Design of digital mental health platforms for family member co-completion: Scoping Review

Ellen T Welsh, Jennifer E McIntosh, An Vuong, Zoe C G Cloud, Eliza Hartley, James Boyd

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Abstract

Background: The COVID-19 pandemic placed additional mental health burden on individuals and on families, resulting in widespread service access problems. Digital mental health interventions suggest promise for improved accessibility. Recent reviews show emerging evidence for individual use and early evidence for multi-users. However, attrition rates remain high for digital mental health interventions and additional complexities exist when engaging multiple family members together online.

Objective: As such, this scoping review aimed to detail the reported evidence for platforms designed for family use, with a focus on the build and design characteristics that promote accessibility and engagement and enable co-completion by families.

Methods: A systematic literature search of MedLine, EMBASE, PsycINFO, Web of Science and CINAHL was conducted for articles published in English Language from 2002 to March 2024. Eligible records included empirical studies of digital platforms containing some elements designed for co-completion by related people as well as some components intended to be completed without therapist engagement. Platforms were included where clinical evidence had been documented.

Results: Of the 9,527 papers reviewed, 85 met eligibility criteria. Twenty-four (24) unique platforms designed for co-use by related parties were identified. Relationships between participants included couples; parent-child dyads; family caregiver-care recipient dyads; and families. Common platform features included the delivery of content via structured interventions with no to minimal tailoring or personalisation offered. Some interventions provided live contact with therapists. User engagement indicators and findings varied and included user experience, satisfaction, completion rates and feasibility. Our findings are more remarkable for what is absent in the literature than what is present. Contrary to expectations, few studies reported any design and build characteristics that enabled co-participation. No studies reported on platform features for enabling co-completion, or considerations for ensuring individual privacy and safety. None examined platform build or design characteristics as moderators of intervention effect and none offered a formative evaluation of the platform itself.

Conclusions: In this early era of digital mental health platform design, this novel review demonstrates a striking absence of information about design elements associated with the successful engagement of multiple related users in any aspect of a therapeutic process. There remains a large gap in the literature detailing and evaluating platform design, highlighting a significant opportunity for future cross-disciplinary research. This review details the incentive for undertaking such research, suggests design considerations when building digital mental health platforms for use by families, and offers recommendations for future development including platform co-design and formative evaluation.

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Introduction

Family mental health

Normatively, mental health disorders impacted more than 1 billion people globally in 2016 [1]. The COVID-19 pandemic brought further substantial impact on mental health, placing increased demand on mental health services [2]. Mental health is inherently relational [3, 4] and family members and partners are inevitably impacted by an individual's mental health challenges [5]. During COVID, markers of heightened family stress included rising rates of family violence [6], increased parenting stress [7] and observed rates of maladaptive parenting practices, including neglectful, harsh, and coercive parenting [8-10].

There is a strong evidence base for family and systemic interventions for child- and adult-focused mental health challenges. Family participation supports members of the family to safely contribute to individual recovery and to improved relationships [11-13] and can be more beneficial than individual work [14-16] and family educational interventions [17]. In addition, parent-involvement in interventions for childhood behavioural [18] and adolescent anxiety disorders [19] has been shown to be beneficial and contributes to positive long-term outcomes.

Digital mental health

The World Health Organisation has emphasised the significant potential of digital mental health interventions (DMHI) in expanding reach and access to services [20]. Such DMHI have shown promise in reaching underserved populations [21] leading to improved management of symptoms in individuals [22], particularly youth under the age of 25 [23, 24]. There is growing meta-analytic evidence for positive mental health outcomes of digitally-delivered versus in-person individual treatment, for example in the field of cognitive behavioural interventions [25]. With rapid developments in technology, research interest is expanding, with most of the literature so far focussed on DMHI for individuals. For example, a review of systematic reviews of digital interventions for mental health and wellbeing (with no limitations placed on population) conducted in 2021 identified 246 systematic reviews published between 2016 and 2021, all of which reviewed digitally delivered mental health interventions for individuals [26].

Beyond those designed for individuals, two first generation reviews of dyadic (caregiver and care recipient) [27] and couple targeted DMHI [28] suggest that DMHI can decrease barriers and improve timely access and outcomes for distressed relationships. However, research into DMHI for *families to access together* is as yet undeveloped.

Despite growing evidence and regardless of population targeted, retention rates for DMHI remain low, limiting their ultimate impact [29-32]. Among other factors, interface ease of use has been identified as a barrier to DMHI retention and engagement by individuals [25, 33]. Is it likely that similar (or possibly even greater) barriers for family engagement in the digital mental health space exist. Given the fundamental differences in the approach and focus for family and relational interventions when compared to interventions designed for individuals [3, 34], it is likely that there are unique factors to consider when designing DMHI for use by families. This might include considerations for individual user privacy and ways in which the platform allows multiple people to contribute to and especially to co-complete activities, such as shared goal setting. Thus, it would be ill-founded to extrapolate results from studies of interventions designed for use by individuals, and assume similar platform interaction values for families. The need for further research specific to the design of DMHI for family use is clear.

Design of digital mental health interventions for families

The question, therefore, arises about what an effective DMHI for family use might look like. Given computers and tablets are designed for use by individuals, DMHI intended for co-completion by family members may utilise different platform and interface features to support and sustain family engagement. No review to date has examined evidence for design and build characteristics that promote co-completion usability, including improved engagement and accessibility.

In that light, this review aimed to synthesise the available evidence regarding the build and design characteristics that enable co-completion and discuss reported indicators of user engagement of platforms designed for such use, namely: usability, satisfaction, acceptability, and feasibility. In digital mental health literature, these user engagement indicators measure the ability of a platform to engage and sustain users. There is, however, a notable lack of agreement of both definition and measurement of the construct of "engagement", which can lead to inappropriate selection, presentation and interpretation of user engagement indicators across studies [35]. As such, a scoping review was conducted and we adopt the definition of user engagement as outlined by Perski et al: *"Engagement with [Digital Behaviour Change Interventions] is (1) the extent (e.g. amount, frequency, duration, depth) of usage and (2) a subjective experience characterised by attention, interest and affect"* [36].

In this scoping review, we differentiate the term "platform" from the term "intervention". We define "platform" as the tools, infrastructure, and technical foundation behind the delivery of an intervention, including interface characteristics such as the design, layout, and delivery mode. We define "intervention" as the mental health related content that is delivered via the platform. This review sought to understand i) the design and functionality characteristics that enable the effective engagement and co-completion of a family oriented DMHI and ii) whether these elements moderate the effect of the intervention on mental health or relational outcomes. To distinguish effective platform contributors to engagement from elements pertaining to intervention content, we selected only those platforms housing interventions of established clinical efficacy (which we defined as any intervention that had at least one study reporting a significant improvement in a mental health or relational outcome). Additionally, it is expected build characteristics may vary by population, and given there is no uniform family composition, this review scoped platforms designed for co-completion by any family relationship type, including couples, family sub-systems and whole of family.

Method

Search strategy

To identify studies reviewing platforms delivering clinical interventions designed for co-completion by families, a systematic search was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA; [37]). A comprehensive electronic literature search for articles published in English was conducted in the following databases: MEDLine, EMBASE and PsycINFO via the OVID platform, CINAHL via the Ebscohost platform, and Web of Science. In line with developments in digital technology, studies were included if they were published in or since 2002. The search was first conducted on 24th June 2022 and additional searches were conducted on 24th November 2022, 21st April 2023 and 15th March 2024.

Eligibility criteria

As advised by the Joanna Briggs Institute's guidelines for conducting scoping reviews [38], the PCC framework was used to define eligibility. *Table 1* displays inclusion and exclusion criteria in line with the PCC framework and contains additional study elements relevant to eligibility criteria.

Table 1 Inclusion and exclusion criteria detailing the PCC (population, concept, context) framework for defining eligibility criteria for scoping reviews and additional study elements

Category	Included	Excluded
Population	DMHI designed for completion by at least two related people together	DMHI designed for completion by individuals; designed for use by related people but no activities were completed together (i.e., completed separately); and DMHI where children were the focus and the parent's role was in assisting their child to participate only
Concept	Platform design elements of DMHI (via a web or smartphone interface), and containing some component that is intended to be completed without therapist or human intervention (i.e., is self-directed by participants)	DMHI where target condition was physical illness, physical activity, and weight management and programs delivered by virtual reality devices, wearable devices, DVD or other non-web-based approaches
Context	Open and included all care settings (e.g., primary care, community) and all jurisdictions and geographic locations	
Study types and design	Empirical studies	Non-empirical studies; grey literature (i.e., non-peer reviewed or unpublished manuscripts)
Publication dates	January 1, 2002 to March 15, 2024	
Publication language	English	

Studies were not excluded where platforms contained additional components involving practitioner

(sometimes referred to in studies as a coach, professional, therapist or staff member) engagement. Further to the inclusion and exclusion criteria outlined in *Table 1*, platforms offering interventions that had no evidence of clinical efficacy (i.e., no identified studies that reported any significant improvements in mental health or relational outcomes) were excluded. Provided that at least one identified study established clinical efficacy for that platform, all studies corresponding to that intervention were then included, whether they reported on clinical outcomes or not. Platforms that met all other inclusion criteria but without established clinical efficacy are presented in *Appendix 1*.

Search and data extraction methodology

Three key search constructs addressed the different elements of the research question: digital intervention; mental/relational health; and population. Results were combined using Boolean operators. Search strategies for each database can be seen in *Appendix 2*. Reference lists of relevant reviews were also screened for potentially relevant studies. Data extraction was completed by two researchers trained in systematic search methodology using a standardised template and discrepancies were resolved by discussion between the two researchers. In cases where it appeared there could be co-completion, but it was not directly specified, the study authors were contacted, and websites were searched.

Screening and selection process

Search results were downloaded into Clarivate EndNote [39] and imported into Covidence [40]. Duplicates were first removed in Endnote and again following import into Covidence. Two researchers screened identified studies at title and abstract level with 20% double-screened. Disagreements were resolved through discussion. Two researchers screened the articles at full text with 20% double screening to determine eligibility against the inclusion criteria outlined above. Reasons for exclusion at full text were recorded.

Data synthesis

Data was synthesised using a narrative approach. Due to high variability in the reporting of outcomes and measurements across studies, a systematic or meta-analytic approach was not possible.

Included articles were grouped by the digital platform used and presented in *Table 2*. Information regarding the authors; the year of publication; the country where the study took place; the population; and associated user engagement indicators were extracted. Significant differences in mental health and/or relational outcomes following digital mental health intervention were indicated. Detail about the platforms was extracted into a separate table (*Table 3*). Also detailed were: the intervention target; relationship between participants; components designed to be completed either self-paced, together, individually, and/or with a professional; tailored components; and any additional key features. Results were categorised and synthesised based on the targeted relationship for the intervention (e.g., couples or families).

