

## ► Child and adolescent telepsychiatry: variations in utilization, referral patterns and practice trends

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### Summary

Seattle Children's Hospital is a tertiary referral hospital that has provided telepsychiatry to seven partner sites in the northwest since 2001. Service utilization data, patient demographics and diagnoses were collected for the period from the service inception in October 2001 until November 2007. During the study period, 701 patients were treated with a mean of 2.8 appointments per patient (SD 1.9). Five psychiatrists and four psychologists provided care. Utilization varied across referring sites and was largely dependent upon the availability of telepsychiatrists, although the degree of support from administration and stakeholders also contributed to the success of the service. A total of 190 primary care practitioners referred patients to telepsychiatry, including 106 family physicians and 71 paediatricians. Paediatricians referred to the service more frequently than family physicians ( $t = 2.8$ ,  $P < 0.05$ ). Overall, telepsychiatry with young people is feasible, acceptable and increases access to mental health care. There appear to be four core components necessary to a successful telepsychiatry programme: psychiatrists who are interested in exploring new ways to reach underserved young people; clearly identified stakeholders who can collaborate with one another to make good use of the telepsychiatry service; a children's mental health 'champion' who represents these stakeholders and wants services for their community; and a stable administration that perceives telepsychiatry as valuable for their patients and their doctors.

### Introduction

The prevalence of psychiatric disorders among children living in rural communities is similar to that of children living in urban areas (7–20%),<sup>1</sup> but the scarcity of mental health specialists and evidence-based treatments<sup>2</sup> renders systems of care inadequate to meet the mental health needs of rural children.<sup>3–4</sup> Telepsychiatry may therefore be a valuable tool.

Seattle Children's Hospital (SCH) is the tertiary referral site for children living in four states of the Pacific Northwest (Washington, Alaska, Montana and Idaho). Telepsychiatry is one of the services provided. There are seven partner sites:

(1) *Olympia*, a city of 207,000 located 120 km south of Seattle. This college town serves a large surrounding

area of rural communities. The population is over 85% Caucasian. Referrals were made by local primary care practitioners (PCPs);

(2) *Wenatchee*, a city of 29,000 located 240 km northeast of Seattle. Hispanics comprise the largest ethnic minority (approximately 20%). Referrals were made by PCPs from very rural surrounding communities;

(3) *Yakima*, a city of 73,000 located 240 km southeast of Seattle. Approximately 40% of the population is Hispanic. Referrals were from local PCPs;

(4) *Longview*, a city of 36,000 located 240 km southwest of Seattle, with a small population of ethnic minorities (11%). Longview differed from the other PCP-referral sites because all the referring physicians were part of a local group paediatric practice;

(5) *Aberdeen*, a city of 16,000 on the Pacific coast, 180 km southwest of Seattle. The population is 82% Caucasian. Referrals were from local PCPs;

(6) *Ketchikan*, an island city in southeast Alaska, about 1100 km northwest of Seattle reachable by plane or boat. The population of 16,000 is 67% Caucasian and

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18% Alaska Native. The telepsychiatry clinic is located in a community mental health centre with referrals from the centre's clinicians and four local PCPs;

- (7) *Naselle*, a minimum security juvenile correctional facility 320 km southwest of Seattle. It serves 150 juvenile offenders (mostly male) aged 14–18 years.

The SCH telepsychiatry service provided both direct services to young people and consultative support to PCPs who included paediatricians, family physicians, nurse practitioners and physician assistants. PCPs sent an assessment request form to request services. They decided which patients to refer and whether the patients would be appropriate for telepsychiatry. The telepsychiatry programme did not screen nor triage patients except to schedule new patients for the next available appointment. All telepsychiatrists were available to evaluate and treat patients at all PCP-referral sites. The Ketchikan and Naselle sites had their own dedicated telepsychiatrist. After the initial assessment, the telepsychiatrist determined whether the patient would receive a single consultation with return to the referring PCP with treatment recommendations, additional consultative sessions or ongoing care. Five telepsychiatrists provided care. Four telepsychologists also provided services, predominantly related to school consultation with some limited psychotherapy. Models of care varied from single session consultation to multiple sessions for stabilization to ongoing care for youths with complicated needs. Services focused on diagnostic assessment, pharmacotherapy, and coordination of care particularly with schools. PCPs resumed care at the end of the telepsychiatry treatment.

