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Group-based patient education via videoconference: A scoping review

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ABSTRACT

Objectives: To summarize recent evidence on the feasibility, acceptability, and effectiveness of videoconference (VC) group-based patient and caregiver education.
Methods: Systematic searches of the literature were conducted. Data was extracted on the characteristics of the studies and interventions and on the feasibility, acceptability, and effectiveness of the interventions.
Results: From 12,570 hits, 65 studies were eligible for inclusion. Their results confirmed previously identified tendencies of high feasibility and acceptability of VC group patient education, and improved health outcomes. However, evidence of effectiveness is limited, and the quality of studies is varied. Several patient and caregiver groups also remain under-researched. Only four studies stated that facilitators were trained in using VC-technology.
Conclusion: VC group-based patient and caregiver education is feasible and acceptable and may improve health outcomes for participant patients and caregivers. However future research should increase the number of high-quality randomized controlled trials to establish the effectiveness of VC group-based education for several groups of patients and caregivers. Studies of the training of facilitators is also warranted.
Practice implications: The results suggest that interventions should be more accessible. An overview of the recent evidence may also stimulate the development and evaluation of VC group-based patient and caregiver education.

1. Introduction

Videoconference (VC) technology has received increased attention as an innovative way to provide patient education and health care services for people with chronic or long-term conditions and their caregivers [1,2]. Patient education includes "the process of influencing patient behavior and generating the changes in knowledge, attitudes and skills needed to maintain or improve health" [3-5]. VC-technology is considered highly relevant for improving accessibility, reducing costs of care and has increasingly been employed to facilitate patient education interventions such as caregiver support programs and self-management programs, in particular during the COVID-19 pandemic [6,7]. Today, health authorities in several countries promote the use and normalization of VC with patients and caregivers in a wide range of contexts [8] and providers and patients have adopted a more positive attitude towards the use of VC [9].

Advantages of the audio-visual format have been highlighted, including the positive interactions between patients and between patients and health care providers [10]. Interacting with and learning from people in a similar situation may contribute positively to social support

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and personal self-management [11]. Facilitators also benefit from the face-to-face contact offered by VC as it gives them access to verbal and non-verbal cues, allows them to build rapport with patients and caregivers, and give constructive feedback and responses to foster a change in lifestyle and behavior [12].

Studies indicate positive outcomes of participating in patient education interventions, such as enhanced social support, physical and mental health outcomes, and improved quality of life [10]. Studies also suggest that patient education leads to health care improvements, among them better access to health services and cost-effectiveness [13]. Banbury et al. [5] summarized 17 studies published between 2000 and 2016 on the feasibility, acceptability and effectiveness of facilitator-led VC group patient education and social support in a home setting. The review suggests that while interventions seem to be feasible and acceptable to participants, it is difficult to assess intervention effectiveness due to a lack of studies with experimental designs. Furthermore, although most studies found positive associations with health outcomes, effect sizes of interventions varied greatly and were generally small in magnitude. Another study by Mallow et al. [14] summarized 27 studies on the outcomes of VC patient education for people with chronic conditions dwelling in community settings. Although the interventions were largely feasible and effective, only a few studies were randomized controlled trials. Both reviews conclude that despite a growing research database on VC in the last decades, evidence on effectiveness is difficult to assess because of few randomized controlled trials and small samples.

Most publications on VC patient education explore text-based or individual video consultation, therapy, or education; far fewer have explored VC group-based patient education [2,15]. Although the number of published studies of group-based interventions has increased in recent years, the development of the field has not been systematically scrutinized (9).

An updated review is needed to gain new and deeper insight into group-based VC interventions for several reasons. First, due to the rapid development in the field, and the technical advances forced by the COVID-pandemic, we expect to find more studies focusing on a broader range of chronic conditions compared to previous reviews. Second, technological advances are expected to reduce reports of technological difficulties in the delivery of intervention. In turn, these advances should improve attendance, retention, and satisfaction with the interventions. Third, considering the expansion of research in recent years, it is important to assess whether there has been an increase in randomized controlled trials with larger samples compared to feasibility studies. Fourth, a review can confirm trends concerning improved patient and caregiver outcomes among participants detected in previous research. Given the expansion of digital health interventions observed in the past decade and especially after COVID-19, we also expect that facilitators have gained more clinical experience delivering online services using VC technology.

