BMJ Open

Understanding the Uptake of Virtual Care for First and Return Outpatient Appointments in Child and Adolescent Mental Health Services: A Mixed Methods Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-074803
Article Type:	Original research
Date Submitted by the Author:	17-Apr-2023
Complete List of Authors:	Campbell, Leslie Anne; Dalhousie University, Community Health & Epidemiology; IWK Health Centre, Psychiatry Clark, Sharon; IWK Health Centre, Mental Health and Addictions Chorney, Jill; IWK Health Centre, Mental Health and Addictions; Dalhousie University, Psychiatry Emberly, Debbie; IWK Health Centre, Mental Health and Addictions Carrey, NJ; IWK Health Centre, Psychiatry; Dalhousie University, Psychiatry Bagnell, Alexa; IWK Health Centre, Psychiatry; Dalhousie University, Psychiatry Blenus, Jaime; IWK Health Centre, Mental Health and Addictions Daneff, Miriam; IWK Health Centre, Mental Health and Addictions Campbell, John; Dalhousie University, Community Health & Epidemiology
Keywords:	Child & adolescent psychiatry < PSYCHIATRY, COVID-19, MENTAL HEALTH, Health Services Accessibility, Health Equity

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Understanding the Uptake of Virtual Care for First and Return Outpatient Appointments in Child and Adolescent Mental Health Services: A Mixed Methods Study

Leslie Anne Campbell, PhD, RN. Associate Professor and Sobey Family Chair in Child and Adolescent Mental Health Outcomes Research, Dalhousie University and IWK Health (ORCID 0000-0003-2534-0450)[1,2,3]

Sharon Clark, PhD. Psychologist and Advanced Practice Lead, Choice and Partnership Approach, IWK Health (ORCID ID: 0000-0002-0923-1783)[2]

Jill Chorney, PhD, Psychologist and Advance Practice Lead, Behavior Change, IWK Health. Associate Professor, Dalhousie University (ORCID 0000-0002-6137-049X) [2,3]

Debbie Emberly, MSc, PhD, Psychologist and Advanced Practice Lead, Research, Evaluation and Outcomes, IWK Health (ORCID 0000-0003-0114-1211)[2]

Normand Carrey, MD, FRCPC, Associate Professor, IWK Health and Dalhousie University (ORCID 0000-0001-7753-8448) [2,3]

Alexa Bagnell, MD, FRCPC, Professor and Head of the Division of Child and Adolescent Psychiatry, IWK Health and Dalhousie University (0000-0002-1484-9676)[2,3]

Jaime Blenus B.A, TRS, MScOT, OT Reg(NS), Clinical Occupational Therapist, Community Mental Health Program, IWK Health[2]

Miriam Daneff, BSc, MAHSR, Research Assistant, IWK Health[2]

John Charles Campbell, BEng, MASc, EIT, Research Coordinator, Dalhousie University (0000-0002-1325-0485) [1]

[1] Department of Community Health and Epidemiology, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

[2] IWK Health, Halifax, Nova Scotia, Canada

[3] Department of Psychiatry, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

Corresponding author: Leslie Anne Campbell, PhD, RN Room 418, 5790 University Avenue, Halifax NS B3H 1V7 Canada Telephone: 902.494.3860 Email: leslie.anne.campbell@dal.ca

Word count: 3498

Abstract

Objective: To describe patterns of virtual and in-person outpatient mental health service use and factors that may influence the choice of modality to inform service planning in a child and adolescent mental health service following the rapid implementation of virtual mental health care in March 2020.

Design: A pragmatic mixed-methods approach using routinely collected administrative data from April 1st, 2020 and March 31st, 2022 and semi-structured interviews with clients, caregivers, clinicians, and staff. Interview data were coded according to the Consolidated Framework for Implementation Research (CFIR) and examined for patterns of similarity or divergence across data sources, respondents, or other relevant characteristics.

Setting: IWK Health, Nova Scotia, Canada

Participants: IWK Health clinicians and staff who had participated in virtual mental health care following its implementation in March 2020 and clients (aged 12-18 years) and caregivers of clients (aged 3-18 years) who had received treatment from an IWK outpatient clinic between April 1st, 2020 and March 31st, 2022 (n=1300). Participants (n=48) in semi-structured interviews included nine clients aged 13-18 years (mean 15.7 years), ten caregivers of clients ages 5-17 years (mean 12.7 years), eight CMHA booking and registration or administrative staff, and 21 clinicians.

Results: During peak pandemic activity, upwards of 90% of visits (first or return) were conducted virtually. Between waves, return appointments were more likely to be virtual than first appointments. Interview participants (n=48) reported facilitators and barriers to virtual care within the CFIR domains of “outer setting” (e.g., external policies, client needs and resources), “inner setting” (e.g., communications within the service), “individual characteristics” (e.g.,

personal attributes, knowledge and beliefs about virtual care), and "intervention characteristics" (e.g., relative advantage of virtual or in-person care).

Conclusions: Shared decision-making regarding treatment modality (virtual vs. in-person) requires consideration of client, caregiver, clinician, appointment, health system, and public health factors across episodes of care to ensure accessible, safe, and high-quality mental health care.

Strengths and Limitations:

- The study includes the perspectives youth and caregivers in identifying facilitators and barriers to accessing virtual mental health care.
- Uptake of virtual care is differentiated by both levels of pandemic activity and by visit type (first or return appointments).
- Administrative data include pre-pandemic service use, allowing for comparisons prior to and during pandemic activity.
- Interview participants do not include clients or caregivers who were unable to access mental health services (either virtually or in person).

Key words: Mental Health Services; Virtual Care; Child and Adolescent Psychiatry; Mixed Methods; Health Care Quality, Access, and Evaluation; Community Mental Health Services; Consolidated Framework for Implementation Research (CFIR)

Background

Prior to the COVID-19 pandemic, virtual mental health care (also known as telepsychiatry, tele-mental health, or remote mental health care) had been promoted as a means of improving access to mental health services, largely by addressing geographical disparities in access.[1,2] However, its uptake was limited in practice.[3–6] The technology was deemed not user-friendly, and providers were hesitant in its adoption, citing concerns that the quality of virtual care was inferior to care offered in-person despite evidence to the contrary.[7,8] The onset of the pandemic and ensuing public health restrictions to in-person care provided the impetus for the wide-scale adoption of virtual mental health care to enable access to services. Emerging evidence has identified the need to understand client and caregiver considerations to ensure equitable access to services.[9–13]

Objective

We undertook an overarching program of research to investigate the evolving delivery of virtual mental health care in a tertiary child and adolescent mental health service to support timely matching of service modality to client, family/caregiver, and clinician needs. In this first paper, we present our findings comparing the uptake of virtual care by first and return outpatient visits and discuss factors that may influence the selection of modality of care, categorized using the Consolidated Framework for Implementation Research (CFIR).

Methods

Study Design

We employed a pragmatic, mixed-methods approach that iteratively incorporated routinely collected administrative health data (Meditech scheduling and registrations) and key informant interviews with clients, caregivers, clinicians, and staff to identify barriers and facilitators to the readiness for and uptake of virtual care in a tertiary child and adolescent mental health service. This approach took advantage of existing quality improvement processes, promoted data richness, and allowed for methodological triangulation.

Setting

The IWK Mental Health and Addictions (MHA) Program provides family-centered mental health and addictions care for children and adolescents up to their 19th birthday in Nova Scotia, Canada. Services include inpatient care, psychiatry-led specialty clinics, intensive day treatment services, and outpatient services offered in Community Mental Health and Addictions (CMHA) clinics, schools, and other community locations. Approximately 430 interdisciplinary health professionals and 16 child and adolescent psychiatrists provide care to nearly 6,000 clients and conduct over 50,000 outpatient appointments and 330 inpatient admissions annually (fiscal year 2021).

Prior to the COVID-19 pandemic, existing telehealth services were rarely utilized by IWK MHA, and were largely for clients in geographically distant locations. All IWK MHA services, except for inpatient services, pivoted to a virtual care model at the onset of the public health restrictions introduced in Nova Scotia in March 2020. As the public health restrictions varied with subsequent waves of the pandemic, virtual care continued to be an important treatment

modality within the CMHA clinics, while within the more intensive day and overnight services a return to in person services, with adjustments to meet public health requirements, was required.

In 2012, the IWK MHA Program adopted the Choice and Partnership Approach (CAPA) as a model of care delivery and guiding philosophy for the Program. CAPA is a model of service delivery that has a foundation in shared decision-making where clients' and families' expertise in their lives is valued alongside collaboration with professionals to define what is important to them and to consider options to support their mental health.[14,15] Within CMHA services, the first client/caregiver contact with the clinician is the "Choice" appointment where a joint case formulation and agreed goals for treatment are developed. When formal treatment is deemed to be required it is facilitated by means of "Partnership" sessions that focus on interventions that support working towards specific treatment goals.

Data Sources

Administrative health data sources included Meditech registration and scheduling databases held at IWK Health. Client demographics and appointment information including numbers, types, and modality (virtual or in-person) were abstracted for fiscal years (FY) 2018-2021 to compare trends in service use prior to and during the pandemic. Key informant interviews with IWK MHA clinicians, CMHA booking and registration and administrative staff, and with CMHA clients and caregivers were employed to identify diverse perspectives regarding barriers and facilitators to virtual care. IWK MHA clinicians and staff were invited by a Program-wide email to take part in the interviews if they had participated in the organization or delivery of virtual mental health care following its implementation in March 2020. Clients between the ages of 12-18 and caregivers of clients between the ages of 3-18 were invited by email to participate in

interviews if they had agreed to be contacted for research and had received treatment from an IWK CMHA outpatient clinic between April 1st, 2020 and March 31st, 2022 (n=1300). Clinician/staff interviews were conducted between June - August 2021, and client/caregiver interviews were conducted in December 2021 and January 2022.

Analyses

Descriptive analyses of administrative data included calculations of counts and proportions as appropriate. Service use was mapped to pandemic activity ("waves") based on case counts and public health restrictions in Nova Scotia.[16] Initial observations of service use patterns contributed to the development of guiding questions for the key informant interviews to foster a better understanding of the observed results and to inform further analyses of relevant administrative data. The CFIR was used to ensure comprehensiveness and consistency in the identification and use of key constructs related to the implementation of virtual care and to allow comparisons across studies, settings, and initiatives employing the framework.[17] The CFIR provided a particularly useful framework as it allowed for the explicit consideration of the outer context (e.g., COVID-19 public health policies) in the implementation of virtual care, and is useful in rapid-cycle evaluation.[18] Interview transcripts were coded according to the five domains of the CFIR, namely, "intervention characteristics", "inner setting", "outer setting", "individual characteristics", and the "implementation process".[17] We also coded any implementation outcomes at the client/caregiver, clinician/staff, and service levels.[19] We sought to identify patterns of similarity or divergence by data source, respondent type, and other relevant characteristics. Here we present results relevant to our understanding of the use of modality by outpatient visit type (Choice vs. Partnership) in relation to pandemic activity.

Research Ethics and Participant Consent

The study was approved by the IWK Health Research Ethics Board (Title: Our Virtual Reality: Rapidly Responding to Changing Mental Health Needs among Children and Adolescents, Project #1026770). Interview participants provided informed consent prior to their participation. Consent was not required for the secondary analyses of pseudo-anonymized administrative health datasets.

Findings

Administrative Data

The administrative data included 6,718 unique clients with a total of 51,321 attended CMHA appointments between April 1, 2018 and March 31, 2022. At their first (Choice) CMHA visit, clients ranged in age from 2-19 years (mean 12.4 years), and 48.7% were male.

Key Informant Interview Participants

Participants (n=48) in semi-structured interviews included nine clients aged 13-18 years (mean 15.7 years), ten caregivers of clients ages 5-17 years (mean 12.7 years), eight CMHA booking and registration or administrative staff, and 21 clinicians (psychologists, social workers, psychiatrists, and other health professionals working in IWK CMHA, Specific Care Clinics, and Intensive Services).

Proportions of Virtual and In-Person Appointments over the Pandemic

The administrative data analysis demonstrated that proportions of virtual vs. in-person CMHA (outpatient) attended appointments varied by both pandemic activity and by Choice or Partnership appointments (Figure 1). During peak pandemic activity that included high case counts and strict Public Health restrictions during Waves 1 (March – June 2020) and 3 (March – June 2021) in Nova Scotia[16], proportions of all appointments conducted virtually neared 100% and 90%, respectively. Between pandemic waves, higher proportions of Partnership appointments were conducted virtually compared to Choice appointments. While the return to in-person appointments increased over the course of the observation period, by the fourth wave of the pandemic in November 2022 the proportions of Partnership appointments conducted virtually ranged from 42-83% of attended visits compared to 6-63% for attended Choice appointments.

