Appendix - Impact of COVID-19 on telepsychiatry at the service and individual patient level (Hong et al., 2021)

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Section 1: Study protocol. Evaluation of telepsychiatry: a feasibility study across the lifespan within the NHS

*The following protocol was designed and submitted to Oxford Health NHS Foundation Trust (OHFT) and Southern Health NHS Foundation Trust (SHFT) committees prior to study initiation.

Background and rationale
Mental health and wellbeing are a major public health concern during the COVID-19 pandemic (Rathod et al., 2020) and higher prevalence of suicidal ideation and lower prevalence of wellbeing reported in the general public (Phiri et al., 2021). Health anxiety, as well as the impact of social distancing, and the accompanying economic disruption are likely to have a wide and far reaching impact on the mental health and wellbeing of the population, both now and into the future (Chau et al., 2021).

As well as the health impact on the general population, there is likely to be increased demand from existing service users, who are particularly vulnerable at this difficult time. In addition, the needs of the general public are likely to prompt increased numbers of referrals for assessment by mental health services. However, the need for health services to follow social distancing measures to reduce spread of COVID-19 means that there have been changes in the way health services have been working. Face-face contact with patients has been minimised and health staff have been encouraged to offer consultations remotely. However, early indications are that the uptake of different types of telehealth consultations (telephone or video-based) are patchy, with significantly more video consultation in Child and Adolescent services and very few in adult and older age services (Oxford Health).

Whilst this may be a new approach for many clinicians and patients, telepsychiatry is a well-recognised sub-discipline of telemedicine and includes psychiatric assessments or follow-up interviews conducted using telephone calls, audio and video digital platforms. It has been used since the 1950s and, particularly in the USA and Australia has been subject to evaluations with promising outcomes and clear guidelines. (APA 2021, https://www.psychiatry.org/psychiatrists/practice/telepsychiatry/toolkit/history-of-telepsychiatry). The evidence suggests that it is effective and well accepted across a range of age groups and cultural backgrounds. It may also be able to offer additional benefits, particularly when combined with other digital technologies such as online platforms and apps for recording and tracking of symptoms and treatment strategies. However, it is unclear to what extent UK clinicians are aware of this and are utilising the research and guidelines related to telepsychiatry during this current response to the COVID-19 pandemic.

The current crisis represents both a challenge and an opportunity for mental health services. Whereas there is evidence that telepsychiatry can be used to offer effective care for mental health problems.
telepsychiatry), there is a dearth of evidence regarding incorporation of telepsychiatry into routine mental health services in the context of a disaster. Therefore, the onus is on mental health services to optimise the use of telemedicine using the best available evidence and also to conduct meaningful research into its implementation at a time of crisis.

Even prior to the COVID-19 pandemic mental health services were already looking at service transformation to increase the use of digital technologies for consultations. The COVID-19 pandemic and social distancing has made evaluating such a transformation even more urgent. The results of such an evaluation will be essential both during and in the aftermath of the pandemic.

**Aims**

We aim to conduct a feasibility study to evaluate the uptake, acceptability (including barriers to use), clinical utility and overall service impact of telepsychiatry during the COVID-19 pandemic within the NHS. This will lay the groundwork for larger-scale studies, in due course, evaluating the impact of interventions such as remote training, introduction of apps (to support teleconsultations), and/or use of clinical-decision making tools in teleconsultations.

**Objectives**

1) To evaluate the **uptake** of teleconsultations, using routine clinical data to analyse numbers of telephone, digital and face to face contacts
2) To evaluate the **acceptability** of teleconsultations, using online feedback from clinicians, service-users and carers, as to how these consultations are experienced. Barriers to use, such as lack of confidence in using technology, or lack of access to the technology itself will be assessed, with options for written or telephone feedback if easier
3) To evaluate the **utility** of teleconsultations, using routine clinical data (such as DNAs, consultation time, amount/quality/rapidity of documentation) alongside online questionnaire data from service-users and clinicians (perceived communication and rapport)
4) To evaluate the **effectiveness** of teleconsultations using routine clinical data (such as prescriptions, hospitalisation) alongside online questionnaires from clinicians (PHQ/global state) and service users (self-report measures of global state)
5) Overall impact on the service- qualitative data on overall effects from clinicians, service users and carers.
6) To develop an intervention to improve telepsychiatry within the NHS
7) To develop a protocol for a trial to evaluate the intervention to implement telepsychiatry in the NHS

**Approach**

It will be important to frame the evaluation within the context of the current, and growing, research evidence base relating to telepsychiatry initiatives and the application of this evidence as is reflected in existing training and guidance materials available within the Trust.
**Method**

In Phase 1 we will collect and analyse data, using routine clinical data and self-report questionnaires developed specifically for this study (as outlined in objectives 1-5). For each of the above outcomes we will analyse by service factors (e.g. types of service), clinician factors (e.g. discipline) and service user factors (e.g. degree of disability, diagnosis, sex, age), which will be available from routine clinical data. Services to be included in this study will be agreed with the Trust.

In Phase 2 we will develop an intervention aimed at improving the uptake, acceptability, utility and/or effectiveness of telepsychiatry within NHS services. Most likely it will consist of a package of information and training. The content, format and delivery of which will be decided in consultation with service users, clinicians and managers and using the best available evidence in the literature. Focus groups with clinicians and patients, together with other feedback, will be used to develop this intervention with expert input.

In Phase 3 we will develop a protocol for a trial to evaluate the developed intervention, most likely using a stepped wedge design.

**Participants**

Patients, carers and clinicians in NHS mental health services (including children and adolescents, adults, older adults, pharmacies and care homes).

**Out of Scope**

This study will exclude any form of evaluation of types of digital platforms being used in the Trust.

