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Predictors of transitioning to adult mental health services and associated costs: a cross-country comparison

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ABSTRACT

Background Young people are at risk of falling through the care gap after leaving child and adolescent mental health services (CAMHS) despite an ongoing need for mental health support. Currently, little is known about the predictors of transitioning to adult mental health services (AMHS), and associated healthcare and societal costs as young people cross the transition boundary.

Objective To conduct a secondary data analysis exploring predictors of transitioning or falling through the gap and associated costs.

Methods Data were used from a longitudinal study, which followed young people from seven European countries for 2 years after reaching their CAMHS boundary. Predictors of transitioning (including sociodemographic and clinical variables) and longitudinal resource use were compared for 488 young people who transitioned to AMHS versus those who fell through the gap.

Findings Young people were more likely to transition to AMHS if they were severely ill. Those from Italy, the Netherlands and the UK were more likely to fall through the gap than transition to AMHS. Healthcare costs fell for all young people over the study, with a sharper decrease for those who fell through the gap.

Conclusions Total healthcare costs fell for all participants, indicating that the intensity of mental health support reduces for all young people as they cross the CAMHS boundary, regardless of clinical need.

Clinical implications It is important that alternative forms of mental health support are available for young people who do not meet the AMHS care threshold but still have mental health needs after leaving CAMHS.

INTRODUCTION

When young people (YP) reach the upper age boundary of child and adolescent mental health services (CAMHS), care should be transferred to an adult mental health service (AMHS) if that young person still requires ongoing support. This transfer of care should occur as part of the therapeutic

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Previous research has indicated that around a quarter of young people transition to adult mental health services (AMHS) after reaching the upper age limit of child and adolescent mental health services (CAMHS).
- ⇒ Young people with diagnoses of severe and enduring mental illness are more likely to transition, as are those who have previously attempted suicide or who are more severely ill when they reach the transition boundary.

WHAT THIS STUDY ADDS

- ⇒ To our knowledge, this is the first study exploring resource use and healthcare costs for young people after leaving CAMHS.
- ⇒ This study also indicated that only the most severely ill of young people with a diagnosis of anxiety or mood disorder, neurodevelopmental disorder or emerging personality disorder transition to AMHS.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

- ⇒ Not all young people require ongoing mental health support after leaving CAMHS. However, there is a subsample of young people who do require ongoing support but do not meet the criteria for AMHS. It is important that other sources of support are available to meet the mental health needs of these young people.

process and is known as transition. If carried out correctly,¹ it should result in good continuity of care, taking place at a time and pace appropriate for the individual's needs. While not all YP are likely to need ongoing care, only around a quarter of YP transition to AMHS² and some are said to fall through the gap between services, as they do not transition despite an ongoing need.³

YP with certain diagnoses are at particular risk of falling through the gap. For example, YP with



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neurodevelopmental disorders, such as attention-deficit hyperactivity disorder (ADHD) or autism spectrum disorder, are at particular risk of discontinuity of care, as there is a lack of available specialist adult services.^{4,5} Other research has indicated that YP with an anxiety or depressive disorder are less likely to transition.^{3,6} A cohort study conducted as part of the MILESTONE Project, which aimed to understand and improve mental health service transitions for YP in eight European countries, found those who had a more severe illness, suicidal thoughts or used psychotropic medication were more likely to transition.⁷

Previous research has established that mental illness in YP results in higher costs for the education system, criminal justice system and wider society, in addition to increased healthcare costs.^{8,9} Preliminary work investigating specialist services for transition-aged youth has found improvements in mental health outcomes for YP, with associated cost savings.^{9,10} So far, however, there has been no detailed investigation comparing the costs of transitioning to AMHS compared with those who fall through the gap between services.

OBJECTIVE

This research used a subsample of the MILESTONE Study population,^{7,11} which combined a trial of an intervention of managed transition, a health economics analysis and a longitudinal study. The first objective of this study was to expand on existing findings to explore the predictors of YP falling through the gap versus transitioning to AMHS with a diagnosis of anxiety or mood disorder, neurodevelopmental disorder or emerging personality disorder. These groups are most likely to fall through the gap compared with diagnoses such as psychosis or schizophrenia.^{3,6,12} Most previous research has focused only on diagnostic, not sociodemographic or clinical predictors of transitioning. YP with emerging personality disorder have been included despite contradictory findings regarding transition outcomes.^{3,12} The second objective was to examine the healthcare and societal costs associated with transitioning and falling through the gap.