[Insert Figure 1]

Facilitators and Barriers to Virtual Mental Health Care

Outer Setting (External Policies, Client Needs and Resources)

The levels of COVID-19 activity (i.e., case counts) and public health restrictions directly influenced decisions regarding the implementation and use of virtual mental health care. *". . . I think that [the province's] rules and recommendations probably played a big role in virtual care." "So very much driven by an increase in cases and to stop the amount of people in large groups in the office."* P3 (Social Worker) Periods of lower COVID-19 activity between pandemic waves allowed for more choice in service modality and accommodation of client needs and preferences. *"... during those times when we're not in lockdown, we give families the choice."* P5 (Psychologist)

Client and caregiver needs and resources highlighted both facilitators of and barriers to virtual care. Participants identified the need for access to resources such as a private or safe space, reliable internet connection, and technology to facilitate virtual care. *"I think that if somehow like there was a way to make a safe space for people away from home* [for a virtual appointment]*, that would be beneficial to a lot of people probably."* P44 (Client) Client reluctance or low motivation to engage in treatment, low English fluency, and distractibility due to young age or clinical presentation (e.g., attention deficit/hyperactivity disorder) were reported to be barriers to virtual care. *"Where it does fall a little more flat is with the younger kids and trying to teach them direct skills, because obviously the screen isn't all that interesting and they have a hard time connecting with us, we can't use toys and play-based methods as well."* P21 (Psychologist)

Inner Setting (Communications within the Service)

During episodes of higher COVID-19 activity, the relative priority of offering access to services outweighed concerns about guidance for providing virtual care. *"And what we can provide is better than nothing, right – not being there at all for these families, these patients."* P2 (Youth Care Worker) As restrictions eased, organizational policies and messaging regarding the use of clinical judgement for guiding decisions regarding virtual care were reported to be available. However, clinician participants identified a need for more structured guidance in terms of what constituted *"needing to be seen in person".* P12 (Psychologist)

Individual Characteristics (Personal Attributes, Knowledge and Beliefs about Virtual Care)

Participants' consideration of personal risk of COVID-19 infection impacted decisions to provide or use virtual care. *"I think that, especially with COVID, a lot of people are already pretty anxious to leave the house."* P48 (Client) *"Personally, during the pandemic, I would prefer to work from home, just because I don't want to put myself in any risks that seem unnecessary."* P3 (Social Worker)

Clinician preferences for modality also varied by their technical savviness, disinclination for wearing masks during sessions, and ability to build rapport with clients. *"Knowing how to use a computer well… because virtual care is more fun and works better when you're screen sharing; you have websites or documents or videos, making it more interactive."* P13 (Social Worker) Clients and caregivers reported that technologically savvy and understanding clinicians were helpful in explaining how to navigate the virtual care platform and in fostering a feeling of connection. *"It was nice that if something happened my psychologist would always have like two other options to fix the problem, like because my volume didn't work she's like, 'that's fine, we'll use our phone.' Like it was never something that was stressful. … So that's really helpful."* P34 (Client) *"It's the same things that make them good at their job in-person; you know, compassion, understanding, the education and training."* P30 (Caregiver)

Importantly, clinicians' attitudes toward virtual care and stage of change evolved over the course of the pandemic. *"I think for me the main thing with the shift to virtual, I just keep reflecting on like my own personal shift from, 'there is no way;' I can remember being in meetings at the start of the pandemic saying there is absolutely no way that doing these appointments virtually will*

work, like that is just not a thing. To now, I'm in a place of, there is no way we can stop having virtual care as an option, right?" P20 (Occupational Therapist)

Intervention Characteristics (Relative Advantage of Virtual or In-Person Care)

All participants reported relative advantages of both virtual and in-person care by client and caregiver needs and appointment type (e.g., Choice or Partnership, brief medication checks). Caregivers spoke to the convenience of virtual appointments that didn't require leaving work, accessing public transport, finding and paying for parking, or finding childcare. *"I think it opens it up to so many more people who can't travel, who don't have transportation, who have the anxiety to leave, they can still have that help."* P38 (Caregiver) Similarly, clinicians noted the relative convenience and utility of virtual care, particularly for brief follow-up or less sensitive appointments, and for appointments with caregivers specifically. *"Them having to come physically . . . That's a full day of school missed. That's a parent taking time off work. For what? So I see them for 20 minutes and say, 'how's it going?' 'It's great.' Refill their med."* P15 (Psychiatrist) *"I find working with parents, it works really well, doing it over Zoom. Often because . . . it's not quite as sensitive as some of the one-on-one individual therapy I would do with teenagers."* P5 (Psychologist)

In-person care was generally preferred for intensive treatment; however, virtual care was noted to be particularly advantageous for care coordination between providers and equally useful when compared to in-person care for structured or didactic work. *"If it's more content based, more didactic, more directive, more about giving people information . . . that seems to go just as well in either format. But then there's some other work that I would do that is more like related to*

either attachment related issues or trauma or emotion-based work that I find is more variable." P19 (Psychologist)

While the administrative data showed lower uptake of virtual care for Choice appointments compared to Partnership appointments, virtual care may offer a means of "breaking the ice" in the introduction to the service for some clients. *"I remember doing a Choice appointment . . . he shared that he was so anxious about meeting new people . . . that there was no way he would have made it to the office to meet in-person . . .* [virtual care] *became a way for someone to get help."* P20 (Occupational Therapist)

Implementation Outcomes

While individual preferences for virtual or in-person care varied, virtual care was deemed to be useful, particularly in a hybrid model of service delivery in which it is offered in addition to in-person care. *"I think that, like virtual care for mental health should still always be an option."* P44 (Client)

Discussion

The Public Health restrictions necessitated by the COVID-19 pandemic required the rapid implementation of virtual mental health care. We aimed to describe patterns of virtual child and adolescent mental health outpatient service use in a publicly funded tertiary health centre and to identify factors that may influence the choice of modality. The present study contributes to the understanding of virtual mental health service use patterns[6,20] by differentiating between first and

return visits. Proportions of virtual vs. in-person outpatient appointments varied by pandemic activity and first and return appointment type. During periods of public health restrictions or high COVID-19 case counts, particularly during the first and third waves of the pandemic in Nova Scotia, both Choice (first) and Partnership (return) outpatient appointments were conducted nearly entirely by means of virtual care. Between pandemic waves, while the proportions of in-person appointments increased for both Choice and Partnership appointments over time, Partnership appointments were more likely to continue to be conducted virtually.

Participants in the key informant interviews aided our understanding of these observed patterns in the service use data. Considerations identified by clients, caregivers, clinicians and staff regarding barriers and facilitators to virtual care included those in the CFIR domain "outer setting" (including COVID-19 activity and public health restrictions, client needs, and client/family resources), "inner setting" (such as policies to exercise "clinical judgement" regarding modality), "individual characteristics" (including knowledge and beliefs about virtual care, "tech savviness", and individual stage of change), and "intervention characteristics" (in particular, the relative advantage of virtual or in-person care). Choice of modality was more likely to be influenced by both clinician and client/caregiver needs or preferences during lower COVID-19 activity, but in-person care required greater clinical justification during pandemic peaks.

As in previous studies, our findings support a hybrid model of virtual and in-person care[6,21] and identify additional considerations regarding visit types and client needs. The higher proportion of in-person Choice appointments compared to Partnership appointments is in keeping with a previously published survey of child and adolescent mental health clinicians, who reported a preference for initial in-person meetings to establish rapport and develop a therapeutic

relationship before transferring to virtual care.[22–24] However, our results demonstrate a role for virtual care in first contact with clinicians. Participants in the present study noted the relative advantage of virtual care for initial appointments to establish rapport with clients who would otherwise not attend in-person appointments due to reluctance to come to the clinic related to the clinical presenting concern (e.g., social anxiety) or logistical barriers (such as caregivers having to take a day off of work, access transport, or find childcare).

While moving appointments from clinic to home environments by means of virtual care may remove many barriers to access of mental health care and support continued engagement with services, it does not ensure accessible care for all, and in some instances may introduce new barriers to care. In addition to a reliable internet connection and workable technology with which to access a virtual platform, clients and caregivers require a private or safe space in which to conduct their appointment.[25] Additional barriers to virtual care identified by our participants included client reluctance or low motivation to engage in care, low English fluency, and poor engagement due to young age or clinical presentation (e.g., attention deficit/hyperactivity disorder). The relatively higher sustained uptake of virtual care for return Partnership appointments over the course of the pandemic may reflect, in part, clinicians', clients', and caregivers' increasing comfort with the technology and evolving individual stage of change in its implementation.[26] Indeed, participants who were initially reluctant to use virtual care for mental health care identified an ongoing hybrid model of virtual and in-person care as important for supporting access to care for some clients and families. Additionally, access to collaborative activities such as case conferences, meetings, and conferences or training activities may be supported by virtual technologies.[27]

The CAPA model adopted by the IWK CMHA service is a client- and family-centred model of mental health care rooted in principles of shared decision-making and matching care to client and caregiver needs.[14,15] Matching service modality to those needs adds a layer of consideration in decision-making regarding treatment options.[9] The need for clarity regarding "clinical judgement" in choice of modality was identified as a gap in policy and practice. Clear, transparent guidance for shared decision-making will need to balance considerations of appointment complexity and risk, therapeutic alliance and engagement in care, and barriers and facilitators of access. Considerations regarding modality may also vary by appointment types (e.g., first or return appointments), or by the purpose of the appointment (e.g., medication check), highlighting the need for ongoing decisions regarding modality across episodes of care. Understanding and incorporating these considerations from the perspectives of clients, caregivers, and clinicians is necessary for informing best practices in shared decision making.[28]

While promoted as a means of improving geographical access to mental health services, virtual care was not widely adopted in publicly funded services prior to the COVID-19 pandemic.[1,2] The rapid shift to virtual care following the onset of the pandemic offered an opportunity to identify patterns of its use and to understand facilitators of and barriers to its uptake.[29] A systematic review of systematic reviews of the implementation of e-health interventions that employed the CFIR also identified barriers and facilitators to implementation across CFIR domains, noting that implementation is multi-level and complex.[5] Our mixed methods approach aided our comprehensive understanding of the implementation of virtual care in a child and adolescent mental health service, identifying potentially shifting client and clinician needs within a complex health system setting during the uncertainty introduced by the pandemic. Further, the integration of clinical and service data and client, caregiver, and clinician perspectives supports a robust

learning health system, which will be important for ensuring responsive, client-focused services when needed.

Clinical Implications

A hybrid model of virtual and in-person mental health care provides an important strategy for engaging youth and families, including those who would or could not otherwise attend appointments in person. Shared decisions regarding modality need to balance clients' and caregivers' abilities to access services while meeting changing needs across episodes of care. Opportunities for future research include the development and evaluation of hybrid models of care and the co-creation of guidance to support ongoing transparent, shared decisions that ensure accessible, safe, and high-quality mental health care.

Data Access

Data are not available due to confidentiality requirements.

Acknowledgements

We are grateful to the clients, caregivers, staff, and clinicians who shared their experiences and insights into the provision and use of virtual mental health care. We also wish to thank Krystal Blackmore for support with administrative data extraction.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

Funding

The research was supported by the Canadian Institutes of Health Research Operating Grant: COVID-19 Mental Health & Substance Use Service Needs and Delivery - Understanding Rapid System Transformations #MS1- 173063.

Contributorship statement

LAC designed the study and drafted data collection tools, monitored data collection, analysed qualitative data, reviewed data analyses, drafted and revised the paper and is guarantor. SC designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. JC designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. DE designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. NC designed the study and drafted data collection tools, reviewed data analyses, and reviewed and revised the paper. AB reviewed data analyses, and reviewed and revised the paper. JB analysed qualitative data, reviewed data analyses, and reviewed and revised the paper. MD conducted interviews, maintained and analysed qualitative data, reviewed data analyses, and reviewed and revised the paper. JCC maintained and analysed quantitative data, reviewed data analyses, and reviewed and revised the paper.

Patient and Public Involvement

Due to the rapid implementation of virtual care following the onset of the COVID-19 pandemic, our study did not include direct involvement of clients (patients), families, or the public. However, its undertaking was motivated by the need to better understand the barriers to and facilitators of virtual mental health care. It is anticipated that the results of this study will inform implementation and continuing evaluation efforts, ultimately supporting improved outcomes for clients and their families.

References

1. Di Carlo F, Sociali A, Picutti E, Pettorruso M, Vellante F, Verrastro V, Martinotti G, di Giannantonio M. Telepsychiatry and other cutting-edge technologies in COVID-19 pandemic: Bridging the distance in mental health assistance. International Journal of Clinical Practice. 2021;75(1):ijcp.13716. doi:10.1111/ijcp.13716

2. Malhotra N, Sakthivel P, Gupta N, Nischal N, Ish P. Telemedicine: a new normal in COVID era; perspective from a developing nation. Postgraduate Medical Journal. 2022;98(e2):e79–e80. doi:10.1136/postgradmedj-2020-138742

3. Toulany A, Kurdyak P, Gandhi S, Fu L, Grewal S, Kulkarni C, Saunders N, Vigod S, Guttmann A, Chiu M, et al. Health System-Level Evaluation of Tele-Mental Health Services Among Children and Adolescents in Ontario, Canada. The Canadian Journal of Psychiatry. 2022;67(6):462–469. doi:10.1177/07067437211043395

4. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, Caffery LJ. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). Journal of Telemedicine and Telecare. 2020;26(5):309–313. doi:10.1177/1357633X20916567

5. Ross J, Stevenson F, Lau R, Murray E. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). Implementation Science. 2016;11(1):146. doi:10.1186/s13012-016-0510-7

6. Hong JS, Sheriff R, Smith K, Tomlinson A, Saad F, Smith T, Engelthaler T, Phiri P, Henshall C, Ede R, et al. Impact of COVID-19 on telepsychiatry at the service and individual patient level

across two UK NHS mental health Trusts. Evidence-Based Mental Health. 2021;24(4):161–166. doi:10.1136/ebmental-2021-300287

7. Simms DC, Gibson K, O'Donnell S. To use or not to use: Clinicians' perceptions of telemental health. Canadian Psychology / Psychologie canadienne. 2011;52(1):41–51. doi:10.1037/a0022275

8. Vis C, Mol M, Kleiboer A, Bührmann L, Finch T, Smit J, Riper H. Improving Implementation of eMental Health for Mood Disorders in Routine Practice: Systematic Review of Barriers and Facilitating Factors. JMIR Mental Health. 2018;5(1):e20. doi:10.2196/mental.9769

9. Schlief M, Saunders KRK, Appleton R, Barnett P, Vera San Juan N, Foye U, Olive RR, Machin K, Shah P, Chipp B, et al. Synthesis of the Evidence on What Works for Whom in Telemental Health: Rapid Realist Review. Interactive Journal of Medical Research. 2022;11(2):e38239. doi:10.2196/38239

10. Shore JH, Schneck CD, Mishkind MC. Telepsychiatry and the Coronavirus Disease 2019 Pandemic—Current and Future Outcomes of the Rapid Virtualization of Psychiatric Care. JAMA Psychiatry. 2020;77(12):1211. doi:10.1001/jamapsychiatry.2020.1643

11. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, Cannon M, Correll CU, Byrne L, Carr S, et al. How mental health care should change as a consequence of the COVID-19 pandemic. The Lancet. Psychiatry. 2020;7(9):813–824. doi:10.1016/S2215-0366(20)30307-2

12. Allemang B, Cullen O, Schraeder K, Pintson K, Dimitropoulos G. Recommendations for youth engagement in Canadian mental health research in the context of COVID-19. Journal of

the Canadian Academy of Child and Adolescent Psychiatry = Journal De l'Academie Canadienne De Psychiatrie De L'enfant Et De L'adolescent. 2021;30(2):123–130.