Therefore, this scoping review aimed to summarize evidence from empirical studies published over a seven-year period regarding VC group-based patient education interventions for patients with chronic or long-term conditions and caregivers.

More specifically, the following research questions are explored in this review:

1. What origins, study aims, designs, measures and outcomes are described in the literature?
2. Which VC group patient education interventions are described, in terms of target group, facilitator, technological support, intervention location, duration and intensity?
3. Which feasibility, acceptability, and effectiveness or efficacy outcomes are associated with interventions for the target groups?

2. Method

To identify types of evidence in the field, explore how research on VC group-based patient education is conducted and identify gaps in the knowledge base, we chose to conduct a scoping review. These are typical scoping review purposes [16]. As opposed to a systematic review, we do not aim to provide a synthesized answer to a particular question but to produce a broad characterization of key issues regarding the extent, range, and nature of research activity in the field. In conducting the review, we applied the methodological five-stage framework described by Arksey and O'Malley [17] and Levac et al. [4]. We followed the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) guideline and checklist [18] and used the Mixed Method Appraisal Tool (MMAT) to conduct a quality appraisal of the articles [19].

2.1. Stage 1: identifying the research questions

In the first stage, research questions were developed and articulated by the research team. The team members included researchers, health professionals with experience of conducting patient education and individuals with experience as users of health care.

2.2. Stage 2: identifying relevant studies

Systematic searches were conducted by a research librarian (who also removed duplicates) in the following databases for articles published between January 2015 and May 2022 (Date of search: 25 May 2022): MEDLINE, EMBASE, APA PsychINFO, Cochrane Database of Systematic Reviews, Cochrane Center Register of Controlled Trials and CINAHL. In each database, searches were conducted for a range of words and concepts, alone or in various combinations, related to the main subject: *chronic disease*, *videoconferencing* or *telehealth* and *group process* or *group structure*. The search strategy was developed by the research team in close dialogue with the research librarian. Words and concepts used in the database searches are provided in Appendix A. Search results were exported into Covidence and EndNote for screening and reading in full text.

The entire research team was involved in discussions to clarify the inclusion and exclusion criteria. These criteria were pilot tested on a random sample of 25 abstracts by coauthors AV, MH and OBK. The purpose was to clarify the criteria prior to the main screening process involving the entire team. In Table 1, a summary of inclusion and exclusion criteria is provided.

2.3. Stage 3: study selection

After removing duplicates and clearly non-relevant studies, abstracts and full-text articles were screened by two research team members (coauthors) independently. Through dialogue, coauthors achieved consensus on which studies to include or exclude in cases of differences in opinion. To identify a larger corpus of relevant studies, a snowball search was conducted by the first author on the reference list of the included studies. At least two authors independently read the studies in full text. In cases of disagreement between coauthors, consensus was reached through discussion. The quality appraisal was conducted by two coauthors independently of each other and in cases of disagreement consensus was achieved by dialogue (see Appendix B).

2.4. Stage 4: charting data

In step four, data on the characteristics of the studies (origin, study aims, design, measures, outcomes. ie, research question 1), characteristics of the interventions (target group, facilitator, technological support, location, duration, and intensity, ie, research question 2) and feasibility, acceptability, and effectiveness or efficacy (ie, research question 3) were charted in duplicate by AV and ARA and described in a matrix using Microsoft Word (see Appendix C). Drafts of the matrix (charting form) were discussed among the coauthors AV, ARA, MH and

Table 1
Inclusion and exclusion criteria.