Results

Overview

The searches combined yielded 17,765 results. Following removal of 8,238 duplicates in EndNote and Covidence, 9,527 papers were screened at title and abstract level resulting in 9,184 exclusions. 343 full-text articles were reviewed for inclusion with 263 exclusions. Reasons for exclusion included: platform designed for use by individuals (n=154); non-empirical studies (n=55); platform did not contain any self-guided component (n=36); wrong indication (e.g.,, weight loss intervention; n=18) or no identified significant improvement in mental health or relational outcomes (*Appendix 1*; 3). 80 studies were included for data extraction. An additional five studies were identified through reference scanning and included in data extraction, resulting in a total of 85 studies included in this review.
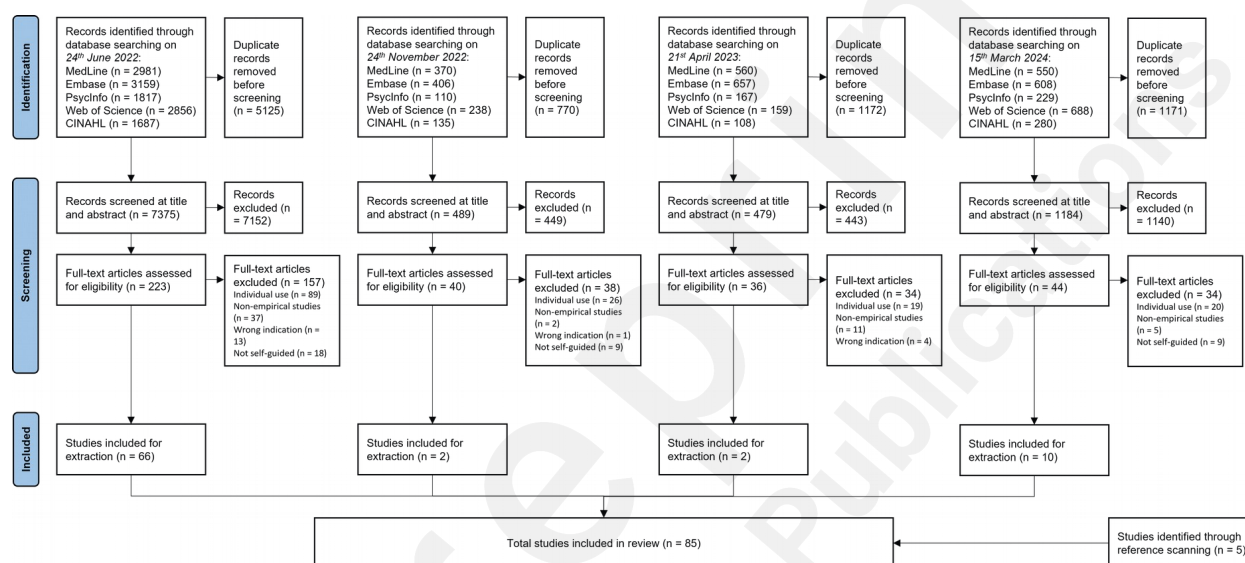

Figure 1 PRISMA-ScR diagram [37] showing inclusion and exclusion of studies at each stage of the review process

The following sections first summarise the studies identified, and then report on characteristics of, and findings related to, the included platforms.

Included studies

Table 2 details the characteristics of the 85 studies, including study type; their population and sample size; usability measures and findings; and an indication of clinical efficacy based on significant improvement in mental health or relational outcomes following completion of the intervention. Of the 85 included studies, data was collected during randomised controlled trials (RCTs; n=63), pilot feasibility studies (n=14), single-arm studies (n=7) and one non-randomised quasi experimental study.

Sixty-three (63) studies were completed in the United States of America (USA), 10 were completed in Canada, four in Australia, two in the UK, two in China, and one each in the Netherlands, Sweden, Japan and Korea. Fifty-two percent (52%) of included studies were published between 2019 and March 2024, while five percent of studies were published in the first five years of the search (2002 – 2006 inclusive), and the remainder (43%) in between these periods.

Table 2 Characteristics of studies meeting eligibility criteria, including: name of the platform examined; study and country; type of study and comparator (where applicable); population, sample size and attrition rate; relational and individual constructs/outcomes; reported user engagement indicators; and corresponding findings.

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes **Relational; Individual**	User Engagement Indicators	Reported findings
4Cs:CRC [41] China	Pilot feasibility trial	Heterosexual couples where one member is experiencing colorectal cancer; 24 couples; 16.70%	Dyadic coping; Cancer-related communication; Self-efficacy; physical and mental health; positive and negative emotions	1. Post-intervention evaluation 2. Feasibility and acceptability	1. Highly rated usefulness, ease of use, satisfaction; all acceptability ratings M>5.2/7. 2. 83.8% retention; 609 session views; M(views per page)=29; M(page views/session/dyad)=3 to 7.
4Cs:CRC [42] China	RCT; online/ face-to-face/ blended/ control	Heterosexual couples where one member has colorectal cancer; 212 couples; 16%	Dyadic coping [a]; Cancer related communication [a]; Marital satisfaction; Self-efficacy [a]; physical and mental [a] health; positive [a] and negative [a] emotions	Not reported	Not reported
CA-CIFFTA [43] United Kingdom	RCT; no treatment	Hispanic (80%) and black (20%) adolescents and their families; 80 parent-child dyads; 27% (intervention)	Family cohesion [a]; family conflict; parenting practices; Adolescent behaviour problems [a]	Not reported	Not reported
C-MBI for YBCS [44] USA	RCT; MBI completed by YBCS only (I-MBI)	Women breast cancer survivors and their male partners; 117 couples; 26% (I-MBI), 38% (C-MBI)	Couple functioning [a] (I-MBI only); Individual level functioning [a]	1. Feasibility and acceptability of YBCS (self-report) 2. Feasibility and acceptability of partner (self-report)	1. 39% requested more contact with peers; 63% would recommend; 77% watched all videos, 90% used supplemental material, 91% completed some or all assignments; rated most useful: mindfulness sessions (80%), yoga (14%), partner interaction (7%); time-constraints most cited reason for not recommending 2. 93% had no desire to interact with peers; 69% would recommend; 69% watched all videos, 89% used supplemental materials, 92% completed some or all assignments; time-constraints most cited reason for not recommending
Cool Kids	RCT;	Children (aged 7-	Anxiety diagnosis [a];	1. Satisfaction	1. 73% parents satisfied

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
Online [45] Australia	Waitlist	12) with anxiety and their parents/caregivers; 95 dyads; 12% to post-treatment and 27% at six-month follow-up	Anxiety scale; Life interference [a] (parent only); Mood and feelings [a]; Strengths and difficulties [a]	2. Completion	or very satisfied; 92% reported helpful; 97% mod or very confident recommending intervention; 64% children 'happy' with intervention; 89% reported helpful or very helpful; 70% mod or very confident it would help a friend. 2. 83% accessed all lessons (M=7.52; SD=1.23; range=3-8); received M=8.8/10 (SD=1.61; range=3-10) calls.
Couple HOPES [46] Canada	Pilot feasibility trial; Pre-post	Couples where one member was a military member, veteran, or first responder with PTSD symptoms; 10 couples; 30%	Relationship satisfaction [a] (partners only); Conflict; PTSD symptoms [a]; Partner's accommodations to PTSD symptoms [a]; Anxiety, distress and quality of life [a]; AOD use	1. Satisfaction (*CSQ*)	1. M_{PTSD} = 3.4/4 (SD = 0.7); $M_{Partner}$ = 3.7/4 (SD = 0.4)
Couple HOPES [47] Canada	Single-arm	Couples where one member was a military member, veteran, or first responder with PTSD symptoms; 17 couples; 35%	Relationship satisfaction [a] (ineffective arguing) PTSD self-report; Partner report of PTSD symptoms; Mental health; Well-being [a] (perceived health); Partner accommodation	1. Satisfaction (*CSQ*)	1. M_{PTSD} = 3.5/4 (SD = 0.6); $M_{Partner}$ = 3.7/4 (SD = 0.3)
Couple HOPES [48] Canada	Single-arm	Couples where one member was a military member, veteran, or first responder with PTSD symptoms; 27 couples; 33%	Relationship functioning [a] (ineffective arguing); Mental health; Well-being [a] (perceived health, quality of life)	1. Satisfaction (*CSQ*)	1. $M_{Partner}$ = 3.7/4 (SD = 0.4)
Couple HOPES [49] USA	Pilot feasibility trial; Pre-post	Couples where one member was a military veteran with PTSD; 15 couples; 27%	Relationship satisfaction [a]; Relationship quality [a] (neg. relationship quality); PTSD symptoms [a]; Depression; QoL; Significant others response to trauma	1. Completion 2. Feedback	1. M (weeks duration)=7.20 (SD=5.56); n=11 completed; 4 non-completers (n=2 4/7, n=1 2/7, n=1 1/7); n=3 "treatment responders" completed faster 2. Coach helpful for processing info, thoughts and feelings; feedback videos unrealistic or "cheesy", others found helpful for

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	**Population; sample; attrition**	**Measurement constructs/outcomes Relational; Individual**	**User Engagement Indicators**	**Reported findings**
					digesting and relating to material
Couplelinks [50] Canada	Pilot feasibility trial	Heterosexual couples where a member has a breast cancer diagnosis; 16 couples; 38%	Not reported	1. Treatment satisfaction (TSQ) 2. Usability	1. M = 4/5 (SD = 0.56) 2. 4/5 (SD = 0.83)
Couplelinks [51] Canada	Pilot feasibility trial	Heterosexual couples where a member has a breast cancer diagnosis; 6 couples; Not reported	Not reported	1. Engagement promotion by therapist	1. Rational model of engagement promotion: Friendly and positive yet firm approach; humanising technology; inclusive and empathic attitude. Empirical model of engagement promotion: fostering couple-facilitator bond; fostering intervention adherence; fostering within-couple bond
Couplelinks [52] Canada	Pilot feasibility trial	Heterosexual couples where a member has a breast cancer diagnosis; 12 couples; Not reported	Not reported	1. Types of engagement	1. Couple "types"; keen: completed with minimal engagement; compliant: met facilitator deadlines; apologetic: enjoy and committed, had trouble staying on track; straggling: least engaged
Couplelinks [53] Canada	Pilot feasibility trial	Heterosexual couples where a member has a breast cancer diagnosis; 13 couples; Not reported	Not reported	1. Perceived benefits and limitations	1. 58% agreed or strongly agreed it was beneficial, 35% somewhat beneficial
Couplelinks [54] Canada	RCT; waitlist	Heterosexual couples where a member has a breast cancer diagnosis; 67 couples; 20.5% intervention, 0% control	Dyadic coping [a]; Dyadic consensus, cohesion and satisfaction; Marital satisfaction; Collective coping [a]; Anxiety [a] and depression	Not reported	Not reported
Couplelinks [55] Canada	RCT; waitlist	Heterosexual couples where member has breast cancer diagnosis; 57 participants; Not reported	Not reported	1. Treatment satisfaction (TSQ)	1. M = 4.3/5; SD = 0.54; females' satisfaction ratings significantly higher (p = 0.01), medium effect size = 0.57
eMB [56] USA	RCT; Control	Couples where one member was pregnant; 30 couples; 0%	Anxiety [a] (pregnant person's anxiety) and depression symptoms	1. Satisfaction (CSQ-8) 2. Completion rates and adherence	1. Excellent satisfaction M = 3.42 (SD = 0.55); M_{preg}= 3.42 (SD = 0.59); $M_{partner}$ = 3.43 (SD = 0.49); factors perceived

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
					to promote engagement incl. flexibility (independent and conjoint options, own pace), focus of self before talking to partner; helpful elements incl. videos, interactive exercises and activities; impacting engagement incl. video relatability, poor quality, outdated images, simplistic and low-tech visualisations, perceived as old or silly, extreme vignettes and illustrations, overly dramatized and unrelatable 2. 50% used alone, 9% together with partner, 27% combo; 14% did not engage; 0% completed one lesson per week as advised; 83 discrete logins, pregnant people visited more (M=4.17 v M$_{partners}$=3.44)
Embers the Dragon [57] United Kingdom	Pilot feasibility trial; no treatment	Child aged 2-7 and a parent; 129 families; 7.7% intervention, 20.4% control	Parental responses to childhood behaviours [a]	Not reported	Not reported
ePrep (studies of ePrep and OurRelationship reported below) [58] USA	RCT; IRC	Heterosexual couples in long-term relationships; 77 couples; 0%	Commitment attitudes [a]; Communication [a]; Relationship satisfaction [a]; Psychological aggression and assault [a]; Depression, dysphoria and well-being [a]; Anxiety [a]	1. Level of engagement as a moderator of clinical outcomes	1. Higher engagement (measured by results on quizzes): greater intervention effect for alternatives monitoring (β = −.33, p = .04), constructive communication (β = .29, p = .07), self-reported physical assault (β = −.58, p = .11), male relationship satisfaction (β = .48, p = .02) and female depression (β = −.37, p = .10). Greater time spent completing homework assignments: greater intervention effect for reported couple physical assault (β = −.69, p = .06), severe psychological