Videoconferencing used ISDN lines at 384 kbit/s or a fractional T1 line providing similar bandwidth. Videoconferencing equipment (Polycom MP or FX) allowed assessment of dysmorphology, tics, motor skills, affect and developmental variants in relatedness. Rapport was generally quickly established by demonstrating the use of the equipment to the youth and parent(s), including allowing the youth to manipulate the remote control to scan the telepsychiatrist's office and to obtain close-up views of themselves or parent(s) on the monitor screen.

Our hypotheses were: (1) all of the PCP referral sites would make equal use of the telepsychiatry services offered to them; (2) participating PCPs would refer patients with equal frequencies across disciplines (paediatricians versus family physicians); and (3) participating telepsychiatrists would show similar practice patterns regarding consultation versus ongoing care. We conducted a retrospective analysis of telepsychiatry activity.

## Methods

Service utilization data, patient demographics and diagnoses were collected for the period from the service

inception in October 2001 until November 2007.

The information was derived from service records including electronic billing records which included CPT codes (Current Procedural Terminology<sup>5</sup>) and ICD-9 codes (International Classification of Diagnoses - Ninth Edition<sup>6</sup>). These codes were extracted and collated by a utilization analyst who maintained electronic records for the physicians' practice plan at the consulting site. These records were then linked to departmental clinical records, the referring PCPs' assessment request forms and the assigned telepsychiatrist. The resulting lists of diagnoses were then collated into major diagnostic categories such as 'mood disorders', 'anxiety disorders' or 'developmental disorders'. We have previously reported interim data regarding the similarity of patients managed by telepsychiatry and conventionally,<sup>7</sup> and the satisfaction of families<sup>8</sup> and PCPs<sup>9</sup> with telepsychiatry.

Chi-square tests were used to evaluate differences in the proportions of males and females across age and diagnostic groups. Independent samples *t*-tests were used to evaluate differences in number of referrals by PCP discipline. Analyses of variance (ANOVA) were used to evaluate site and provider differences in utilization rates. A Bonferroni correction for multiple comparisons was applied. All analyses were conducted using a standard statistical package (SPSS version 15.0.1).

## Results

During the study period, there were similar numbers of male and female patients ( $P > 0.05$ ). However, the proportion of children under 7 years of age (18%) was significantly lower than those aged 7–12 years (43%) and those 12 years old or older (39%) (see Table 1).

### Diagnostic profile

Attention-deficit hyperactivity disorder (ADHD) was significantly more common in boys ( $P < 0.01$ ) (see Table 2). Depressive ( $P < 0.01$ ) and anxiety ( $P \leq 0.01$ ) disorders were more common in girls (see Table 3). In children under 7 years old, ADHD was more common in boys ( $P \leq 0.05$ ) and anxiety disorders were more common in girls ( $P \leq 0.01$ ). Among school-aged children, the only difference was that anxiety disorders were more common in girls than boys ( $P \leq 0.05$ ). Among teenaged children, ADHD ( $P \leq 0.001$ ) and disruptive behaviour disorders ( $P \leq 0.01$ ) were more common in males; while depressive disorders ( $P \leq 0.01$ )

Table 1 Numbers of patients

Age (years)	Males	Females	Total
<7	86	37	123
7–12	197	105	302
>12	174	102	276

**Table 2** Diagnoses for males. Most children had more than one diagnosis, so the percentages do not add to 100%

Diagnosis	No. (%) <7 years (n = 86)	No. (%) 7-12 years (n = 197)	No. (%) >12 years (n = 174)	Total (%) (n = 457)
Attention-deficit hyperactivity disorders	35 (41)	85 (43)	81 (47)	201 (44)
Other disruptive behaviour disorders	37 (43)	75 (38)	53 (31)	165 (36)
Depressive disorders	3 (4)	17 (9)	43 (25)	63 (14)
Anxiety disorders	6 (7)	41 (21)	16 (9)	63 (14)
Pervasive developmental disorders	8 (9)	25 (13)	10 (6)	43 (9)
Other Axis I disorders	12 (14)	14 (7)	8 (5)	34 (7)
Learning disorders	8 (9)	17 (9)	7 (4)	32 (7)
Mental retardation	9 (11)	13 (7)	9 (5)	31 (7)
Bipolar disorders	1 (1)	8 (4)	11 (6)	20 (4)
Medical diagnoses	8 (9)	6 (3)	3 (2)	17 (4)
Adjustment disorders	7 (8)	4 (2)	5 (3)	16 (4)
Tic disorders	3 (4)	11 (6)	1 (0.6)	15 (3)
Substance abuse disorders	0	0	12 (7)	12 (3)
Psychotic disorders	1 (1)	6 (3)	4 (2)	11 (2)
Elimination disorders	4 (5)	4 (2)	3 (2)	11 (2)
Somatic disorders	0	1 (0.5)	2 (1)	3 (0.7)
Eating disorders	1 (1)	0	1 (0.6)	2 (0.4)
Fetal toxicity	0	0	0	0