Study characteristics	**Inclusion criteria**	**Exclusion criteria**
Publication	Peer reviewed primary study, journal article	Not peer reviewed/not primary study/not journal article (ie, reviews, protocol study, Ph.D. dissertation, conference abstracts)
Language	English publication	Non-English publication
Publication year	Published in 2005 or later	Published prior to 2005
Study aim	Feasibility and/or acceptability and/or effectiveness/efficacy of intervention	Not feasibility/not acceptability/not effectiveness or efficacy of intervention
Intervention characteristics	**Inclusion criteria**	**Exclusion criteria**
Target group	People with chronic illness or caregiver to people with chronic illness (including somatic disease, injury, physical or intellectual disability or disorder and drug addiction and long-covid patients, with no age limitation)	Not chronic illness/not caregiver to a person with chronic illness/not aimed at patients or caregivers alone (eg, family intervention)
Videoconferencing	Synchronic interventions	Asynchronic interventions
Delivery format	Group patient intervention	Individual patient intervention only
Facilitator	Health professional facilitator	Non-professionals (eg, peers)

OBK to ensure that the items were clearly described. Consequently, we decided to use feasibility, acceptability, and effectiveness as headings in the matrix to make the result column easier to read and summarize. While feasibility concerns the degree to which an intervention can successfully be used or conducted within a given setting [20], acceptability refers to the perception among stakeholders of whether a treatment or innovation is agreeable, palatable, or satisfactory [20]. We limited the extraction of data to attendance and retention/attrition rates associated with the interventions (feasibility) and participants' degree of satisfaction and/or whether they experienced benefits from the intervention or program (acceptability). These feasibility and acceptability measures were most often reported in the included studies and therefore extracted in our review to allow a systematic cross-study comparison. Effectiveness or efficacy of VC patient education is defined as "the impact of an intervention on important individual outcomes, including potential negative effects, and broader impact including quality of life and economic outcomes; and variability across subgroups (generalizability or heterogeneity of effects)" [21]. Effectiveness or efficacy can be determined by studies using experimental or quasi-experimental methods alike [21]. We also added author conclusion in the matrix to clarify author statements on major conclusions and future research needs.

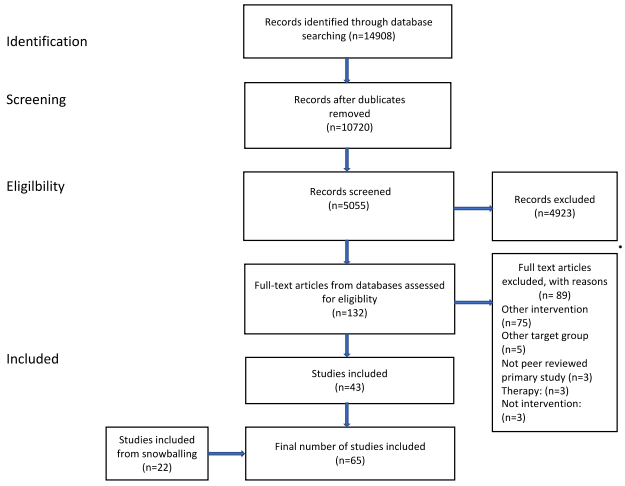
2.5. Stage 5: collating, summarizing, and reporting results

Subsequently, the study information was collated, summarized, and reported in the result section. Results from the studies on the feasibility, acceptability, and effectiveness of participation in the interventions were compared.

3. Results

3.1. Screening

Database searches yielded a total of 14,908 records, of which 4188 were duplicates. The abstracts of the remaining 5055 studies were screened independently by at least two research team members (co-authors), and 4923 were excluded because they did not fulfil the inclusion criteria. A total of 132 studies were downloaded for full text screening and evaluated independently by two research team members. As a result, 43 were included and 89 were excluded, most often because they investigated other interventions (not VC-interventions) or target groups (eg, students or health personnel). After screening the reference lists of included studies by title and publication year through a snowball search, 42 studies were selected for further scrutiny, of which 22 were included. A total of 65 articles from databases and reference lists were included in this review (see flow diagram).



3.2. Characteristics of the studies

3.2.1. Country of origin

Most studies – 29 of 65 – originated from the United States [22–50], followed by 18 from Australia [51–68], 5 from Canada [11,69–72], three from the United Kingdom [73–75], two from Germany [76,77] and one each from Greece [78], Norway [77], Turkey [78], Spain [79], Iran [80], Finland [81], India [82], and the Netherlands [83].

