



Evaluation of the impact of a digital care navigator on increasing patient registration with digital mental health interventions in routine care

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ABSTRACT

Background: Less than half of adults with mental health disorders in the United States receive appropriate or timely care. Digital Mental Health Interventions (DMHIs) have the potential to bridge this gap. However, real-world adoption of DMHIs is impeded by patient and provider-level technological barriers. Care navigators have the potential to address these challenges by providing technical support and enhancing patients' experience with DMHIs.

Objective: This study explores the effect of a digital care navigator (DCN) on patient registration latency and rates of DMHIs implemented as part of a digital-first behavioral health care model integrated within routine care at a large multispecialty group medical practice.

Methods: Data were collected from electronic medical records and DMHI registration data were obtained from the DMHI vendors. Descriptive statistics were used to describe the DCN's efforts to help patients register with their DMHIs. Moods median tests evaluated differences in registration latency and weekly registration rate pre- and post- DCN implementation. Change in registration likelihood as a function of DCN outreach latency was investigated using a Kaplan-Meier plot.

Results: During the first eight months, the DCN made 1306 phone calls to 680 unique patients, successfully connecting with 66 %. DCN implementation also increased the median registration rate from 61.9 % to 76.9 %. Results showed that the expediency by which the DCN outreached patients directly impacted registration rate such that of those who were outreached by the DCN on the day of their referral to a DMHI, 96.86 % registered. This number was reduced to 76.15 % if the DCN reached them 1-day following referral, and 41.39 % 5-days after their referral.

Conclusions: Use of a DCN shows promise for enhancing patient registration rates with DMHIs in routine healthcare settings.

1. Introduction

In the United States, nearly 58 million adults are diagnosed with a behavioral health condition annually (National Institute of Mental Health, 2023), yet fewer than half can access appropriate behavioral

health care (Substance Abuse and Mental Health Services Administration, 2019). Digital mental health interventions (DMHIs) provided through smartphones and other electronic devices are designed to address behavioral health symptoms and optimize patient healthcare outcomes (Substance Abuse and Mental Health Services Administration,

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2023). With the value of the global DMHIs market estimated to reach \$17.16 billion by 2030 (Data Bridge Market Research, 2023), many companies are investing in the future of evidence-based care delivered by technology. DMHIs have demonstrated clinical effectiveness for patients struggling with a variety of behavioral health conditions, including depression (Arean et al., 2016), anxiety (Newman et al., 2021), insomnia (Werner-Seidler et al., 2023), and obsessive-compulsive disorder (Hwang et al., 2021). DMHIs offer additional benefits compared to traditional behavioral health interventions; for patients, they are viewed as more accessible and convenient (Hedman et al., 2012), available on-demand, and they may help reduce the perceived stigma of behavioral health care (Webb et al., 2010). From an organizational perspective, the provision of clinical care using DMHIs requires fewer resources (e.g., staff and space) compared to traditional care options; they are highly flexible, allowing for more personalized treatment; and are scalable, making it easier for organizations to expand programs to meet the behavioral healthcare demand (Webb et al., 2010). Thus, DMHIs have the potential to close the gap in access to effective and appropriate behavioral health care (Digital Therapeutics Alliance, 2021).

Despite the promise of DMHIs to fill the behavioral health treatment gap, there is limited evidence supporting the real-world adoption of DMHIs by patients or commercial users downloading apps online (Williams et al., 2020; Wisniewski and Torous, 2020) and previous research has identified significant barriers to DMHI uptake. For example, the selection of appropriate DMHIs is a challenge as there are over 10,000 behavioral health-focused DMHIs in circulation (Clay, 2021; Schueller and Torous, 2020) making it difficult for any individual to select appropriate DMHIs. Limited digital literacy among users (Borghouts et al., 2021; Nouri et al., 2019) and clinicians (Borghouts et al., 2021; Feijt et al., 2018) has also arisen as a significant challenge to using DMHIs. Furthermore, data privacy concerns can diminish clinician confidence in DMHIs in clinical settings thus decreasing clinical referrals (Lattie et al., 2020). Patient registration and engagement with DMHIs is low. For example, a review of 93 real-world usage of behavioral health apps found that the median percentage of users who opened the app each day was 4 %, and the median retention rate was 3.9 % for 15 days and 3.3 % for 30 days (Baumel et al., 2019). Further, a systematic review of the uptake and use of digital self-help interventions for anxiety, depression, and mood, found that as few as 21 % of registered users used an app at least once, and as few as 7 % completed 40 %–70 % of a full program (Fleming et al., 2018). Thus, sustained engagement remains a formidable barrier to fully leveraging DMHIs in clinical settings and fulfilling their promise to address the access to care problem in the field (Gilbody et al., 2015; Mohr et al., 2017; Waalen et al., 2019).