**Table 3** Diagnoses for females. Most children had more than one diagnosis, so the percentages do not add to 100%

Diagnosis	No. (%) <7 years (n = 37)	No. (%) 7-12 years (n = 105)	No. (%) >12 years (n = 102)	Total (%) (n = 244)
Attention-deficit hyperactivity disorders	8 (22)	41 (39)	22 (22)	71 (29%)
Anxiety disorders	10 (27)	33 (31)	26 (26)	69 (28)
Other disruptive behaviour disorders	15 (41)	34 (32)	16 (16)	65 (27)
Depressive disorders	0	9 (9)	43 (42)	52 (21)
Learning disorders	4 (11)	11 (11)	3 (3)	18 (7)
Pervasive development disorders	3 (8)	9 (9)	3 (3)	15 (6)
Bipolar disorders	0	7 (7)	6 (6)	13 (5)
Mental retardation	3 (8)	3 (3)	6 (6)	12 (5)
Other Axis I disorders	4 (11)	4 (4)	4 (4)	12 (5)
Adjustment disorders	2 (5)	6 (6)	3 (3)	11 (5)
Medical diagnoses	4 (11)	3 (3)	4 (4)	11 (5)
Substance abuse disorders	0	0	9 (9)	9 (4)
Psychotic disorders	1 (3)	2 (2)	2 (2)	5 (2)
Tic disorders	0	4 (4)	0	4 (2)
Elimination disorders	2 (5)	2 (2)	0	4 (2)
Somatic disorders	0	0	2 (2)	2 (0.8)
Eating disorders	0	0	1 (1)	1 (0.4)
Fetal toxicity	0	1 (1)	0	1 (0.4)

**Table 4** Mean service utilization across sites accounting for length of participation in the programme

Site	Length of time in the programme (months)	Total no. of patients	Total no. of appointments	Mean (SD) no. of new patients per month	Mean (SD) no. of appointments per month	No. of patients with more than one appointment	Mean (SD) no. of return appointments per month
Olympia	74	251	807	3.4 (1.7)	10.9 (6.3)	145	7.5 (4.5)
Wenatchee	74	241	639	3.3 (2.1)	8.6 (4.5)	129	5.4 (3.0)
Yakima	55	26	86	0.5 (0.4)	1.6 (1.4)	16	1.1 (1.0)
Longview	57	63	191	1.1 (0.6)	3.4 (3.4)	34	2.5 (2.6)
Ketchikan	13	14	31	1.1 (1.1)	2.4 (1.9)	7	1.4 (1.4)
Aberdeen	22	18	65	0.8 (0.9)	2.9 (1.9)	7	2.4 (1.4)
Naselle	24	88	184	3.7 (2.8)	7.7 (6.4)	52	4.1 (3.7)

and anxiety disorders ( $P \leq 0.001$ ) were more common in females.

### Patients and appointments by participating sites

From 2001 to 2007, 701 patients were treated with 2003 teleconsultations or appointments (mean 2.8 appointments per patient, SD 1.9). Utilization varied across sites as shown in Table 4.

There were significant differences in utilization among the four PCP-referral sites for the mean number of patients ( $F = 38.9, P < 0.0001$ ) and the mean number of appointments (i.e. telepsychiatry sessions) ( $F = 36.8, P < 0.0001$ ). Many of the subsequent *post hoc* pair-wise comparisons were significant. As similar results were found for comparisons of patients and for appointments, we report only results for patients, which are shown in Table 5. There was significant variability between sites, which disproves the first hypothesis that the sites used telepsychiatry services equally.