3.2.2. Study aim

Regarding study aim, 31 (47 %) of the included studies investigated the feasibility, acceptability, and preliminary effectiveness of interventions [22,24,25,27,32–34,36,37,38,42,43,47–49,53,56,64–68,70,71,72,75,77–79,84,85]. Twenty studies (30 %) explored effectiveness only [11,23,26,28,39,40,50,52,57–59,61,62,69,76,80–82,86], whilst 14 (21.5 %) of the included studies only explored the feasibility and/or acceptability of interventions [29,30,35,41,44–46,51,54,55,60,63,73,74].

3.2.3. Design

Thirty-eight of the 65 studies were quasi-experimental, of which 26 were single-arm pre-post studies [11,22,24,25,27,29,34,41,42,44,52,54,55,58,59,67–72,75,78,79,84,87] eight were multiple arm pre-post studies [32,33,38,47,53,56,80,83] and four were cross-sectional studies [30,35,45,51]. Twenty-five studies were randomized controlled trials (RCTs) [23,26,28,36,37,39,40,43,46,48–50,57,60–66,76,77,81,82,86] (three RCTs did not report findings on effectiveness or efficacy) and two used a qualitative design [73,74]. Among the 65 included studies, 25 were pilot studies. The sample size of the included articles ranged from 4 to 213 participants, averaging 30 participants per study. Of the 65 studies, eight included more than 50 participants and 11 included fewer than 10 participants. Most studies, 33 in number, had 30 or fewer individuals participating.

Most of the included studies, 51 of 65, assessed effectiveness or outcomes of participation, of which 29 were pre-post studies, 18 collected follow-up data between 2 and 6 months after the completion of the intervention, three included follow-ups at 12-months, and 1 a 21-month follow up.

3.2.4. Outcomes and measures

Several outcomes and measures were used to investigate the effectiveness or efficacy of participation in the interventions. Table 1 presents the distribution of outcomes assessed by the 51 studies, along with some examples of the measures that were used and examples of included studies that used these measures. .

3.2.5. Quality appraisal

The appraisal showed that the quality of the included studies varied. The 25 RCTs satisfied most of the methodological quality criteria outlined in the MMAT manual. Six of the RCTs describe being single-blinded. Two compared the intervention with an active online control group stating that participants were blinded to group allocation, ie, were unaware of which active treatment arm they were allocated to. Two studies with waitlist control groups state that participants were blinded to the allocation but provide no information on how blinding occurred or was made possible. In the latter studies, the statistician was blinded until all analyses were completed. All other studies were non-blinded trials or did not provide information on blinding and ten were pilot studies. The appraisal of the 38 non-randomized studies also showed mixed results. Only eight studies included control groups in their design and most single-arm studies did not use appropriate methods such as stratification, regression, or standardization to control or adjust for possible effects of confounding variables in the results assessments. The two included qualitative studies had high methodological quality.

3.3. Characteristics of the interventions

The interventions had diverse target groups, facilitators, and locations, were of different duration and intensity and presented variable information on IT-support. For further details, see appendix D.

Table 2
Outcomes, number of studies and measures.