**Expected impact**

This is a feasibility study to evaluate the current use of telepsychiatry and barriers to its use, in the context of COVID-19. The information would be used to design an intervention study to improve patient care (nationally and possibly internationally) in the context of the current pandemic and telepsychiatry beyond this.
Section 2: Key variable definitions

| Service activity variables | Definitions |
|----------------------------|-------------|
| (between 1st Jan and 1st Sept 2018, 2019, 2020) | (All variables exclude test (dummy) patients/referrals) |
| **Total number of patients registered in mental health services** | Number of patients registered to MH - number in patient table (client demographics). Will include deceased. |
| **Total number of distinct patients seen during the study period** | Patients who have had an open referral during this period - counted only once. This will include deceased for those which have had an open referral and subsequently become deceased within the same period. |
| **Total number of patients with an open referral** | Extracted in accordance to how the Trust report Nationally - Open referral is defined as a referral accepted date with no end date or where the end date occurred within the period. **Exclusions**: rejected referrals. This is a **distinct count of patients** with an open referral within the period |
| **Total number of open referrals** | Extracted in accordance to how the Trust report Nationally - Open referral is defined as a referral accepted date with no end date or where the end date occurred within the period. **Exclusions**: rejected referrals. This counts **number of referrals within the period** (more than one per patient is possible) |
| **Total number of new patients with an accepted referral** | Extracted in accordance to how the Trust report Nationally - Accepted referral is defined as a referral accepted date within the period. **Exclusions**: rejected referrals. This is a **distinct count of patients** with an accepted referral within the period. The patient could have been subsequently discharged within the same period or had multiple referrals accepted within the period, they will only be counted once. |
| **Total number of new referrals** | Extracted in accordance to how the Trust report Nationally - Accepted referral is defined as a referral accepted date within the period. **Exclusions**: rejected referrals. This is a **count of number of** accepted referrals within the period. More than one per patient is possible. |
| **Number of patients discharged** | Discharge is where the referral has a discharge date within the period. Distinct count of patients. If multiple referrals and discharged within the same period then only one is counted. |
| **Inpatient activity variables** | **Definitions** |
|-------------------------------|----------------|
| **Number of Inpatients (number of occupied beds per day)** | Number of occupied beds per day - If a patient has a bed for 5 days then 7 days within the same period then this will count as 12 |
| **Number of inpatients (were in hospital at least once during the period)** | Number of distinct patient with a hospital stay |
| **Number of new inpatients (admissions)** | Number of admission start dates for inpatients within the study period. Can be multiple per patient if more then one admission occurs within the period. |
| **Number of discharged inpatients** | Number of discharge dates for inpatients within the study period. Can be multiple per patient if more then one discharge occurs within the period. |
### Section 3: Contact/Consultation types: F2F (face-to-face/in-person) and Non F2F (non-face-to-face/remote)

| Contact Types                          | F2F / Non F2F | Contact Type Group |
|----------------------------------------|--------------|--------------------|
| NULL                                   |              |                    |
| Digital Consultations/Telemedicine     | Non F2F      | Telemedicine        |
| Email                                  | Non F2F      | Email              |
| Face to face communication             | F2F          | Face to Face       |
| Short Message Service (SMS) – Text Messaging | Non F2F   | SMS                |
| Talk Type for a Person Unable to Speak | Non F2F      | Talk Type          |
| Telemedicine                           | Non F2F      | Telemedicine        |
| Telemedicine Web Camera                | Non F2F      | Telemedicine        |
| Telephone                              | Non F2F      | Telephone          |
### Section 4: Mental health services inclusion and exclusion

| Services          | Include                                         | Exclude                                                                 |
|-------------------|-------------------------------------------------|------------------------------------------------------------------------|
| CAMHS             | Perinatal, Complex needs                       | Exclude Learning Disabilities (LD), Eating Disorders (ED), Forensic, IAPT and psychological therapies, Psychiatric liaison services, Rehabilitation Services, Tertiary, Neuro psychiatry |
| Adults            | Perinatal, Complex needs                       | Learning Disabilities (LD), Eating Disorders (ED), Forensic, IAPT and psychological therapies, Psychiatric liaison services, Rehabilitation Services, Tertiary, Home Treatment Teams/Crisis services, Neuro psychiatry |
| Older Adults      |                                                 | Learning Disabilities (LD), Eating Disorders (ED), Forensic, IAPT and psychological therapies, Psychiatric liaison services, Rehabilitation Services, Tertiary, Home Treatment Teams/Crisis services, Neuro psychiatry, memory clinics? |
| Eating Disorders  | Adults and CAMHS ED                            |                                                                        |
| Forensic Mental Health | Adults and CAMHS Forensic                    |                                                                        |
| Learning Disabilities | Adults and CAMHS LD                           |                                                                        |
| EIP               | Adult and CAMHS EIP                            |                                                                        |
| Memory Clinics    | Memory Assessment Services                      |                                                                        |
| Liaison           | Liaison / A&E services, independent of age of the patient - including off-site emergency clinics that may have been set up to carry out assessments that would normally be expected to take place in A&E | Specific perinatal |
| HTT & Crisis Response | Home treatment / crisis services - independent of age of the patient |                                                                        |
Section 5: Demographic data

Section 5A: Southern Health NHS Foundation Trust (SHFT) demographic data

Tables 5Ai-iv below show: SHFT service data by age, gender, ethnicity, and team-level % figures. Calculations were done using initial absolute number of numbers of accepted referrals, for all services including inpatient and community. Note that a single patient can have multiple referrals. Percentages in the table below were calculated by dividing the total number of accepted referrals for the respective year.