As healthcare organizations explore the utility of DMHIs to provide behavioral health services to patients, it is critical to understand how to address these adoption barriers and establish buy-in from clinicians and patients alike. Research suggests that the role of a ‘care navigator’ (Wisniewski and Torous, 2020) can improve patient experience and engagement in their healthcare (Pace et al., 2018). Care navigators have been widely utilized in the provision of in-person care, from primary care to cancer to AIDS treatment, to effectively remove barriers as patients navigate dynamic, complex, and often fragmented healthcare systems (Carter et al., 2018). Care navigation programs have demonstrated significant benefits including improvements in patients’ access to care, outcomes, and reduced emergency department utilization (Carter et al., 2018). Nevertheless, the use of care navigation for addressing barriers to patient DMHI adoption in clinical settings, particularly in behavioral health, is nascent. Thus, this paper assesses the impact of a digital care navigator implemented within a routine healthcare setting on patient adoption of DMHIs, namely registration rates.

2. Methods

2.1. Setting

Reliant Medical Group (Reliant) is a large multispecialty medical group practice located in the northeastern region of the United States, and serves 340,000 adult and pediatric patients across 10 sites, with a primary care integrated Behavioral Health department. To address the growing challenges in successfully getting patients connected with behavioral health services, Reliant implemented Precision Behavioral Health as part of routine primary care in 2022. The development of Precision Behavioral Health has been described elsewhere (Youn et al., 2023). Briefly, Precision Behavioral Health is a digital-first care model that includes an ecosystem of DMHIs provided to patients as a frontline treatment, with strategic human support and ongoing monitoring. The goal of Precision Behavioral Health is to increase access to evidence-based interventions for patients with mild-moderate anxiety and depression, and related challenges. The DMHIs included in PBH include digital wellness interventions and digital therapeutics (Substance Abuse and Mental Health Services Administration, 2023) provided to the patients through a variety of delivery modalities, such as smartphone applications, virtual reality headsets, and other devices.

2.2. Procedure

For a detailed description of the Precision Behavioral Health program’s procedures, please see Youn et al., 2023. Briefly, following a referral from primary care to the behavioral health department, patients meet with a master’s-level behavioral health integrated clinician for a triage assessment to determine the best treatment option based on presenting concerns. If the integrated clinician determines the patient is clinically appropriate for Precision Behavioral Health, and the patient expresses an interest, they are referred to a specific DMHI matching their needs. The DMHI and Precision Behavioral Health program are offered as a standalone, first-line treatment option for behavioral health needs and not as an adjunctive to another psychotherapy treatment. Following the referral, the referring clinician schedules a phone call between the patient and the Digital Care Navigator (DCN) who assists the patient with registration procedures for the referred DMHI. DCNs outreach patients 3 times with approximately 2–3 business days in-between each outreach. If patients do not return the phone call after the third outreach, the DCNs discontinue their outreach attempts. Patients are all scheduled with an integrated clinician for a follow-up appointment at 4- or 6-weeks following referral and therefore have additional opportunities to change their clinical care at that time if they would like. Throughout the DMHI program, patients can reach out to the DCN or the integrated clinician if they have any questions regarding their DMHI using the electronic health record platform’s messaging system.