Outcomes and number of studies	Examples of measures
• Mental health (n = 31)	• Hospital Anxiety and Depression Scale (HADS) [37] • Patient Health Questionnaire-8 (PHQ-8) [49] • Depression Anxiety Stress Scale-21 (DASS-21) [67] • Center for Epidemiological Studies Depression Scale (CES-D) [68]
• Physical health (n = 12)	• Weight (smart scales), Body mass index and blood pressure [21] • Salivary cortisol levels [48] • Eight-item Stanford Disability Scale [11]
• Coping (n = 12)	• Bandura's exercise self-efficacy scale (BESES) [35] • Revised Scale for Caregiving Self-Efficacy [20] • The health education impact questionnaire (heiQ) [51]
• Quality of Life (n = 10)	• Short Form 36 [20] • PROMIS Pain Interference Scale (interference daily life) [47] • The Functional Assessment of Cancer Therapy-Ovarian Form (FACT-O) [40]
• Behavioral outcomes (n = 9)	• Three Factor Eating Questionnaire-18 [81] • Medication Adherence Report Scale (MARS) [83] • Self-reported physical activity, diet, alcohol and smoking [22]
• Social outcomes (n = 8)	• Social identification (12-item measure) [11] • Friendship scale [35] • Social Provisions Scale (SPS) [40]
• Health economic outcomes (n = 3)	• Cost comparison to Diagnosis-Related Group (DRG) reimbursement for outpatient rehabilitation [79] • Cost and real-world functioning (study-developed items) [61] • Emergency Department visits and hospitalization [33]
• Cognitive outcomes (n = 2)	• The health literacy questionnaire (HLQ) [51] • Perceived cognitive function (Functional assessment of cancer therapy-cognition perceived cognitive impairment subscale)[40]

3.4. Feasibility, acceptability, and effectiveness or efficacy of interventions

Included studies described findings on feasibility, acceptability as well as effectiveness or efficacy.

25 studies reported on feasibility. In Table 3, a summary of findings on attendance and retention/attrition rates is presented.

35 studies explored measures of acceptability. Table 4 sums up findings on acceptability, ie, satisfaction and benefits of participation.

A total of 51 of the included 65 studies gathered data on the effectiveness or efficacy of interventions, of which 41 (80 %) found positive interaction effects post intervention or at follow-up for patients and caregivers. Table 5 provides an overview of findings on the outcome areas where interventions led to significant changes.

Of these 41 studies which detected positive interaction effects, 17 were single arm pre-post studies [11,24,25,27,34,42,51,58,59,68,69–72,75,78,79,85], eight were multiple arm pre-post studies [32,33,38,47,53,56,80,83] and 16 were randomized controlled trials [23,28,39,40,43,48,50,57,61,62,66,76,77,81,82,86].

Looking exclusively at the 16 randomized controlled trials (RCTs) we identified studies exploring interventions for patients with obesity [23,26,77], heart failure [35], cancer [40,46,60,61,66,81,86], systemic sclerosis [60], multiple sclerosis [47], bereaved patients [74], adolescents with a cardiac diagnosis [37] and adolescents with chronic conditions [48]. Caregiver interventions targeted caregivers of children with autism [41], learning and attentional disabilities [46], obesity [34], cancer [57,63–65], type 1 diabetes [26], as well as adult caregivers of post-discharge COVID-19 patients experiencing physical and mental complications [80].

The 16 studies found statistically significant effects, including effects on mental health [28,39,40,43,48,50,57,62,66,76,77,81,82], coping [61,66], physical outcomes [23,43,50], quality of life [66,77], social support [48,86] and behavioral outcomes [86]. Five of those showing significant effects were pilot studies. Nine of the 16 compared the intervention to a waitlist group [23,28,43,48,57,62,76,82,86] and seven used active control groups, either in-person controls [39,50,77,81], another VC control [66] or both other VC and waitlist controls [40,61]. VC interventions and in-person controls were equally effective with few or no significant differences between them. Compared to waitlist controls, included studies suggest significant effect of the intervention on one or several outcomes (primary or secondary) measured post-intervention and/or at follow up. Only seven of the 16 publications included measures on effect size [43,48,50,57,66,76,77] (all used Cohen's d as measure). The results suggest a medium to large effect size (Cohen d range 0.43–1.20). In three studies, changes in outcomes were

Table 3
Feasibility.

Feasibility (n = 25)	Findings	References
Attendance (n = 25)	The majority, 24 of 25 studies, found acceptable or high rates of attendance and a high degree of participation in the intervention sessions. In summary, 64 %–98 % attendees participated in over 60 % of the sessions.	[22,24,25,27,29,34,36–38,41,42–46,48,49,53,56,58,66,68,70,71]
	Poor attendance rates were reported in one of the 25 studies	[52]
Retention/attrition (n = 21)	In 20 of 21 studies high retention/low attrition rates were identified. The studies reported a retention rate of >80 %.	[22,24,27,29,30,32,44,45,48,49,51,55,56,60,63,66,71,72,75,77]
	Low retention/high attrition was found in one of the 21 studies. 31.6 % completed the intervention	[63]

Table 4
Acceptability.