Table 5Ai. SHFT demographic data: age.

| Year | Age (0-11) | Age (12-13) | Age (14-15) | Age (16-17) | Age (18-64) | Age (65+) |
|------|------------|-------------|-------------|-------------|-------------|-----------|
| 2018 | 0.04%      | 0.19%       | 0.67%       | 1.98%       | 65.98%      | 31.15%    |
| 2019 | 0.04%      | 0.09%       | 0.48%       | 1.65%       | 66.83%      | 30.92%    |
| 2020 | 0.04%      | 0.08%       | 0.24%       | 1.38%       | 67.28%      | 30.99%    |
| Average across 2018-2020 | 0.12% | 0.46% | 1.67% | 66.70% | 31.02% |

Table 5Aii. SHFT demographic data: gender.

| Year | Gender (Female) | Gender (Male) | Gender (Not Stated) | Gender (Other) |
|------|-----------------|---------------|---------------------|----------------|
| 2018 | 55.00%          | 44.93%        | 0.06%               | 0.02%          |
| 2019 | 57.27%          | 42.69%        | 0.04%               | 0.01%          |
| 2020 | 58.60%          | 41.36%        | 0.03%               | 0.01%          |
| Average across 2018-2020 | 56.96% | 42.99% | 0.04% | 0.01% |

Table 5Aiii. SHFT demographic data: ethnicity.

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| Year    | Ethnicity (Afro-Caribbean) | Ethnicity (Asian) | Ethnicity (British) | Ethnicity (Chinese) | Ethnicity (Not Stated) | Ethnicity (Other) |
|---------|-----------------------------|-------------------|---------------------|--------------------|-----------------------|-------------------|
| 2018    | 0.25%                       | 0.43%             | 73.26%              | 0.14%              | 20.77%                | 5.13%             |
| 2019    | 0.23%                       | 0.44%             | 74.57%              | 0.15%              | 19.21%                | 5.41%             |
| 2020    | 0.28%                       | 0.42%             | 74.76%              | 0.18%              | 18.60%                | 5.78%             |
| Average across 2018-2020 | 0.25%                       | 0.43%             | 74.20%              | 0.16%              | 19.53%                | 5.44%             |
## Section 5B: Oxford Health NHS Foundation Trust (OHFT) demographic data

### Table 5Bi. OHFT demographic data: age.

| Year | Age (0-11) | Age (12-13) | Age (14-15) | Age (16-17) | Age (18-24) | Age (25-34) | Age (35-44) | Age (45-55) | Age (56-64) | Age (65-74) | Age (75+) | Age (Other) |
|------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|-------------|
| 2018 | 7.89%      | 5.31%       | 6.23%       | 8.65%       | 20.55%      | 11.41%      | 8.79%       | 8.61%       | 5.42%       | 4.05%       | 13.06%     | 0.01%       |
| 2019 | 11.36%     | 5.73%       | 7.36%       | 9.77%       | 16.68%      | 10.89%      | 8.57%       | 8.38%       | 5.01%       | 4.01%       | 12.23%     | 0.01%       |
| 2020 | 13.57%     | 6.22%       | 8.53%       | 10.49%      | 13.17%      | 11.05%      | 8.53%       | 8.15%       | 4.89%       | 3.94%       | 11.47%     | 0.00%       |
| Average across 2018-2020 | 10.94% | 5.75% | 7.37% | 9.64% | 16.80% | 11.12% | 8.63% | 8.38% | 5.11% | 4.00% | 12.26% | 0.01% |

### Table 5Bii. OHFT demographic data: gender.

| Year | Gender (Female) | Gender (Male) | Gender (Other) |
|------|-----------------|---------------|----------------|
| 2018 | 53.26%          | 46.68%        | 0.06%          |
| 2019 | 52.90%          | 47.04%        | 0.06%          |
| 2020 | 53.63%          | 46.32%        | 0.05%          |
| Average across 2018-2020 | 53.26% | 46.68% | 0.06% |

### Table 5Biii. OHFT demographic data: ethnicity.

| Year | Ethnicity-African | Ethnicity-Any other Asian background | Ethnicity-Any other Black background | Ethnicity-Any other mixed group | Ethnicity-Any other White background | Ethnicity-British | Ethnicity-Irish | Ethnicity-Not Known | Ethnicity-Not stated | Ethnicity-White and Black African | Ethnicity-White and Black Caribbean |
|------|-------------------|-------------------------------------|----------------------------------|-------------------------------|-------------------------------------|-----------------|-------------|-----------------|----------------------|-------------------------------|----------------------------------|
| 2018 | 0.42%             | 2.35%                               | 0.81%                            | 0.68%                         | 1.82%                             | 3.20%           | 61.10%      | 0.53%           | 26.33%                | 1.07%                          | 0.53%                            |
| 2019 | 0.40%             | 2.35%                               | 0.84%                            | 0.66%                         | 3.12%                             | 2.97%           | 59.63%      | 0.46%           | 26.68%                | 1.12%                          | 0.57%                            |
| 2020 | 0.40%             | 2.29%                               | 0.81%                            | 0.99%                         | 3.08%                             | 3.14%           | 58.18%      | 0.43%           | 27.65%                | 1.12%                          | 0.61%                            |
| Average across 2018-2020 | 0.41% | 2.33% | 0.82% | 0.77% | 2.67% | 3.10% | 59.64% | 0.47% | 26.89% | 1.10% | 0.57% | 0.36% | 0.87% |
## Section 6: Community mental health services

| Community Mental Health Appointments | Aggregate No. | Oxford     | Southern | Southern:Oxford ratio in each year |
|--------------------------------------|---------------|------------|----------|------------------------------------|
| **Scheduled F2F and Non F2F Appointments** |               |            |          |                                    |
| 2018                                 | 244,216       | 337,946    |          | 1.38                               |
| 2019                                 | 253,758       | 337,893    |          | 1.33                               |
| 2020                                 | 292,864       | 356,909    |          | 1.22                               |
| **Attended F2F and Non F2F Appointments** |               |            |          |                                    |
| 2018                                 | 207,781       | 272,392    |          | 1.31                               |
| 2019                                 | 216,617       | 271,076    |          | 1.25                               |
| 2020                                 | 258,265       | 288,672    |          | 1.12                               |