2.3. Digital care navigator

The DCN role was developed to address the low DMHI registration rates that are established in the literature (Baumel et al., 2019). The role was conceived to connect with the patients after they were referred to DMHIs by their providers and provide patients with technical assistance during the registration process. The assistance offered was specifically designed to be technical in nature and not clinical, and ranged from helping patients set up Wi-Fi, finding their Wi-Fi password, learning to create an account on the DMHIs’ website, and/or setting up their DMHI devices appropriately. This role was conceptualized to provide a human touch point for patients to increase their comfort and willingness to try a digital program to address their needs. The first contact with the DCN was strategically placed after the provider made the referral to a DMHI and before the patient started the digital program. This ensured that the patient’s experience included a human connection before starting the digital program, without overburdening clinicians with additional

responsibilities. The first DCN for Precision Behavioral Health began contacting patients to assist with their DMHI registration processes on June 22, 2022, two months following the launch of the pre-implementation phase of Precision Behavioral Health at Reliant (for more details on the implementation process see [Youn et al., 2023](#)).

2.4. Data analysis

Data were collected through the electronic health record platform from April 26, 2022, to May 25, 2023. Data analyses aimed to first describe the study sample and quantify the DCN’s efforts to help patients register. Data extracted included the date of DCN calls made, length of the calls, and outcome of the calls (i.e. did not answer/voicemail was left, answered, could not leave voicemail). For calls that were answered, the following outcomes were noted: registration completed by patients before the DCN call, declined assistance, elected to not participate in Precision Behavioral Health, the patient required a second outreach or the patient requested a written copy of instructions. The dates of patient registrations with the DMHI were provided by the DMHI vendors weekly to the Precision Behavioral Health team ([Youn et al., 2023](#)).

Using patients that accepted the DMHI referral post-DCN implementation, descriptive statistics were used to describe the proportion of successful patient connections (regardless of whether or not the patient registered) out of the total number of the DCN’s attempted outreaches, the amount of time spent in calls with each patient, and the outcome of the call. Second, we evaluated the impact of the DCN’s outreaches on patients’ registration rate and latency to registration, which was measured as the number of days between the date the DMHI referral was placed by an integrated clinician and the date the patient registered with the DMHI. For patients who registered with their DMHI pre- and post-DCN implementation, Mood’s median test was used to investigate significant differences in registration latency. For all patients that were referred and accepted DMHIs in the timeframe specified above, Mood’s median test was used to assess significant differences in weekly registration rates (operationalized as registered over referred) comparing the registration rate pre-and post-DCN implementation. Third, we evaluated whether the DCN’s latency in outreaching patients impacted the likelihood of registration using a Kaplan-Meier test. Data included all patients who were referred after the implementation of the DCN. All analyses were conducted using R statistical software (V 4.2.1) ([R Development Core Team, 2014](#)).

2.5. Informed consent

The evaluation of the implementation of the DCN role within PBH was deemed to be an exempt quality improvement project by the Office of Human Research Affairs in United Health Group (exemption action ID: 2023-0008-01). The study was determined to present negligible risk to participants. As part of standard care at Reliant, for patients who accept the PBH referral, providers obtain and document patients’ verbal consent to have the DMHI vendor share de-identified data regarding their status and engagement with the intervention back with Reliant. Additionally, DMHI vendors collect consent as part of their terms and conditions when patients register for their intervention, which allows them to share their data with Reliant.

3. Results

Patients included (N = 874) were seen as part of routine care at the Behavioral Health Department in Reliant, and were referred to and accepted the Precision Behavioral Health referral, regardless of registration status. Patient demographic characteristics are displayed in [Table 1](#). Before DCN implementation in the Precision Behavioral Health program (April 26, 2022–June 21, 2022), 37 patients registered and 35 patients did not. After DCN implementation (from June 22, 2022–May 25, 2023), 616 patients registered, and 186 patients did not.

Table 1
Patient demographics table.

Demographic variables	Overall (N = 874)	Pre-DCN (N = 72)	Post-DCN (N = 802)
	N/% or M(SD)	N/% or M(SD)	N/% or M(SD)
Age	39.19 (14.72)	39.41 (13.67)	39.17 (14.82)
Biological sex			
Female	651/74 %	48/67 %	603/75 %
Male	223/26 %	24/33 %	199/25 %
Race			
Asian	11/1 %	2/3 %	9/1 %
Black	45/5 %	9/13 %	36/4.5 %
Native American	3/<1 %	0/0 %	3/<1 %
Unknown	217/25 %	19/26 %	198/25 %
White	598/68 %	42/58 %	556/69 %
Ethnicity			
Hispanic	92/11 %	5/7 %	87/11 %
Non-Hispanic	516/59 %	41/57 %	475/59 %
Unknown	266/30 %	26/36 %	240/30 %