13. Doan BT, Yang YB, Romanchych E, Grewal S, Monga S, Pignatiello T, Bryden P, Kulkarni C. From Pandemic to Progression: An Educational Framework for the Implementation of Virtual Mental Healthcare for Children and Youth as a Response to COVID-19. Journal of Contemporary Psychotherapy. 2021;51(1):1–7. doi:10.1007/s10879-020-09478-0

14. York A, Kingsbury S. The choice and partnership approach: a service transformation model. Surrey: CAPA Systems; 2013.

15. Clark S, Emberly D, Pajer K, Delong E, McWilliam S, Bagnell A, Abidi S, Casey B, Gardner W. Improving Access to Child and Adolescent Mental Health Care: The Choice and Partnership Approach. Journal of the Canadian Academy of Child and Adolescent Psychiatry = Journal De l'Academie Canadienne De Psychiatrie De L'enfant Et De L'adolescent. 2018;27(1):5–14.

16. Government of Nova Scotia. Nova Scotia COVID-19 Dashboard. Nova Scotia COVID-19 Dashboard. https://experience.arcgis.com/experience/204d6ed723244dfbb763ca3f913c5cad

17. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science. 2009;4(1):50. doi:10.1186/1748-5908-4-50

18. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle

evaluation approach to improving implementation. Implementation science: IS. 2017;12(1):15. doi:10.1186/s13012-017-0550-7

19. Damschroder LJ, Reardon CM, Opra Widerquist MA, Lowery J. Conceptualizing outcomes for use with the Consolidated Framework for Implementation Research (CFIR): the CFIR Outcomes Addendum. Implementation Science. 2022;17(1):7. doi:10.1186/s13012-021-01181-5

20. Saunders NR, Kurdyak P, Stukel TA, Strauss R, Fu L, Guan J, Fiksenbaum L, Cohen E, Guttmann A, Vigod S, et al. Utilization of Physician-Based Mental Health Care Services Among Children and Adolescents Before and During the COVID-19 Pandemic in Ontario, Canada. JAMA pediatrics. 2022;176(4):e216298. doi:10.1001/jamapediatrics.2021.6298

21. Smith K, Ostinelli E, Macdonald O, Cipriani A. COVID-19 and Telepsychiatry: Development of Evidence-Based Guidance for Clinicians. JMIR mental health. 2020;7(8):e21108. doi:10.2196/21108

22. Ashcroft R, Ryan B, Mehta K, Brown J, Lam S, Dolovich L, Boudreault A, Rayner J, Grenier J, Dahrouge S, et al. “Healthcare at its finest”: Patient perspectives on virtual care appointments in primary care. In: COVID-19. American Academy of Family Physicians; 2022. p. 2944. http://www.annfammed.org/lookup/doi/10.1370/afm.20.s1.2944. doi:10.1370/afm.20.s1.2944

23. Romanchych E, Desai R, Bartha C, Carson N, Korenblum M, Monga S. Healthcare providers’ perceptions of virtual-care with children’s mental health in a pandemic: A hospital and community perspective. Early Intervention in Psychiatry. 2022;16(4):433–443. doi:10.1111/eip.13196

24. Uscher-Pines L, Sousa J, Raja P, Mehrotra A, Barnett ML, Huskamp HA. Suddenly Becoming a "Virtual Doctor": Experiences of Psychiatrists Transitioning to Telemedicine During the COVID-19 Pandemic. Psychiatric Services. 2020;71(11):1143–1150. doi:10.1176/appi.ps.202000250

25. Ceniti AK, Abdelmoemin WR, Ho K, Kang Y, Placenza F, Laframboise R, Bhat V, Foster JA, Frey BN, Lam RW, et al. "One Degree of Separation": A Mixed-Methods Evaluation of Canadian Mental Health Care User and Provider Experiences With Remote Care During COVID-19. The Canadian Journal of Psychiatry. 2022;67(9):712–722. doi:10.1177/07067437211070656

26. Taylor A, Caffery LJ, Gesesew HA, King A, Bassal A, Ford K, Kealey J, Maeder A, McGuirk M, Parkes D, et al. How Australian Health Care Services Adapted to Telehealth During the COVID-19 Pandemic: A Survey of Telehealth Professionals. Frontiers in Public Health. 2021;9:648009. doi:10.3389/fpubh.2021.648009

27. Hall JD, Danna MN, Hoeft TJ, Solberg LI, Takamine LH, Fortney JC, Nolan JP, Cohen DJ. Patient and Clinician Perspectives on Two Telemedicine Approaches for Treating Patients with Mental Health Disorders in Underserved Areas. Journal of the American Board of Family Medicine: JABFM. 2022;35(3):465–474. doi:10.3122/jabfm.2022.03.210377

28. Ainsworth NJ, Husain MI, Mulsant BH. From challenge to opportunity: COVID-19 and the evolution of virtual mental health care. Families, Systems, & Health. 2021;39(4):659–661. doi:10.1037/fsh0000648

29. Appleton R, Barnett P, Vera San Juan N, Tuudah E, Lyons N, Parker J, Roxburgh E, Spyridonidis S, Tamworth M, Worden M, et al. Implementation strategies for telemental health: a systematic review. BMC Health Services Research. 2023;23(1):78. doi:10.1186/s12913-022-08993-1

Tables

N/A

Figure Legends

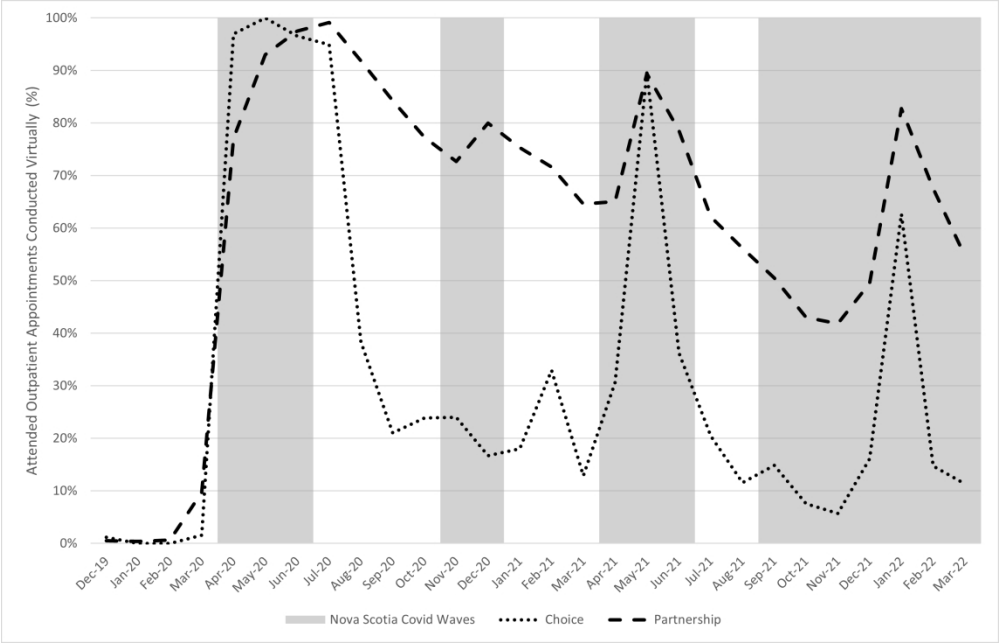
Figure 1: Proportions of Virtual Choice and Partnership Attended Outpatient Appointments by Nova Scotia COVID-19 Waves

Figures

(Figure 1 uploaded separately)

Supplementary Material

Consolidated Framework for Implementation Research (CFIR) Codebook



564x363mm (130 x 130 DPI)

Topic	Short Description	Inclusion Criteria	Exclusion Criteria
I. INTERVENTION CHARACTERISTICS			
A Intervention Source	Perception of key stakeholders about whether the intervention is externally or internally developed.	Include statements about the source of the innovation and the extent to which interviewees view the change as internal to the organization, e.g., an internally developed program, or external to the organization, e.g., a program coming from the outside.	Exclude or double code statements related to who participated in the decision process to implement the innovation to Engaging, as an indication of early (or late) engagement. Participation in decision-making is an effective engagement strategy to help people feel ownership of the innovation.
B Evidence Strength & Quality	Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes.	Include statements regarding awareness of evidence and the strength and quality of evidence, as well as the absence of evidence or a desire for different types of evidence, such as pilot results instead of evidence from the literature.	Exclude or double code statements regarding the receipt of evidence as an engagement strategy to Engaging: Key Stakeholders. Exclude or double code descriptions of use of results from local or regional pilots to Trialability.
C Relative advantage	Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution.	Include statements that demonstrate the innovation is better (or worse) than existing programs.	Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to Tension for Change.
1 Zoom = in-person			
2 Zoom < in-person			
3 Zoom > in-person			
4 Disadvantage of phone			
D Adaptability	The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs.	Include statements regarding the (in)ability to adapt the innovation to their context, e.g., complaints about the rigidity of the protocol. Suggestions for improvement can be captured in this code but should not be included in the rating process, unless it is clear that the participant feels the change is needed but that the program cannot be adapted. However, it may be possible to infer that a large number of suggestions for improvement demonstrates lack of compatibility, see exclusion criteria.	Exclude or double code statements that the innovation did or did not need to be adapted to Compatibility.
E Trialability	The ability to test the intervention on a small scale in the organization [8], and to be able to reverse course (undo implementation) if warranted.	Include statements related to whether the site piloted the innovation in the past or has plans to in the future, and comments about whether they believe it is (im)possible to conduct a pilot.	Exclude or double code descriptions of use of results from local or regional pilots to Evidence Strength & Quality
F Complexity	Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.	Code statements regarding the complexity of the innovation itself.	Exclude statements regarding the complexity of implementation and code to the appropriate CFIR code, e.g., difficulties related to space are coded to Available Resources and difficulties related to engaging participants in a new program are coded to Engaging: Innovation Participants.
G Design Quality and Packaging	Perceived excellence in how the intervention is bundled, presented, and assembled.	Include statements regarding the quality of the materials and packaging.	Exclude statements regarding the presence or absence of materials and code to Available Resources.
H Cost	Costs of the intervention and costs associated with implementing that intervention including investment, supply, and opportunity costs.	Include statements related to the cost of the innovation and its implementation.	Exclude statements related to physical space and time, and code to Available Resources. In a research study, exclude statements related to costs of conducting the research components (e.g., funding for research staff, participant incentives).
II. OUTER SETTING			
A Patient Needs & Resources	The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization.	Include statements demonstrating (lack of) awareness of the needs and resources of those served by the organization. Analysts may be able to infer the level of awareness based on statements about: 1. Perceived need for the innovation based on the needs of those served by the organization and if the innovation will meet those needs; 2. Barriers and facilitators of those served by the organization to participating in the innovation; 3. Participant feedback on the innovation, i.e., satisfaction and success in a program. In addition, include statements that capture whether or not awareness of the needs and resources of those served by the organization influenced the implementation or adaptation of the innovation.	Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to Tension for Change. Exclude statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation, and code to Engaging: Innovation Participants.
1 Client characteristics and presenting concerns - Facilitators	E.g., anxiety, depression, ADHD, rapport building skills		
2 Client characteristics and presenting concerns - Barriers	E.g., anxiety, depression, ADHD, rapport building skills		
3 Client - resources	E.g., access to technology, privacy		
4 Client preference			
B Cosmopolitanism	The degree to which an organization is networked with other external organizations.	Include descriptions of outside group memberships and networking done outside the organization.	Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications.
C Peer Pressure	Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge.	Include statements about perceived pressure or motivation from other entities or organizations in the local geographic area or system to implement the innovation.	
D External Policy & Incentives	A broad construct that includes external strategies to spread interventions including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.	Include descriptions of external performance measures from the system. Include pandemic as an external incentive. Include statements that say how fast the switch had to happen.	
III. INNER SETTING			
A Structural Characteristics	The social architecture, age, maturity, and size of an organization.	Include statements relating to participant's home office space (IWK is now in their home therefore it's still in the domain of Inner Setting) Include statements about onsite physical office space (e.g., characteristics of the space and its effects)	Exclude statements about the availability of onsite office space to Available Resources

B Networks & Communications	The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.	Include statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning.	Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program and code to Access to Knowledge & Information. Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to Engaging: Key Stakeholders. Exclude descriptions of outside group memberships and networking done outside the organization and code to Cosmopolitanism.
C Culture	Norms, values, and basic assumptions of a given organization.	Inclusion criteria, and potential sub-codes, will depend on the framework or definition used for “culture.” For example, if using the Competing Values Framework (CVF), you may include four sub-codes related to the four dimensions of the CVF and code statements regarding one or more of the four dimension in an organization.	
D Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an intervention and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.	Include statements regarding the general level of receptivity to implementing the innovation.	Exclude statements regarding the general level of receptivity that are captured in the sub-codes.
1 Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change.	Include statements that (do not) demonstrate a strong need for the innovation and/or that the current situation is untenable, e.g., statements that the innovation is absolutely necessary or that the innovation is redundant with other programs. Note: If a participant states that the innovation is redundant with a preferred existing program, (double) code lack of Relative Advantage	Exclude statements regarding specific needs of individuals that demonstrate a need for the innovation, but do not necessarily represent a strong need or an untenable status quo, and code to Needs and Resources of Those Served by the Organization. Exclude statements that demonstrate the innovation is better (or worse) than existing programs and code to Relative Advantage.
2 Compatibility	The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals’ own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.	Include statements that demonstrate the level of compatibility the innovation has with organizational values and work processes. Include statements that the innovation did or did not need to be adapted as evidence of compatibility or lack of compatibility. Include statements about equipment that was already being used at IWK prior to virtual care.	Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to Relative Priority, e.g., if an innovation is not prioritized because it is not compatible with organizational values.
3 Relative Priority	Individuals’ shared perception of the importance of the implementation within the organization.	Include statements that reflect the relative priority of the innovation, e.g., statements related to change fatigue in the organization due to implementation of many other programs.	Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to Compatibility, e.g., if an innovation is not prioritized because it is not compatible with organizational values.
4 Organizational Incentives & Reward	Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary and less tangible incentives such as increased stature or respect.	Include statements related to whether organizational incentive systems are in place to foster (or hinder) implementation, e.g., rewards or disincentives for staff engaging in the innovation.	
5 Goals and Feedback	The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.	Include statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal. Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of “Reflecting and Evaluating” into on-going or sustained organizational structures and processes may be (double) coded to Goals and Feedback.	Exclude statements that refer to the implementation team’s (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation, and code to Reflecting & Evaluating. Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.
6 Learning Climate	A climate in which: a) leaders express their own fallibility and need for team members’ assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.	Include statements that support (or refute) the degree to which key components of an organization exhibit a “learning climate.”	
E Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an intervention.	Include statements regarding the general level of readiness for implementation.	Exclude statements regarding the general level of readiness for implementation that are captured in the sub-codes.
1 Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation. One important dimension of organizational commitment is managerial patience (taking a long-term view rather than short-term) to allow time for the often inevitable reduction in productivity until the intervention takes hold.	Include statements regarding the level of engagement of organizational leadership.	Exclude or double code statements regarding leadership engagement to Engaging: Formally Appointed Internal Implementation Leaders or Champions if an organizational leader is also an implementation leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline. Note that a key characteristic of this Implementation Leader/Champion is that s/he is also an Organizational Leader.
2 Available Resources	The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.	Include statements related to the presence or absence of resources specific to the innovation that is being implemented.	Exclude statements related to training and education and code to Access to Knowledge & Information. Exclude statements related to the quality of materials and code to Design Quality & Packaging. Exclude statements about equipmenet that was already being used by clinicians prior to the implementation of virtual care and code to Compatibility.
3 Access to knowledge and information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.	Include statements related to implementation leaders' and users' access to knowledge and information regarding use of the program, i.e., training on the mechanics of the program.	Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to Engaging: Key Stakeholders. Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications

IV. CHARACTERISTICS OF INDIVIDUALS			
A Knowledge & Beliefs about the Intervention	Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.		Exclude statements related to familiarity with evidence about the innovation and code to Evidence Strength & Quality.
B Self-efficacy	Individual belief in their own capabilities to execute courses of action to achieve implementation goals.		
C Individual Stage of Change	Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention.		
D Individual Identification with Organization	A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization.		
E Other Personal Attributes	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.		
V. PROCESS			
A Planning	The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods. Planning was in the moment, iterative and focused on the most immediate needs. So early on, the virtual practice working group came together with the task of identifying what specific implementation supports were needed to start providing virtual care quickly . . . a dedicated focus on in the moment planning/responding early on in pandemic. Over time, especially with second and third wave, it was much more just integrated into routine operational planning between managers and their teams (with direction from the director). So based on the status of the pandemic and restrictions at the time, the decisions about what would be virtual vs in person would shift based on the needs of the care areas.	Include evidence of pre-implementation diagnostic assessments and planning, as well as refinements to the plan.	
1 Suggestions from Participants (facilitators)	Suggestions from participants related to the planning of the implementation of virtual care. (We want to distinguish between suggestions for plannning vs what planning actually occurred).		
B Engaging	Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.	Include statements related to engagement strategies and outcomes, i.e., if and how staff and innovation participants became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of engagement efforts determines the rating, i.e., if there are repeated attempts to engage staff that are unsuccessful, or if a role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of staff - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.	Exclude statements related to specific sub constructs, e.g., Champions or Opinion Leaders. Exclude or double code statements related to who participated in the decision process to implement the innovation to Innovation Source, as an indicator of internal or external innovation source.
1 Opinion Leaders	Individuals in an organization who have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the intervention	Include statements related to engagement strategies and outcomes, e.g., how the opinion leader became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage an opinion leader that are unsuccessful, or if the opinion leader leaves the organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the opinion leader here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.	
2 Formally appointed internal implementation leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an intervention as coordinator, project manager, team leader, or other similar role.	Include statements related to engagement strategies and outcomes, e.g., how the formally appointed internal implementation leader became engaged with the innovation and what their role is in implementation.	Exclude or double code statements regarding leadership engagement to Leadership Engagement if an implementation leader is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.
3 Champions	"Individuals who dedicate themselves to supporting, marketing, and 'driving through' an [implementation]" [101](p. 182), overcoming indifference or resistance that the intervention may provoke in an organization.	Include statements related to engagement strategies and outcomes, e.g., how the champion became engaged with the innovation and what their role is in implementation.	Exclude or double code statements regarding leadership engagement to Leadership Engagement if a champion is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.
4 External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction.	Include statements related to engagement strategies and outcomes, e.g., how the external change agent (entities outside the organization that facilitate change) became engaged with the innovation and what their role is in implementation, e.g., how they supported implementation efforts.	Note: It is important to clearly define what roles are external and internal to the organization. Exclude statements regarding facilitating activities, such as training in the mechanics of the program, and code to Access to Knowledge & Information if the change agent is considered internal to the study, e.g., a staff member at the national office. If the study considers this staff member internal to the organization, it should be coded to Access to Knowledge & Information, even though their support may overlap with what would be expected from an External Change Agent.
5 Key Stakeholders	Individuals from within the organization that are directly impacted by the innovation, e.g., staff responsible for making referrals to a new program or using a new work process.	Include statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation.	Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program, and code to Access to Knowledge & Information. Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications.

6 Intervention Participants	Individuals served by the organization that participate in the innovation, e.g., patients in a prevention program in a hospital.	Include statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage participants determines the rating, i.e., if there are repeated attempts to engage participants that are unsuccessful, the construct receives a negative rating.	Exclude statements demonstrating (lack of) awareness of the needs and resources of those served by the organization and whether or not that awareness influenced the implementation or adaptation of the innovation and code to Needs & Resources of Those Served by the Organization.
C Executing	Carrying out or accomplishing the implementation according to plan.	Include statements that demonstrate how implementation occurred with respect to the implementation plan. Note: Executing is coded very infrequently due to a lack of planning. However, some studies have used fidelity measures to assess executing, as an indication of the degree to which implementation was accomplished according to plan.	
D Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.	Include statements that refer to the implementation team's (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation. Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.	Exclude statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal, and code to Goals & Feedback. Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of "Reflecting and Evaluating" into on-going or sustained organizational structures and processes may be (double) coded to Goals and Feedback. Exclude statements that capture reflecting and evaluating that participants may do during the interview, for example, related to the success of the implementation, and code to Knowledge & Beliefs about the Innovation.
E Accommodation	The idea that they are trying to work around a barrier that may have presented. Process/mechanism of working around that barrier.		
VI. IMPLEMENTATION OUTCOMES			
A Acceptability	The perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory. Satisfaction with various aspect of the innovation (e.g. content, complexity, comfort, delivery, and credibility).		
B Adoption	The intention, initial decision, or action to try or employ an innovation or evidence-based practice. Adoption also may be referred to as ''uptake.'' Uptake; utilization; initial implementation; intention to try.		
C Appropriateness	The perceived fit, relevance, or compatibility of the innovation or evidence based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem. Suitability; usefulness; practicability.		
D Feasibility	The extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting. Actual fit or utility; suitability for everyday use; practicability.		
E Fidelity	The degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers. Delivered as intended; adherence; integrity; quality of program delivery.		
F Implementation Cost	The cost impact of an implementation effort . . . depends upon the costs of the particular intervention, the implementation strategy used, and the location of service delivery. Marginal cost; cost-effectiveness; cost-benefit.		
G Penetration	The integration of a practice within a service setting and its subsystems. Level of institutionalization? Spread? Service access? (Reach)		
H Sustainability	The extent to which a newly implemented treatment is maintained or institutionalized within a service setting's ongoing, stable operations. Maintenance; continuation; durability; incorporation; integration; institutionalization; sustained use; routinization.		
VII. SERVICE OUTCOMES (IOM Standards of Care)	Descriptions from IOM Standards of Care		
A Efficiency	Avoiding waste (e.g., waste of equipment, ideas, and energy).		
B Safety	Avoiding injuries to patients.		
C Effectiveness	Providing care based on scientific knowledge.		
D Equity	Ensuring that the quality of care does not vary because of characteristics such as gender, ethnicity, socioeconomic status, or geographic location.		
E Patient-centeredness	Providing respectful and responsive care that ensures that patient values guide clinical decisions.		
F Timeliness	Reducing waits for both recipients and providers of care.		
VIII. CLIENT OUTCOMES			
A Satisfaction			
B Function			
C Symptomatology			
IX. CLINICIAN AND STAFF OUTCOMES			
A Satisfaction	Clinician's job satisfaction		
B Effectiveness	Are they still able to do their job effectively?		

The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
Title and abstract					
	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	Title page	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included. RECORD 1.2: If applicable, the geographic region and time frame within which the study took place should be reported in the title or abstract. RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	Abstract Abstract N/A
Introduction					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 5		
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5		
Methods					
Study Design	4	Present key elements of study design early in the paper	Page 6		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pages 6-7		
Participants	6	*(a) Cohort study* - Give the eligibility criteria, and the sources and methods of selection		RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects)	Pages 6-7

Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	Page 7 – all attended visits included	RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.	Page 7 – all attended visits included
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	N/A		

Bias	9	Describe any efforts to address potential sources of bias	Page 7 – all attended visits included		
Study size	10	Explain how the study size was arrived at	Page 7 – all attended visits included		
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	N/A		

Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) *Cohort study* - If applicable, explain how loss to follow-up was addressed *Case-control study* - If applicable, explain how matching of cases and controls was addressed *Cross-sectional study* - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	Page 8 (mixed methods analysis described)		
Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	N/A – counts of visits (study population not constructed)
				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	N/A – all attended visits included

Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	N/A
Results					
Participants	13	(a) Report the numbers of individuals at each stage of the study (*e.g.*, numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	N/A	RECORD 13.1: Describe in detail the selection of the persons included in the study (*i.e.,* study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	N/A – all attended visits included
Descriptive data	14	(a) Give characteristics of study participants (*e.g.*, demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) *Cohort study* - summarise follow-up time (*e.g.*, average and total amount)	Page 9		
Outcome data	15	*Cohort study* - Report numbers of outcome events or summary measures over time *Case-control study* - Report numbers in each exposure	Page 10, Figure 1		
		category, or summary measures of exposure *Cross-sectional study* - Report numbers of outcome events or summary measures			

Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Page 10, Figure 1		
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	Mixed methods study – qualitative results presented Pages 10-14		
Discussion					
Key results	18	Summarise key results with reference to study objectives	Pages 14-16		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	N/A – all visit data included	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	N/A all visit data included
Interpretation	20	Give a cautious overall interpretation of results considering objectives,	Pages 14-17		
		limitations, multiplicity of analyses, results from similar studies, and other relevant evidence			

Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A – qualitative findings		
Other Information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19		
Accessibility of protocol, raw data, and programming code		..	N/A	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data, or programming code.	N/A

*Reference: Benchimol EI, Smeeth L, Guttmann A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langan SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.

BMJ Open

Understanding the Uptake of Virtual Care for First and Return Outpatient Appointments in Child and Adolescent Mental Health Services: A Mixed Methods Study

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2023-074803.R1
Article Type:	Original research
Date Submitted by the Author:	10-Nov-2023
Complete List of Authors:	Campbell, Leslie Anne; Dalhousie University, Community Health & Epidemiology; IWK Health Centre, Psychiatry Clark, Sharon; IWK Health Centre, Mental Health and Addictions Chorney, Jill; IWK Health Centre, Mental Health and Addictions; Dalhousie University, Psychiatry Emberly, Debbie; IWK Health Centre, Mental Health and Addictions Carrey, NJ; IWK Health Centre, Psychiatry; Dalhousie University, Psychiatry Bagnell, Alexa; IWK Health Centre, Psychiatry; Dalhousie University, Psychiatry Blenus, Jaime; IWK Health Centre, Mental Health and Addictions Daneff, Miriam; IWK Health Centre, Mental Health and Addictions Campbell, John; Dalhousie University, Community Health & Epidemiology
Primary Subject Heading:	Mental health
Secondary Subject Heading:	Health services research, Paediatrics
Keywords:	Child & adolescent psychiatry < PSYCHIATRY, COVID-19, MENTAL HEALTH, Health Services Accessibility, Health Equity

I, the Submitting Author has the right to grant and does grant on behalf of all authors of the Work (as defined in the below author licence), an exclusive licence and/or a non-exclusive licence for contributions from authors who are: i) UK Crown employees; ii) where BMJ has agreed a CC-BY licence shall apply, and/or iii) in accordance with the terms applicable for US Federal Government officers or employees acting as part of their official duties; on a worldwide, perpetual, irrevocable, royalty-free basis to BMJ Publishing Group Ltd ("BMJ") its licensees and where the relevant Journal is co-owned by BMJ to the co-owners of the Journal, to publish the Work in this journal and any other BMJ products and to exploit all rights, as set out in our licence.

The Submitting Author accepts and understands that any supply made under these terms is made by BMJ to the Submitting Author unless you are acting as an employee on behalf of your employer or a postgraduate student of an affiliated institution which is paying any applicable article publishing charge ("APC") for Open Access articles. Where the Submitting Author wishes to make the Work available on an Open Access basis (and intends to pay the relevant APC), the terms of reuse of such Open Access shall be governed by a Creative Commons licence – details of these licences and which Creative Commons licence will apply to this Work are set out in our licence referred to above.

Other than as permitted in any relevant BMJ Author's Self Archiving Policies, I confirm this Work has not been accepted for publication elsewhere, is not being considered for publication elsewhere and does not duplicate material already published. I confirm all authors consent to publication of this Work and authorise the granting of this licence.