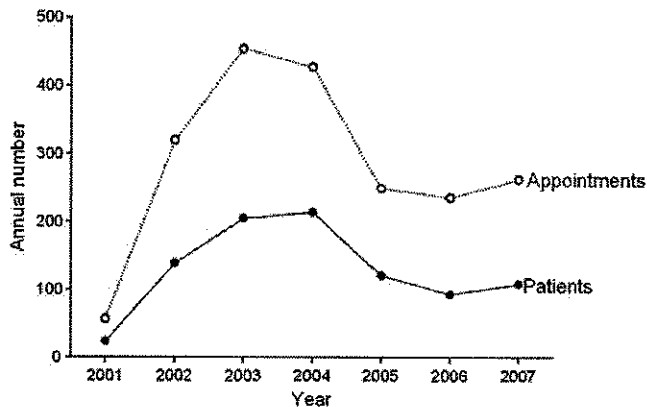
Olympia and Wenatchee, two of the first sites to join the telepsychiatry programme, did not differ in their mean number of referred patients. Both sites demonstrated significantly greater utilization than Yakima, also a long term telepsychiatry site. Olympia and Wenatchee also showed significantly greater mean utilization than Longview. In comparing Longview with Yakima which had the same length of participation in the programme, there was no significant difference in mean patient referral rates. Aberdeen differed from Olympia and Wenatchee, but not from Yakima or Longview. However, its short-lived participation in the programme precludes meaningful comparisons. Ketchikan and Naselle were not PCP-based referral clinics but had their own clinical, programmatic and payment mechanisms and were not relevant to these comparisons.

### Annual appointment rates

The total number of appointments varied annually due to factors at both the telepsychiatry and patient sites ( $F = 16.2, P < 0.0001$ ) (see Figure 1). Subsequent *post hoc* pair-wise comparisons are shown in Table 6. Many of the pair-wise comparisons were significant. Similar results were obtained when comparing variation in the number of patients across the six years.

**Table 5** Differences between sites in the mean numbers of patients evaluated each month. An ANOVA indicated that the mean number of patients per month differed significantly among sites (see text). Each entry provides the results of the *post hoc*, pair-wise ANOVA comparison with a Bonferroni correction applied

	Olympia	Wenatchee	Yakima	Longview
Olympia				
Wenatchee	1.8 $P > 0.05$			
Yakima	8.2 $P < 0.001$	6.4 $P < 0.001$		
Longview	6.7 $P < 0.001$	5.0 $P < 0.001$	1.5 $P > 0.05$	



**Figure 1** Annual number of patients and appointments

### Referrals by PCP discipline

A total of 190 PCPs referred patients to telepsychiatry: 106 family physicians, 71 paediatricians and 13 nurse practitioners or physicians' assistants, as shown in Table 7. We focus here on the family physicians and paediatricians as they comprised the target audience and the few participating nurse practitioners and physicians' assistants were not representative of the larger population of mid-level practitioners. An independent samples *t*-test was used to compare the number of referrals per year for paediatricians (mean 82, SD 54) versus family physicians (mean 23, SD 11) controlling for the number of referring physicians in each category each year. Paediatricians referred significantly more patients than family physicians ( $t = 2.8, P < 0.05$ ). Most providers referred one patient. Paediatricians were much more likely than family physicians to refer multiple patients. Of the 106 referring family physicians, 79 referred one patient, 17 referred 2 patients, 6 referred 3 patients and 4 referred 7 patients. In contrast, there were 25

paediatricians who referred a single patient, one paediatrician who referred 33 patients and one who referred 89 patients. These findings disprove the second hypothesis that physicians of different disciplines would similarly utilize telepsychiatry services.

### Practice patterns by telepsychiatrists

The telepsychiatrists participated in the programme for differing lengths of time (one year to six years) and so mean utilization was determined. A one-way ANOVA indicated that the mean number of appointments per month differed significantly among providers ( $F = 21.3, P < 0.0001$ ) (see Table 8). The results of subsequent *post hoc* pair-wise comparisons of the mean appointment rates indicated that telepsychiatrist 1 (mean 16.1, SD 7.9) and 3 (mean 12.5, SD 9.2) did not differ from one another, but both provided significantly more appointments, or consultations, per month than the other three telepsychiatrists. To examine how the telepsychiatrists differed in their practices, we examined the number of return appointments provided to patients. A one way ANOVA indicated that the mean number of return appointments per month also differed among telepsychiatrists ( $F = 21.9, P < 0.0001$ ). Telepsychiatrist 1 ( $10.6 \pm 5.4$ ) provided more return appointments per month than all of the others, and telepsychiatrist 3 (mean 5.4, SD 4.6) provided more return appointments than telepsychiatrists 2 and 4. These findings disprove the third hypothesis that telepsychiatrists would show similar practice patterns regarding consultation versus ongoing care.