To evaluate whether there were meaningful differences between the pre-and post-DCN implementation cohorts, t-test and chi-square tests were used. The results showed that there were no significant differences in age $t(872) = 0.14, p = 0.88$; legal sex $\chi^2(1, N = 874) = 2.09, p = 0.15$; or ethnicity $\chi^2(2, N = 874) = 1.85, p = 0.4$. Significant differences were identified for race $\chi^2(4, N = 874) = 11.19, p < 0.05$. Pairwise post-hoc comparisons with Bonferroni corrections revealed that the proportion of Black patients in pre-DCN implementation was statistically higher compared with the proportion of Black patients in post-DCN implementation cohort (pre-DCN cohort = 0.12; post-DCN cohort: = 0.04, $p = 0.01$). None of the other races statistically differed in pre- and post-DCN implementation cohorts.

From June 22, 2022 (the DCN’s first day making phone calls) through May 25, 2023 (the last date of data extract), the DCN made 1261 phone calls to 755 unique patients (86 % of the 874 referred patients) and spoke to 498 (66 %) of those patients over the phone. The mean number of phone calls for those who registered was 1.80 (SD = 1.27) and the mean number of phone calls for those who did not end up registering was 2.27 (SD = 1.22). Overall, the median time spent per call was 2 min (IQR = 1 to 3 min) for unsuccessful registrations and 4 min (IQR = 2 to 8 min) for successful registrations. Of the patients who connected with the DCN (regardless of registration outcome), 187 (38 %) patients reported that they had already registered with their DMHI before talking with the DCN; 148 (30 %) required registration support; 109 (22 %) declined assistance; 23 (5 %) elected not to participate in Precision Behavioral Health and reported that to the DCN; 14 (3 %) patients required a second outreach for additional support; 3 (1 %) requested a written copy of instructions; and 4 (1 %) were unable to speak to the DCN at the time of the phone call and requested a callback.

The impact of the DCN outreach on registration latency is shown in [Fig. 1a](#). The latency between referral and registration decreased from a median of 3 days (IQR = 0 to 22 days) pre-DCN to a median of 1 day (IQR = 0 to 5 days) post-DCN. The decrease in registration latency was not statistically significant (Mood’s median test; p -value = 0.17). Post-implementation of DCN, the registration rate increased from 54.5 % to 77.0 %. As shown in [Fig. 1b](#), the weekly registration rate increased from a median of 61.9 % (IQR = 33.33 to 66.67 %) to a median of 76.90 % (IQR = 70.30 % to 83.70 %). This increase was statistically significant (Mood’s median test; p -value = 0.02).

[Fig. 2](#) depicts the results evaluating the latency in the DCN’s outreach on the likelihood of registration. Of the patients that were outreached by the DCN the same day they were referred to the program, 96.86 % registered (95 % CI: 95.61 % to 98.13 %). For patients outreached with a 1-day lag, the likelihood of registration dropped to 76.15 % (95 % CI: 73.09 %–79.33 %). Outreach latency of five days further dropped the likelihood of registration to 41.39 % (95 % CI: 36.62 %–46.79 %).

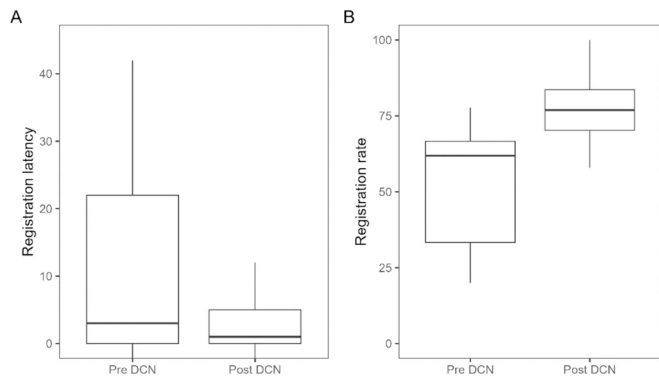


Fig. 1. Digital Care Navigator effect on registration latency and registration rate.
DCN: Digital Care Navigator. Pre DCN = Period of time prior to the inclusion of the digital care navigator in the program; Post DCN = Period of time after the inclusion of the digital care navigator in the program.