Understanding the Uptake of Virtual Care for First and Return Outpatient Appointments in Child and Adolescent Mental Health Services: A Mixed Methods Study

Leslie Anne Campbell, PhD, RN. Associate Professor and Sobey Family Chair in Child and Adolescent Mental Health Outcomes Research, Dalhousie University and IWK Health (ORCID 0000-0003-2534-0450)[1,2,3]

Sharon Clark, PhD. Psychologist and Advanced Practice Lead, Choice and Partnership Approach, IWK Health (ORCID ID: 0000-0002-0923-1783)[2]

Jill Chorney, PhD, Psychologist and Advance Practice Lead, Behavior Change, IWK Health. Associate Professor, Dalhousie University (ORCID 0000-0002-6137-049X) [2,3]

Debbie Emberly, MSc, PhD, Psychologist and Advanced Practice Lead, Research, Evaluation and Outcomes, IWK Health (ORCID 0000-0003-0114-1211)[2]

Normand Carrey, MD, FRCPC, Associate Professor, IWK Health and Dalhousie University (ORCID 0000-0001-7753-8448) [2,3]

Alexa Bagnell, MD, FRCPC, Professor and Head of the Division of Child and Adolescent Psychiatry, IWK Health and Dalhousie University (0000-0002-1484-9676)[2,3]

Jaime Blenus B.A, TRS, MScOT, OT Reg(NS), Clinical Occupational Therapist, Community Mental Health Program, IWK Health[2]

Miriam Daneff, BSc, MAHSR, Research Assistant, IWK Health[2]

John Charles Campbell, BEng, MASc, EIT, Research Coordinator, Dalhousie University (0000-0002-1325-0485) [1]

[1] Department of Community Health and Epidemiology, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

[2] IWK Health, Halifax, Nova Scotia, Canada

[3] Department of Psychiatry, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, Canada

Corresponding author: Leslie Anne Campbell, PhD, RN Room 418, 5790 University Avenue, Halifax NS B3H 1V7 Canada Telephone: 902.494.3860 Email: leslie.anne.campbell@dal.ca

Word count: 3498

Abstract

Objective: To describe patterns of virtual and in-person outpatient mental health service use and factors that may influence the choice of modality in a child and adolescent service.

Design: A pragmatic mixed-methods approach using routinely collected administrative data from April 1st, 2020 and March 31st, 2022 and semi-structured interviews with clients, caregivers, clinicians, and staff. Interview data were coded according to the Consolidated Framework for Implementation Research (CFIR) and examined for patterns of similarity or divergence across data sources, respondents, or other relevant characteristics.

Setting: Child and adolescent outpatient mental health service, Nova Scotia, Canada

Participants: IWK Health clinicians and staff who had participated in virtual mental health care following its implementation in March 2020 and clients (aged 12-18 years) and caregivers of clients (aged 3-18 years) who had received treatment from an IWK outpatient clinic between April 1st, 2020 and March 31st, 2022 (n=1300). Participants (n=48) in semi-structured interviews included nine clients aged 13-18 years (mean 15.7 years), ten caregivers of clients ages 5-17 years (mean 12.7 years), eight CMHA booking and registration or administrative staff, and 21 clinicians.

Results: During peak pandemic activity, upwards of 90% of visits (first or return) were conducted virtually. Between waves, return appointments were more likely to be virtual than first appointments. Interview participants (n=48) reported facilitators and barriers to virtual care within the CFIR domains of "outer setting" (e.g., external policies, client needs and resources), "inner setting" (e.g., communications within the service), "individual characteristics" (e.g., personal attributes, knowledge and beliefs about virtual care), and "intervention characteristics" (e.g., relative advantage of virtual or in-person care).

Conclusions: Shared decision-making regarding treatment modality (virtual vs. in-person) requires consideration of client, caregiver, clinician, appointment, health system, and public health factors across episodes of care to ensure accessible, safe, and high-quality mental health care.

Strengths and Limitations:

- The study includes the perspectives youth and caregivers in identifying facilitators and barriers to accessing virtual mental health care.
- Uptake of virtual care is differentiated by both levels of pandemic activity and by visit type (first or return appointments).
- Administrative data include pre-pandemic service use, allowing for comparisons prior to and during pandemic activity.
- Interview participants do not include clients or caregivers who were unable to access mental health services (either virtually or in person).

Key words: Mental Health Services; Virtual Care; Child and Adolescent Psychiatry; Mixed Methods; Health Care Quality, Access, and Evaluation; Community Mental Health Services; Consolidated Framework for Implementation Research (CFIR)

Background

Prior to the COVID-19 pandemic, virtual mental health care (also known as telepsychiatry, tele-mental health, or remote mental health care) had been promoted as a means of improving access to mental health services, largely by addressing geographical disparities in access.(1,2) However, its uptake was limited in practice.(3–6) The technology was deemed not user-friendly, and providers were hesitant in its adoption, citing concerns that the quality of virtual care was inferior to care offered in-person despite evidence to the contrary.(7,8) The onset of the pandemic and ensuing public health restrictions to in-person care provided the impetus for the wide-scale adoption of virtual mental health care to enable access to services. Emerging evidence has identified the need to better understand client and caregiver considerations regarding treatment modality in order to address barriers to care and ensure equitable access to services.(9–13)

Objective

Our study objective was to understand factors that may affect the use of virtual or in-person care to support the timely matching of service modality to client, family/caregiver, and clinician needs. Within our overarching program of research investigating the evolving delivery of virtual mental health care in a tertiary child and adolescent mental health service, we present our initial findings comparing the uptake of virtual care by first and return outpatient visits and discuss factors that may influence the selection of modality of care, categorized using the Consolidated Framework for Implementation Research (CFIR).

Methods

Study Design

We employed a pragmatic, mixed-methods approach that iteratively incorporated routinely collected administrative health data (Meditech scheduling and registrations) and key informant interviews with clients, caregivers, clinicians, and staff to identify barriers and facilitators to the readiness for and uptake of virtual care in a tertiary child and adolescent mental health service. This approach took advantage of existing quality improvement processes, promoted data richness, and allowed for methodological triangulation.

Setting

The IWK Mental Health and Addictions (MHA) Program provides family-centered mental health and addictions care for children and adolescents up to their 19th birthday in Nova Scotia, Canada. Services include inpatient care, psychiatry-led specialty clinics, intensive day treatment services, and outpatient services offered in Community Mental Health and Addictions (CMHA) clinics, schools, and other community locations. Approximately 430 interdisciplinary health professionals and 16 child and adolescent psychiatrists provide care to nearly 6,000 clients and conduct over 50,000 outpatient appointments and 330 inpatient admissions annually (fiscal year 2021).

Prior to the COVID-19 pandemic, existing telehealth services were rarely utilized by IWK MHA, and were largely for clients in geographically distant locations. All IWK MHA services, except for inpatient services, pivoted to a virtual care model at the onset of the public health restrictions introduced in Nova Scotia in March 2020. As the public health restrictions varied

with subsequent waves of the pandemic, virtual care continued to be an important treatment modality within the CMHA clinics, while within the more intensive day and overnight services a return to in person services, with adjustments to meet public health requirements, was required.

In 2012, the IWK MHA Program adopted the Choice and Partnership Approach (CAPA) as a model of care delivery and guiding philosophy for the Program. CAPA is a model of service delivery that has a foundation in shared decision-making where clients' and families' expertise in their lives is valued alongside collaboration with professionals to define what is important to them and to consider options to support their mental health.(14,15) Within CMHA services, the first client/caregiver contact with the clinician is the "Choice" appointment where a joint case formulation and agreed goals for treatment are developed. When formal treatment is deemed to be required it is facilitated by means of "Partnership" sessions that focus on interventions that support working towards specific treatment goals.

Data Sources

Administrative health data sources included Meditech registration and scheduling databases held at IWK Health. Client demographics and appointment information including numbers, types, and modality (virtual or in-person) were abstracted for fiscal years (FY) 2018-2021 to compare trends in service use prior to and during the pandemic. Key informant interviews with IWK MHA clinicians, CMHA booking and registration and administrative staff, and with CMHA clients and caregivers were employed to identify diverse perspectives regarding barriers and facilitators to virtual care. IWK MHA clinicians and staff were invited by a Program-wide email to take part in the interviews if they had participated in the organization or delivery of virtual mental health care following its implementation in March 2020. Clients between the ages of 12-

18 and caregivers of clients between the ages of 3-18 were invited by email to participate in interviews if they had agreed to be contacted for research and had received treatment from an IWK CMHA outpatient clinic between April 1st, 2020 and March 31st, 2022 (n=1300). Clinician/staff interviews were conducted between June - August 2021, and client/caregiver interviews were conducted in December 2021 and January 2022.

Analyses

Descriptive analyses of administrative data included calculations of counts and proportions as appropriate. Service use was mapped to pandemic activity ("waves") based on case counts and public health restrictions in Nova Scotia.(16) Initial observations of service use patterns contributed to the development of guiding questions for the key informant interviews to foster a better understanding of the observed results and to inform further analyses of relevant administrative data. The CFIR was used to ensure comprehensiveness and consistency in the identification and use of key constructs related to the implementation of virtual care and to allow comparisons across studies, settings, and initiatives employing the framework.(17) The CFIR provided a particularly useful framework as it allowed for the explicit consideration of the outer context (e.g., COVID-19 public health policies) in the implementation of virtual care, and is useful in rapid-cycle evaluation.(18) Interview transcripts were coded according to the five domains of the CFIR, namely, "intervention characteristics", "inner setting", "outer setting", "individual characteristics", and the "implementation process".(17) We also coded any implementation outcomes at the client/caregiver, clinician/staff, and service levels (see Supplementary Material for codebook).(19) We sought to identify patterns of similarity or divergence by data source, respondent type, and other relevant characteristics. Here we present

results relevant to our understanding of the use of modality by outpatient visit type (Choice vs. Partnership) in relation to pandemic activity.

Research Ethics and Participant Consent

The study was approved by the IWK Health Research Ethics Board (Title: Our Virtual Reality: Rapidly Responding to Changing Mental Health Needs among Children and Adolescents, Project #1026770). Interview participants provided informed consent prior to their participation. Consent was not required for the secondary analyses of pseudo-anonymized administrative health datasets.

Patient and Public Involvement

Due to the rapid implementation of virtual care following the onset of the COVID-19 pandemic, our study did not include direct engagement of clients (patients), families, or the public. However, its undertaking was motivated by the need to better understand the barriers to and facilitators of virtual mental health care. It is anticipated that the results of this study will inform implementation and continuing evaluation efforts, ultimately supporting improved access to and outcomes of outpatient mental health services for clients and their families.

Findings

Administrative Data

The administrative data included 6,718 unique clients with a total of 51,321 attended CMHA appointments between April 1, 2018 and March 31, 2022. At their first (Choice) CMHA visit, clients ranged in age from 2-19 years (mean 12.4 years), and 48.7% were male.

Key Informant Interview Participants

Participants (n=48) in semi-structured interviews included nine clients aged 13-18 years (mean 15.7 years), ten caregivers of clients ages 5-17 years (mean 12.7 years), eight CMHA booking and registration or administrative staff, and 21 clinicians (psychologists, social workers, psychiatrists, and other health professionals working in IWK CMHA, Specific Care Clinics, and Intensive Services).

Proportions of Virtual and In-Person Appointments over the Pandemic

The administrative data analysis demonstrated that proportions of virtual vs. in-person CMHA (outpatient) attended appointments varied by both pandemic activity and by Choice or Partnership appointments (Figure 1). During peak pandemic activity that included high case counts and strict Public Health restrictions during Waves 1 (March – June 2020) and 3 (March – June 2021) in Nova Scotia(16), proportions of all appointments conducted virtually neared 100% and 90%, respectively. Between pandemic waves, higher proportions of Partnership appointments were conducted virtually compared to Choice appointments. While the return to in-person appointments increased over the course of the observation period, by the fourth wave of the pandemic in November 2022 the proportions of Partnership appointments conducted virtually ranged from 42-83% of attended visits compared to 6-63% for attended Choice appointments.

[Insert Figure 1]

For reference, the absolute numbers of attended Choice and Partnership appointments are presented in Figure 2. In contrast to the patterns observed by modality, the overall numbers of attended appointments remained relatively stable over the observation period.

[Insert Figure 2]

Facilitators and Barriers to Virtual Mental Health Care

Outer Setting (External Policies, Client Needs and Resources)

The levels of COVID-19 activity (i.e., case counts) and public health restrictions directly influenced decisions regarding the implementation and use of virtual mental health care. *". . . I think that [the province's] rules and recommendations probably played a big role in virtual care." "So very much driven by an increase in cases and to stop the amount of people in large groups in the office."* P3 (Social Worker) Periods of lower COVID-19 activity between pandemic waves allowed for more choice in service modality and accommodation of client needs and preferences. *"... during those times when we're not in lockdown, we give families the choice."* P5 (Psychologist)

Client and caregiver needs and resources highlighted both facilitators of and barriers to virtual care. Participants identified the need for access to resources such as a private or safe space, reliable internet connection, and technology to facilitate virtual care. *"I think that if somehow like there was a way to make a safe space for people away from home* [for a virtual appointment]*, that would be beneficial to a lot of people probably."* P44 (Client) Client reluctance or low motivation to engage in treatment, low English fluency, and distractibility due

to young age or clinical presentation (e.g., attention deficit/hyperactivity disorder) were reported to be barriers to virtual care. *"Where it does fall a little more flat is with the younger kids and trying to teach them direct skills, because obviously the screen isn't all that interesting and they have a hard time connecting with us, we can't use toys and play-based methods as well."* P21 (Psychologist)

Inner Setting (Communications within the Service)

During episodes of higher COVID-19 activity, the relative priority of offering access to services outweighed concerns about guidance for providing virtual care. *"And what we can provide is better than nothing, right – not being there at all for these families, these patients."* P2 (Youth Care Worker) As restrictions eased, organizational policies and messaging regarding the use of clinical judgement for guiding decisions regarding virtual care were reported to be available. However, clinician participants identified a need for more structured guidance in terms of what constituted *"needing to be seen in person"*. P12 (Psychologist)

Individual Characteristics (Personal Attributes, Knowledge and Beliefs about Virtual Care)

Participants' consideration of personal risk of COVID-19 infection impacted decisions to provide or use virtual care. *"I think that, especially with COVID, a lot of people are already pretty anxious to leave the house."* P48 (Client) *"Personally, during the pandemic, I would prefer to work from home, just because I don't want to put myself in any risks that seem unnecessary."* P3 (Social Worker)