Table 6A: Scheduled and attended F2F (face-to-face/in-person) and Non F2F (non-face-to-face/remote) appointments in community mental health services in Oxford Health NHS Foundation Trust (OHFT) and Southern Health NHS Foundation Trust (SHFT) in 2018, 2019, and 2020.
Figure 6A. Total CMHT activity in OHFT, in terms of F2F plus NF2F appointments, from 2019 to 2020.
X-axis: ICD-10 diagnostic group and year. Y-axis: number of appointments. ICD-10: International Classification of Diseases, 10th edition.
Figure 6B. Total CMHT activity in OHFT, in terms of F2F plus NF2F appointments, from 2019 to 2020, for ICD-10 ‘Other’ Diagnostic group (any diagnostic group not in Figure 6a) and for all diagnostic groups combined. Y-axis: number of appointments.
Table 6B: Ratio of scheduled NF2F versus F2F appointments by ICD-10 diagnostic group, in 2019 and 2020, in OHFT.

| ICD-10 Diagnostic Group                          | Ratio Scheduled NF2F to F2F 2019 | Ratio Scheduled NF2F to F2F 2020 |
|-------------------------------------------------|----------------------------------|----------------------------------|
| ICD_Eating_Disorders (F50)                      | 0.12                             | 1.51                             |
| ICD_Affective_disorders (F3*)                    | 0.18                             | 1.58                             |
| ICD_Conduct_disorders (F90-F98)                  | 0.34                             | 2.05                             |
| ICD_Dementia (F00, F01, F02, F03)                | 0.34                             | 2.11                             |
| ICD_Developmental_Disorders (F8*)                | 0.31                             | 2.20                             |
| ICD_Mental_retardation (F7*)                     | 0.24                             | 2.61                             |
| ICD_Neurotic_Stress-related (F4*)                | 0.21                             | 1.79                             |
| ICD_Personality_Disorders (F60-F61)              | 0.15                             | 1.00                             |
| ICD_Schizophrenia (F2*)                          | 0.13                             | 0.86                             |
| ICD_Substance_misuse (F1*)                       | 0.16                             | 0.98                             |
| ICD_Other                                        | 0.26                             | 2.21                             |
| ICD_Total (Sum of all relevant ICD groups in the rows below) | 0.23                             | 1.76                             |

Figure 6C: Ratio of scheduled NF2F versus F2F appointments by ICD-10 diagnostic group, in 2019 and 2020, in OHFT. Corresponds to Table 6B.
ICD_Eating Disorders (F50)
ICD_Affective Disorders (F3*)
ICD_Conduct Disorders (F90-F98)
ICD_Dementia (F00, F01, F02, F03)
ICD_Developmental Disorders (F8*)
ICD_Mental Retardation (F7*)
ICD_Neurotic Stress-related (F4*)
ICD_Personality Disorders (F60-F61)
ICD_Schizophrenia (F2*)
ICD_Substance misuse (F1*)
ICD_Other
ICD_Total (Sum of all relevant ICD groups in the rows below)

|                         | ICD_Eating Disorders (F50) | ICD_Affective Disorders (F3*) | ICD_Conduct Disorders (F90-F98) | ICD_Dementia (F00, F01, F02, F03) | ICD_Developmental Disorders (F8*) | ICD_Mental Retardation (F7*) | ICD_Neurotic Stress-related (F4*) | ICD_Personality Disorders (F60-F61) | ICD_Schizophrenia (F2*) | ICD_Substance misuse (F1*) | ICD_Other | ICD_Total |
|-------------------------|-----------------------------|-----------------------------|-------------------------------|----------------------------------|----------------------------------|--------------------------------|----------------------------------|-----------------------------------|------------------------|------------------------|-----------|-----------|
| 2019 Ratio Scheduled NF2F to F2F | 0.12                        | 0.18                        | 0.34                          | 0.34                             | 0.24                             | 0.21                           | 0.15                             | 0.13                              | 0.16                   | 0.26                   | 0.23      | 0.23      |
| 2020 Ratio Scheduled NF2F to F2F | 1.51                        | 1.58                        | 2.05                          | 2.11                             | 2.20                             | 2.61                           | 1.79                             | 1.00                              | 0.86                   | 0.98                   | 2.21      | 1.76      |
Figure 6D: Non-attended F2F appointments across diagnostic groups, as a percentage of scheduled F2F appointments, in 2020 in OHFT

Figure 6E: Non-attended Non F2F appointments across diagnostic groups, as a percentage of scheduled Non F2F appointments, in 2020 in OHFT
Figure 6F. Total CMHT activity in Southern Health NHS Foundation Trust (SHFT), in terms of F2F plus NF2F appointments, from 2019 to 2020. Total CMHT activity in SHFT, in terms of F2F plus NF2F appointments, was similar or increased in all teams from 2019 to 2020. Y-axis: number of appointments.
Table 6C: Ratio of scheduled NF2F versus F2F appointments by Clinical Team, in 2019 and 2020, in SHFT.