Acceptability (n = 35)	Findings	References
Overall satisfaction (n = 19)	In all 19 studies, the majority of participants (>80 %) reported being satisfied or highly satisfied with the intervention	[27,30,33,34,38,44,46,49,54,56,59,64,66,67,72,84]
	In three of the 19 studies, a few participants struggled connecting to other participants	[56,64,67]
Satisfaction with specific intervention features (n = 11)	Highly rated intervention features included: 1. sharing experiences with other in a similar situation 2. facilitators´abilities to provide constructive group interactions 3. computer and VC-software use 4. content, duration, and intensity 5. feedback from facilitators 6. practicing coping skills (n = 11)	[36,54–56,64,67,71]
	In four of the 11 studies participants experienced too many technical problems	[42,67,73,85]
Participant-reported benefits (n = 31)	Participant benefits included: 1. social support (n = 8) 2. coping abilities (n = 5) 3. empowerment (n = 4) 4. knowledge (n = 2) 5. motivation for change (n = 2) 6. quality of life (n = 1) 7. reduced burden by 8. saving time and travel (n = 6)	[35,37,39,42,48,51,53,73] [33,35,44,48,60] [53,74,75,84] [29,44] [35,52] [57] [20,28,40,71,82,84]
	In two of the 31 studies, a few participants reported feeling fearful and overwhelmed, and had difficulties connecting with other group members.	[20,42]
	In one the 31 studies, 6 of 14 cancer patients indicated that some aspects of videoconference delivery had negatively impacted their intervention experience	[65]

Table 5
Effectiveness/efficacy.

Effectiveness/ efficacy (n = 41)	Findings	References
Mental health (n = 24)	Most studies (24 of 31) found improvement on mental health outcomes, eg, significant reduction of anxiety and depression scores in target group	[11,25,27,28,39,40,42,43,48,50,56,57,62,66,68,69,70,72,76,78,80,81,82,87]
Social outcomes (n = 7)	Most studies (7 of 8) found positive social outcomes, eg, social skills, communication or social networks was significantly enhanced	[34,48,52,58,59,75,86]
Physical health (n = 7)	Most studies (7/12) found significant improvement on physical health measures, eg, body mass index and blood pressure	[11,23,32,33,38,43,50]
Coping (n = 5)	Less than half (5 of 12 studies) showed improvement on measures of self-efficacy and coping skills	[11,31,43,61,66]
Quality of life (n = 5)	Half of the studies (5 of 10) found significant improvement on quality-of-life measures	[38,58,66,77,79]
Behavioral outcomes (n = 3)	A third of studies (3 of 9) found positive behavioral outcomes such as medication adherence and increased physical activity	[69,81,86]
Cognitive outcomes (n = 2)	Two of two studies detected improvement in health literacy and perceived cognitive function	[45,51]
Health economic outcomes (n = 1)	One of three studies found significantly lower rates of ED visits in the intervention group compared with patients receiving usual care	[33]

reported as clinically significant [40,66,81].

4. Discussion and conclusion

4.1. Discussion

In this scoping review, we have summarized knowledge from 65 studies on the feasibility, acceptability, and effectiveness of group-based videoconference education for patients and caregivers published between January 2015 and May 2022. In general, the studies were published in the Anglosphere, particularly the United States (29 of 65), or European countries. Although there are exceptions, the United States is still overrepresented in publications concerning use of VC for health interventions – as detected in previous studies [14].

Thirty-one of 65 (47 %) included studies collected data on feasibility, acceptability, and effectiveness, followed by 20 (30 %) exploring effectiveness alone and 14 (21 %) exploring feasibility and acceptability. Compared to previous reviews [5,14], our review shows a decline in studies assessing feasibility and acceptability only, and an increase in studies that include analysis of effectiveness or efficiency.