### Discussion

To our knowledge, the present study is the first comprehensive report of utilization in a well-established paediatric telepsychiatry programme. It complements previous smaller and/or less comprehensive studies documenting the feasibility<sup>7,10-13</sup> and acceptability<sup>7-11,14</sup> of telepsychiatry with young people, and corroborates past findings regarding the representativeness of patients being referred to telepsychiatry.<sup>7,11,12,15</sup> The results show that telepsychiatry patients are representative of national outpatient samples.<sup>16</sup> Therefore, telepsychiatry appears to be a good resource for young people who cannot access conventional psychiatric services in person.

**Table 6** Differences in mean monthly appointments (telepsychiatry sessions) from year to year. An ANOVA indicated that the mean number of appointments per month differed significantly among sites (see text). Each entry provides the results of the *post hoc*, pair-wise ANOVA comparison with a Bonferroni correction applied

	2002	2003	2004	2005	2006	2007
2002						
2003	4.1 $P = 0.03$					
2004	6.0 $P < 0.001$	2.0 $P > 0.05$				
2005	8.5 $P < 0.001$	4.4 $P < 0.001$	2.4 $P > 0.05$			
2006	9.3 $P < 0.001$	5.3 $P < 0.001$	3.3 $P = 0.01$	0.9 $P > 0.05$		
2007	9.0 $P < 0.001$	5.0 $P < 0.001$	3.0 $P = 0.02$	0.6 $P > 0.05$	0.3 $P > 0.05$	

**Table 7** Referrals by specialty during the study. The number of referring physicians across years is not additive as some physicians made referrals in more than one year. Accounting for the number of referring physicians in each category each year, paediatricians referred significantly more patients than family physicians:  $t = 2.8, P < 0.05$

	2001	2002	2003	2004	2005	2006	2007	Mean (SD)	
Total referrals	24	119	172	174	71	57	66	683*	
Family physicians	No. of referrals	7	30	38	30	15	17	22.6 (10.7)	
	No. of referring providers	6	24	28	28	14	16	18.9 (8.2)	
	Mean (SD) no. of referrals per provider	1.2 (0.4)	1.3 (0.5)	1.4 (0.8)	1.1 (0.3)	1.1 (0.3)	1.1 (0.3)	1.3 (0.7)	1.2 (0.5)
Paediatricians	No. of referrals	17	89	134	144	56	40	45	75.0 (48.8)
	No. of referring providers	10	22	39	38	28	26	23	26.6 (10.0)
	Mean (SD) no. of referrals per provider	1.7 (1.1)	4.1 (3.0)	3.4 (4.3)	3.8 (9.1)	2.0 (1.5)	1.5 (0.9)	2.0 (1.5)	2.8 (4.8)

\*Total referrals = 683 rather than 701, the total number of patients reported in text, because 18 referrals were made by non-doctors (e.g. nurse practitioners) who were not included in the present analysis

### Limitations

The major limitation of the study, like previous studies, lies in its descriptive nature and a retrospective design that relied on billing records to discern diagnostic codes for patients and dates of service. Another limitation was the lack of information about the reasons for the PCPs' differing referral patterns. Future studies should focus on their needs from telepsychiatry. Similarly, there was no information about the telepsychiatrists' on-site practices to examine whether they approached telepsychiatry with a different perspective. Such information might help to determine what is needed to attract more child and adolescent psychiatrists to telepsychiatry. The present results emphasize the need for randomized clinical trials to prospectively examine service utilization patterns by subjects, referring PCPs and telepsychiatrists.

### Referral patterns

In previous studies we found that participating young people were demographically and diagnostically similar to those treated in usual outpatient care,<sup>7,12</sup> that both parents,<sup>8</sup> PCPs<sup>9</sup> and young people<sup>10</sup> were highly satisfied with telepsychiatric care, that many PCPs made multiple referrals, and that families who returned for follow-up care reported satisfaction that was similar to or better than their satisfaction with their initial appointment.<sup>8</sup> These studies suggest that telepsychiatry is effective.