| Clinical Team            | Ratio Scheduled NF2F to F2F 2019 | Ratio Scheduled NF2F to F2F 2020 |
|-------------------------|----------------------------------|----------------------------------|
| Adults                  | 0.33                             | 1.30                             |
| EIP                     | 0.30                             | 1.47                             |
| Eating Disorders        | 0.10                             | 2.53                             |
| Forensic mental health  | 0.14                             | 0.48                             |
| HTT & Crisis response   | 0.65                             | 1.56                             |
| Learning disabilities   | 0.43                             | 1.79                             |
| Liaison                 | 0.14                             | 0.31                             |
| Older adults            | 0.25                             | 1.62                             |
| Other                   | 0.76                             | 2.35                             |
Figure 6G: Ratio of scheduled NF2F versus F2F appointments by Clinical Team, in 2019 and 2020, in SHFT. Corresponds to Table 6C.
### Table 6D: Referrals per month in OHFT and SHFT in 2020.

| Months of 2020 | OHFT referrals | SHFT referrals |
|---------------|----------------|----------------|
| Jan           | 5,596          | 4,485          |
| Feb           | 5,914          | 4,300          |
| March         | 5,123          | 3,613          |
| April         | 3,086          | 2,401          |
| May           | 3,502          | 3,001          |
| June          | 4,668          | 3,962          |
| July          | 5,280          | 4,314          |
| Aug           | 4,283          | 3,853          |
| Sept          | 5,190          | 4,060          |

### Figure 6H: Referrals per month in OHFT and SHFT in 2020. Corresponds to Table 6D.
Table 6E: Monthly attendance rate at F2F (face-to-face/in-person) and Non-F2F (remote) appointments in 2020 in OHFT and SHFT.

| Months of 2020 | OHFT  | SHFT  |
|--------------|-------|-------|
|              | F2F   | Non-F2F | F2F | Non-F2F |
| January      | 84.9% | 93.2%   | 77.9% | 87.1% |
| February     | 84.4% | 92.4%   | 78.2% | 87.1% |
| March        | 78.6% | 92.2%   | 71.4% | 85.9% |
| April        | 80.1% | 91.4%   | 66.5% | 84.3% |
| May          | 89.4% | 90.0%   | 76.8% | 83.0% |
| June         | 92.0% | 89.3%   | 78.9% | 82.8% |
| July         | 91.1% | 88.7%   | 78.6% | 82.3% |
| August       | 91.5% | 87.9%   | 79.3% | 83.1% |
| September    | 89.8% | 87.9%   | 79.1% | 82.6% |
| **Monthly average** (May to September 2020) | 90.8% | 88.8%   | 78.6% | 82.7% |
Table 6F: Non-attendance rates of F2F (face-to-face) and non-F2F consultations by ICD diagnosis in the year 2020 at Oxford Health NHS Foundation Trust. Non-attendance rate (%) = (Number not attended / scheduled appointments) x 100%

| ICD Diagnosis                        | F2F Non-attendance rate (%) | Non-F2F Non-attendance rate (%) | Ratio of F2F to Non-F2F Non-attendance rate |
|--------------------------------------|-----------------------------|---------------------------------|--------------------------------------------|
| ICD_Mental_retardation (F7*)         | 7.2                         | 5.2                             | 1.4                                        |
| ICD_Substance_misuse (F1*)           | 8.7                         | 14.9                            | 0.6                                        |
| ICD_personality_disorders (F60-F61)  | 9.2                         | 10.7                            | 0.9                                        |
| ICD_Schizophrenia (F2*)              | 9.9                         | 9.5                             | 1.0                                        |
| ICD_Affective_disorders (F3*)         | 11.9                        | 9.5                             | 1.3                                        |
| ICD_Eating_disorders (F50)           | 12.4                        | 9.8                             | 1.3                                        |
| ICD_Total                            | 14.4                        | 10.4                            | 1.4                                        |
| ICD_Developmental_Disorders (F8*)    | 15.3                        | 8.6                             | 1.8                                        |
| ICD_Neurotic_Stress-related (F4*)    | 16.9                        | 10.5                            | 1.5                                        |
| ICD_Other                            | 16.9                        | 11.1                            | 1.5                                        |
| ICD_Dementia (F00-F03)               | 17.2                        | 3.9                             | 4.4                                        |
| ICD_Conduct_disorders (F90-F98)      | 22.4                        | 11.2                            | 2.0                                        |
**Figure 6J: No-show rates* for F2F (face-to-face) and non-F2F appointments in Oxford and Southern NHS Trusts in 2020.**

*No-show rates were defined as follows: percentage of all scheduled appointments of the respective modality (F2F or Non-F2F) which were DNAs (Did Not Attend, aka. 'no-show', is recorded when a patient does not attend a scheduled appointment and there is no clear reason given by the patient or service for the non-attendance).

No-show rate_{modality} = (Number of DNA_{modality} / Number of scheduled appointments_{modality}) x 100%
Section 7: HoNOS and Mental Health Care cluster analyses

Section 7.1: Cohort 1 Analyses

Cohort 1 Selection criteria (Also described in Methods of the main text)
Step 1 – Identify patients have at least 1 assessment in 2018, 2019 & 2020
Step 2 – If a patient has more than one assessment in a year, then the most recent assessment is included in the analysis.
Step 3 – Identify patient moved between superclass in 2018, 2019 and 2020 and exclude them from the analysis.

| HoNOS Assessments          | 2018  | 2019  | 2020  |
|---------------------------|-------|-------|-------|
| Total Honos Assessment    | 10,720| 10,872| 9,538 |
| Patients                  | 998   | 998   | 998   |
| Patient move superclass   | 206   | 206   | 206   |
| Assessments in the analysis | 792   | 792   | 792   |

Table 7A – Descriptive statistics for patients and HoNOS assessment per year in Cohort 1

The table below shows the number of patients in each superclass per year. Please note the patients move between clusters are excluded from the analysis.

| SuperClass       | 2018 | 2019 | 2020 |
|------------------|------|------|------|
| Non-psychotic    | 284  | 284  | 284  |
| Organic          | 174  | 174  | 174  |
| Psychotic        | 332  | 332  | 332  |
| Var*             | 2    | 2    | 2    |
| Grand Total      | 792  | 792  | 792  |

Table 7B – Number of patients per superclass per year in Cohort 1

‘Var: Cluster 0 is called the ‘variance’ cluster, which codes patients who need mental health care, but cannot be classified into one of the other clusters. Cluster 9 is a ‘blank cluster’ and is not used.