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	**Population; sample; attrition**	**Measurement constructs/outcomes Relational; Individual**	**User Engagement Indicators**	**Reported findings**
					aggression for males ($\beta = -.90$, p = .02) and females ($\beta = -.09$, p = .01), and male perpetrated physical assault (partner-report $\beta = -1.10$, p = .02), but an attenuation of the positive effect of ePREP on self-reported minor psychological aggression (males $\beta = .40$, p = .11; females, $\beta = .43$, p = .12). Males with higher engagement experienced attenuation of positive impact on anxiety ($\beta = .35$, p = .01) and females who completed more homework experienced attenuation of positive impact on depression symptoms ($\beta = .45$, p = .03).
ePrep [59] USA	RCT; IRC	Married couples; 52 couples; 4% post-intervention, 92% one-year follow-up (8% intervention, 7.6% control)	Conflict resolution methods [a]; Psychological aggression and assault [a]	Not reported	Not reported
FOCUS [60] USA	Single-arm; Repeated measures	Patient-caregiver dyads; 38 dyads; 14%	Communication; Social support; Emotional distress [a]; Quality of life [a]; Appraisal [a]; Coping resources; Self-efficacy	1. Satisfaction 2. Comfort and skill using computers and internet 3. Feasibility	1. Ease of use M=6.0/7 (SD=1.1); usefulness M=4.4/7 (SD=1.4); general satisfaction M=4.8 (SD=1.7); no adverse effects of completing together 2. Moderate skill level 3. Lower enrolment rate than previous in-person RCTs (51% as compared with 68-80%); retention rate was higher than in-person (86% as compared with 62-83%)
ICBT [61] Sweden	RCT; waitlist	Families where child (8-12) has mental health diagnosis; 93 families (93 children, 182 parents); 2% intervention, 4% control	Anxiety [a] (parent-reported); Development and wellbeing; Child depression; Primary carer mental health	1. Satisfaction 2. Compliance	1. Child satisfaction M=3.67; parent satisfaction M=3.78; 86% of parents agreed/ very much agreed they would recommend; 82% children agreed/very much agreed treatment was

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
					effective 2. Completed modules M=9.7 (SD=1.8; range=4-11); 83% completed first nine modules; four families did not complete modules intended for both children and parents
Military Family Foundations [62] USA	RCT; no treatment	Heterosexual couples expecting their first child where one member was in the military; 56 couples; 34.5% mothers and 48.3% fathers (intervention), 7.4% mothers and 22.2% fathers (control)	Interparental relationship [a] (mothers only); Parental adjustment [a]; Parent report of child outcomes [a] (sadness)	1. Completion	1. M=3.93/8 completed modules
MindGuide Couple [63] Korea	Single-arm	Korean heterosexual couples; 17 couples; 11%	Couple relationship satisfaction; Family relationship [a]; Mental health; Positive and negative emotions; Satisfaction with life [a]	1. Satisfaction and acceptability 2. Recruitment, retention and completion	1. 100% reported content and tasks were helpful; 90% reported content applicable to everyday activities; coaching most helpful (90%), followed by video lectures (43%) and practical tasks (43%); reported benefits incl. flexible access (90%), less burdensome than face-to-face (86.3%), no geographic limitations (76.7%); reported drawbacks incl too long (33.3%), time burden (76.7%); 93.4% satisfied; 100% satisfied with level of coaching. 2. 94.1% completed
Mission Reconnect [64] USA	RCT; MR plus PREP/ PREP alone/ waitlist	Veteran-partner dyads; 320 individuals (160 couples); 1.2% MR; 2.5% MR [a] PREP, 1.2% PREP, 0% waitlist	Perceived social support; Dyadic adjustment; Stress [a]; Depression [a]; PTSD symptoms [a]; Self-compassion [a]; Response to stressful experiences [a]; Sleep quality; Physical pain	1. Intervention use 2. Satisfaction	1. M=2.5 hours using per week; at 16 week follow up, M=90 minutes per week 2. $M_{Veterans'}$ (likely to recommend)=8.7/10 and $M_{partners}$=9.1/10
Mother-daughter Program	RCT; waitlist	Girls aged 10-13 and their mothers; 202 dyads; 0%	Mother communication [a]; Conflict	1. Anonymous program	1. Improved mother-daughter relationship: M_{Girls}=4.14/5

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
[65] USA		between pre- and post, 2% intervention and 1% control lost between post- and follow-up	management [a]; Daughter communication [a]; Perceived rules [a]; Parental monitoring; Normative beliefs [a]; Self-efficacy [a]; Alcohol use [a]; Drinking intention [a]; Refusal skills; Parental rules [a]; Parental monitoring [a]	rating	(SD=0.35); $M_{Mothers}$=4.25/5 (SD=0.29); Learned useful information: M_{Girls}=4.16/5 (SD=0.38); $M_{Mothers}$=4.13/5 (SD=0.34); Enjoyed intervention: M_{Girls}=4.07/5 (SD=0.39); $M_{Mothers}$=4.20/5 (SD=0.34); Found time to complete together: M_{Girls}=3.04/5 (SD=0.37); $M_{Mothers}$=3.24/5 (SD=0.33)
Mother-daughter Program [66] USA	RCT; no treatment	Girls aged 11-13 and their mothers; 591 dyads; 3.2% intervention	Mother-daughter communication [a]; Substance use [a]; Family rules [a]; Parental monitoring [a]; Normative beliefs [a]; Depression; Problem-solving skills; Body esteem; Drug refusal self-efficacy [a]; Intentions [a]	Not reported	Not reported
Mother-daughter Program [67] USA	RCT; no treatment	Girls aged 11-13 and their mothers; 916 dyads; From baseline to 1-year follow-up 5.7%, between 1 and 2-year follow-up 4.2%	Communication [a]; Mother-daughter closeness [a]; Family rules [a]; Parental monitoring [a]; Body esteem; Depression; Coping ability [a]; Normative beliefs [a]; Refusal self-efficacy [a]; Substance use [a]; Intentions [a]; Family rituals [a]	Not reported	Not reported
Mother-daughter Program [68] USA	RCT; no treatment	Asian American girls aged 11-14 and their mothers; 108 dyads; 3.5% intervention, 3.8% control	Mother-daughter closeness [a]; Mother-daughter communication [a]; Substance use [a]; Intentions; Depression [a]; Self-efficacy [a]; Refusal skills [a]; Parental monitoring [a]; Family rules [a]	Not reported	Not reported
Mother-daughter Program [69] USA	RCT; no treatment	Asian American girls aged 11-14 and their mothers; 108 dyads; 89.2% completed 2-year measure	Mother-daughter closeness [a] (girls only); Mother-daughter communication [a]; Parental monitoring	1. Completion	1. 96.4% completed entire intervention; 94.6% completed booster session; participants completed initial 9 sessions

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
			[a] (girls only); Family rules [a] (girls only); Depressive symptoms; Body esteem; Self-efficacy [a]; Refusal skills [a]; Normative beliefs; Substance use [a]; Intentions [a]		M(days)=175 (SD=68.9 days)
Mother-daughter Program [70] USA	RCT; no treatment	Black and Hispanic girls aged 10-13 and their mothers; 564 dyads; 6.6% intervention, 3.3% control	Mother-daughter closeness; Mother-daughter communication [a]; Substance use [a]; Normative beliefs [a]; Intentions [a]; Depression [a]; Self-efficacy [a]; Refusal skills; Parental monitoring [a]; Family rules [a]; Body esteem	Not reported	Not reported
Mother-daughter Program [71] USA	RCT; no treatment	Mother-daughter dyads in public housing; 36 dyads; 3%	Mother-daughter closeness [a]; Mother-daughter communication [a]; Parental monitoring [a]; Substance use; Fruit and vegetable intake [a]; Physical activity [a]; Perceived stress [a]; Drug refusal skills [a]	1. Fidelity	1. 97% completed all 3 sessions
OFPS [72] USA	Pilot feasibility trial; pre-post	Children (5-16) with mod to severe TBI and families (all family members could participate, outcomes reported for one parent and child); 19 participants in 6 families; 0%	Child/parent relationship [a]; Sibling relationship [a]; Therapeutic alliance [a]	1. Feasibility 2. Ease of use 3. Helpfulness & satisfaction (WEQ)	1. All web session completed without therapist assistance; families completed M=10.3 web sessions 2. M=3.59/5 ease of us 3. M(website helpfulness)=4.12/5, M(videoconferencing helpfulness)=4.35/5; 94.7% would recommend the intervention to others
OFPS [73] USA	Pilot feasibility trial; pre-post	Children (5-16) with mod to severe TBI and families (all family members could participate, outcomes reported for one parent and child); 19 participants in 6 families; 0%	Injury-related family stress and burden [a]; Therapeutic alliance [a]; Parental distress, depression and anxiety [a]; Child adjustment [a]	Not reported	Not reported
OFPS [74] USA	RCT; usual care plus IRC	Children (5-16) with mod to severe TBI and	Family problem solving, communication and	1. Web-site usage and caregiver	1. 100% parents indicated they would recommend to others;

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
		families (all family members could participate, outcomes reported for one parent and child); 46 families; 12% intervention, 0% IRC	behaviour management; Parental problem solving; Parental distress, depression and anxiety [a]	satisfaction (WEQ)	33% indicated they would prefer to meet in person; 94.4% reported the website was moderately to extremely easy to use
OFPS [75] USA	RCT; usual care plus IRC	Children (5-16) with mod to severe TBI and families (all family members could participate, outcomes reported for one parent and child); 46 families; 12% intervention, 0% IRC	Child adjustment [a] (self-control and compliance only)	1. Child's self-reported web-site usage 2. Satisfaction (WEQ)	1. Sig. neg. correlations between n sessions completed and chid behaviour problems (-.59) and parental distress (-.60) at baseline, families with more problems at baseline completed fewer sessions 2. 88% rated website as at least mod easy to use; 26% rated it little or not easy to use relative to other sites; all children rated the website content at least moderately helpful; 94% reported feeling at least moderate support and understanding when using the website; 31% reported feeling angry when using the website; 25% reported feeling moderately to extremely worried when using the website
OFPS [76] USA	RCT; usual care plus IRC	Children (5-16) with mod to severe TBI and families (all family members could participate, outcomes reported for one parent and child); 46 families; 12% intervention, 0% IRC	Therapeutic alliance *no moderation by prior tech use;* Parental depression *(moderated by prior tech use)* and anxiety	1. Parent's self-reported web-site usage 2. Satisfaction (WEQ) 3. Prior computer use 4. Computer equipment comfort rating	1. Both groups reported spending equivalent amounts of time on web site 2. Satisfaction did not differ by prior tech use 3. Significant effect of technology at home for improvements in depression ($t(22) = 2.24$, $p = 0.035$); trend in same direction for anxiety; nontechnology users more likely to miss sessions ($M = 16.33$, $SD = 11.29$; $t[18] = 2.43$, $p = 0.026$) 4. Technology users became more comfortable with the technology over time

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
OFPS [77] USA	Pilot feasibility; pre- and post	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 9 families; 0%	Family functioning [a]; Adolescent adjustment; Parental distress and depression [a]	1. Feasibility	1. All families completed the 10 core sessions. 6 families completed one or more supplemental sessions
OFPS [78] USA	Pilot feasibility; pre- and post	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 9 families; 0%	Not reported	1. Self-reported web-site usage 2. Satisfaction (WEQ; OSS)	1. In addition to parent and teen, nine siblings participated in at least some of the sessions 2. Father satisfaction was generally high; 4/9 teens and 2/7 mothers reported a preference for face to face; feedback provides support for acceptability and helpfulness of the intervention
OFPS [79] USA	RCT; usual care plus IRC	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 41 families; 20% intervention, 5% IRC	Executive functioning [a] (teens with severe TBI)	Not reported	Not reported
OFPS [80] USA	RCT; usual care plus IRC	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 41 families; 20% intervention, 5% IRC	Family conflict [a]; Adolescent adjustment	1. Self-reported web-site usage and satisfaction	1. Families completed average of 10 sessions; 95% completed all 10 sessions; 87% parents reported meeting their goals, learned ways to improve child's behaviour, understood their child better (p < .05 relative to IRC)
OFPS [81] USA	RCT; usual care plus IRC	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 41 families; 20% intervention, 5%	Parental distress and depression [a] (lower SES only); Social problem solving [a] (lower SES only)	1. Website utilisation, ease of use, and satisfaction (WEQ; OSS)	1. 93% rated mod or extremely helpful compared to other sites; parents suggestions for change included fewer questionnaires; 20% of parents agreed the intervention was too short

