Supplemental Online Content

Niendam TA, Loewy R, Savill M, et al. Effect of technology-enhanced screening on the duration of untreated psychosis: a cluster randomized clinical trial. *JAMA Psychiatry*. Published online January 4, 2023. doi:10.1001/jamapsychiatry.2022.4436

This supplemental material has been provided by the authors to give readers additional information about their work.

eMethods

Site Identification: Analyses of historical clinic data showed that approximately one-third of our referrals came from other community mental health providers, followed by the individual or their family (19%), ERs/hospitals or crisis stabilization (18%), and then schools (8%). We used this data to identify sites for possible participation in the project. Additionally, leadership within Sacramento County Behavioral health and the two local school districts provided opportunities for us to describe the study to all sites under their purview so they could identify a desire to participate. If they did indicate interest, research staff would follow up to discuss the study. Sites who were willing to participate were randomized to conditions.

Consent and Randomization. Community site leadership provided consent to participate in the study as a site and consented to randomization. Individual participants consented to share their data after randomization, at the point of the tablet for the Active Arm, and at the phone screen, for the TAU arm. The team biostatistician (Delucchi), developed the randomization algorithm. As sites were consented, research staff assigned the sites within each strata to interventions in consecutive pairs. The clusters were the individual clinic sites. The number per sites, therefore, varied and were out of our control. Of the sites contributing data, the average number per site was 38 (SD=55.5). The ICC was <.01 and no CI could be computed."

Screening administration. Each site received password-protected, Wi-Fi-disabled, Android tablets loaded with the study application ("App"), which included an informed consent, basic demographic questionnaire, and the Prodromal Questionnaire-Brief (PQ-B [1]). Staff were instructed to offer the tablet to all eligible individuals presenting with a mental health concern at or within 60 days of their first visit. Staff recorded any individuals who declined or were ineligible in the App. The App automatically scored the PQ-B and displayed "Request phone interview from EDAPT" if the participant scored above threshold, or "Continue to monitor or refer directly if still concerned" for scores below threshold. For clients who declined the tablet, were ineligible for screening, or who scored below threshold, staff were encouraged to use clinical judgement and refer them at any time if deemed appropriate for EDAPT services.

The diagnostic phone interview. Diagnosis and DUP length was determined by a 90 minute diagnostic phone interview based on the positive symptoms scale of the Structured Interview for Prodromal Syndromes (SIPS, version 4.0) [2], role functioning measures including the Global Functioning: Social and Global Functioning: Role scales [3], and additional questions about mood and behaviors, substance use, developmental, medical and family history. Individuals were categorized along the psychosis-spectrum into one of four categories: 1) first-episode psychosis [FEP; onset of full-threshold psychotic symptom (delusion, hallucination, disorganized communication) according to the SIPS (P score = 6) within the past 2 years], 2) chronic psychosis (CP; an onset of psychosis greater than 2 years prior to phone interview), 3) clinical-high-risk (CHR; sub-threshold psychosis symptoms of any duration; e.g. P scores on the SIPS in the 3-5 range), or 4) no psychosis (NP). Therefore, some individuals categorized here as FEP might merit the Brief Intermittent Psychosis Syndrome (BIPS) diagnosis on the SIPS and be characterized in some settings as CHR. Outcomes were calculated for FEP only and for all psychosis spectrum, which included FEP, CP and CHR. Phone interviews were completed by trained research staff and subsequently reviewed by a licensed clinical psychologist to confirm diagnostic category and exclusion criteria not captured at an earlier stage.

For FEP and CP individuals, the date of psychosis onset was determined as the first date a SIPS positive symptom score reached a level 6 (Severe and psychotic) according to SIPS criteria, which were evaluated via the phone interview. When only the month and year could be ascertained, the 15th of the month was used. When only the season and year were known, July 15th was used for Summer, April 15th for Spring, October 15th for Fall, and December 15th for winter. When only the age at first episode was known, date of birth + 6 months was used. When only the year was known, July 1st was used. DUP was calculated as the number of days between the date of psychosis onset and the date of the phone interview. If the phone interview was completed across multiple sessions, the date that it began was used.

Research assistants called participants within one business day of referral to schedule the phone interview. Phone interviews were conducted by study staff trained to reliability standards and supervised by licensed clinicians (TAN and KB). After three failed attempts to contact the participant, the referring provider was contacted, and the participant left a final voicemail.