We further found that a large variety of patient and caregiver groups have been targeted in research published during the last seven years. As described earlier (see appendix D), various groups of patients were investigated in 44 of the included studies. At the same time, however, the number of studies targeting several large groups, such as patients living with obesity, diabetes, or COPD, is low. Hence, knowledge of how to provide VC group education and support to these and other groups is lacking, especially to children and adolescent with different health conditions. Only nine of 44 studies on patient interventions involved young people.

Such knowledge is equally important for caregiver groups. In fact, none of our included studies targeted children and adolescents as caregivers for siblings or parents with long-term conditions. This omission is critical. For instance, adolescent caregivers of mentally ill parents report being emotionally exhausted and feeling alienated from their peers [87]. As is argued, VC group education and other digital interventions hold large potential to improve the situation of children and adolescent caregivers, who are often hard to reach [87]. Thus, in general terms, more studies and in particular RCTs are needed to establish the effectiveness of VC group education for several patient and caregiver groups.

The results of our review further demonstrate that interventions were largely led by health and mental health professionals or by facilitators certified as diabetes educators, counsellors, or coaches. Although several of the facilitators had relevant professional experience, only four studies stated that facilitators were trained in using VC technology. Despite an increased emphasis on the importance of educational and technological knowledge and skills to provide high quality health care [88], this competency is given scant attention in the studies we have summarized.

The lack of attention to competency is also seen in related fields [89]. Within online group therapy, for example, facilitator training and guidelines on how to conduct online group sessions is warranted [90]. As argued by Weinberg [90], there is a need to further explore the lack of quality on several dimensions in the facilitation of online group therapy facilitation. He suggests that more research must be carried out both on

what constitutes important elements in group therapy and on the training of therapist facilitators.

Studies in our review further stress the importance of technological and educational competence in facilitating group cohesion and interaction for participant benefit and satisfaction. Acceptability data on program features suggested that participants appreciate professionals contributing to constructive group interactions [36,54–56,64,67,71]. Another included study [11] indicates that group facilitation is an important mediator for interventional effect. It finds that augmenting group identification among participants in VC groups predicts self-efficacy on a group and individual level which, in turn, is significantly associated with better physical and mental health outcomes. Thus, the quality of the interaction between participants and between participants and facilitators seems to contribute to positive interventional effects and should be given more attention in future research.

We also found that information on the degree and type of technological assistance provided to patient and caregiver participants varied greatly. Studies described participants receiving information on how to download, access, and use the technology beforehand, being engaged in testing essential elements prior to commencing the program or on-site support in and between sessions. However, as many as 25 studies did not provide any information on the IT support provided. No pattern could be identified on whether certain degrees and types of assistance were positively associated with patient or caregiver outcomes of participation, but most studies reporting on one or several kinds of assistance indicate positive intervention effect. Acceptability data reported in the studies also suggest that participants found the computer program or videoconference platform easy to use [22,45,46,63,64,68,71,79], and that facilitators or assistants were helpful with technological issues [22]; few reported having technical problems [42,73,85].

Despite reports of challenges with digital health interventions [91], most of the included studies reported high attendance and retention rates for patient and caregiver VC patient education interventions. In addition, participants reported being satisfied or highly satisfied with the interventions and with the personal benefits of participation. Thus, our review confirms positive trends described in previous publications and strengthens the evidence on feasibility and acceptability of group-based VC patient education.