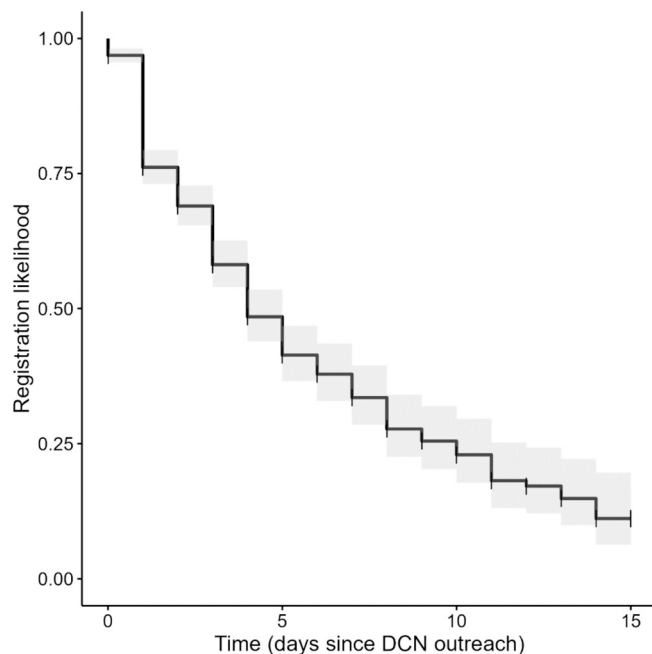


Fig. 2. Kaplan-Meier curve depicting likelihood of patient registration based on latency of Digital Care navigator outreach.
DCN = Digital Care Navigator.

4. Discussion

The goal of the present study was to evaluate the impact of a Digital Care Navigator in facilitating registration with DMHIs as a standalone, first-line treatment option for patients who were referred by their providers as part of routine care. Results showed a significant 15 % increase in weekly registration rates following the implementation of the DCN. Every patient that is referred and does not connect with treatments, such as DMHIs, is a missed opportunity to provide critical mental health care that can impact overall health and well-being. Untreated behavioral health challenges have significant negative effects on an individual’s cardiovascular health and life expectancy, (Doherty and Gaughran, 2014). Additionally, untreated mental health problems have far-reaching societal consequences including diminished workplace productivity (Druss et al., 2011), costing the US economy 300 billion USD annually (Rollins et al., 2021). Thus, finding resources that can be easily implemented as part of routine care such as a DCN to significantly

increase connecting patients with DMHIs can have meaningful effects at large.

A potential explanation for the increase in registration rates after the DCN implementation may be the human element. DMHIs are still a relatively novel form of treatment option for behavioral health challenges (Torous et al., 2021). Therefore, it may be that having a human connection to support a patient’s journey from referral to registration may be helpful when the patient is trying a new treatment option. The field of psychotherapy research has consistently demonstrated that the therapeutic alliance between the therapist and patient accounts for the majority of positive outcomes (Martin et al., 2000). It is in the context of a strong alliance that patients report feeling safe and are willing to take risks even within the context of therapy and work towards eliciting change (Beck et al., 2006). Therefore, the DCN outreach could be hypothesized to serve a similar role for the patient in trying a novel intervention. The results of the nature of the DCN phone calls further support this hypothesis. While the DCN conversed with 66 % of patients, only a third of the DCN’s conversations with the patients were focused on providing registration support. Instead, the majority of the calls included discussions of other aspects of the registration process. Even in this digital treatment option, the human support and connection cannot be underestimated.

This is the first study that we know of to document the impact of differential outreach latencies on the likelihood of successful registration of DMHIs. The results highlight the importance of the DCN rapidly outreaching patients to aid in their registration process following their referral from the provider. The likelihood of registration when the DCN outreached the patient within 24 h of referral was 96.64 %, with that likelihood dropping every subsequent day. The benefits of connecting patients quickly with services are well established in the field. For example, bridge clinics, whose purpose is to provide low-barrier and quick transitional care for patients with substance use disorders, have been shown to enhance outcomes for patients and are considered an essential part of the care continuum (Taylor et al., 2023). Engaging with patients right after they were referred to DMHIs by their providers may align with the patients’ purpose of why they want to start a DMHI as well as enhance their sense of ease with which they can get started- strategies that have been shown to be effective in increasing adoption (Powell et al., 2017).