METHODS

This study used data collected in seven out of the eight countries involved in the MILESTONE Project¹¹: Belgium, Croatia, France, Germany, Ireland, Italy, the Netherlands and the UK. Due to administrative procedures, the dataset from Croatia was not available for this study.

Cost analyses were conducted using a healthcare and personal social services perspective as well as a wider societal perspective including the criminal justice system and other costs, meaning both healthcare and wider societal costs were taken into consideration in the analysis.

Participants

All YP recruited to the MILESTONE Study who had a diagnosis of anxiety or mood disorder, neurodevelopmental disorder or emerging personality disorder were included. YP may have other comorbid diagnoses, as the sample was not limited to those with only the diagnoses listed above.

Participants were classified as falling through the transition gap if they were discharged from CAMHS with no other referral despite having an ongoing clinical need, or if they were referred to AMHS but discharged by the next data collection time point, while still indicating a clinical need. This could occur at any time in the study, as YP could have stayed at CAMHS beyond the transition boundary. Clinical need was measured by a score of

2 or above on Health of the Nation Outcome Scale for Children and Adolescents (HoNOSCA) questions relating to psychiatric symptoms.¹³ Participants were classified as transitioning to AMHS if they were referred and started care at an AMHS. This study did not include YP who were discharged from CAMHS with no ongoing clinical need.

Study procedure and measures

YP were recruited at around 6 months prior to their CAMHS transition boundary and followed up for up to 24 months: T1 (baseline), T2 (+9 months), T3 (+15 months) and T4 (+24 months). Demographic data were collected at each time point through semistructured interviews. Diagnostic data were collected from the YP's clinician or available clinical records at each time point. Clinicians completed the Clinical Global Impression-Severity (CGI-S) Scale¹⁴ as a measure of illness severity. The clinician-rated HoNOSCA (rated by trained research assistants) was used to assess clinical need (a higher score indicates higher levels of need)¹⁵ and the ASEBA Instruments (Achenbach System of Empirically Based Assessment)^{16,17} were used to assess emotional and behavioural problems. An adapted Independent Behaviour During Consultation Scale (IBDCS) was used to measure adolescents' self-efficacy and independent behaviour,¹⁸ with a lower score indicating fewer independent behaviours. A MILESTONE-specific Client Service Receipt Inventory was developed to collect resource use information. Finally, the EQ5D-5L¹⁹ was used for the health economic analysis. Health profiles from this measure were combined with preference-weights²⁰ to calculate utility scores. These utility scores were used to assess health-related quality of life for all MILESTONE participants at each data collection point. Further information about the measures used can be found in online supplemental file 1.

Statistical analysis

Predictors of transitioning

A logistical regression model was used to explore the predictors of YP falling through the gap. Independent variables included age, gender, nationality, ethnicity, diagnosis, length of time at CAMHS, number of diagnoses, previous suicide attempt, severity of illness (CGI and HoNOSCA scores) and independent behaviour score (from the baseline IBDCS). ORs of independent variables and associated 95% CIs were calculated to assess the impact of the independent variable on probability of transitioning. Post-analysis tests were conducted to check the model for specification and collinearity errors.

Health economic analyses

Calculating cost

Resource use data were combined with unit costs to estimate the costs associated with YP who fell through the gap compared with those who made the transition to adult services. We pragmatically adopted a one-country pooled perspective given the lack of availability of high-quality unit cost sources in all participating countries, whereby unit costs were derived from UK costing resources such as the National Health Service reference costs²¹ and the Personal Social Services Research Unit.²² Costs are presented in Belgium euros (converted using purchasing power parity) for the price year 2015. Given the time frame of the study, costs were not discounted. Details of unit costs are presented in online supplemental file 2.