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
		IRC			
OFPS [82] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control	Teen executive function [a] (older adolescents)	Not reported	Not reported
OFPS [83] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control	Caregiver depression and distress [a] (intention to treat analysis); Caregiver efficacy	1. Prior technology use 2. Completion	1. Prior computer use did not moderate reductions in depression and distress; non-frequent computer users in intervention group reported significantly higher levels of caregiver efficacy ($F(41) = 7.15, p = .01$) 2. 43% of parents reported spending < 30 mins per week on CAPS; 50% reported spending 30 mins – 2 hours per week; 88% completed four or more sessions
OFPS [84] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control	Child behavioural outcomes [a] (older adolescents)	1. Completion	1. 43% of parents reported spending < 30 mins per week on CAPS; 50% reported spending 30 mins – 2 hours per week; 88% completed four or more sessions; 93% rated the website as moderately to extremely helpful
OFPS [85] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control	Parent-teen conflict; Parent-teen interactions; Structural, organisational, and transactional characteristics of families	1. Completion	1. 43% of parents reported spending < 30 mins per week on CAPS; 50% reported spending 30 mins – 2 hours per week; 88% completed four or more sessions

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
OFPS [86] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control, final assessment: 13.4% intervention, 11.4% control	Long-term caregiver depression and distress [a] (distress only); Long-term perceived parenting efficacy	Not reported	Not reported
OFPS [87] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 12.3% intervention, 5.9% control, final assessment: 30.8% intervention, 19.4% control	Long-term child behavioural outcomes [a] (internalising behaviours of older adolescents)	1. Completion	1. Number of sessions completed unrelated to improvements in internalising symptoms over time; those completing more sessions reported less improvement in externalising symptoms over time ($p = 0.007$)
OFPS [88] USA	RCT; usual care plus IRC	Child (12-17) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 132 children and their families; 25% intervention, 21% control	Adolescent emotional and behavioural functioning; Adolescent mood and behaviour *As a function of parent marital status*	Not reported	Not reported
OFPS [89] USA	RCT; face-to-face F-PST/ therapist-guided F-PST/ self-guided online F-PST	Adolescents (14-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 149 parents and caregivers; 18%	Parent depression [a] (therapist-guided group only); Parent psychological distress [a] (therapist guided group only)	1. Computer usage prior and during	1. Parents with less comfort with technology improved more with therapist guided treatment when compared to self-guided (*df*: 1, 107; *F*: 3.80; *P* = .054)
OFPS [90] USA	RCT; face-to-face F-PST/	Adolescents (14-18) with moderate to severe TBI and	Behavioural outcomes	1. Patient perceived preference for	1. 71% parents agreed/strongly agreed self-guided F-PST was

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
	therapist-guided F-PST/ self-guided online F-PST	families (all family members could participate, outcomes reported for one parent and child only); 149 parents and caregivers; At 9-month assessment: 35.3% face-to-face, 21.5% therapist guided, 20% self-guided		treatment (pre-intervention) 2. Adherence 3. Satisfaction 4. Computer usage	most convenient; 54% parents agreed/strongly agreed self-guided and therapist-guided online would be most beneficial; 55% teens agreed/strongly agreed self-guided F-PST was most convenient; for adolescents, distance from hospital was associated with perceived benefits ($\chi 2 = 7.01$; p = .008) 2. Median(hours per week)=5; parents assigned to preferred group completed M=5.29 sessions and those assigned to non-preferred group completed M=6.37 sessions; adolescents in preferred group completed M=6.12 sessions and those in non-preferred group completed M=5.17; adolescent treatment preference was significantly related to attrition ([CI] = 1.03–5.44, $\chi 2 = 4.22$, p = .040) 3. Parents in FTF group rated the intervention more favourably than those in therapist-guided (Cohen's d = 0.67, CI = 0.10–1.15, $t = -2.49$, $p < .0431$) or self-guided (Cohen's d = 1.18, CI = 0.56–1.62, $t = -4.36$, $p < .001$); parents in FTF group reported higher satisfaction than parents in self-guided group (Cohen's d = 0.63, CI = 0.09–1.11, $t = -2.51$, $p = .040$) 4. No significant association with treatment preference
OFPS [91] USA	RCT; face-to-face F-PST/ therapist-	Adolescents (14-18) with moderate to severe TBI and families (all	Adolescent quality of life [a]; Brain injury symptoms	Not reported	Not reported

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
	guided F-PST/ self-guided online F-PST	family members could participate, outcomes reported for one parent and child only); 149 parents and caregivers; At 9-month assessment: 35.3% face-to-face, 21.5% therapist guided, 20% self-guided			
OFPS [92] USA	RCT; TOPS with family/ TOPS teen only/ IRC	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 152 teenagers and their families; 31% TOPS-F, 24% TOPS-TO, 23% IRC	Child behavioural outcomes [a] (TOPS-Family)	1. Completion	1. Completion M_{TOPS-F}=8.00 (SD=2.90) and $M_{TOPS-TO}$=8.40 (SD=2.80); completed supplemental sessions: TOPS-Family 14.29%; TOPS-TO 13.46%
OFPS [93] USA	RCT; TOPS with family/ TOPS teen only/ IRC	Teenagers (11-18) with moderate to severe TBI and families (all family members could participate, outcomes reported for one parent and child only); 152 teenagers and their families; 31% TOPS-F, 24% TOPS-TO, 23% IRC	Family functioning; Family cohesion [a] (TOPS-F and two-parent households); Parent-adolescent conflict; Parental psychological distress and depression [a] (TOPS-F and two-parent households)	Not reported	Not reported
OurRelationship [94] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction [a]; Pos and neg relationship quality [a] (reducing neg relationship quality); Relationship confidence [a]; Depression [a]; Anxiety [a]; Perceived health [a]; Work functioning [a]; Quality of Life [a]	1. Evaluation (Client Evaluation of Services Questionnaire) 2. Completion rates 3. Coach engagement	1. M=26.81 (SD=4.44), nearly equivalent to in-person individual therapy (d=-0.07) and high-quality couple therapy (d=-0.18); 94% mostly or very satisfied with services received; 97% would recommend to a friend 2. 86% completed entire intervention; additional 5% completed through the "Understand" phase 3. Coaches spent M=51.32 mins with couples (SD=17.11); individuals received

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
					M=5.11 scripted chat reminders (SD=1.7) and no tailored chat messages
OurRelationship [95] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction [a] (no moderation by LI-IPV)	Not reported	Not reported
OurRelationship [96] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction; Relationship confidence; Pos and neg relationship quality [a] (moderated by rurality); Depression; Anxiety; Perceived health [a] (moderated by race); Work functioning; Quality of life	1. Evaluation (Client Evaluation of Services Questionnaire) 2. Participant predictors of completion	1. Couples were generally satisfied with the intervention (M=26.81, SD=4.44); service evaluation was not moderated by race, ethnicity, income, education, or rural status 2. Hispanic couples (*Odds Ratio* = 0.24, *p* = .009, *d* = 0.79) and low income couples (*Odds Ratio* = 0.21, *p* = .002, *d* = 0.85) more likely to dropout
OurRelationship [97] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Long-term: Relationship satisfaction; Pos [a] and neg relationship quality; Relationship confidence [a] (Hispanic couples); Depression [a]; Anxiety [a]; Perceived health [a]; Work functioning [a]; Quality of Life [a]	Not reported	Not reported
OurRelationship [98] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction; Coparenting conflict [a] (not maintained at follow up); Child functioning [a]	Not reported	Not reported
OurRelationship [99] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction [a]; Communication [a]; Emotional intimacy [a]; Relationship problem confidence [a]; Relationship problem acceptance [a]; Self-protective orientation [a]	Not reported	Not reported
OurRelationship [100] USA	RCT; waitlist	Heterosexual couples; 300 couples; 8%	Relationship satisfaction [a] (*moderated by neuroticism*); Relationship confidence [a] Depression	Not reported	Not reported

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes **Relational; Individual**	User Engagement Indicators	Reported findings
			(*moderated by neuroticism and conscientiousness*); Personality		
OurRelationship [101] USA	RCT; low-coach support/ high-coach support	Heterosexual couples; 356 couples; High-support 34%, low-support 64%	Relationship satisfaction [a] (both groups); Depression [a] (both groups); Anxiety [a] (both groups, high-support significantly greater)	1. Platform predictors of completion	1. High-support participants significantly more likely to complete entire intervention (66% v 36%; $\chi2(1) = 32.795, p < .001$); high-support participants more likely to complete two thirds (69% v 45%; $\chi2(1) = 20.355, p < .001$); no significant differences in first phase completion; completion did not differ by race, ethnicity, or household income
OurRelationship [102] USA	RCT; low-coach support/ high-coach support/ no-coach support	Heterosexual couples; 529 couples; 93.9% no coach, 34% high-support, 64% low-support	Relationship satisfaction; Relationship confidence; Depression; Anxiety	1. Platform predictors of completion	1. 6.1% of no-coach participants completed intervention, 66.1% high-support and 36.0% low-support; substantial and immediate drop off when compared with high-support (b = −2.68; SE = 0.35; t= −7.65; OR = 0.07, 95% CI [0.04, 0.14]; p<.001) and low-support (b = −1.98; SE = 0.34; t= −5.76; OR= 0.14, 95% CI [0.07, 0.27]; p<.001) (neither was significant); Hispanic individuals less likely to complete the intervention without a coach than non-Hispanic individuals (b = −3.99, p<.001); higher levels of depressive symptoms predicted less drop off with no coach (b = 0.08, p = .038)
OurRelationship [103] USA	RCT; Brief OR with coach/ Brief OR without coach/ waitlist	Heterosexual couples; 104 couples; With coach: 40.4% mid-intervention, 25% end-intervention, 17.4% follow-up,	Relationship satisfaction; Pos and neg relationship quality [a] (positives); Relationship confidence; Communication;	1. Platform predictors of completion	1. Dropout rate was 9.3% for Full-OR and 28.8% for Brief-OR with coach (v2 (1) = 12.104, p < .001); 71.2% completion in coach condition and

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes **Relational; Individual**	User Engagement Indicators	Reported findings
		without coach: 56% mid-intervention, 26% end-intervention, 26% follow-up	Anxiety; Depression; Perceived health and quality of life; Work functioning		42.3% in no coach condition (v2 (1) = 8.814, p = .003)
OurRelationship [104] USA	Pilot; pre-post	Veterans and their partners; 13 couples; 15%	Relationship satisfaction and distress; Relationship conflict; Depression symptoms; Probable PTSD; Quality of life	1. Intervention satisfaction (CSQ-8) 2. Completion	1. $M_{Veterance}$=3.4/4 (SD=0.4) and $M_{Partners}$ =3.2/4 (SD=0.6); 91% were mostly or very satisfied; 96% would recommend; positive qualitative feedback included structure, videos of similar couples, reminder calls; negative qualitative feedback included repetition, length of some content, technical and logistic frustrations; couples preferred the coach calls 2. Completion rate was 85%; median completion time was 52 days (range=29-73); couples received clinical contact ranging from 52 to 95 mins total
OurRelationship [105] USA	Single-arm; pre-post	Coparenting couples; 136 couples; 20%	Relationship satisfaction and distress [a]; Coparenting satisfaction [a]; Gatekeeping and gateclosing behaviours [a]; Perception of partner's gatekeeping and gateclosing behaviours [a]	Not reported	Not reported
OurRelationship [106] USA	RCT; OR/ OR+ with greater therapist engagement	Couples; 314 couples; 64.3%	Joint and perceptions [a] of partner's pornography consumption; Arguments surrounding self, joint and partner's pornography consumption; Individual pornography use [a]; Problematic pornography use; Lifestyle changes	Not reported	Not reported