Please refer to the Methods section of the main text for a description of HoNOS scores, clusters, and superclasses.
### Section 7.1A: HoNOS Scores

The descriptive statistics for each superclass for HoNOS scores are in the following table.

| Year | N   | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|-----|------|-------------------|----------------|-----|-----|
| 2018 | 284 | 12.64| 2.07              | 5.86           | 1   | 36  |
| 2019 | 284 | 12.34| 2.05              | 6.03           | 0   | 36  |
| 2020 | 284 | 11.88| 1.87              | 8.02           | 0   | 99  |

**Table 7C – The HoNOS Scores descriptive statistics for Non-Psychotic superclass**

| Year | N   | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|-----|------|-------------------|----------------|-----|-----|
| 2018 | 332 | 11.84| 2.16              | 6.44           | 0   | 37  |
| 2019 | 332 | 10.60| 1.94              | 6.59           | 0   | 35  |
| 2020 | 332 | 10.36| 1.90              | 6.12           | 0   | 31  |

**Table 7D – The HoNOS Scores descriptive statistics for Psychotic superclass**

| Year | N   | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|-----|------|-------------------|----------------|-----|-----|
| 2018 | 174 | 9.20 | 1.80              | 5.89           | 1   | 28  |
| 2019 | 174 | 10.17| 1.98              | 6.21           | 1   | 27  |
| 2020 | 174 | 11.89| 2.22              | 9.34           | 1   | 99  |

**Table 7E – The HoNOS Scores descriptive statistics for Organic superclass**
The results of applying Friedman statistical significance test on HoNOS scores for each superclass.

| Year        | N   | Chi-Square | df | Asymp. Sig. |
|-------------|-----|------------|----|-------------|
| Non-Psychotic | 284 | 7.729      | 2  | 0.210       |
| Psychotic   | 332 | 14.772     | 2  | <0.001      |
| Organic     | 174 | 16.823     | 2  | <0.001      |

*Table 7F – The result of Friedman test for HoNOS scores for each superclass*

Post-hoc pairwise test
Post-hoc pairwise tests are commonly performed after a significant difference has been found when there are three or more levels of a factor. The Python package scikit-posthocs provides post hoc tests for pairwise multiple comparisons.

The result of applying Related-Sample Wilcoxon Signed-Rank post-hoc tests on Psychotic and Organic superclass are shown in Tables 7G and 7H respectively.

| Years     | Test Statistics | Std. Error | Srd. Test Statistic | Asymp. Sig. (2-sided test) | Adj. Sig.* |
|-----------|-----------------|------------|---------------------|---------------------------|------------|
| 2018-2019 | 17652.00        | 1531.51    | -3.610              | 0.001                     | 0.003      |
| 2018-2020 | 19008.50        | 1630.34    | -3.799              | 0.001                     | 0.003      |
| 2019-2020 | 19584.00        | 1374.66    | -0.370              | 0.711                     | 1.000      |

*Table 7G – Wilcoxon Post-hoc pairwise test result for Psychotic superclass*

* Significance values have been adjusted by the Bonferroni correction for multiple tests.
| Years     | Test Statistics | Std. Error | Srtd. Test Statistic | Asymp. Sig. (2-sided test) | Adj. Sig.* |
|-----------|-----------------|------------|----------------------|---------------------------|------------|
| 2018-2019 | 6701.00         | 510.22     | 2.618                | 0.009                     | 0.027      |
| 2018-2020 | 8018.50         | 537.44     | 4.243                | <.001                     | 0.003      |
| 2019-2020 | 6688.50         | 500.32     | 2.935                | 0.003                     | 0.009      |

*Significance values have been adjusted by the Bonferroni correction for multiple tests.
Section 7.1B: Clusters

The descriptive statistics for each superclass for HoNOS clusters are in the following three tables.

### Table 7I – The HoNOS Clusters descriptive statistics for Non-Psychotic superclass

| Year | N  | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|----|------|--------------------|----------------|-----|-----|
| 2018 | 284| 4.58 | 2.05               | 1.865          | 1   | 8   |
| 2019 | 284| 4.98 | 2.05               | 2.733          | 1   | 8   |
| 2020 | 284| 4.51 | 1.89               | 2.148          | 1   | 8   |

### Table 7J – The HoNOS Clusters descriptive statistics for Psychotic superclass

| Year | N  | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|----|------|--------------------|----------------|-----|-----|
| 2018 | 332| 11.87| 2.05               | 1.820          | 10  | 17  |
| 2019 | 332| 11.58| 1.91               | 2.227          | 10  | 17  |
| 2020 | 332| 11.81| 2.05               | 1.729          | 10  | 17  |

### Table 7K – The HoNOS Clusters descriptive statistics for Organic superclass

| Year | N  | Mean | Friedman Mean Rank | Std. Deviation | Min | Max |
|------|----|------|--------------------|----------------|-----|-----|
| 2018 | 174| 18.66| 1.83               | 0.859          | 18  | 21  |
| 2019 | 174| 18.49| 1.93               | 2.119          | 18  | 21  |
| 2020 | 174| 19.05| 2.24               | 0.987          | 18  | 21  |
The results of applying Friedman statistical significance test on HoNOS clusters for each Superclass.