Phone Interview Training. Staff received extensive training to reliability standards on the SIPS (version 4.0) [2], Structured Clinical Interview for DSM [SCID[4,5]], Modified Global Assessment of Functioning (GAF [6]), GFS and

GFR [3]), and the Columbia Suicide Severity Rating Scale (CSSRS[7]) by licensed clinical psychologists. Additionally, they attended a training specifically covering the phone interview, which was followed by observational shadowing of three phone interviews conducted by trained staff members and then were shadowed for three phone interviews before conducting phone interviews independently. SIPS Syndrome reliability for staff was excellent/outstanding; all kappas were equal to 1 (i.e., all trainees rated SIP Syndromes 100% consistent with the consensus ratings). SIPS P Scale reliability was good-to-excellent: across the seven trainees, average $r_t = 0.86$ [SD = 0.07, min = 0.75, max = 0.97]. SCID diagnostic reliability was good-to-excellent, all kappas were > 0.75 and average kappa across staff = 0.87.

Additional Exclusion Criteria. Participants were excluded from study analyses if information gathered before or at the phone interview from the participant, collateral or referring provider clearly indicated psychotic symptoms were substance-induced (n=2) or attributed solely to a neurological illness/injury (n=0), current diagnosis of substance dependence (n=2), documented IQ<70 (n=3), age not between 12-30 (n=1) or that they were previously served by the EDAPT clinic (n=2).

Determining Enrollment and DUP. Within the original grant, we proposed to measure enrollment and DUP at the point of "clinician assessment" or clinical intake. However, due to staff turnover, the clinic started a wait list for new intakes and prioritized the most urgent cases (e.g., hospital referrals), which could introduce bias. Since phone screens were able to be continued at the same rate, we proposed to shift to measuring the primary outcome at phone screen and this change was approved by our NIH program officer. As a result, for this analysis, DUP was defined as days from onset of psychotic symptoms to EDAPT phone interview, at which point number of individuals per arm was counted.

PQ-B Screening threshold selection. For the majority of the project, participants met the threshold for referral if the sum of all the PQ-B items weighted by degree of distress/impairment totaled at least 20. However, for the last eight months of the study (February 2017 – September 2017), a modified cutoff was used in order to increase specificity and reduce the false-positive rate, requiring an additional summed score of ≥3 on 5 key items. These key items were selected following an item-level analysis of the PQ-B completed by the first 142 referrals, where it was found that these five items were at least five times more likely to be endorsed as present and distressing in those later diagnosed with psychosis, relative to those who scored at least 20 distress on the PQ-B but were not diagnosed with psychosis. The accuracy of screening for psychosis using these five items was validated in second sample of 159 referrals to an early psychosis clinic, where a ≥3 distress total score was found to have a sensitivity of 75.5% and specificity of 61.1%, which led to them being included in the current study. However, a later analysis of 417 consecutive screens with the new cutoff revealed that adopting the additional criteria led to only 7 additional participants being screened out.