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	**Population; sample; attrition**	**Measurement constructs/outcomes Relational; Individual**	**User Engagement Indicators**	**Reported findings**
			due to the COVID-19 pandemic		
OurRelationship [107] USA	RCT; full-coach/ automated coach/ contingent coach/ waitlist	Couples; 740 couples; 30%	Relationship satisfaction [a] (comparable across all coach support)	1. Completion	1. Completion comparable across all conditions; posterior distributions indicated probability of full-coach couples having higher odds of completing phases 1, 2 and 3, relative to automated-coach, was 28.4%, 43.9%, and 77.4%, respectively; probability of full-coach having higher odds of completing phases 1, 2 and 3, relative to contingent-coach, was 65%, 70%, and 92.7%, respectively; probability of contingent-coach having higher odds of completing phases 1, 2 and 3, relative to automated-coach couples, was 15.6%, 22.6%, and 21.7%, respectively
OurRelationship and **ePREP** [108] USA	RCT; OR/ ePrep/ waitlist	Romantic couples; 742 couples; Post-treatment (10.3%), 2-months follow-up (12.5%), 4-months follow-up (13.0%)	Relationship satisfaction [a]; Communication conflict [a]; Emotional support [a]; Intimate partner violence [a]; Breakup potential [a]	1. Evaluation (Client Evaluation of Services Questionnaire) 2. Completion	1. Participants rated the intervention positively (M=9.9/11); 96% would recommend it to a friend; 93% were satisfied; no significant difference between intervention (b = -0.058, SE = 0.148, p = .695) 2. 69% in both ePREP and OurRelationship completed all content
OurRelationship and **ePREP** [109] USA	RCT; OR/ ePrep/ waitlist	Romantic couples; 742 couples; Post-treatment (10.3%), 2-months follow-up (12.5%), 4-months follow-up (13.0%)	Relationship satisfaction [a]; Breakup potential [a]; Negative communication [a]; Positive communication [a]; Relationship problem intensity [a]; Relationship problem confidence [a]; Emotional support [a]	Not reported	Not reported
OurRelationship and **ePREP**	RCT; OR/ ePrep/	Romantic couples; 742 couples; Post-	Psychological distress [a]; Perceived	Not reported	Not reported

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
[110] USA	waitlist	treatment (10.3%), 2-months follow-up (12.5%), 4-months follow-up (13.0%)	stress [a]; Anger [a]; Problematic alcohol use [a]; Perceived health [a]; Insomnia [a]; Exercise [a]		
OurRelationship and **ePREP** [111] USA	RCT; OR/ ePrep/ waitlist	Romantic couples; 742 couples; Post-treatment (10.3%), 2-months follow-up (12.5%), 4-months follow-up (13.0%)	Co-operative parenting; Parenting stress; Parenting nurturance [a] (OR); Physical and harsh verbal discipline [a] (OR)	Not reported	Not reported
OurRelationship and **ePREP** [112] USA	RCT; OR/ ePrep/ waitlist	Romantic couples; 742 couples; Post-treatment (10.3%), 2-months follow-up (12.5%), 4-months follow-up (13.0%), 12-month follow-up (18.6%)	Long-term: Relationship satisfaction [a]; Breakup potential [a]; Positive communication [a]; Communication conflict [a]; Emotional support [a]; Intimate partner violence; Psychological distress [a]; Perceived stress [a]; Anger [a]; Alcohol use [a]; Perceived health [a]; Insomnia [a]	Not reported	Not reported
OurRelationship and **ePREP** [113] USA	RCT; OR/ ePrep/ waitlist	Military and non-military couples; 90 military couples; Military couples 43%	Relationship satisfaction [a]; Communication conflict [a]; Emotional support [a]; Breakup potential [a]; Intimate partner violence; Psychological distress; Perceived stress; Anger; Substance use; Perceived health	1. Evaluation (Client Evaluation of Services Questionnaire) 2. Completion	1. Evaluation ratings were similarly positive (b = 0.470, p = .067) 2. 57% military couples completed entire intervention (compared with 71% civilian), 8% completing two-thirds, 18% completing one third and 18% completed none
OurRelationship and **ePREP** [114] USA	RCT; OR/ ePrep/ waitlist	Low-income couples; 671 couples; 36% OR, 31% ePrep	Relationship satisfaction [a]; Communication conflict [a]; Emotional support [a]; Intimate partner violence; Breakup potential [a] (not maintained long-term for ePrep)	1. Evaluation (Client Evaluation of Services Questionnaire) 2. Completion	1. Participants' satisfaction: M_{OR}=9.51/11; M_{ePREP}=9.6/11; >95% participants indicated the intervention helped them; 97% indicated they would recommend the intervention; 90% were satisfied with the intervention; no reliable differences in satisfaction between two interventions (B= 0.07, 95% CI [−.07,.21]) 2. 64% completed OR and 69% completed ePREP

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
OurRelationship and **ePREP** [115] USA	RCT, OR/ ePrep/ waitlist	Low-income perinatal couples; 180 couples; 32.8% OR, 36.1% ePrep	Relationship satisfaction [a]; Perceived likelihood of breakup [a]; Communication conflict [a]; Sexual intimacy [a]; Emotional support [a]; Experience of intimate partner violence; Psychological distress [a]; Perceived stress [a] (OR only)	Not reported	Not reported
OurRelationship and **ePREP** [116] USA	RCT; OR/ ePrep/ waitlist	Low-income couples; 659 couples; 16.80%	Relationship satisfaction [a] Not reported	Not reported	Not reported
OurRelationship and **ePREP** [117] USA	RCT; OR/ ePrep/ waitlist	Low-income couples; 615 couples; Not reported	Perceived gratitude from partner [a]; Relationship satisfaction [a]; Relationship instability [a]; Communication skills [a]; Destructive communication [a]; Partner emotional support [a]	Not reported	Not reported
ParentSTRONG [118] USA	RCT; waitlist	Early adolescent males and a parent/guardian; 119 dyads; 8.5%	Dating violence behaviours [a]; Parent-child communication [a]; Attitudes supporting dating violence; Aggression; Emotional regulation [a]	1. Acceptability and fidelity	1. 90% families completed all 6 modules; 87% parents rated helpfulness as >4/5 and 99% >3/5; 65% teens rated helpfulness >4/5 and 96% >3/5; intervention did not allow participants to progress without completing all activities
PACT [119] Australia	RCT; waitlist	Parent-child dyad where child aged 2-10 has cerebral palsy; 67 dyads; 24.4%	Emotional availability [a]; Child involvement [a]; Quality of life [a]; Parental mindfulness [a]; Parental acceptance [a]; Adjustment	Not reported	Not reported
ParentWorks [120] Australia	Single-arm; pre-post measures	Parent or caregiver of a child aged 2-16; 388 families; 92.7% (non-starters incl.)	Dysfunctional parenting [a]; Interparental conflict [a]; Child behavioural difficulties [a]; Parental mental health [a]	1. Satisfaction (CSQ)	1. M=5.49 (SD=0.95); no significant sex differences (t(452) = 0.41), p > 0.05) indicating mothers and fathers were equally satisfied
ParentWorks	Single-arm;	Parent or caregiver	Parent and family	1. Completion	1. For partial

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
[121] Australia	pre-post measures	of a child aged 2-16; 388 families; 92.7% (non-starters incl.)	functioning; Parenting conflict; Child behavioural difficulties; Parental mental health	2. Dropout characteristic 3. Participant predictors of completion	completers, M=2.4/5 modules completed (SD=1.2); for full completers, M=5.58/6 (incl. one optional) modules completed (SD=.76) 2. Mothers in full completer (M=3.62, SD=2.4) and partial completer (M=3.32, SD=2.2) groups reported higher levels of conduct problems than nonstarters (M=3.32, SD=2.2) $(F(2, 1749) = 3.99, p < .05)$ 3. Relative to full completers, nonstarters were more likely to have older children, be married or in a de facto relationship, have higher levels of psychological difficulties, and have lower levels of child conduct problems; Relative to full completers, partial completers were more likely to be married or in a de facto relationship and have higher levels of dysfunctional parenting
PERC [122] USA	Single-arm; pre-post	Couples where one member had a prostate cancer diagnosis; 26 couples; 15%	Dyadic communication; Relationship satisfaction; Quality of life [a]; Symptom distress [a]; General symptoms [a]	1. Feasibility and acceptability 2. Web activity 3. Ease of use	1. 96% completed the intervention 2. 37% couples always logged in together, 23% always logged in individually; M(logins per couple)=3.64 (SD=1.68); M(time spent on platform per couple)=56.96 minutes (SD=39.74); 83% used audio-enhanced slides; 94% visited the assignment and exercise section 3. Participants rated PERC as easy to use, engaging and of high quality
Resilient Living [123]	Pilot feasibility trial	Stroke/brain tumour patients and their	Dyadic coping; Resilience; Stress; Caregiver role	1. Intervention evaluation	1. M=2.6/5 "Do you think the skills you learned enhanced your

Platform/ Study/ Country	Study characteristics		Measures/Outcomes		
	Design; comparator	Population; sample; attrition	Measurement constructs/outcomes Relational; Individual	User Engagement Indicators	Reported findings
Netherlands		caregivers; 16 participants; 68.75%	overload; Quality of life; Fatigue [a]; Physical function [a]; Anxiety [a]; Sleep	2. Was it worth it questionnaire (WiWi)	resilience?" and M=4.4/5 "did you find the online intervention easy to use?"; remaining mean scores ranged between 3.3-4.2/5; Length of modules and ability to complete in their own time were identified as facilitators to use; finding time to complete as a dyad was challenging. 2. 4/5 indicated it was worthwhile participating in the study; 4/5 indicated it was as expected and 1 indicated it was better than expected
Web-based partnership support program [124] Japan	Quasi-experimental design (non-randomised); Control	Infertile couples; 151 couples; 20.40%	Quality of life [a]; Distress	Not reported	Not reported
Web-based PREP program [125] USA	RCT; IRC	Heterosexual foster or adoptive couples; 32 couples; 35%	Negative communication; Knowledge acquisition [a]; Use of PREP skills [a]	1. Intervention feedback	1. Participants responded favourably to intervention

[a] indicates intervention significantly changed (single-arm) or superior to comparator in hypothesized direction at post-intervention; RCT = randomised controlled trial; IRC = internet resource comparison; QoL = quality of life; M = mean/average; SD = standard deviation

The platforms

Twenty-four (24) unique platforms were identified from the 85 studies. **Table 3** displays the characteristics of the 24 platforms, including the intervention target; relationship targeted; duration of intervention participation; components designed for co-completion, individual completion, and therapist engagement; any tailoring offered; and additional reported features.

The majority of interventions were designed for co-completion by couples (n=14), with some identified interventions for parent-child dyads (n=6), families (n=2) and caregiver-care recipient dyads (n=2). Given it was expected that build characteristics might differ according to population (e.g., number of participating family members and their ages), platform results are grouped and reported by the relationship structure targeted by the platform (i.e., couples, parent-child dyads, families, and caregiver-care recipient dyads).

Data from **Table 3** are synthesised based on the features of the platforms, and detail reported user engagement indicators. As platforms were included only where at least one study had demonstrated clinical efficacy of the intervention, mental health and relational outcomes are not reported below (and are instead indicated in **Table 2).**

Table 3 Characteristics of platforms identified in included studies, including: name of the platform; relationship between participants; platform purpose; duration of intervention participation; components that were completed self-paced; components completed together (co-completion) or by individuals alone; practitioner engagement components; any tailoring provided and additional key features

Platform	Target Relationship; Intervention target; Intervention duration	Online self-paced component(s)	Co-completion vs individual completion	Practitioner engagement component(s)	Tailored platform component(s); Additional key features
4Cs:CRC (Caring for couples coping with colorectal cancer)	Couples; Patient-partner coping with cancer; 6-weeks	6 intervention sections including dyadic learning sessions, health information, cancer news, online counselling, sharing circle and personal centre	Content intended to be completed by couples together	Face-to-face/online synchronous counselling sessions delivered bi-weekly to revisit content and provide additional support (some study conditions)	Weekly reminders to complete online sessions
CA-CIFFTA (Computer Assisted – Culturally Informed and Flexible Family-Based Treatment for Adolescents)	Parent-child; Treat behaviour problems and family conflict in young minority adolescents and their families; 12-weeks	4-6 computer-based modules; Links to academic websites	Parents watched videos independently first, then re-watched with adolescent; Individual logins; role-appropriate videos	6-10 face-to-face sessions; fortnightly phone calls; asynchronous communication	Modular format for families to select content most relevant to family's clinical and cultural needs and preferences; Custom links
Cool kids online	Parent-child; Psychoeducation and CBT-based anxiety management skills for children and their parents; 10-weeks	8 online lessons – first six released weekly and final two realised bi-weekly	Online lessons completed together; Parent trained as a "coach" for their child; Additional online information provided to caregivers at the end of each lesson	Parents completed weekly phone calls with clinician – reinforce success, clarify questions, assist with barriers, skill implementation, reinforce practice, normalise experience	Automated reminder emails. Emails reinforced content, skills practice, engagement
C-MBI for YBCS (Couple Mindfulness Based Intervention for Young Breast Cancer Survivors)	Couples; Relationship distress for couples where one member is a breast cancer survivor; 8-weeks	8 weekly, pre-recorded videos delivered online; Video links and reminders emailed to participants weekly	All videos watched together	Participants encouraged to email or call research staff regarding questions or content during participation	None
Couple HOPES (Helping overcome PTSD and Enhance Satisfaction)	Couples; Relationship functioning where one partner has PTSD; 8-weeks	7 interactive modules containing videos, exercises, and practice assignments completed sequentially	Videos and module exercises completed together; Partners had separate, linked accounts where they independently completed assignments;	Four scheduled calls with coach after modules 1, 3, 5 and 7 plus one additional, as needed call; Engagement and adherence facilitated through platform messaging; Coaches role	Automated feedback graph depicts reported symptom change over time; Progress bar and module menu communicated and incentivised progress; Web-based and