| Year        | N   | Chi-Square | df | Asymp. Sig |
|-------------|-----|------------|----|------------|
| Non-Psychotic | 284 | 7.287      | 2  | 0.260      |
| Psychotic   | 332 | 10.044     | 2  | 0.007      |
| Organic     | 174 | 35.193     | 2  | 2.2-e08    |

Table 7L – The result of Friedman test for HoNOS clusters for each superclass

Post-hoc Pairwise test
The result of applying Related-Sample Wilcoxon Signed-Rank post-hoc tests on clusters for Psychotic and Organic superclasses are shown in Tables 7M and 7N below.

| Years        | Test Statistics | Std. Error | Srd. Test Statistic | Asymp. Sig. (2-sided test) | Adj. Sig.* |
|--------------|-----------------|------------|---------------------|---------------------------|------------|
| 2018-2019    | 3480.00         | 447.09     | -2.483              | 0.013                     | 0.039      |
| 2018-2020    | 6372.00         | 583.60     | -0.393              | 0.694                     | 1.000      |
| 2019-2020    | 5563.50         | 457.94     | 1.677               | 0.094                     | 0.282      |

Table 7M – Wilcoxon Post-hoc pairwise test result for Psychotic superclass
* Significance values have been adjusted by the Bonferroni correction for multiple tests.

| Years        | Test Statistics | Std. Error | Srd. Test Statistic | Asymp. Sig. (2-sided test) | Adj. Sig.* |
|--------------|-----------------|------------|---------------------|---------------------------|------------|
| 2018-2019    | 1022.50         | 123.46     | 1.114               | 0.265                     | 1.000      |
| 2018-2020    | 2689.00         | 196.08     | 5.452               | 0.001                     | 0.003      |
| 2019-2020    | 1889.00         | 155.77     | 4.597               | 0.001                     | 0.003      |

Table 7N – Wilcoxon Post-hoc pairwise test result for Organic superclass
* Significance values have been adjusted by the Bonferroni correction for multiple tests.
Section 7.2: Cohort 2 Analyses

Cohort 2 Selection Criteria (Also described in Methods of the main text)
Step 1 – Identify patients have at least 1 assessment in each year in 2019 and 2020
Step 2 – If a patient has more than one assessment in a year, then the most recent assessment is included in the analysis.
Step 3 – Identify patient moved between superclass between 2019 and 2020 and exclude them from the analysis

| HoNOS Assessments               | 2019  | 2020  |
|---------------------------------|-------|-------|
| Total Honos Assessment          | 10,872| 9,538 |
| Patients                        | 2,712 | 2,712 |
| Assessments for 2,712 patients  | 3,608 | 3,507 |
| Patient move superclass         | 394   | 394   |
| Assessments in the analysis     | 2318  | 2318  |

Table 7O - Descriptive statistics for patients and HoNOS assessment per year in Cohort 2

| SuperClass   | Patients |
|--------------|----------|
| Non-psychotic| 909      |
| Organic      | 687      |
| Psychotic    | 720      |
| Var*         | 2        |
| Grand Total  | 2318     |

Table 7P – Number of patients per superclass per year in Cohort 2

‘Var: Cluster 0 is called the ‘variance’ cluster, which codes patients who need mental health care, but cannot be classified into one of the other clusters. Cluster 9 is a ‘blank cluster’ and is not used.

Please refer to the Methods section of the main text for a description of HoNOS scores, clusters, and superclasses.
Section 7.2A: HoNOS Scores

The descriptive statistics for each superclass for HoNOS scores are in the following table.

| Superclass   | Year | N   | Mean  | Std. Deviation | Min | Max |
|--------------|------|-----|-------|----------------|-----|-----|
| Non-Psychotic | 2019 | 909 | 12.182 | 6.835          | 0   | 99  |
|              | 2020 | 909 | 11.617 | 6.826          | 0   | 99  |
| Psychotic    | 2019 | 720 | 11.225 | 6.641          | 0   | 35  |
|              | 2020 | 720 | 10.233 | 7.008          | 0   | 99  |
| Organic      | 2019 | 687 | 9.395  | 6.761          | 0   | 99  |
|              | 2020 | 687 | 10.444 | 8.367          | 1   | 99  |

Table 7Q – The HoNOS Scores descriptive statistics for all superclass

The Wilcoxon signed-rank test ranks for each superclass are in the following three tables.

|                  | N   | Mean Rank | Sum of Ranks |
|------------------|-----|-----------|--------------|
| 2020 - 2019      |     |           |              |
| Negative Ranks   | 457a| 424.24    | 193029.5     |
| Positive Ranks   | 377b| 404.89    | 151835.5     |
| Ties             | 75c | 404.89    |              |
| Total            | 909 |           |              |

Table 7R – The HoNOS Scores Wilcoxon Ranks for Non-Psychotic superclass
| Year       | N   | Mean Rank | Sum of Ranks |
|------------|-----|-----------|--------------|
| 2020 - 2019|     |           |              |
| Negative Ranks | 350 | 321.25 | 112759 |
| Positive Ranks | 261 | 286.66 | 74819  |
| Ties       | 109 |          |              |
| Total      | 720 |          |              |

**Table 7S – The HoNOS Scores Wilcoxon Ranks for Psychotic superclass**

| Year       | N   | Mean Rank | Sum of Ranks |
|------------|-----|-----------|--------------|
| 2020 - 2019|     |           |              |
| Negative Ranks | 248 | 275.99 | 68721 |
| Positive Ranks | 331 | 302.26 | 100350 |
| Ties       | 108 |          |              |
| Total      | 687 |          |              |

**Table 7T – The HoNOS Scores Wilcoxon Ranks for Organic superclass**
The statistical significance result based on Wilcoxon Signed-Rank for each superclass is in the following table.

| SuperClass   | Z     | Asymp. Sig. (2-tailed) |
|--------------|-------|------------------------|
| Non-Psychotic| -2.986 | 0.003                  |
| Psychotic    | -4.342 | <.001                  |
| Organic      | -3.914 | <.001                  |

a Based on positive ranks.
b Based on negative ranks.