Resource use

Descriptive statistics were calculated for all cost components and the level of resource use was compared between those who transitioned and who fell through the gap, using t-tests for continuous variables and χ^2 tests for categorical variables.

Analysing costs

Inpatient, hospital outpatient and community care costs were combined to calculate total healthcare costs for each participant. These were then used to conduct an analysis of costs between those who transitioned and those who fell through the gap. Due to the high percentage of missing data, multiple imputation was used as the base-case for the analysis of total cost. Variables were included in the imputation model if they were to be included in the final multilevel model or were variables that predicted missingness in the cost variables (details in online supplemental file 3). The datasets generated by the multiple imputation were combined using Rubin's rule²³ to allow inferential statistics.

Model development

A series of regression models were conducted to examine differences in the cost of healthcare service use between those who fell through the gap and those who transitioned. An initial unadjusted regression model was conducted to compare EQ5D scores between those who transitioned and who fell through the gap. This was followed by a partially adjusted multilevel model controlling for country and cluster and baseline EQ5D scores.

The final models were fully adjusted, controlling for baseline scores and covariates. The covariates included in each model were: baseline EQ5D utility, ASEBA scores (either youth or adult version), HoNOSCA scores, CGI score, transition outcome, baseline age, gender, ethnicity, primary diagnostic group, length of time at CAMHS, IBDCS score and previous suicide attempt. The two levels in these models were country and cluster (as the original data were collected as part of a cluster-randomised controlled trial). Post-analysis tests were conducted to check for collinearity errors.

FINDINGS

Screening MILESTONE longitudinal cohort data according to the inclusion criteria applied in this study resulted in a sample of 488 participants (of the 1004 recruited). Common reasons for exclusion for the present study included not having a diagnosis at baseline or not having an eligible diagnosis, or not having an ongoing clinical need after leaving CAMHS. Of the included participants, 336 were judged to have fallen through the gap, while 152 transitioned to AMHS. Details of the sample are shown in table 1. Transition outcome by country is also shown in table 1, with the highest percentage of YP transitioning in Ireland (48%) and the lowest percentage of YP transitioning in Italy (12%).

Predictors of transitioning

All variables had less than 10% of missing data at baseline; therefore, it was decided that complete case analysis was sufficient for analysis, resulting in data from 403 participants included in the model (table 2).

Being severely ill was associated with a significantly increased probability of transitioning to AMHS (OR=4.32, 95% CI=1.19 to 15.65), as was having a higher HoNOSCA score (OR=1.06, 95% CI=1.02 to 1.10) and higher IBDCS score (OR=1.05, 95% CI=1.01 to 1.09). In contrast, living in Italy (OR=0.15, 95% CI=0.06 to 0.35), the Netherlands (OR=0.32,

Table 1 Demographic details of participants (n=488)