Platform	Target Relationship; Intervention target; Intervention duration	Online self-paced component(s)	Co-completion vs individual completion	Practitioner engagement component(s)	Tailored platform component(s); Additional key features
			Assignment entries and scores can be seen by both partners	involved reviewing symptom change, reinforcing successes, enhancing motivation for engagement, and troubleshooting barriers	smartphone application
Couplelinks	Couples; Relationship functioning post cancer-diagnosis; 8-weeks	6 modules; Each module begins with informational component followed by instructions for interactive exercises; Couples provide reflection after each module; Additional articles and video resources available	Modules completed together	Asynchronous platform-based messaging; Introductory telephone call and two brief "check ins" to reinforce alliance and promote adherence	Additional non-compulsory content
eMB (Mothers and babies online course)	Couples; Increase partner's understanding of perinatal mood and anxiety disorders and therapeutic approaches to managing associated symptoms; 8-weeks	Recommended completion of one lesson per week in any order with revisits as needed. Psychoeducational modules containing YouTube videos, vignettes, interactive quizzes, homework, guided meditation and downloadable resources	Participants could choose whether to complete separately or together	None	Can be completed in any order
Embers the Dragon	Parent-child; Supporting emotional development and parental responses to child behaviour; 8-weeks	2, 6-minute animated episodes, accompanying videos and activities	Parent and child watch the episodes and complete post-video activities together; Following the episodes, parents watch explanation videos	None	None
ePrep	Couples; Preventative intervention to enhance relationship satisfaction and mental health; 6-weeks	6 hours of online modules and approx. 1-2 hours homework	Couples completed modules and homework together	4 x 15-minute appointments with coach practicing skills; Weekly reminder emails to complete content and links to resources	Computer based, can be completed from mobile or tablet
FOCUS	Caregiver-care	3 sessions delivered	Dyads	Asynchronous	Tailored, app-

Platform	Target Relationship; Intervention target; Intervention duration	Online self-paced component(s)	Co-completion vs individual completion	Practitioner engagement component(s)	Tailored platform component(s); Additional key features
	recipient (family); Psychosocial health of cancer patients and their family caregivers; 6-weeks	sequentially with time to practice skills learned in between	completed sessions together	"help" function that generated an email to the project director	generated messages provided web links addressing dyad's specific concerns; offered a choice of tailored activities to complete between web sessions; tailoring provided based on baseline information provided
iCBT Internet-delivered CBT	Families; Family functioning when a child has an anxiety disorder diagnosis; 10-weeks	11 modules, including reading materials, film, animations, illustrations	Parents worked on their modules first so they could then work with the children; 7 modules aimed at parents only	Platform based messages; tailored feedback after exercise completion; three telephone calls during treatment and additional as needed to clarify content, increase motivation, and solve problems	None
Military Family Foundations	Couples; Military couples at the transition to parenthood; Not specified	5 pre-natal and 3 post-natal modules	Modules completed together	Email reminders sent to couples if they stopped engaging for more than 10 days	None
MindGuide Couples	Couples; Preventative interventions centred on vulnerability to Korean middle adulthood depressions, "Hwa-Byung", and couple relationships; 5-7 weeks	4 modules over 16 sessions, max 60-minutes each; audio-recorded mindfulness, online video lectures, practical tasks, case-based scenarios	Modules 3 and 4 conjoint sessions, including creating a shared vision; Performed practical tasks together; Modules 1 and 2 completed as individuals	Coaching sessions after each module to promote participation via reflective dialogue and provide feedback on participants' responses	None
Mission Reconnect (MR)	Couples; Relationship functioning where a member is a veteran with a history of deployment in a post-9/11 combat operation; 16-weeks	11 activities delivered by instructional videos, guided audio, written manuals	Sessions on "Connecting with Partner" could be complete alone or together; Remaining completed independently	None	Accessible by website and mobile device apps
Mother-	Parent-child;	9-14 modules;	Modules	None	None

Platform	Target Relationship; Intervention target; Intervention duration	Online self-paced component(s)	Co-completion vs individual completion	Practitioner engagement component(s)	Tailored platform component(s); Additional key features
daughter program	Mother daughter relationship quality and reduced risk of underage drinking; 4 (brief version) – 10 weeks	different adaptations were developed; animated characters portrayed adolescent girl and her mother	completed together; Participants independently logged in to complete questions about content; participants could not advance until both mother and daughter had completed this		
OFPS Online Family Problem Solving Therapy (incl CAPS and TOPS)	Families; Family functioning where child/ adolescent/ teen has a traumatic brain injury (TBI); 6-months	7 – 11 sessions; core sessions and additional supplementary sessions provided based on identified need; Online content included problem-solving skills, video clips, exercises and assignments	Website used by multiple family members together	Initial face-to-face session completed in the family's home; Telehealth session following online sessions to review exercises	Supplementary sessions provided based on personal need; Family members selected their picture to indicate they were present; When required, platform would prompt particular family members to respond, other times the whole family was asked to respond together
OurRelationship (OR)	Couples; Relationship distress; 6-weeks (brief OR = 2-weeks)	3-sections including video examples and psychoeducation	Content completed separately; Couple completes guided conversation together at the end of each section	4 phone calls during intervention; asynchronous chat feature	Tailored report on improvement provided; in some studies, automated tailored emails were provided
ParentSTRONG	Parent-child; Adolescent boy domestic violence prevention intervention; 4-weeks	6 modules comprising 4-6 activities; Parents and teens progress through alternate reality as avatars	Following module 1, all are completed by parent and child together; Module 1 (introduction) completed by parents only	Staff could be contacted to troubleshoot tech	None
PACT (Parenting Acceptance and Commitment	Parent-child; Emotional availability and parent and child	3-modules and a final review module after a short break	Some exercises were designed for individual completion	Fortnightly check in (phone, text or email) to monitor completion and	None

Platform	Target Relationship; Intervention target; Intervention duration	Online self-paced component(s)	Co-completion vs individual completion	Practitioner engagement component(s)	Tailored platform component(s); Additional key features
Therapy)	adjustment where the child has cerebral palsy; 10-weeks (enforced break in the middle)			check understanding of content	
ParentWorks	Couples; Father-inclusive parenting intervention; 4-weeks	5-8 modules	Participants accessed by a shared account; Participants had the option to complete independently	None	Feedback provided based on participant responses; Formatted for mobile, laptop and tablet viewing
PERC (Prostate cancer Education and Resources for Couples)	Couples; Relationship distress following a prostate-cancer diagnosis; 8-weeks	7 modules, 5 core and 2 optional	Encouraged to view and complete everything together	None	Optional modules; Users could select text- or audio-based slides depending on preference
Resilient living	Caregiver-care recipient (family); Building dyadic resilience skills for stroke or brain tumour patients and their family caregivers; 8-weeks	4 online video modules and participant journal	Option to complete individually	Telehealth session prior to online commencement	None
Web-based partnership support program	Couples; Support intervention to prevent quality of life deterioration and reduce emotional distress in men undergoing fertility treatment; 2-weeks	30-minutes self-paced content over 10 days	Watched information together online; discussion between couples using the communication form; Individually completed their communication form that was subsequently used to guide their discussion	None	None
Web-based PREP program	Couples; Couple relationship education for foster or adoptive parents; 1-week	Four chapters plus additional resources	Entire intervention completed together	None	None

Couples

Features of platforms for couples

Of platforms requiring co-completion, platforms designed for couples were the most common. Fourteen (14) platforms were identified. The intervention target included relationship distress where a member has a cancer diagnosis (n=2); relationship functioning where a member has a cancer diagnosis (n=2), has PTSD (n=1), or is a veteran (n=1); parenting focussed interventions including a father-inclusive parenting intervention (n=1), education for foster and adoptive parents (n=1), and military couples transitioning to parenthood (n=1); partnership support interventions where the male partner is undergoing treatment for infertility (n=1) or where a member is pregnant (n=1); general relational distress (n=1); and preventative interventions to enhance relationship satisfaction and mental health (n=1) and reduce vulnerability to middle adulthood depression (n=1).

Structure and duration of engagement

Duration of participation varied from 1-week to 16-weeks, with the most common duration being 8-weeks (n=5/14) followed by 6-weeks (n=4/14), including one described as taking 5-7 weeks. The intended duration of one intervention was not specified. One offered a brief version that was completed by couples in 2-weeks, as opposed to the 6-week full version. As per the inclusion criteria for this review, all interventions involved some online self-paced component completed on the platform. Most appeared to require at least weekly engagement, though it was not always specified or prescribed. One platform was designed such that participants could complete the intervention modules in any order, but advised participants to access one module per week and to complete all modules. For all remaining interventions, it appeared intervention content/modules were designed to be completed in a defined order and over a specified period.

Co-participation and contact with practitioners

Six interventions contained elements that were intended for individual completion (ranging from completing assessments to completion of entire sections of content), seven interventions required couples co-complete the whole intervention, while one intervention gave participants the choice to complete some or all of the intervention together. Eight interventions included an element of practitioner engagement, including asynchronous platform-based messaging and/or scheduled synchronous counselling sessions.

Tailoring and additional features

Beyond personalisation through contact with practitioners, four platforms provided tailored content or options for personalisation. Two platforms provided supplementary content that could be accessed based on need and two platforms provided personalised feedback and reporting based on responses to questionnaires. Four platforms specified they were formatted for both web and mobile/tablet use, and one platform allowed participants to select either audio-enhanced, or text-based presentation of content. Finally, one platform included an automated graph depicting reported symptom change over time and a progress bar to incentivise participation.

Reported user engagement indicators of platforms for couples

Forty-eight (48) studies examined the 14 couple-focussed platforms. Of those, 30 reported on user engagement indicators, including 23 studies that reported on satisfaction, feedback, usability, participant evaluation, feasibility and acceptability and 18 that reported on completion rates and web usage. The remaining 18 studies did not report on any user engagement data or findings.

Measures used to collect participant satisfaction, feedback, usability, and evaluation varied. Five studies administered the Client Evaluation of Services Questionnaire (SEQ; [126]) and seven used the Client Satisfaction Questionnaire (CSQ; [127]). The remaining studies reported on satisfaction, feedback and participant evaluation through non-validated measures. Satisfaction ratings were

generally high across all studies.

The impact of video content on user engagement appeared mixed. Participants in four studies provided feedback that content and examples presented by video were helpful, however, in two other studies, participants reported that videos were unhelpful and or that they negatively impacted engagement when they were not-relatable, overly dramatized, or appeared outdated. Additionally, participant qualitative feedback reported in another study suggested that outdated imagery and low-tech visualisations also negatively impacted engagement. Other factors that were reported to be important based on qualitative feedback included one study which reported on the structured nature of the intervention and reminder calls, and in another, participants reported they were more likely to access audio-enhanced slides than text-based content. Feedback provided by participants in one study also noted that the flexibility of the online format facilitated engagement. In general, however, satisfaction, feedback, usability and evaluation data were reported as average values on rating scales.