Clinician preferences for modality also varied by their technical savviness, disinclination for wearing masks during sessions, and ability to build rapport with clients. *"Knowing how to use a computer well… because virtual care is more fun and works better when you're screen sharing; you have websites or documents or videos, making it more interactive."* P13 (Social Worker) Clients and caregivers reported that technologically savvy and understanding clinicians were helpful in explaining how to navigate the virtual care platform and in fostering a feeling of connection. *"It was nice that if something happened my psychologist would always have like two other options to fix the problem, like because my volume didn't work she's like, 'that's fine, we'll use our phone.' Like it was never something that was stressful. … So that's really helpful."* P34 (Client) *"It's the same things that make them good at their job in-person; you know, compassion, understanding, the education and training."* P30 (Caregiver)

Importantly, clinicians' attitudes toward virtual care and stage of change evolved over the course of the pandemic. *"I think for me the main thing with the shift to virtual, I just keep reflecting on like my own personal shift from, 'there is no way;' I can remember being in meetings at the start of the pandemic saying there is absolutely no way that doing these appointments virtually will work, like that is just not a thing. To now, I'm in a place of, there is no way we can stop having virtual care as an option, right?"* P20 (Occupational Therapist)

Intervention Characteristics (Relative Advantage of Virtual or In-Person Care)

All participants reported relative advantages of both virtual and in-person care by client and caregiver needs and appointment type (e.g., Choice or Partnership, brief medication checks). Caregivers spoke to the convenience of virtual appointments that didn't require leaving work, accessing public transport, finding and paying for parking, or finding childcare. *"I think it opens*

it up to so many more people who can't travel, who don't have transportation, who have the anxiety to leave, they can still have that help." P38 (Caregiver) Similarly, clinicians noted the relative convenience and utility of virtual care, particularly for brief follow-up or less sensitive appointments, and for appointments with caregivers specifically. *"Them having to come physically . . . That's a full day of school missed. That's a parent taking time off work. For what? So I see them for 20 minutes and say, 'how's it going?' 'It's great.' Refill their med."* P15 (Psychiatrist) *"I find working with parents, it works really well, doing it over Zoom. Often because . . . it's not quite as sensitive as some of the one-on-one individual therapy I would do with teenagers."* P5 (Psychologist)

In-person care was generally preferred for intensive treatment; however, virtual care was noted to be particularly advantageous for care coordination between providers and equally useful when compared to in-person care for structured or didactic work. *"If it's more content based, more didactic, more directive, more about giving people information . . . that seems to go just as well in either format. But then there's some other work that I would do that is more like related to either attachment related issues or trauma or emotion-based work that I find is more variable."* P19 (Psychologist)

While the administrative data showed lower uptake of virtual care for Choice appointments compared to Partnership appointments, virtual care may offer a means of "breaking the ice" in the introduction to the service for some clients. *"I remember doing a Choice appointment . . . he shared that he was so anxious about meeting new people . . . that there was no way he would have made it to the office to meet in-person . . .* [virtual care] *became a way for someone to get help."* P20 (Occupational Therapist)

Implementation Outcomes

While individual preferences for virtual or in-person care varied, virtual care was deemed to be useful, particularly in a hybrid model of service delivery in which it is offered in addition to in-person care. *"I think that, like virtual care for mental health should still always be an option."* P44 (Client)

Discussion

The Public Health restrictions necessitated by the COVID-19 pandemic required the rapid implementation of virtual mental health care. We aimed to describe patterns of virtual child and adolescent mental health outpatient service use in a publicly funded tertiary health centre and to identify factors that may influence the choice of modality. The present study contributes to the understanding of virtual mental health service use patterns(6,20) by differentiating between first and return visits. Proportions of virtual vs. in-person outpatient appointments varied by pandemic activity and first and return appointment type. During periods of public health restrictions or high COVID-19 case counts, particularly during the first and third waves of the pandemic in Nova Scotia, both Choice (first) and Partnership (return) outpatient appointments were conducted nearly entirely by means of virtual care. Between pandemic waves, while the proportions of in-person appointments increased for both Choice and Partnership appointments over time, Partnership appointments were more likely to continue to be conducted virtually.

Participants in the key informant interviews aided our understanding of these observed patterns in the service use data. Considerations identified by clients, caregivers, clinicians and staff

regarding barriers and facilitators to virtual care included those in the CFIR domain "outer setting" (including COVID-19 activity and public health restrictions, client needs, and client/family resources), "inner setting" (such as policies to exercise "clinical judgement" regarding modality), "individual characteristics" (including knowledge and beliefs about virtual care, "tech savviness", and individual stage of change), and "intervention characteristics" (in particular, the relative advantage of virtual or in-person care). Choice of modality was more likely to be influenced by both clinician and client/caregiver needs or preferences during lower COVID-19 activity, but in-person care required greater clinical justification during pandemic peaks.

As in previous studies, our findings support a hybrid model of virtual and in-person care(6,21) and identify additional considerations regarding visit types and client needs. The higher proportion of in-person Choice appointments compared to Partnership appointments is in keeping with a previously published survey of child and adolescent mental health clinicians, who reported a preference for initial in-person meetings to establish rapport and develop a therapeutic relationship before transferring to virtual care.(22–24) However, our results demonstrate a role for virtual care in first contact with clinicians. Participants in the present study noted the relative advantage of virtual care for initial appointments to establish rapport with clients who would otherwise not attend in-person appointments due to reluctance to come to the clinic related to the clinical presenting concern (e.g., social anxiety) or logistical barriers (such as caregivers having to take a day off of work, access transport, or find childcare).

While moving appointments from clinic to home environments by means of virtual care may remove many barriers to access of mental health care and support continued engagement with services, it does not ensure accessible care for all, and in some instances may introduce new

barriers to care. In addition to a reliable internet connection and workable technology with which to access a virtual platform, clients and caregivers require a private or safe space in which to conduct their appointment.(25) Additional barriers to virtual care identified by our participants included client reluctance or low motivation to engage in care, low English fluency, and poor engagement due to young age or clinical presentation (e.g., attention deficit/hyperactivity disorder). The relatively higher sustained uptake of virtual care for return Partnership appointments over the course of the pandemic may reflect, in part, clinicians', clients', and caregivers' increasing comfort with the technology and evolving individual stage of change in its implementation.(26) Indeed, participants who were initially reluctant to use virtual care for mental health care identified an ongoing hybrid model of virtual and in-person care as important for supporting access to care for some clients and families. Additionally, access to collaborative activities such as case conferences, meetings, and conferences or training activities may be supported by virtual technologies.(27)

The CAPA model adopted by the IWK CMHA service is a client- and family-centred model of mental health care rooted in principles of shared decision-making and matching care to client and caregiver needs.(14,15) Matching service modality to those needs adds a layer of consideration in decision-making regarding treatment options.(9) Virtual care offers important flexibility in options for treatment – for example, caregivers may not need to take a day off work to attend an appointment. However, in some cases coming into the clinic is an active part of treatment. Transparent discussions with clinicians regarding these trade-offs may aid clients and caregivers in understanding that, in the absence of barriers to in-person care, while virtual care may be more convenient, does it help them to do the work they need to do to achieve their goals of treatment?

For clinicians, is there flexibility for accommodating some virtual appointments along with in-person work?

The need for clarity regarding "clinical judgement" in choice of modality was identified as a gap in policy and practice. Clear, transparent guidance for shared decision-making will need to balance considerations of appointment complexity and risk, therapeutic alliance and engagement in care, convenience of access, and barriers and facilitators of access. Considerations regarding modality may also vary by appointment types (e.g., first or return appointments), or by the purpose of the appointment (e.g., medication check), highlighting the need for ongoing decisions regarding modality across episodes of care. Understanding and incorporating these considerations from the perspectives of clients, caregivers, and clinicians is necessary for informing best practices in shared decision making.(28)

While promoted as a means of improving geographical access to mental health services, virtual care was not widely adopted in publicly funded services prior to the COVID-19 pandemic.(1,2) The rapid shift to virtual care following the onset of the pandemic offered an opportunity to identify patterns of its use and to understand facilitators of and barriers to its uptake.(29) A systematic review of systematic reviews of the implementation of e-health interventions that employed the CFIR also identified barriers and facilitators to implementation across CFIR domains, noting that implementation is multi-level and complex.(5) Our mixed methods approach aided our comprehensive understanding of the implementation of virtual care in a child and adolescent mental health service, identifying potentially shifting client and clinician needs within a complex health system setting during the uncertainty introduced by the pandemic. Further, the integration of clinical and service data and client, caregiver, and clinician

perspectives supports a robust learning health system, which will be important for ensuring responsive, client-focused services when needed.

Clinical Implications

A hybrid model of virtual and in-person mental health care provides an important strategy for engaging youth and families, including those who would or could not otherwise attend appointments in person. Shared decisions regarding modality need to balance clients' and caregivers' abilities to access services while meeting changing needs across episodes of care. Opportunities for future research include the development and evaluation of hybrid models of care and the co-creation of guidance to support ongoing transparent, shared decisions that ensure accessible, safe, and high-quality mental health care.

Data Sharing Statement

Data are not available due to confidentiality requirements.

Acknowledgements

We are grateful to the clients, caregivers, staff, and clinicians who shared their experiences and insights into the provision and use of virtual mental health care. We also wish to thank Krystal Blackmore for support with administrative data extraction.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

Funding

The research was supported by the Canadian Institutes of Health Research Operating Grant: COVID-19 Mental Health & Substance Use Service Needs and Delivery - Understanding Rapid System Transformations #MS1- 173063.

Contributorship statement

LAC designed the study and drafted data collection tools, monitored data collection, analysed qualitative data, reviewed data analyses, drafted and revised the paper and is guarantor. SC designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. JC designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. DE designed the study and drafted data collection tools, monitored data collection, reviewed data analyses, and reviewed and revised the paper. NC designed the study and drafted data collection tools, reviewed data analyses, and reviewed and revised the paper. AB reviewed data analyses, and reviewed and revised the paper. JB analysed qualitative data, reviewed data analyses, and reviewed and revised the paper. MD conducted interviews, maintained and analysed qualitative data, reviewed data analyses, and reviewed and revised the paper. JCC maintained and analysed quantitative data, reviewed data analyses, and reviewed and revised the paper.

References

1. Di Carlo F, Sociali A, Picutti E, Pettorruso M, Vellante F, Verrastro V, et al. Telepsychiatry and other cutting-edge technologies in COVID-19 pandemic: Bridging the distance in mental health assistance. Int J Clin Pract. 2021 Jan;75(1):ijcp.13716.

2. Malhotra N, Sakthivel P, Gupta N, Nischal N, Ish P. Telemedicine: a new normal in COVID era; perspective from a developing nation. Postgrad Med J. 2022 Mar;98(e2):e79–80.

3. Toulany A, Kurdyak P, Gandhi S, Fu L, Grewal S, Kulkarni C, et al. Health System-Level Evaluation of Tele-Mental Health Services Among Children and Adolescents in Ontario, Canada. Can J Psychiatry. 2022 Jun;67(6):462–9.

4. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). J Telemed Telecare. 2020 Jun;26(5):309–13.

5. Ross J, Stevenson F, Lau R, Murray E. Factors that influence the implementation of e-health: a systematic review of systematic reviews (an update). Implementation Sci. 2016 Dec;11(1):146.

6. Hong JS, Sheriff R, Smith K, Tomlinson A, Saad F, Smith T, et al. Impact of COVID-19 on telepsychiatry at the service and individual patient level across two UK NHS mental health Trusts. Evid Based Ment Health. 2021 Nov;24(4):161–6.

7. Simms DC, Gibson K, O'Donnell S. To use or not to use: Clinicians' perceptions of telemental health. Canadian Psychology / Psychologie canadienne. 2011 Feb;52(1):41–51.

8. Vis C, Mol M, Kleiboer A, Bührmann L, Finch T, Smit J, et al. Improving Implementation of eMental Health for Mood Disorders in Routine Practice: Systematic Review of Barriers and Facilitating Factors. JMIR Ment Health. 2018 Mar 16;5(1):e20.

9. Schlief M, Saunders KRK, Appleton R, Barnett P, Vera San Juan N, Foye U, et al. Synthesis of the Evidence on What Works for Whom in Telemental Health: Rapid Realist Review. Interact J Med Res. 2022 Sep 29;11(2):e38239.

10. Shore JH, Schneck CD, Mishkind MC. Telepsychiatry and the Coronavirus Disease 2019 Pandemic—Current and Future Outcomes of the Rapid Virtualization of Psychiatric Care. JAMA Psychiatry. 2020 Dec 1;77(12):1211.

11. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, et al. How mental health care should change as a consequence of the COVID-19 pandemic. Lancet Psychiatry. 2020 Sep;7(9):813–24.

12. Allemang B, Cullen O, Schraeder K, Pintson K, Dimitropoulos G. Recommendations for youth engagement in Canadian mental health research in the context of COVID-19. J Can Acad Child Adolesc Psychiatry. 2021 May;30(2):123–30.

13. Doan BT, Yang YB, Romanchych E, Grewal S, Monga S, Pignatiello T, et al. From Pandemic to Progression: An Educational Framework for the Implementation of Virtual Mental Healthcare for Children and Youth as a Response to COVID-19. J Contemp Psychother. 2021;51(1):1–7.

14. York A, Kingsbury S. The choice and partnership approach: a service transformation model. Surrey: CAPA Systems; 2013.

15. Clark S, Emberly D, Pajer K, Delong E, McWilliam S, Bagnell A, et al. Improving Access to Child and Adolescent Mental Health Care: The Choice and Partnership Approach. J Can Acad Child Adolesc Psychiatry. 2018 Jan;27(1):5–14.

16. Government of Nova Scotia. Nova Scotia COVID-19 Dashboard. Nova Scotia COVID-19 Dashboard. Available from: https://experience.arcgis.com/experience/204d6ed723244dfbb763ca3f913c5cad

17. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Sci. 2009 Dec;4(1):50.

18. Keith RE, Crosson JC, O'Malley AS, Cromp D, Taylor EF. Using the Consolidated Framework for Implementation Research (CFIR) to produce actionable findings: a rapid-cycle evaluation approach to improving implementation. Implement Sci. 2017 Feb 10;12(1):15.

19. Damschroder LJ, Reardon CM, Opra Widerquist MA, Lowery J. Conceptualizing outcomes for use with the Consolidated Framework for Implementation Research (CFIR): the CFIR Outcomes Addendum. Implementation Sci. 2022 Dec;17(1):7.