**Table 8** Services by telepsychiatrists. Column 2 indicates all appointments in a month including new and returning patients. Column 3 refers to return appointments only, for those patients who were seen more than once. The mean number of total appointments (column 2) differed significantly across providers ( $F = 21.3, P < 0.0001$ ), as did the mean number of return appointments ( $F = 21.9, P < 0.0001$ )

	Mean monthly appointments (SD)	Mean monthly return appointments (SD)
Provider 1	16.1 (7.9)	10.6 (5.4)
Provider 2	5.5 (3.1)	2.6 (1.8)
Provider 3	12.5 (9.2)	5.4 (4.6)
Provider 4	2.9 (1.4)	1.8 (1.5)
Provider 5	4.3 (2.1)	3.4 (2.1)

Based on these initial suggestions, we expected that all sites and PCPs would take advantage of telepsychiatry when it was offered to them. This was not the case. Our long-term SCH partners in on-site outreach clinics, Olympia and Wenatchee, were similar in their utilization of telepsychiatry, but our other long term partner, Yakima, was not. Yakima's experience was more similar to the new site, Aberdeen. In part, we attribute the low utilization in these sites to their perceived lack of need for paediatric psychiatric services, the lack of identification and investment of stakeholders, and/or lack of a children's mental health 'champion' to advocate the service in the community.<sup>14</sup> Yakima had access to at least three other child and adolescent psychiatrists in their community and during the needs assessment did not identify paediatric psychiatry as one of their core needs. Aberdeen never developed a core group of stakeholders invested in continuing services after a funded demonstration project. Neither site had a children's mental health champion who worked with the telepsychiatry team to build services. These experiences emphasize the importance not only of a careful needs assessment, but also close collaboration with referral sources and identification of local stakeholders who understand the community's needs and the value of telepsychiatry. These are all well known matters in adult telepsychiatry programmes. What is different for paediatric telepsychiatry is that the patients are dependent on adults for their care and there are numerous adult stakeholders who could take advantage of telepsychiatry to bring needed care to youth. These stakeholders include, for example, the schools, the juvenile justice system, and departments of health and human services. Appropriate collaboration with telepsychiatry could benefit the community through the decreased need for special services in schools, lower use of incarceration, as well as better functioning and outcomes of those youths in foster care. Future telepsychiatry programmes should focus on building collaborations across multiple institutions and agencies in the community.

Our experience with Ketchikan and Naselle demonstrated both the needs and vulnerabilities of establishing telepsychiatry with unique settings and/or the effects of an unstable administrative structure. SCH had a long term, monthly on-site consultation with Ketchikan. When

telepsychiatry services became available, these services converted to quarterly on-site services and telepsychiatry during the other eight months of the year. Unfortunately, this change coincided with instability in the administrative structure of the clinic which severely curtailed services to children. With stabilization in the administrative structure, this service is again growing. This emphasizes the need for stable and committed administrative staff who understand the idiosyncrasies of the mental health system, as opposed to the medical system, as well as the specific problems involved in telepsychiatry. By contrast, the Naselle Correctional programme had a stable administrative structure, but services ended when the telepsychiatrist left the SCH and was not replaced.

The ramifications of the loss of a telepsychiatrist were also demonstrated by the reduced utilization by the outpatient sites after 2004, as shown in Figure 1. This decline was not due to decreased requests for services, but was due to the loss of telepsychiatrists in the larger programme. This loss and decreased service provision confirms that telepsychiatry does not generate a new resource, but redistributes an existing resource, one that is already scarce in urban and suburban communities. Residency programmes do not generally include telepsychiatry in training. There is no easy mechanism to attract new psychiatrists to this method of mental health services delivery. To grow, telepsychiatry programmes must appeal to child and adolescent psychiatrists or they will turn to more traditional and readily available career choices. A successful programme can be impeded by the loss of a single telepsychiatrist.

## Conclusion

There appear to be four core components necessary for a successful telepsychiatry programme: psychiatrists who are interested in exploring new ways to reach underserved young people; clearly identified stakeholders who can collaborate with one another to make good use of the telepsychiatry service; a children's mental health 'champion' who represents these stakeholders and wants services for his or her community; and a stable administration that perceives telepsychiatry as valuable for its patients and PCPs.

Overall, our experience supports and expands the results of previous studies describing the need for and overall success of paediatric telepsychiatry. We have also shown the importance of considering both telepsychiatrists' and the PCPs' needs in developing, and sustaining, a telepsychiatry

service. Future work should now focus on systematically measuring outcomes.

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