Findings on the effectiveness or efficacy of interventions align with tendencies depicted in previous research of improved health outcomes for several groups of patients and caregivers. Evidence on these tendencies is further strengthened in our review, which has included a larger number of studies compared to previous publications. We found that 41 of 51 studies (80 %) detected statistically significant changes in scores either right after an intervention (compared to baseline or a control group) or at follow-up on outcomes such as mental health, coping abilities, and quality of life. There is also a clear tendency that more RCTs reporting on effectiveness have been published in recent years. For comparison, whilst 26 % (7/27) of studies described in a review by Mallow et al. [14] and 12 % (2/17) of studies described by Banbury et al. [5] were RCTs, 43 % (22/51) of our included studies were RCTs reporting on effectiveness. At the same time, a large share of the quasi-experimental studies are single group pre-post studies, which makes it difficult to determine whether observed effectiveness or efficacy is caused by the intervention or by other factors such as history, maturation, or testing. Only a few studies accounted for confounders in the design and analysis of data. In addition, although the majority of the RCTs in our review identified positive interventional effect for several outcomes, some had mixed results with no effect on one or several outcome measures. Amongst the eleven studies comparing interventions to waitlist controls, seven found significant differences on primary outcomes [23,28,40,43,48,57,82]. Among those four studies that did not detect effects on the primary outcomes, three studies found effect only on one of several secondary outcomes [61,76,86]. Findings on follow-up results are still limited, with only six studies reporting on long-term efficacy and with mixed results. Three studies identified significant differences between intervention and waitlist at follow ups [40,48,62], three failed to find differences over time [61,76,86] and five did not include follow-up assessments [23,28,43,57,82]. Furthermore, all eleven studies used small or relatively small samples and acknowledge that the studies were underpowered to identify differences in effect between the intervention and waitlist group. In fact, only a few of the total 65 included studies in our review included power analysis or sample size calculations, which limit the conclusions that can be drawn from the included studies.

Thus, despite an increase in the number of effectiveness or efficacy studies indicating positive health outcomes for patients and caregivers, evidence on effect is still limited. Although there seems to be an effect of VC-interventions compared to waitlist control groups in some cases, there is no evidence to suggest that VC-interventions are more efficacious than in-person control groups. In the future, several multicenter studies with larger sample sizes should be conducted to assess effects and effect sizes of interventions more accurately and thus provide a broader generalizability of results.

We acknowledge that our study holds limitations. We have not critically appraised the risk of bias in our review. Although few consider this as mandatory in a scoping review, bias can occur when selecting studies. To reduce selection bias, at least two authors independently assessed the abstracts and articles in full text. Furthermore, unlike systematic reviews which typically aim to answer certain research questions on the effect of RCTs, we have not conducted a meta-analysis of effect estimates. Finally, despite using an array of synonyms in database searches to maximize the identification of relevant studies, the search terms used were not exhaustive. The supplementary snowball search identified several additional studies for inclusion. However, our search strategies may not have detected all relevant published studies.

4.2. Conclusion

VC group-based education for patients and caregivers is feasible and acceptable and may improve several outcomes for both groups. Although our study found that the research field has undergone a positive development over the last 5–7 years, future research should increase the number of high-quality randomized controlled trials with larger samples to establish the effectiveness of VC group education for several groups of patients and caregivers, especially children and adolescents. Research should also investigate the training of facilitators and identify the important elements in the facilitation of VC group education.

4.3. Practice implications

Due to the results of the studies assessed, this review suggests that VC group patient education interventions should be more accessible. A variety of VC group interventions – of different lengths and intensities – could be implemented to improve health outcomes for patients and caregivers of people with long-term illness. Our overview of the research in this area, describing the content, design, outcome measures and results of studies across intervention types and target groups, may be useful to the practice field. Drawing on knowledge from the literature may stimulate the development and evaluation of programs. These interventions or programs may be offered in specialist and community health care settings for patients and caregivers who experience economic and geographic barriers to participation. A review of the literature may also stimulate training interventions for facilitators aiming to increase their self-confidence and competencies in delivering efficient VC group patient education.

CRediT authorship contribution statement

Alvheim Anita Røyneberg: Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis,

Data curation, Conceptualization. **Cleal Bryan Richard:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Hilde Strømme:** Methodology, Formal analysis, Data curation. **Westermann Karl Fredrik:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Haaland-Øverby Mette:** Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kristjansdottir Olöf Birna:** Writing – review & editing, Writing – original draft, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Vågan Andre:** Writing – review & editing. **Fredriksen Kari:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Eriksen Alison Axisa:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Varsi Cecilie:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Stenov Vibeke:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Ingadóttir Brynja:** Writing – review & editing, Writing – original draft, Validation, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2023.108026.

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