20. Saunders NR, Kurdyak P, Stukel TA, Strauss R, Fu L, Guan J, et al. Utilization of Physician-Based Mental Health Care Services Among Children and Adolescents Before and During the COVID-19 Pandemic in Ontario, Canada. JAMA Pediatr. 2022 Apr 1;176(4):e216298.

21. Smith K, Ostinelli E, Macdonald O, Cipriani A. COVID-19 and Telepsychiatry: Development of Evidence-Based Guidance for Clinicians. JMIR Ment Health. 2020 Aug 28;7(8):e21108.

22. Ashcroft R, Ryan B, Mehta K, Brown J, Lam S, Dolovich L, et al. "Healthcare at its finest": Patient perspectives on virtual care appointments in primary care. In: COVID-19 [Internet]. American Academy of Family Physicians; 2022 [cited 2022 Nov 7]. p. 2944. Available from: http://www.annfammed.org/lookup/doi/10.1370/afm.20.s1.2944

23. Romanchych E, Desai R, Bartha C, Carson N, Korenblum M, Monga S. Healthcare providers' perceptions of virtual-care with children's mental health in a pandemic: A hospital and community perspective. Early Intervention Psych. 2022 Apr;16(4):433–43.

24. Uscher-Pines L, Sousa J, Raja P, Mehrotra A, Barnett ML, Huskamp HA. Suddenly Becoming a "Virtual Doctor": Experiences of Psychiatrists Transitioning to Telemedicine During the COVID-19 Pandemic. PS. 2020 Nov 1;71(11):1143–50.

25. Ceniti AK, Abdelmoemin WR, Ho K, Kang Y, Placenza F, Laframboise R, et al. "One Degree of Separation": A Mixed-Methods Evaluation of Canadian Mental Health Care User and Provider Experiences With Remote Care During COVID-19. Can J Psychiatry. 2022 Sep;67(9):712–22.

26. Taylor A, Caffery LJ, Gesesew HA, King A, Bassal A rahman, Ford K, et al. How Australian Health Care Services Adapted to Telehealth During the COVID-19 Pandemic: A Survey of Telehealth Professionals. Front Public Health. 2021 Feb 26;9:648009.

27. Hall JD, Danna MN, Hoeft TJ, Solberg LI, Takamine LH, Fortney JC, et al. Patient and Clinician Perspectives on Two Telemedicine Approaches for Treating Patients with Mental Health Disorders in Underserved Areas. J Am Board Fam Med. 2022 Jun;35(3):465–74.

28. Ainsworth NJ, Husain MI, Mulsant BH. From challenge to opportunity: COVID-19 and the evolution of virtual mental health care. Families, Systems, & Health. 2021 Dec;39(4):659–61.

29. Appleton R, Barnett P, Vera San Juan N, Tuudah E, Lyons N, Parker J, et al. Implementation strategies for telemental health: a systematic review. BMC Health Serv Res. 2023 Jan 25;23(1):78.

Tables

N/A

Figure Legends

Figure 1: Proportions of Virtual Choice and Partnership Attended Outpatient Appointments by Nova Scotia COVID-19 Waves

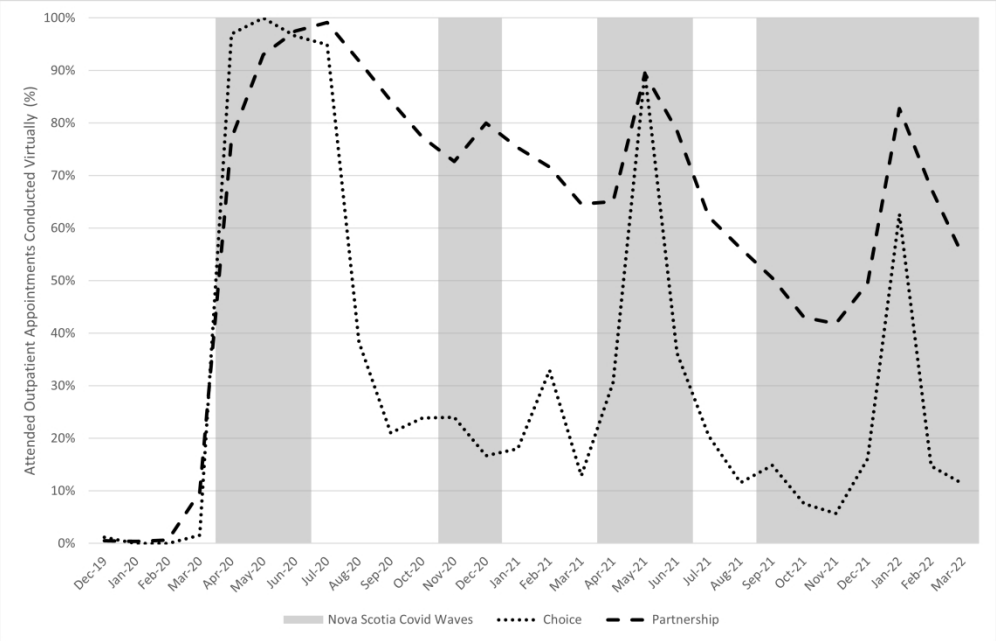
Figure 2: Attended Choice and Partnership Visits by Nova Scotia COVID-19 Waves

Figures

(Figures 1 and 2 uploaded separately)

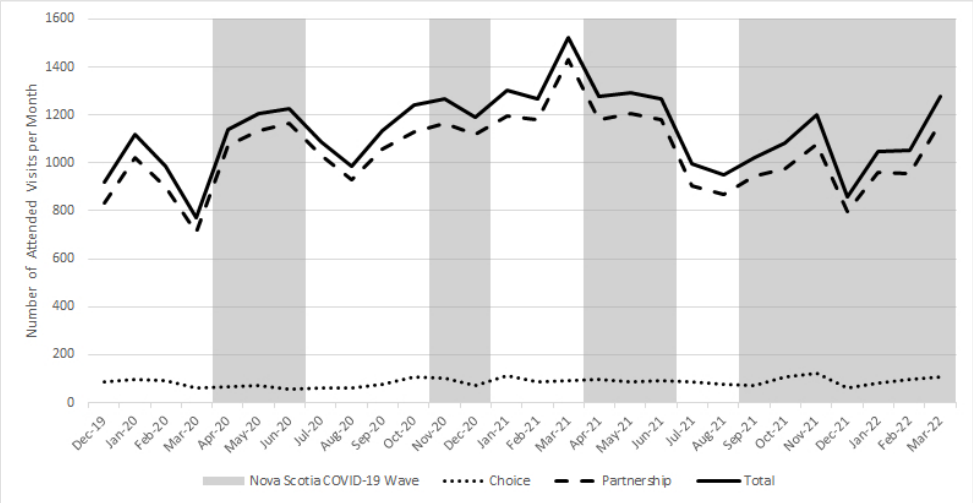
Supplementary Material

Consolidated Framework for Implementation Research (CFIR) Codebook



Proportions of Virtual Choice and Partnership Attended Outpatient Appointments by Nova Scotia COVID-19 Waves

564x363mm (130 x 130 DPI)



Attended Choice and Partnership Appointments

546x294mm (38 x 38 DPI)

Topic	Short Description	Inclusion Criteria	Exclusion Criteria
I. INTERVENTION CHARACTERISTICS			
A Intervention Source	Perception of key stakeholders about whether the intervention is externally or internally developed.	Include statements about the source of the innovation and the extent to which interviewees view the change as internal to the organization, e.g., an internally developed program, or external to the organization, e.g., a program coming from the outside.	Exclude or double code statements related to who participated in the decision process to implement the innovation to Engaging, as an indication of early (or late) engagement. Participation in decision-making is an effective engagement strategy to help people feel ownership of the innovation.
B Evidence Strength & Quality	Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes.	Include statements regarding awareness of evidence and the strength and quality of evidence, as well as the absence of evidence or a desire for different types of evidence, such as pilot results instead of evidence from the literature.	Exclude or double code statements regarding the receipt of evidence as an engagement strategy to Engaging: Key Stakeholders. Exclude or double code descriptions of use of results from local or regional pilots to Trialability.
C Relative advantage	Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution.	Include statements that demonstrate the innovation is better (or worse) than existing programs.	Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to Tension for Change.
1 Zoom = in-person			
2 Zoom < in-person			
3 Zoom > in-person			
4 Disadvantage of phone			
D Adaptability	The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs.	Include statements regarding the (in)ability to adapt the innovation to their context, e.g., complaints about the rigidity of the protocol. Suggestions for improvement can be captured in this code but should not be included in the rating process, unless it is clear that the participant feels the change is needed but that the program cannot be adapted. However, it may be possible to infer that a large number of suggestions for improvement demonstrates lack of compatibility, see exclusion criteria.	Exclude or double code statements that the innovation did or did not need to be adapted to Compatibility.
E Trialability	The ability to test the intervention on a small scale in the organization [8], and to be able to reverse course (undo implementation) if warranted.	Include statements related to whether the site piloted the innovation in the past or has plans to in the future, and comments about whether they believe it is (im)possible to conduct a pilot.	Exclude or double code descriptions of use of results from local or regional pilots to Evidence Strength & Quality
F Complexity	Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement.	Code statements regarding the complexity of the innovation itself.	Exclude statements regarding the complexity of implementation and code to the appropriate CFIR code, e.g., difficulties related to space are coded to Available Resources and difficulties related to engaging participants in a new program are coded to Engaging: Innovation Participants.
G Design Quality and Packaging	Perceived excellence in how the intervention is bundled, presented, and assembled.	Include statements regarding the quality of the materials and packaging.	Exclude statements regarding the presence or absence of materials and code to Available Resources.
H Cost	Costs of the intervention and costs associated with implementing that intervention including investment, supply, and opportunity costs.	Include statements related to the cost of the innovation and its implementation.	Exclude statements related to physical space and time, and code to Available Resources. In a research study, exclude statements related to costs of conducting the research components (e.g., funding for research staff, participant incentives).
II. OUTER SETTING			
A Patient Needs & Resources	The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization.	Include statements demonstrating (lack of) awareness of the needs and resources of those served by the organization. Analysts may be able to infer the level of awareness based on statements about: 1. Perceived need for the innovation based on the needs of those served by the organization and if the innovation will meet those needs; 2. Barriers and facilitators of those served by the organization to participating in the innovation; 3. Participant feedback on the innovation, i.e., satisfaction and success in a program. In addition, include statements that capture whether or not awareness of the needs and resources of those served by the organization influenced the implementation or adaptation of the innovation.	Exclude statements that demonstrate a strong need for the innovation and/or that the current situation is untenable and code to Tension for Change. Exclude statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation, and code to Engaging: Innovation Participants.
1 Client characteristics and presenting concerns - Facilitators	E.g., anxiety, depression, ADHD, rapport building skills		
2 Client characteristics and presenting concerns - Barriers	E.g., anxiety, depression, ADHD, rapport building skills		
3 Client - resources	E.g., access to technology, privacy		
4 Client preference			
B Cosmopolitanism	The degree to which an organization is networked with other external organizations.	Include descriptions of outside group memberships and networking done outside the organization.	Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications.
C Peer Pressure	Mimetic or competitive pressure to implement an intervention; typically because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge.	Include statements about perceived pressure or motivation from other entities or organizations in the local geographic area or system to implement the innovation.	
D External Policy & Incentives	A broad construct that includes external strategies to spread interventions including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.	Include descriptions of external performance measures from the system. Include pandemic as an external incentive. Include statements that say how fast the switch had to happen.	
III. INNER SETTING			
A Structural Characteristics	The social architecture, age, maturity, and size of an organization.	Include statements relating to participant's home office space (IWK is now in their home therefore it's still in the domain of Inner Setting) Include statements about onsite physical office space (e.g., characteristics of the space and its effects)	Exclude statements about the availability of onsite office space to Available Resources

B Networks & Communications	The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.	Include statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning.	Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program and code to Access to Knowledge & Information. Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to Engaging: Key Stakeholders. Exclude descriptions of outside group memberships and networking done outside the organization and code to Cosmopolitanism.
C Culture	Norms, values, and basic assumptions of a given organization.	Inclusion criteria, and potential sub-codes, will depend on the framework or definition used for “culture.” For example, if using the Competing Values Framework (CVF), you may include four sub-codes related to the four dimensions of the CVF and code statements regarding one or more of the four dimension in an organization.	
D Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an intervention and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.	Include statements regarding the general level of receptivity to implementing the innovation.	Exclude statements regarding the general level of receptivity that are captured in the sub-codes.
1 Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change.	Include statements that (do not) demonstrate a strong need for the innovation and/or that the current situation is untenable, e.g., statements that the innovation is absolutely necessary or that the innovation is redundant with other programs. Note: If a participant states that the innovation is redundant with a preferred existing program, (double) code lack of Relative Advantage	Exclude statements regarding specific needs of individuals that demonstrate a need for the innovation, but do not necessarily represent a strong need or an untenable status quo, and code to Needs and Resources of Those Served by the Organization. Exclude statements that demonstrate the innovation is better (or worse) than existing programs and code to Relative Advantage.
2 Compatibility	The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals’ own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.	Include statements that demonstrate the level of compatibility the innovation has with organizational values and work processes. Include statements that the innovation did or did not need to be adapted as evidence of compatibility or lack of compatibility. Include statements about equipment that was already being used at IWK prior to virtual care.	Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to Relative Priority, e.g., if an innovation is not prioritized because it is not compatible with organizational values.
3 Relative Priority	Individuals’ shared perception of the importance of the implementation within the organization.	Include statements that reflect the relative priority of the innovation, e.g., statements related to change fatigue in the organization due to implementation of many other programs.	Exclude or double code statements regarding the priority of the innovation based on compatibility with organizational values to Compatibility, e.g., if an innovation is not prioritized because it is not compatible with organizational values.
4 Organizational Incentives & Reward	Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary and less tangible incentives such as increased stature or respect.	Include statements related to whether organizational incentive systems are in place to foster (or hinder) implementation, e.g., rewards or disincentives for staff engaging in the innovation.	
5 Goals and Feedback	The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.	Include statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal. Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of “Reflecting and Evaluating” into on-going or sustained organizational structures and processes may be (double) coded to Goals and Feedback.	Exclude statements that refer to the implementation team’s (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation, and code to Reflecting & Evaluating. Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.
6 Learning Climate	A climate in which: a) leaders express their own fallibility and need for team members’ assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.	Include statements that support (or refute) the degree to which key components of an organization exhibit a “learning climate.”	
E Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an intervention.	Include statements regarding the general level of readiness for implementation.	Exclude statements regarding the general level of readiness for implementation that are captured in the sub-codes.
1 Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation. One important dimension of organizational commitment is managerial patience (taking a long-term view rather than short-term) to allow time for the often inevitable reduction in productivity until the intervention takes hold.	Include statements regarding the level of engagement of organizational leadership.	Exclude or double code statements regarding leadership engagement to Engaging: Formally Appointed Internal Implementation Leaders or Champions if an organizational leader is also an implementation leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline. Note that a key characteristic of this Implementation Leader/Champion is that s/he is also an Organizational Leader.
2 Available Resources	The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.	Include statements related to the presence or absence of resources specific to the innovation that is being implemented.	Exclude statements related to training and education and code to Access to Knowledge & Information. Exclude statements related to the quality of materials and code to Design Quality & Packaging. Exclude statements about equipmenet that was already being used by clinicians prior to the implementation of virtual care and code to Compatibility.
3 Access to knowledge and information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.	Include statements related to implementation leaders' and users' access to knowledge and information regarding use of the program, i.e., training on the mechanics of the program.	Exclude statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation, and code to Engaging: Key Stakeholders. Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications