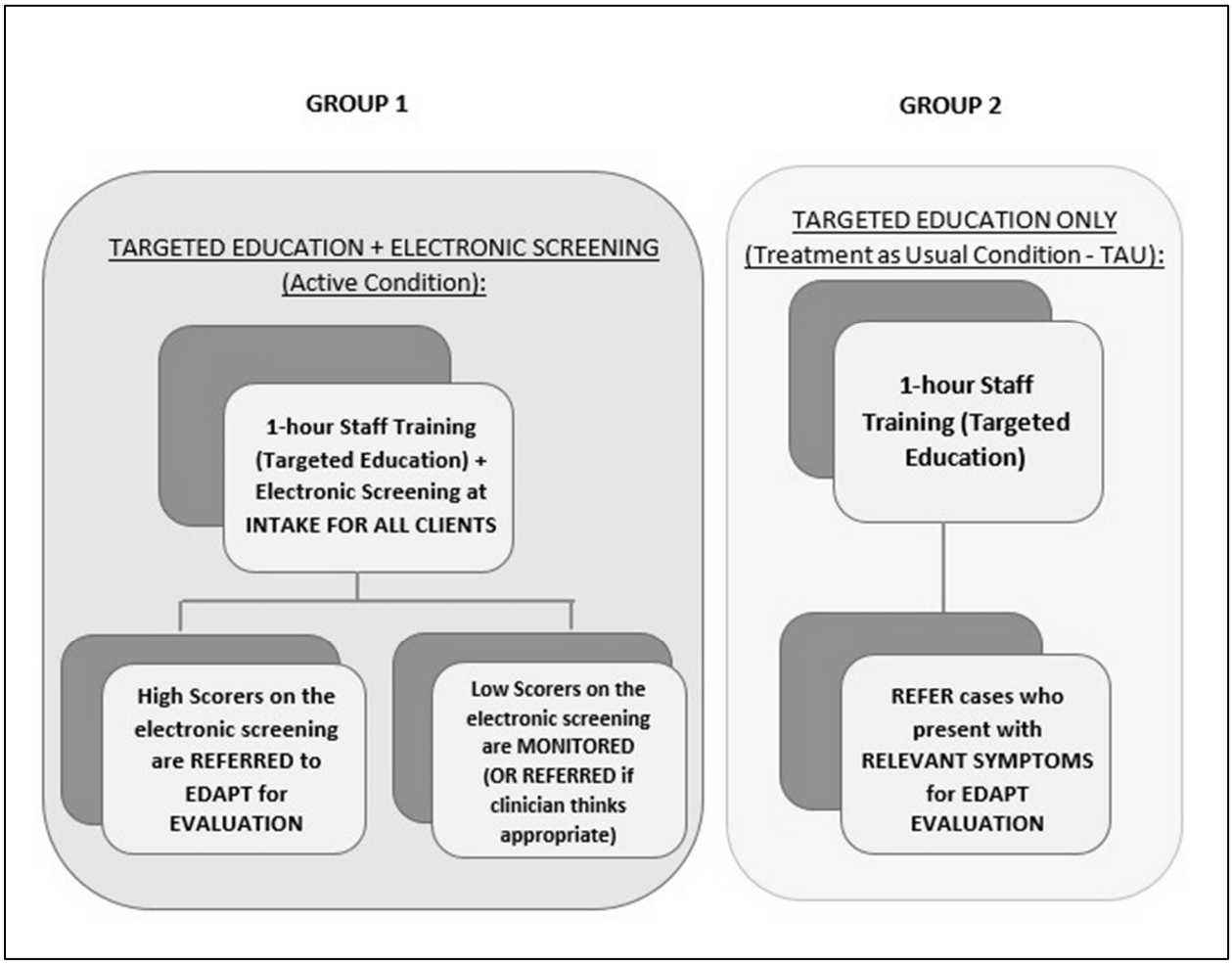
Statistical analysis. Phase 1 data (reported in the current paper) was not analyzed until March of 2018. Prior to that, we only tracked recruitment and participant completion, but did not conduct an interval analysis.

Statistical Power. For hypothesis 1, assuming a correlation coefficient of 0.1 within each cluster, with n=84 clients we would have 80% power to detect a difference in DUP between 262 days (+/- 192.5 days) in the control arm and 131 days (+/- 192.5 days) in the intervention arm, using a 1-tailed test at $p<.05$. For hypothesis 2, with approximately 5000 individuals expected to be potentially eligible across the two arms (2500 in each arm) and an identification rate of psychosis spectrum disorders of 2.5% in the control arm, we calculated 80% power to detect a proportional difference of .014 at $p<.05$.

eTable. Study sites included in analysis

Site	Type	Treatment Arm	Description	Total number served	FEP Cases	CHR Cases
River Oak Center for Children	Community Mental Health	Active	Outpatient mental health services for youth	988	24 (53%)	36 (56%)
Visions Unlimited	Community Mental Health	Active	Outpatient mental health services for youth and adults	408	14 (31%)	12 (19%)
Another Choice, Another Chance	Community Mental Health	Active	Outpatient mental health services for youth and adults	273	3 (7%)	6 (9%)
Adult Psychiatric Support Services	Community Mental Health	Active	Outpatient mental health services for adults	25	1 (2%)	0 (0%)
Community Psychiatry, Davis	Community Mental Health	Active	Psychiatric assessment and services for children and adults	310	2 (4%)	4 (6%)
C.K. McClatchy High School	School	Active	Public high school student support services	170	1 (2%)	5 (8%)
Rosa Parks Middle School	School	Active	Public K-8 school student support services	258	0 (0%)	1 (2%)
Total served by Active sites				2432	45	64
Turning Point Northgate RST	Community Mental Health	TAU	Outpatient mental health services for adults	405	2 (7%)	0 (0%)
UCD CAARE	Community Mental Health	TAU	Outpatient mental health services for youth	220	14 (47%)	9 (31%)
Wellspace	Community Mental Health	TAU	Integrated behavioral health center	68	2 (7%)	2 (7%)
UC Davis, Outpatient Psychiatry	Community Mental Health	TAU	Outpatient psychiatry for children and adults	1160	9 (30%)	15 (52%)
Community Psychiatry, Roseville	Community Mental Health	TAU	Psychiatric assessment and services for children and adults	98	1 (3%)	0 (0%)
Hiram Johnson High School	School	TAU	Public high school student support services	336	1 (3%)	1 (3%)
Will C Wood Middle School	School	TAU	Public middle school student support services	168	1 (3%)	2 (7%)
Total served by TAU sites				2455	30	29

eFigure. Study procedures



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