Taken together, the results of this study show that the DCN role is a promising resource for providers and organizations to increase patient registration of DMHIs for behavioral health treatment. Given that two-thirds of patients hadn’t registered by the time the DCN made their outreach, this is evidence of the relevance of the role. For the patients that had already registered prior to the DCN outreach, the DCNs used the opportunity to check that the patients registered correctly, and answer any technical or program questions they may have. Additionally, the median time the DCN spent with each patient is 3 min, which means that each DCN can swiftly help numerous patients successfully register with their DMHIs. Since the role and responsibilities do not require a clinical license, it provides organizations with a potentially cost-effective option for the team that is additive to the patient experience but not part of the supply-demand challenge that exists in behavioral health with limited licensed behavioral health providers. Further, an investigation of care navigation for telehealth demonstrated its cost effectiveness by reducing technological barriers thus improving adherence (Mechanic et al., 2022). This solution also does not overburden providers to have technical conversations with their patients, and they may focus on the clinical aspects of the appointment.

The results of the study should be reviewed in the context of a few limitations. Given that the implementation of the DCN was done as part of routine care, there could have been other contextual factors that may have impacted the registration and latency results. Interestingly, even though the median registration time was reduced from 3 days to 1 day following the implementation of the DCN, the results were not statistically significant. These results may be due to the small sample size of

patients prior to the DCN implementation. However, it is notable the wide range of latency in registration pre-DCN. The days between referral and registration ranged from 0 to 22 days. This may represent the challenges that patients face when attempting to start a new DMHI on their own, including time and navigating technical challenges, which are the exact challenges the DCN role was developed to address. Future studies should explore reasons that contribute to this wide variability in registration latency to further understand it. A third limitation is the small sample size pre-DCN which may also account for the differences in racial representation between the pre-and post-DCN implementation groups. Overall, the representation of patients was not as diverse, and future studies should investigate the impacts of race on DMHI registration and adoption. The results of the DCN's impact may not generalize to DMHIs' registration rate or latency when they are not referred by providers and accessed by end-users directly. Finally, it would be interesting to collect patient feedback related to the quality of the interaction with the DCN, such as whether they were satisfied with the call, or whether they found the call to be helpful. These data would provide a richer depiction of how DCNs are perceived by those they are helping.

Despite these limitations, the results of this study showcase the promise of solutions like a care navigator in addressing the hurdle of patients registering for DMHIs (Harty et al., 2023), and starting their digital treatments. Future studies should explore additional responsibilities for the digital care navigator, such as supporting patients in continued engagement with the DMHIs, instead of solely focusing on registration. A recent meta-analysis showed that post-registration, there is low sustained engagement in DMHIs in the real world, with 3.9 % median retention rates at 15 days post-registration and 3.3 % at 30 days (Baumel et al., 2019). Further, there is emerging evidence to relate sustained engagement and enhanced therapeutic gains (Gan et al., 2021). Thus, given the success of the DCN in increasing registration rates, it would be important to investigate the impact that the DCN could have in enhancing sustained long-term engagement, as well as the cost-effectiveness of the inclusion of the DCN role within the broader context of the program.

Declaration of competing interest

Samuel S. Nordberg has a financial relationship with Mental Health Informatics, which owns the Norse Feedback measure, a measurement-based tool that has been integrated within routine care at Reliant Medical Group as part of the Precision Behavioral Health initiative described in this paper. Samuel S. Nordberg declares a potential conflict of interest. Dr. Nordberg has a plan in place with OptumCare and Reliant Medical Group to monitor that the potential conflict of interest does not impact methods, results, and publications related to the Norse Feedback measure or Precision Behavioral Health. No other authors have a declaration of interest to disclose. The PBH program was funded by United Health Group's Strategy & Innovation Office. Funding for PBH was possible due to Reliant having been acquired by United Health Group's Optum Care in 2018.

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