IV. CHARACTERISTICS OF INDIVIDUALS			
A Knowledge & Beliefs about the Intervention	Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.		Exclude statements related to familiarity with evidence about the innovation and code to Evidence Strength & Quality.
B Self-efficacy	Individual belief in their own capabilities to execute courses of action to achieve implementation goals.		
C Individual Stage of Change	Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention.		
D Individual Identification with Organization	A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization.		
E Other Personal Attributes	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.		
V. PROCESS			
A Planning	The degree to which a scheme or method of behavior and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods. Planning was in the moment, iterative and focused on the most immediate needs. So early on, the virtual practice working group came together with the task of identifying what specific implementation supports were needed to start providing virtual care quickly . . . a dedicated focus on in the moment planning/responding early on in pandemic. Over time, especially with second and third wave, it was much more just integrated into routine operational planning between managers and their teams (with direction from the director). So based on the status of the pandemic and restrictions at the time, the decisions about what would be virtual vs in person would shift based on the needs of the care areas.	Include evidence of pre-implementation diagnostic assessments and planning, as well as refinements to the plan.	
1 Suggestions from Participants (facilitators)	Suggestions from participants related to the planning of the implementation of virtual care. (We want to distinguish between suggestions for plannning vs what planning actually occurred).		
B Engaging	Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities.	Include statements related to engagement strategies and outcomes, i.e., if and how staff and innovation participants became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of engagement efforts determines the rating, i.e., if there are repeated attempts to engage staff that are unsuccessful, or if a role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of staff - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.	Exclude statements related to specific sub constructs, e.g., Champions or Opinion Leaders. Exclude or double code statements related to who participated in the decision process to implement the innovation to Innovation Source, as an indicator of internal or external innovation source.
1 Opinion Leaders	Individuals in an organization who have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the intervention	Include statements related to engagement strategies and outcomes, e.g., how the opinion leader became engaged with the innovation and what their role is in implementation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage staff determines the rating, i.e., if there are repeated attempts to engage an opinion leader that are unsuccessful, or if the opinion leader leaves the organization and this role is vacant, the construct receives a negative rating. In addition, you may also want to code the "quality" of the opinion leader here - their capabilities, motivation, and skills, i.e., how good they are at their job, and this data affects the rating as well.	
2 Formally appointed internal implementation leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an intervention as coordinator, project manager, team leader, or other similar role.	Include statements related to engagement strategies and outcomes, e.g., how the formally appointed internal implementation leader became engaged with the innovation and what their role is in implementation.	Exclude or double code statements regarding leadership engagement to Leadership Engagement if an implementation leader is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.
3 Champions	"Individuals who dedicate themselves to supporting, marketing, and 'driving through' an [implementation]" [101](p. 182), overcoming indifference or resistance that the intervention may provoke in an organization.	Include statements related to engagement strategies and outcomes, e.g., how the champion became engaged with the innovation and what their role is in implementation.	Exclude or double code statements regarding leadership engagement to Leadership Engagement if a champion is also an organizational leader, e.g., if a director of primary care takes the lead in implementing a new treatment guideline.
4 External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction.	Include statements related to engagement strategies and outcomes, e.g., how the external change agent (entities outside the organization that facilitate change) became engaged with the innovation and what their role is in implementation, e.g., how they supported implementation efforts.	Note: It is important to clearly define what roles are external and internal to the organization. Exclude statements regarding facilitating activities, such as training in the mechanics of the program, and code to Access to Knowledge & Information if the change agent is considered internal to the study, e.g., a staff member at the national office. If the study considers this staff member internal to the organization, it should be coded to Access to Knowledge & Information, even though their support may overlap with what would be expected from an External Change Agent.
5 Key Stakeholders	Individuals from within the organization that are directly impacted by the innovation, e.g., staff responsible for making referrals to a new program or using a new work process.	Include statements related to engagement strategies and outcomes, e.g., how key stakeholders became engaged with the innovation and what their role is in implementation.	Exclude statements related to implementation leaders' and users' access to knowledge and information regarding using the program, i.e., training on the mechanics of the program, and code to Access to Knowledge & Information. Exclude statements about general networking, communication, and relationships in the organization, such as descriptions of meetings, email groups, or other methods of keeping people connected and informed, and statements related to team formation, quality, and functioning, and code to Networks & Communications.

6 Intervention Participants	Individuals served by the organization that participate in the innovation, e.g., patients in a prevention program in a hospital.	Include statements related to engagement strategies and outcomes, e.g., how innovation participants became engaged with the innovation. Note: Although both strategies and outcomes are coded here, the outcome of efforts to engage participants determines the rating, i.e., if there are repeated attempts to engage participants that are unsuccessful, the construct receives a negative rating.	Exclude statements demonstrating (lack of) awareness of the needs and resources of those served by the organization and whether or not that awareness influenced the implementation or adaptation of the innovation and code to Needs & Resources of Those Served by the Organization.
C Executing	Carrying out or accomplishing the implementation according to plan.	Include statements that demonstrate how implementation occurred with respect to the implementation plan. Note: Executing is coded very infrequently due to a lack of planning. However, some studies have used fidelity measures to assess executing, as an indication of the degree to which implementation was accomplished according to plan.	
D Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.	Include statements that refer to the implementation team's (lack of) assessment of the progress toward and impact of implementation, as well as the interpretation of outcomes related to implementation. Reflecting and Evaluating is part of the implementation process; it likely ends when implementation activities end. It does not require goals be explicitly articulated; it can focus on descriptions of the current state with real-time judgment, though there may be an implied goal (e.g., we need to implement the innovation) when the implementation team discusses feedback in terms of adjustments needed to complete implementation.	Exclude statements related to the (lack of) alignment of implementation and innovation goals with larger organizational goals, as well as feedback to staff regarding those goals, e.g., regular audit and feedback showing any gaps between the current organizational status and the goal, and code to Goals & Feedback. Goals and Feedback include organizational processes and supporting structures independent of the implementation process. Evidence of the integration of evaluation components used as part of "Reflecting and Evaluating" into on-going or sustained organizational structures and processes may be (double) coded to Goals and Feedback. Exclude statements that capture reflecting and evaluating that participants may do during the interview, for example, related to the success of the implementation, and code to Knowledge & Beliefs about the Innovation.
E Accommodation	The idea that they are trying to work around a barrier that may have presented. Process/mechanism of working around that barrier.		
VI. IMPLEMENTATION OUTCOMES			
A Acceptability	The perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory. Satisfaction with various aspect of the innovation (e.g. content, complexity, comfort, delivery, and credibility).		
B Adoption	The intention, initial decision, or action to try or employ an innovation or evidence-based practice. Adoption also may be referred to as ''uptake.'' Uptake; utilization; initial implementation; intention to try.		
C Appropriateness	The perceived fit, relevance, or compatibility of the innovation or evidence based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem. Suitability; usefulness; practicability.		
D Feasibility	The extent to which a new treatment, or an innovation, can be successfully used or carried out within a given agency or setting. Actual fit or utility; suitability for everyday use; practicability.		
E Fidelity	The degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers. Delivered as intended; adherence; integrity; quality of program delivery.		
F Implementation Cost	The cost impact of an implementation effort . . . depends upon the costs of the particular intervention, the implementation strategy used, and the location of service delivery. Marginal cost; cost-effectiveness; cost-benefit.		
G Penetration	The integration of a practice within a service setting and its subsystems. Level of institutionalization? Spread? Service access? (Reach)		
H Sustainability	The extent to which a newly implemented treatment is maintained or institutionalized within a service setting's ongoing, stable operations. Maintenance; continuation; durability; incorporation; integration; institutionalization; sustained use; routinization.		
VII. SERVICE OUTCOMES (IOM Standards of Care)	Descriptions from IOM Standards of Care		
A Efficiency	Avoiding waste (e.g., waste of equipment, ideas, and energy).		
B Safety	Avoiding injuries to patients.		
C Effectiveness	Providing care based on scientific knowledge.		
D Equity	Ensuring that the quality of care does not vary because of characteristics such as gender, ethnicity, socioeconomic status, or geographic location.		
E Patient-centeredness	Providing respectful and responsive care that ensures that patient values guide clinical decisions.		
F Timeliness	Reducing waits for both recipients and providers of care.		
VIII. CLIENT OUTCOMES			
A Satisfaction			
B Function			
C Symptomatology			
IX. CLINICIAN AND STAFF OUTCOMES			
A Satisfaction	Clinician's job satisfaction		
B Effectiveness	Are they still able to do their job effectively?		

The RECORD statement – checklist of items, extended from the STROBE statement, that should be reported in observational studies using routinely collected health data.

	Item No.	STROBE items	Location in manuscript where items are reported	RECORD items	Location in manuscript where items are reported
Title and abstract					
	1	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found	Title page	RECORD 1.1: The type of data used should be specified in the title or abstract. When possible, the name of the databases used should be included. RECORD 1.2: If applicable, the geographic region and time frame within which the study took place should be reported in the title or abstract. RECORD 1.3: If linkage between databases was conducted for the study, this should be clearly stated in the title or abstract.	Abstract Abstract N/A
Introduction					
Background rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 5		
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5		
Methods					
Study Design	4	Present key elements of study design early in the paper	Page 6		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Pages 6-7		
Participants	6	*(a) Cohort study* - Give the eligibility criteria, and the sources and methods of selection		RECORD 6.1: The methods of study population selection (such as codes or algorithms used to identify subjects)	Pages 6-7

Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable.	Page 7 – all attended visits included	RECORD 7.1: A complete list of codes and algorithms used to classify exposures, outcomes, confounders, and effect modifiers should be provided. If these cannot be reported, an explanation should be provided.	Page 7 – all attended visits included
Data sources/ measurement	8	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	N/A		

Bias	9	Describe any efforts to address potential sources of bias	Page 7 – all attended visits included		
Study size	10	Explain how the study size was arrived at	Page 7 – all attended visits included		
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why	N/A		

Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding (b) Describe any methods used to examine subgroups and interactions (c) Explain how missing data were addressed (d) *Cohort study* - If applicable, explain how loss to follow-up was addressed *Case-control study* - If applicable, explain how matching of cases and controls was addressed *Cross-sectional study* - If applicable, describe analytical methods taking account of sampling strategy (e) Describe any sensitivity analyses	Page 8 (mixed methods analysis described)		
Data access and cleaning methods		..		RECORD 12.1: Authors should describe the extent to which the investigators had access to the database population used to create the study population.	N/A – counts of visits (study population not constructed)
				RECORD 12.2: Authors should provide information on the data cleaning methods used in the study.	N/A – all attended visits included

Linkage		..		RECORD 12.3: State whether the study included person-level, institutional-level, or other data linkage across two or more databases. The methods of linkage and methods of linkage quality evaluation should be provided.	N/A
Results					
Participants	13	(a) Report the numbers of individuals at each stage of the study (*e.g.*, numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed) (b) Give reasons for non-participation at each stage. (c) Consider use of a flow diagram	N/A	RECORD 13.1: Describe in detail the selection of the persons included in the study (*i.e.,* study population selection) including filtering based on data quality, data availability and linkage. The selection of included persons can be described in the text and/or by means of the study flow diagram.	N/A – all attended visits included
Descriptive data	14	(a) Give characteristics of study participants (*e.g.*, demographic, clinical, social) and information on exposures and potential confounders (b) Indicate the number of participants with missing data for each variable of interest (c) *Cohort study* - summarise follow-up time (*e.g.*, average and total amount)	Page 9		
Outcome data	15	*Cohort study* - Report numbers of outcome events or summary measures over time *Case-control study* - Report numbers in each exposure	Page 10, Figure 1		
		category, or summary measures of exposure *Cross-sectional study* - Report numbers of outcome events or summary measures			

Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Page 10, Figure 1		
Other analyses	17	Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses	Mixed methods study – qualitative results presented Pages 10-14		
Discussion					
Key results	18	Summarise key results with reference to study objectives	Pages 14-16		
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	N/A – all visit data included	RECORD 19.1: Discuss the implications of using data that were not created or collected to answer the specific research question(s). Include discussion of misclassification bias, unmeasured confounding, missing data, and changing eligibility over time, as they pertain to the study being reported.	N/A all visit data included
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14-17		

Generalisability	21	Discuss the generalisability (external validity) of the study results	N/A – qualitative findings		
Other Information					
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19		
Accessibility of protocol, raw data, and programming code		..	N/A	RECORD 22.1: Authors should provide information on how to access any supplemental information such as the study protocol, raw data, or programming code.	N/A

*Reference: Benchimol EI, Smeeth L, Guttmann A, Harron K, Moher D, Petersen I, Sørensen HT, von Elm E, Langan SM, the RECORD Working Committee. The REporting of studies Conducted using Observational Routinely-collected health Data (RECORD) Statement. *PLoS Medicine* 2015; in press.