	Fell through gap	Transitioned	All
Age at baseline in years, mean (SD)	17.06 (0.58)	17.00 (0.67)	17.04 (0.61)
Gender, n (%)			
Female	186 (55.36)	98 (64.47)	284 (58.20)
Male	149 (44.35)	54 (35.53)	203 (41.60)
Other	1 (0.3)	0 (0)	1 (0.21)
Ethnicity, n (%)			
White European	279 (83.04)	116 (76.32)	395 (80.94)
Other	26 (7.74)	11 (7.24)	37 (7.58)
Missing	31 (9.23)	25 (16.45)	56 (11.48)
Country, n (%)			
Belgium	35 (10.42)	27 (17.76)	62 (12.71)
France	27 (8.04)	22 (14.47)	49 (10.04)
Germany	37 (11.01)	19 (12.5)	56 (11.48)
Ireland	13 (3.87)	12 (7.89)	25 (5.12)
Italy	76 (22.62)	10 (6.58)	86 (17.62)
Netherlands	61 (18.15)	23 (15.13)	84 (17.21)
UK	87 (25.89)	39 (25.66)	126 (25.82)
Diagnosis, n (%)			
Neurodevelopmental	133 (39.58)	49 (32.24)	182 (37.30)
Emotional disorders	137 (40.77)	69 (45.39)	206 (42.21)
Personality/trauma	35 (10.42)	21 (13.82)	56 (11.48)
Eating disorders	9 (2.68)	3 (1.97)	12 (2.46)
Other	22 (6.55)	10 (6.58)	32 (6.56)
Number of diagnoses, n (%)			
1	146 (43.45)	43 (28.29)	189 (38.73)
2	98 (29.17)	55 (36.18)	153 (31.35)
3	63 (18.75)	39 (25.66)	102 (20.90)
4	15 (4.46)	5 (3.29)	20 (4.10)
5	7 (2.08)	3 (1.97)	10 (2.05)
6	6 (1.79)	5 (3.29)	11 (2.25)
7	1 (0.3)	2 (1.32)	3 (0.62)
Length of time in CAMHS, n (%)			
1 year	45 (13.39)	16 (10.53)	61 (12.50)
2 years	60 (17.86)	17 (11.18)	77 (15.78)
3 years	48 (14.29)	15 (9.87)	63 (12.91)
4 years	78 (23.21)	52 (34.21)	130 (26.64)
5 years	57 (16.96)	31 (20.39)	88 (18.03)
6 years	39 (11.61)	12 (7.89)	51 (10.45)
Missing	9 (2.68)	9 (5.92)	18 (3.69)
Previous suicide attempt, n (%)			
No	233 (69.35)	83 (54.61)	316 (64.75)
Yes	88 (26.19)	58 (38.16)	146 (29.92)
Don't know	11 (3.27)	2 (1.32)	13 (2.66)
Missing	4 (1.19)	9 (5.92)	13 (2.66)

CAMHS, child and adolescent mental health services.

95% CI=0.16 to 0.64) or the UK (OR=0.48, 95% CI=0.25 to 0.91) was significantly associated with reduced odds of transitioning to AMHS compared with Belgium (the reference country in the model).

As the variance inflation factor for each predictor variable included in the model was below 10, we concluded that the model does not contain any collinearity errors. The model was also found to not have any specification errors. The model was deemed to be an adequate fit to the data as results from the Pearson's χ^2 and Hosmer-Lemeshow goodness-of-fit tests

Table 2 Logistic regression coefficients in the final model (n=403)

Predictor	OR	Z	P value	95% CI
Male	0.68	1.4	0.162	0.40 to 1.17
Length of time in CAMHS	1.15	1.54	0.125	0.96 to 1.37
Germany	0.52	1.48	0.14	0.21 to 1.24
Total baseline HoNOSCA score	1.06	3.04	0.002	1.02 to 1.10
Italy	0.15	4.23	0.00	0.06 to 0.35
Netherlands	0.32	3.16	0.002	0.16 to 0.64
UK	0.48	2.2	0.028	0.25 to 0.91
Total baseline IBDCS score	1.05	2.17	0.03	1.01 to 1.09
Previous suicide attempt	1.66	1.85	0.065	0.97 to 8.83
CGI rating of 'severely ill'	4.32	2.38	0.017	1.19 to 15.65

CAMHS, child and adolescent mental health services; CGI, Clinical Global Impression; HoNOSCA, Health of the Nation Outcome Scale for Children and Adolescents; IBDCS, Independent Behaviour During Consultation Scale.

were not significant ($\text{Prob}>\chi^2=0.3024$ and $\text{Prob}>\chi^2=0.7150$, respectively).

Costs

The percentage of missing data increased over the course of the study. At T4, 19.8% of HoNOSCA data were missing (an increase from 2.1% at T1), as well as 28.3% of ASEBA data (an increase from 6.6%); therefore, multiple imputation was used as a sensitivity analysis. Transition outcome and baseline HoNOSCA score were not significantly associated with missing data.

Those who transitioned were more likely than those who fell through the gap to be receiving inpatient care at all time points (see [table 3](#)). Inpatient contact also decreased significantly for those who transitioned after T1, which indicates that around half of those who were receiving inpatient care when they were at CAMHS were transitioned to adult outpatient care after leaving children's inpatient services.

Levels of contact with any type of community services were high for both groups over the study period, and did not reduce over time, except for a decrease for those who fell through the gap between baseline and T2 (when the majority would have been discharged from CAMHS).