Reporting of completion rates and web usage rates varied. They were reported as combinations of the following: the average number of participants who completed the entire intervention; the average number of modules/sessions completed by individuals/couples; the average time to completion; the number of discrete logins and/or page views; and the amount of time spent accessing the platform. Feasibility and acceptability data were reported similarly, with completion statistics often used as an indication of an interventions' feasibility or acceptability. In addition, five studies reported on predictors of noncompletion, including three studies that reported higher levels of support from a practitioner as predictors of completion. The remaining two studies reported on participant baseline characteristics as predictors of noncompletion.

Finally, two studies of the same platform identified different couple "types" with regards to their enthusiasm and engagement (e.g., "keen completers" or "stragglers"), and therapists' role in engagement promotion. One remaining study reported that higher levels of engagement (measured by participants' correct responses to quiz questions) led to greater intervention effect on a number of clinical outcomes, and another found that those with the shortest time-frame between commencement and completion (i.e., completed the intervention faster) were more likely to be classified as "treatment responders" (identified by significant improvement on outcomes) at post-intervention assessment.

No studies of couple-based platforms identified build or design characteristics as moderators of intervention effect. No studies performed a formative evaluation of the platform and no studies reported design and build characteristics that enabled co-participation, beyond participant qualitative feedback.

Parent-child dyads

Features of platforms for parent-child dyads

Platforms designed for co-use by parent-child dyads were the second most common, with six platforms identified in this review. The intervention target included behaviour problems and conflict in young minority adolescents and their families (n=1); emotional development and parental responses to child behaviour (n=1); mother-daughter relationship quality and risk of underage drinking (n=1); adolescent male domestic violence prevention (n=1); emotional availability and parent-child adjustment where a child has cerebral palsy (n=1); and anxiety management skills and psychoeducation for parents and children (n=1). Four of the six platforms were developed for adolescents and a parent, one was for young children aged 2-7 and a parent and one was for children aged 7-12 and their parents. In all cases, only one parent was asked to participate. Below, we summarise the reported features of the platforms as detailed in the included studies.

Structure and duration of engagement

Duration of intervention use varied from 4-weeks to 12-weeks, with the most common duration

being 10-weeks (n=3/6). One intervention of 10-weeks duration in total enforced an extended break in the middle of intervention engagement and another offered a brief version of only four weeks (compared with the 10-week full version). Participation varied from once a fortnight to 2 online sessions/modules a week. Five of six interventions appeared to involve completion in a structured manner, following a predetermined order. One platform presented intervention content in a modular format that allowed participants to select content that was relevant to their needs and cultural preferences in any order. Intended duration and number of modules accessed appeared to be prescribed, however.

Co-participation and contact with practitioners

The amount and method of co-participation varied greatly. Two platforms required parents to watch the intervention content or preparatory materials before engaging with their adolescent child. Two required the parent to complete explanation videos or additional content following co-completion with their young child. One platform involved co-completion of all intervention modules, and independent completion of questions about content, with both the parent and adolescent required to complete these questions before the dyad could progress to the next module. Finally, studies of one platform reported "some exercises" were designed for co-completion but did not specify the extent of co-completion.

Four interventions included contact with a practitioner while two were entirely self-guided. One of those offering contact with a practitioner only offered this to parents and not the participating child. Two included scheduled sessions with a practitioner to discuss content, with one also supporting asynchronous communication with a practitioner via the platform. Finally, in one intervention, participants could contact practitioners via the platform for technical troubleshooting as required.

Tailoring and additional features

One platform allowed participants to select content based on their clinical and cultural needs. Content was selected from a list of available modules, though the process by which dyads selected this content was not described. This same platform offered dyads links to external sources of information based on their responses to questionnaires.

Reported user engagement indicators of platforms for parent-child dyads

A total of twelve (12) studies evaluated five different interventions designed for use by parent-child dyads. Of those, five reported on user engagement indicators including completion or fidelity (n=4) and satisfaction or acceptability (n=3). The remaining seven studies reported on mental health or relational outcomes and did not report on user engagement indicators.

The four studies reporting on completion or fidelity documented the number of participants who completed the entire intervention as prescribed. One study also reported on the average time it took participants to complete the intervention and another reported on the number of dyads who accessed all sessions and received calls from a practitioner. No studies reported on participants' interaction with the platform or any predictors of noncompletion.

All studies reporting on satisfaction and acceptability did so using non-validated measures. Mean satisfaction ratings were high. One study asked participants to indicate how easily they found time to complete the activities together, with a mean rating of 3.04/5. In no study did the satisfaction and acceptability data distinguish between platform and intervention satisfaction.

No studies of parent-child interventions identified platform build or design characteristics as moderators of intervention effect. No studies performed formative evaluations of the platform and no studies reported design and build characteristics that enabled co-participation.

Families

Features of platforms for families

Two platforms designed for co-completion by families were identified. The intervention target included family functioning where a child has an anxiety diagnosis (n=1), and family functioning where a child/adolescent/teen has a traumatic brain injury (n=1). Both platforms were intended for use by a child, adolescent or teen with a presenting clinical concern and any family members, including parents and siblings. Though siblings and other family members were invited to participate, studies detailed outcomes and engagement for a single parent and child only.

Structure and duration of engagement

Intervention participation on one platform extended for 10-weeks over 11 online chapters and the other delivered 7-11 sessions over six months. Both were designed for sequential completion of module content.

Co-participation and contact with practitioners

One platform asked family members to complete the entire intervention together. The other asked parents to complete sections themselves before working with children on a small number of modules intended for co-completion. Both included scheduled telehealth sessions with a practitioner during intervention participation. In addition, one platform also included a platform-based message system for contacting practitioners asynchronously. In this same platform, practitioners also provided reports to participants following exercise completion.

Tailoring and additional features

One platform provided no tailoring beyond engagement with, and feedback provided by practitioners. The other platform included supplementary sessions that could be completed by families should they wish to. In addition, this platform supported co-completion by asking family members to select their picture when they were present. The platform would then prompt either individual family members to respond or ask all family members to respond together.

Reported user engagement indicators of platforms for families

Twenty-three (23) studies examined the two family-based interventions. Of those, 16 reported user engagement indicators including satisfaction and ease of use (n=9); completion rates, compliance, adherence, and web utilisation (n=13); and feasibility (n=2). The remaining seven studies did not report on satisfaction, completion or feasibility data or findings.

Of those reporting satisfaction and ease of use, six studies used an adaptation of the Website Evaluation Questionnaire (WEQ; [128]) to measure participant satisfaction with the intervention. The remaining three studies administered non-validated measures developed for their studies. Satisfaction ratings were high across all studies. In two studies where the WEQ was administered, participants were asked to rate the website's ease of use, generally reporting the website was "moderately easy" to "easy" to use. Participants in one study reported a preference for meeting in person. Other than this, satisfaction ratings were either relevant to content or did not distinguish between platform and intervention satisfaction.

Completion rates, compliance, adherence, and web-utilisation were all reported as combinations of the following: the number of participants who completed the entire intervention; the average number of modules completed; time spent on the platform; and the number of families completing supplemental sessions. Feasibility was reported similarly, with one study also reporting that families were able to complete all sessions without practitioner assistance. In addition, one study reported on number of sessions completed as a predictor of symptom change (with inconsistent effect) and another reported on participant characteristics at baseline as predictors of completion.

Three studies also measured participants' technology use and comfort with technology prior to the commencement of the intervention and examined this as a predictor of intervention effect. Results

were inconsistent. In addition, one study identified whether participants' preference for treatment modality pre-intervention, that is, face-to-face, online self-paced, or online therapist-guided, impacted treatment outcomes. It was found that adolescent treatment preference was significantly related to attrition, but there were no other links with treatment effect or satisfaction.

No studies of family-based platforms identified build or design characteristics as moderators of the intervention effect. No studies performed a formative evaluation of the platform and, aside from one platform describing how participants identify they're present, no studies reported design and build characteristics that enabled co-participation.

Caregiver-care recipient (family) dyads

Features of platforms for caregiver-care recipient dyads

Two platforms were identified for family caregiver-care recipient dyads. The target of the interventions on the platforms included dyadic resilience for stroke or brain tumour patients and their family caregivers (n=1), and psychosocial health of cancer patients and their family caregivers (n=1).

Structure and duration of engagement

One of the two platforms involved intervention participation over six weeks, with three sessions delivered sequentially. The other platform contained four online modules and a participant journal completed over eight weeks. While not explicitly reported, it appeared that this platform also required sequential completion of intervention content.

Co-participation and contact with practitioners

Both platforms were designed to be completed by members of the dyad together, however, one had the option of completing the entire intervention independently if desired. One contained an asynchronous help function within the platform that generated an email to the project director. The other included a telehealth session prior to commencement of the online component.

Tailoring and additional features

One platform contained several tailored elements while the other did not offer any personalisation. Tailoring included platform-generated messages that provided web-links addressing dyad's concerns and supplementary activities offered between web-sessions. Both were generated from self-reported baseline information.

Reported user engagement indicators of platforms for caregiver-care recipient dyads

The two interventions were each evaluated in one study. Both studies reported on satisfaction, and one reported on feasibility with both reporting high satisfaction ratings. One study reported there were no adverse effects of participants completing the intervention on the online platform together, and the other identified length of the modules and the ability to complete the intervention in their own time as facilitators to use. In one study, participants noted finding time to complete the intervention as a dyad was sometimes challenging. Where feasibility was reported, the study found lower enrolment rates than previous in-person RCTs, but higher retention rates.

Neither study identified build or design characteristics as moderators of intervention effect. No study performed formative evaluation of the platform and neither reported design nor build characteristics that enabled co-participation.

Discussion

This review details build, design and user engagement characteristics of DMHI that enable co-completion of clinical interventions by related people. To distinguish effective platform contributors to engagement from elements pertaining to intervention content, we selected only those platforms housing interventions of established clinical efficacy (i.e., previously reported significant improvement of at least one mental health or relational outcome). Some common design features were identified, however, in contrast to expected findings, specific design characteristics enabling co-completion were rarely reported and evidence for engaging families is under explored.

Common platform features

This review identified platform design features that were common across included studies. Regardless of the relationship targeted, most platforms delivered a structured intervention that required engagement over a prescribed duration of time with content completed sequentially. Two platforms allowed participants to access content in a non-sequential manner and a handful (n=4) offered supplementary content based on identified need. Retention rates remain low for DMHI [29] and there are further complexities when family members participate together [50]. As such, consideration might be given to ways in which families' time on the platform can be optimised.

Single Session Thinking (SST) is one process by which therapists treat each encounter as if it were the sole session, encouraging the participants to make the most of the time [129]. Adaptation to online delivery of family therapy sessions already holds promise [130] and digital single session interventions have been trialled in college student settings, with positive preliminary findings [131-133]. Emerging evidence therefore suggests that SST principles could readily be applied to self-paced online, mimicking single, standalone sessions that address the family's present needs as they identify them. Check in prompts and invitations to return as needed could be automated from the platform, to encourage return visits as required or desired by the family. A platform designed to deliver content as such would likely reduce the burden on families and provide greater flexibility in how they access content.

Minimal tailoring was offered in seven DMHI identified in this review, providing more or less the same intervention to all participants. Sixteen (16) of the 24 interventions included interaction (either synchronous or asynchronous) with a practitioner. Evidence for personalised mental health care is growing rapidly, acknowledging the complexity and diversity of individuals and families [134, 135]. Guided interventions (i.e., those where participants have some contact with a practitioner) report higher levels of engagement than self-guided interventions, however, incorporating human contact can be costly and can limit the flexibility and accessibility associated with online mental health interventions [136]. Research suggests that compared with targeted or generic feedback, personalisation can be used to improve engagement, subsidise personal contact, and contributes to positive attitudes towards a DMHI [134, 135]. Beyond this, several studies included in this review identified baseline characteristics that moderated participants' responses to the intervention. These included characteristics such as age, relationship status and prior comfort with technology. Understanding how baseline measures might impact participants' ability or desire to engage with platforms, and providing options for personalisation accordingly, would likely result in greater engagement. A family-based platform might include tailored design options such as colour and font choices, preferences for video or text-based content, and preferences for receipt of prompts and reminders. In addition, if children are present, families could have the option to access content that has been adapted for younger readers. In a world where artificial intelligence is supporting personalisation across the internet, it would be remiss not to consider personalisation in family and relational-based DMHI.