*Table 7U – The result of Wilcoxon Signed-Rank test for HoNOS scores for each superclass in Cohort 2.*
Section 7.2B: Clusters

The descriptive statistics for each superclass for HoNOS clusters are in the following table.

| Superclass  | Year | N   | Mean | Std. Deviation | Min | Max |
|-------------|------|-----|------|----------------|-----|-----|
| Non-Psychotic | 2019 | 909 | 4.5  | 1.959          | 1   | 8   |
|             | 2020 | 909 | 4.41 | 2.098          | 1   | 8   |
| Psychotic   | 2019 | 720 | 11.75| 1.844          | 10  | 17  |
|             | 2020 | 720 | 11.73| 1.656          | 10  | 17  |
| Organic     | 2019 | 687 | 18.64| 0.865          | 18  | 21  |
|             | 2020 | 687 | 18.86| 0.909          | 18  | 21  |

*Table 7V – The HoNOS Cluster descriptive statistics for all superclass*

The Wilcoxon signed-rank test ranks for each superclass are in the following three tables.

| N      | Mean Rank | Sum of Ranks |
|--------|-----------|--------------|
| 2020 - 2019 | **324**^a | **277.58**   | **89382** |
| Negative Ranks | | | |
| Positive Ranks | **260**^b | **306.62**   | **79108** |
| Ties        | **325**^c | | |
| Total       | **909**   | | |

*Table 7W – The HoNOS Cluster Wilcoxon Ranks for Non-Psychotic superclass*
### Table 7X – The HoNOS Cluster Wilcoxon Ranks for Psychotic superclass

| N  | Mean Rank | Sum of Ranks |
|----|-----------|--------------|
| 2020 - 2019 Negative Ranks | 129<sup>a</sup> | 161.66 | 20854 |
| 2020 - 2019 Positive Ranks | 160<sup>b</sup> | 132.55 | 21341 |
| Ties | 431<sup>c</sup> | | |
| Total | 720 | | |

### Table 7Y – The HoNOS Cluster Wilcoxon Ranks for Organic superclass

| N  | Mean Rank | Sum of Ranks |
|----|-----------|--------------|
| 2020 - 2019 Negative Ranks | 70<sup>a</sup> | 131.81 | 9227 |
| 2020 - 2019 Positive Ranks | 191<sup>b</sup> | 131.39 | 25226 |
| Ties | 426<sup>c</sup> | | |
| Total | 687 | | |
The statistical significance result based on Wilcoxon Signed-Rank for each superclass is in the following table.

| SuperClass      | Z    | Asymp. Sig. (2-tailed) |
|-----------------|------|------------------------|
| Non-Psychotic   | -1.283<sup>a</sup> | 0.199                  |
| Psychotic       | -1.75<sup>b</sup>   | 0.861                  |
| Organic         | -6.93<sup>b</sup>   | <.001                  |

<sup>a</sup> Based on positive ranks.  
<sup>b</sup> Based on negative ranks.

*Table 7Z – The result of Wilcoxon Signed-Rank test for HoNOS cluster for each superclass in Cohort 2.*
## Section 8: Inpatient service data

Table 8A: Inpatient service data (turnover) in 2018, 2019, and 2020 in Oxford Health NHS Foundation Trust (OHFT) and Southern Health NHS Foundation Trust (SHFT).

|                          | OHFT  | SHFT  |
|--------------------------|-------|-------|
| Inpatients (in hospital at least once during the specified period) |       |       |
| 2018                     | 1,335 | 1,855 |
| 2019                     | 1,370 | 1,860 |
| 2020                     | 1,301 | 1,870 |
| Number of new admissions as inpatients |       |       |
| 2018                     | 1,077 | 1,626 |
| 2019                     | 1,088 | 1,698 |
| 2020                     | 1,033 | 1,744 |
| Number of discharged inpatients |       |       |
| 2018                     | 1,075 | 1,590 |
| 2019                     | 1,106 | 1,696 |
| 2020                     | 1,022 | 1,839 |

Table 8B: Number of occupied beds per day in OHFT and SHFT in 2018, 2019, and 2020.

|                          | OHFT  | SHFT  |
|--------------------------|-------|-------|
| Inpatients (number of occupied beds per day) |       |       |
| 2018                     | 117,712 | 135,849 |
| 2019                     | 115,144 | 131,461 |
| 2020                     | 106,574 | 113,252 |
Table 8C: Number of distinct patients with a hospital stay per month in OHFT and SHFT in 2020.

|       | OHFT patients | SHFT patients |
|-------|---------------|---------------|
| Jan   | 514           | 673           |
| Feb   | 536           | 627           |
| March | 528           | 634           |
| Apr   | 470           | 522           |
| May   | 483           | 535           |
| June  | 492           | 574           |
| July  | 494           | 602           |
| Aug   | 497           | 559           |
| Sept  | 494           | 573           |

Figure 8A: Number of inpatients (distinct patients with a hospital stay) per month in OHFT and SHFT in 2020. Corresponds to Table 8C.
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