At the first two time points, those who transitioned had significantly more overnight Accident and Emergency (A&E) admissions than those who fell through the gap. YP who transitioned to AMHS had on average more outpatient A&E visits than those who fell through the gap at all time points, with this difference reaching statistical significance at time points one, two and four (see [table 3](#)).

Significantly more of those in the transition group reported taking time off work or study due to their health at the first three time points. There were no significant differences between the number of general practitioner (GP) visits or contacts with the criminal justice system for those who transitioned and those who fell through the gap.

Costs over time

Costs over time are presented in [figure 1](#). Except for mean GP costs for those who transitioned, all costs decreased over the course of the study. Costs were generally higher for those who transitioned compared with those who fell through the gap.

Predictors of cost

Total inpatient cost

Predictors of higher total inpatient costs were transitioning to AMHS ($p<0.01$) and previously attempting suicide ($p<0.01$). Predictors of lower total inpatient costs were having a higher baseline EQ5D utility score (indicating a higher quality of life) ($p=0.01$), having a lower age at the transition boundary ($p=0.01$), not being white European ($p=0.03$), having a diagnosis of an emotional disorder ($p=0.01$) and being at CAMHS for a longer length of time before transitioning ($p<0.01$).

Total hospital outpatient cost

Predictors of higher outpatient costs were total baseline HoNOSCA score ($p<0.01$), transitioning to AMHS ($p=0.03$), not being white European ($p<0.01$), and having a diagnosis of a personality or trauma disorder ($p<0.01$), or an eating disorder ($p=0.01$). The predictors of lower outpatient costs were baseline EQ5D utility score ($p<0.01$) and having an 'other' diagnosis ($p=0.04$).

Total community cost

Predictors of higher community costs were transitioning to AMHS ($p<0.01$) and previously attempting suicide ($p<0.01$). Predictors of lower total community costs were baseline EQ5D utility score ($p<0.01$), being male ($p=0.01$) and having an 'other' diagnosis ($p<0.01$).

Total healthcare costs

Predictors of higher total costs were transitioning to AMHS ($p<0.01$) and previously attempting suicide ($p<0.01$). Predictors of lower total costs were baseline EQ5D utility score ($p<0.01$), having an emotional disorder ($p=0.01$) or 'other' diagnosis ($p=0.01$), and having a longer length of time at CAMHS ($p<0.01$) (see full findings in [table 4](#) below).

DISCUSSION

YP with a diagnosis of depression or anxiety disorder, neurodevelopmental disorders or emerging personality disorder are more likely to transition to AMHS if they are among the most severely ill of patients. This concurs with other studies exploring predictors of transition (eg, [3 12](#)). This is in accordance with the findings of the full sample of this cohort study,⁷ suggesting a severe illness is a main predictor of transition, regardless of diagnosis.

One novel finding of this research is the country variation in those who transitioned or fell through the gap. This research found that living in Italy, the Netherlands and the UK was associated with a lower likelihood of transitioning to AMHS. One possible explanation for this country variation is the high heterogeneity between the characteristics of CAMHS in different European countries²⁴ or the variations in type of CAMHS involved in MILESTONE (eg, inpatient vs community services, or CAMHS specialising in different disorders), as well as potential differences in AMHS eligibility.

Overall, mean total inpatient, outpatient and community costs decreased over the 24 months the YP were involved in MILESTONE. This may be due to several factors. There was a general decrease in costs for all YP after T1, which was the time when most would have reached their CAMHS upper age limit. This suggests that the intensity of support received by all YP decreased after leaving CAMHS, even if they transitioned. This finding is supported by other studies, for example, a recent systematic review of experiences of YP with ADHD leaving CAMHS found

Table 3 Comparing service use between those who fell through the gap (FTG) and transitioned to AMHS