Platform features for enabling co-completion

By their nature, computers and mobile devices are designed for use by individuals. Given obvious complexities involved in having multiple people participate in an online intervention together, it was expected platforms designed for such use may contain features for enabling co-completion across the lifespan. It was also expected that the way participants engage may differ from platforms designed for individual use. This could include considerations about privacy of individual participants' data, methods for encouraging participants to work together, and design choices to allow all participants to contribute to activities. One platform requested participants select their image when they were in attendance, and this was then used to prompt individuals to respond and participate in activities. Other than this, no study identified platform characteristics that were included to specifically enable co-completion. In general, studies detailed participants' engagement with the intervention but not with the platform. Reporting on platform engagement might include details of how participants navigated the interface, how they identified and accessed content, or the modes through which content was delivered. On the other hand, intervention reporting was found to delve into factors such as attrition rate and measurement completion. Crucially, it is important to distinguish between intervention trial attrition (i.e., dropout attrition or loss to follow-up) and platform disengagement (i.e., non-usage attrition), as recommended in a prior review [137]. These two forms of attrition are influenced by distinct factors [138, 139] and failure to differentiate between them could potentially lead to misinterpretation of platform engagement dynamics.

It was also expected that studies would provide insights into the build and design considerations relating to individual user privacy and safety within a shared online space. This encompasses considerations such as determining when an individual's information can or should be shared with other members of the family and effectively identifying and responding to safety risks. From our perspective, these design aspects are essential considerations when developing a family-based DMHI. However, none of the studies identified in this review reported or discussed how they tackled or addressed these privacy and safety considerations. To further ensure the adequate addressing of not only these concerns, and to anticipate other potential considerations, rigorous co-design processes are essential. This co-design strategy would significantly contribute to the refinement of family-based DMHI, ensuring they meet the nuanced needs of users.

Engagement with practitioners

The varied nature of engagement in guided tools (i.e., involving interaction with practitioners, structured sessions, and feedback loops), stands in stark contrast to the self-guided usage and consistent participation characterising engagement in tools lacking contact with practitioners. Recognising challenges intrinsic to self-guided tools, such as user motivation and adherence, becomes paramount, particularly given the absence of practitioner involvement is likely to make the sustainability of user interest more demanding. The role of technology in promoting engagement with practitioners is multifaceted, encompassing communication facilitation through asynchronous methods and data-driven insights that enhance personalised interactions. Moreover, exploring hybrid models, and incorporating periodic check-ins or teletherapy sessions within self-guided platforms presents a promising balance between autonomy and professional support.

Addressing challenges in technology engagement involves prioritising user-centred design, integrating behavioural science principles, and leveraging feedback mechanisms, either automated or through clinician input, to ensure continuous support and guidance. Looking forward, suggested avenues for future research are many, including the long-term effectiveness of guided and self-guided tools, understanding the impact of different engagement strategies, and developing sophisticated technology-assisted therapeutic approaches.

Evidence for enabling co-completion

We faced constraints in reporting evidence on platform features that engaged and enabled co-completion by families because no study conducted a direct evaluation of the platform design. This limitation hindered our ability to provide comprehensive insights into the effectiveness of features promoting co-completion among participating family members. In addition, while several evaluated practitioner support, family member co-participation, population characteristics and baseline scores on mental health or relational measures as moderators of intervention outcomes, no study evaluated design features as potential moderators of intervention outcomes.

Of the 85 included studies, 66 reported on user engagement indicators. Of those, the majority (n=48) employed custom, non-validated measures and the remaining employed validated measures that were intervention specific and gave no information about platform engagement. Given this measurement heterogeneity, little is possible by way of cross-study comparison. In addition, without evaluation of platform design strategies, no conclusions can be drawn about enabling or disabling features. The capacity for real world translation, and understanding of how to overcome known barriers, is constrained.

A need for cohesive platform evaluation and reporting

Platform user experience design, including ease of use, navigation, screen layout, readability, gamification, feedback, and attractiveness play a large role in a participant's perception and engagement with a website and ultimately a site's usability [29, 140, 141]. In addition, individual participant characteristics such as age, literacy level, level of disability, and mental health conditions may impact their engagement with, and ability to use a platform as designed. When a family presents online, more than one person's needs must be catered for.

There is a lack of consensus and shared understanding of how to usefully conceptualise and measure engagement and accessibility with digital mental health platforms [35, 36]. This variability is not unique to the context of family-based mental health platforms, with reviews of engagement in digital mental health reporting similar heterogeneity [35, 134, 142]. Studies tend to report on measures such as completion or attrition rates, usability, user satisfaction, acceptability, and feasibility as indicators of how well the application engaged users. Often, these data are self-reported. Given high attrition rates for self-guided platforms [102], and additional complexities involved in requiring family members to co-complete activities [50], understanding platform characteristics that enable co-use and promote engagement is vital to informing future development of such platforms. There is limited direct evidence to support practitioners, developers, and designers to understand why engagement levels remain low, and there remains a limited understanding of how to design a DMHI to optimise engagement for families.

Assessment of user engagement indicators such as completion data alone is likely insufficient to measure how well a platform engaged its users. For example, reporting on duration of participation and sessions completed neglects factors impacting how families navigate the website, such as interface design and organisation, and user characteristics. Analysis of platform use patterns and baseline characteristics in addition to these completion statistics would provide greater insight into how families engage with a platform. Formative, as opposed to summative evaluations of usability are conducted to inform the redesign and improvement of a web-interface. Formative evaluations consider multiple factors and involve building a deep understanding of user perceptions and use patterns of platforms. In addition to self-reported measures and completion rates, often formative evaluations also consider website analytics such as bounce rate, pages per session, top exit pages and the pathways users take to get to pages where they ultimately spend most of their time. It is a recommendation of this review that formative evaluations of web-based mental health platforms become common practice for DMHI, particularly for novel and complex applications such as family-

based platforms.

Finally, a systematic review of evaluations of usability of mobile mental health technologies [143] recommended closer collaboration between health care and computer science experts when evaluating DMHI, suggesting this would increase the quality of interpretation of the evaluation. A summary of learnings from the *ParentWorks* trial identified an expected benefit of having involved a web-agency during the early stages of content translation to optimise user experience [144]. An interdisciplinary approach might enhance knowledge sharing too, through detailed reporting of DMHI design decisions, and their interactions with platform elements and clinical outcomes.

Clearly there remains a need for coherent reporting and evaluation practices in the field, to inform guidelines and policy on effective strategies for engaging families online, in mental health related interventions. Until rigorous co-design with families, and an interdisciplinary approach between content experts and user-experience designers is taken to formative evaluations, growth and expansion of efficacious mental health platforms for family use will lag.

Study strengths, limitations and future research directions

This study represents the first of its kind. Utilising a replicable search strategy over four time periods, we synthesize here the state of the published evidence regarding platform design and build characteristics enabling successful engagement of related parties in digitally delivered mental health interventions. Given grey literature was not searched for this review, it is possible that emerging evidence for new multi-user digital platforms has been missed. Our findings are limited by the technical reporting of many studies. Principally, many published studies do not provide details about their platform build, or the way in which participants engage with the platform, including whether co-participation was expected. Where this information was not provided, the study authors were contacted, and websites were searched to retrieve the relevant information. It is likely that examination of some relevant functionality was precluded when this information was not provided, or was insufficient.

Most studies excluded participants where those other than the identified person had a mental illness. Whether through care-giving burden, stigma, or familial shared conditions, it is rare that a family presenting for therapy would have only one member experiencing mental health stress or significant challenges [145, 146]. Given the potential of these platforms to aide family therapy applications, further research with families where multiple members experience stress or mental health challenges is needed. Until then, it is difficult to generalise the evidence reported in this review to the real-world experience of families who may present for family therapy.

In addition, diversity in populations was limited, with most studies including Caucasian, heterosexual, and middle-class participants. There is a lack of evidence from low- and middle-income countries (LMIC), with all studies performed in more economically developed countries (MEDC). The technological experiences and needs of families in LMIC will likely vary significantly to those in MEDC given, among other factors, the varying degree in ease of access to technology. Digital interventions have the potential to expand reach and access to services, however, until participants from LMIC are included in studies of digital platforms for families, findings cannot be generalised to these populations and ultimate reach is limited.

As this is a new and novel field, language and terminology is still being defined, and means of measuring and defining engagement and feasibility are not well established [29]. Of included studies, 52% were published in the last five years, reflecting rapid developments in technology and associated applications.

Conclusion

While there is emerging evidence to suggest that DMHI are clinically effective, there remains a large evidence gap in the literature about the extent to which platform specific design and build elements

may also contribute to timely access, user experience, safe co-completion by family members and clinical outcomes. In the service of improved mental and relational health outcomes, our findings point to a significant opportunity for meaningful cross-disciplinary research, development, and evaluation of family-based mental health platforms. Findings from the next era of research will be central to enabling policy and practice advancements in equitable access to effective mental health care support for families.

Data Availability

All data generated or analysed during this study are included in this published article [and its supplementary information files].

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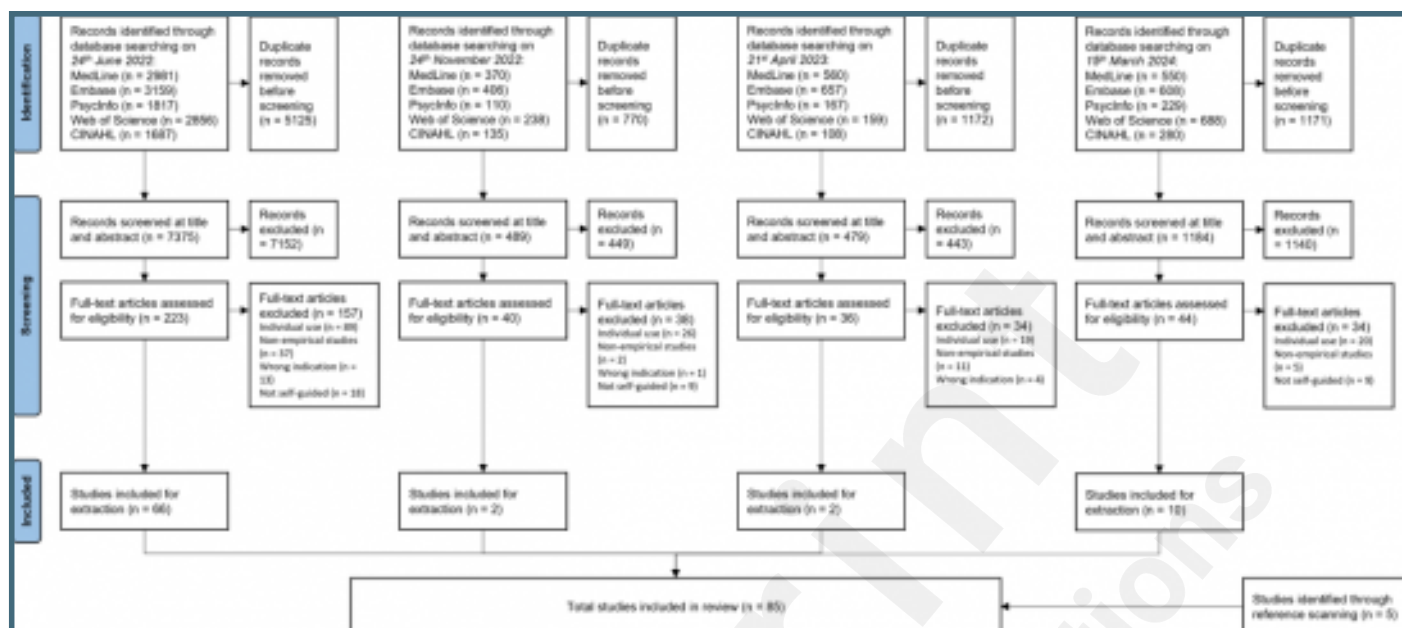
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Supplementary Files

Figures

PRISMA-ScR diagram [37] showing inclusion and exclusion of studies at each stage of the review process.

Multimedia Appendixes

Excluded Studies and Platforms.
URL: http://asset.jmir.pub/assets/48041d4285936add7b5095f755baf867.docx

Search Strategies.
URL: http://asset.jmir.pub/assets/5b47add5a4b75a012a4f95a073de116c.docx