Analysis	Time point	% 'yes'	χ^2 , p values
Inpatient contact	T1*	FTG (n=315)=13.33 Transition (n=142)=32.39	χ^2 (1, 457)=22.87, p<0.01
	T2*	FTG (n=294)=3.40 Transition (n=122)=14.75	χ^2 (1, 416)=17.70, p<0.01
	T3*	FTG (n=267)=4.12 Transition (n=105)=13.33	χ^2 (1, 372)=10.21, p<0.01
	T4*	FTG (n=250)=3.60 Transition (n=104)=11.54	χ^2 (1, 354)=8.29, p<0.01
Outpatient contact	T1	FTG (n=313)=56.87 Transition (n=140)=56.43	χ^2 (1, 453)=0.01, p=0.93
	T2	FTG (n=292)=35.96 Transition (n=121)=40.50	χ^2 (1, 413)=0.75, p=0.39
	T3*	FTG (n=267)=28.09 Transition (n=103)=44.66	χ^2 (1, 370)=9.27, p<0.01
	T4	FTG (n=250)=31.20 Transition (n=102)=39.22	χ^2 (1, 352)=2.09, p=0.15
Community contact	T1	FTG (n=314)=87.26 Transition (n=137)=83.94	χ^2 (1, 451)=0.89, p=0.35
	T2*	FTG (n=293)=66.21 Transition (n=121)=80.17	χ^2 (1, 414)=7.98, p<0.01
	T3*	FTG (n=263)=63.12 Transition (n=102)=81.37	χ^2 (1, 365)=11.30, p<0.01
	T4*	FTG (n=249)=65.46 Transition (n=104)=81.73	χ^2 (1, 353)=9.29, p<0.01
Number of A&E overnight admissions	T1*	FTG (n=315)=0.03 Transition (n=142)=0.14	t(455)=-3.02, p<0.01
	T2*	FTG (n=294)=0.01 Transition (n=122)=0.10	t(414)=-2.22, p=0.03
	T3	FTG (n=267)=0.02 Transition (n=105)=0.06	t(370)=-1.45, p=0.15
	T4	FTG (n=250)=0.01 Transition (n=104)=0.05	t(352)=-1.67, p=0.09
Number of outpatient A&E visits	T1*	FTG (n=313)=0.15 Transition (n=140)=0.32	t(451)=-2.15, p=0.03
	T2*	FTG (n=292)=0.10 Transition (n=121)=0.27	t(411)=-2.02, p=0.04
	T3	FTG (n=267)=0.11 Transition (n=103)=0.19	t(368)=-1.07, p=0.29
	T4*	FTG (n=250)=0.06 Transition (n=102)=0.30	t(350)=-2.44, p=0.02
Community GP visits	T1	FTG (n=314)=1.94 Transition (n=137)=1.58	t(449)=0.52, p=0.60
	T2	FTG (n=293)=1.23 Transition (n=121)=2.00	t(412)=-1.87, p=0.06
	T3	FTG (n=263)=1.39 Transition (n=102)=1.88	t(363)=-1.43, p=0.15
	T4	FTG (n=249)=1.59 Transition (n=104)=1.78	t(351)=-0.65, p=0.52
Time off work or study	T1*	FTG (n=312)=45.19 Transition (n=141)=56.74	χ^2 (1, 453)=5.18, p=0.02
	T2*	FTG (n=294)=32.65 Transition (n=122)=44.26	χ^2 (1, 416)=5.04, p=0.03
	T3*	FTG (n=267)=31.46 Transition (n=105)=45.71	χ^2 (1, 372)=6.69, p=0.01
	T4	FTG (n=250)=32.80 Transition (n=104)=31.73	χ^2 (1, 354)=0.04, p=0.85

Continued



Table 3 Continued

Analysis	Time point	% 'yes'	χ^2 , p values
Contact with criminal justice system	T1	FTG (n=309)=4.85 Transition (n=141)=9.22	χ^2 (1, 450)=3.16, p=0.08
	T2	FTG (n=294)=3.40 Transition (n=122)=5.74	χ^2 (1, 416)=1.20, p=0.27
	T3	FTG (n=267)=2.25 Transition (n=105)=1.90	χ^2 (1, 372)=0.04, p=0.84
	T4	FTG (n=250)=2.80 Transition (n=104)=2.88	χ^2 (1, 354)=0.00, p=0.97

*Significant at the 95% level.
A&E, Accident and Emergency; AMHS, adult mental health services; GP, general practitioner.

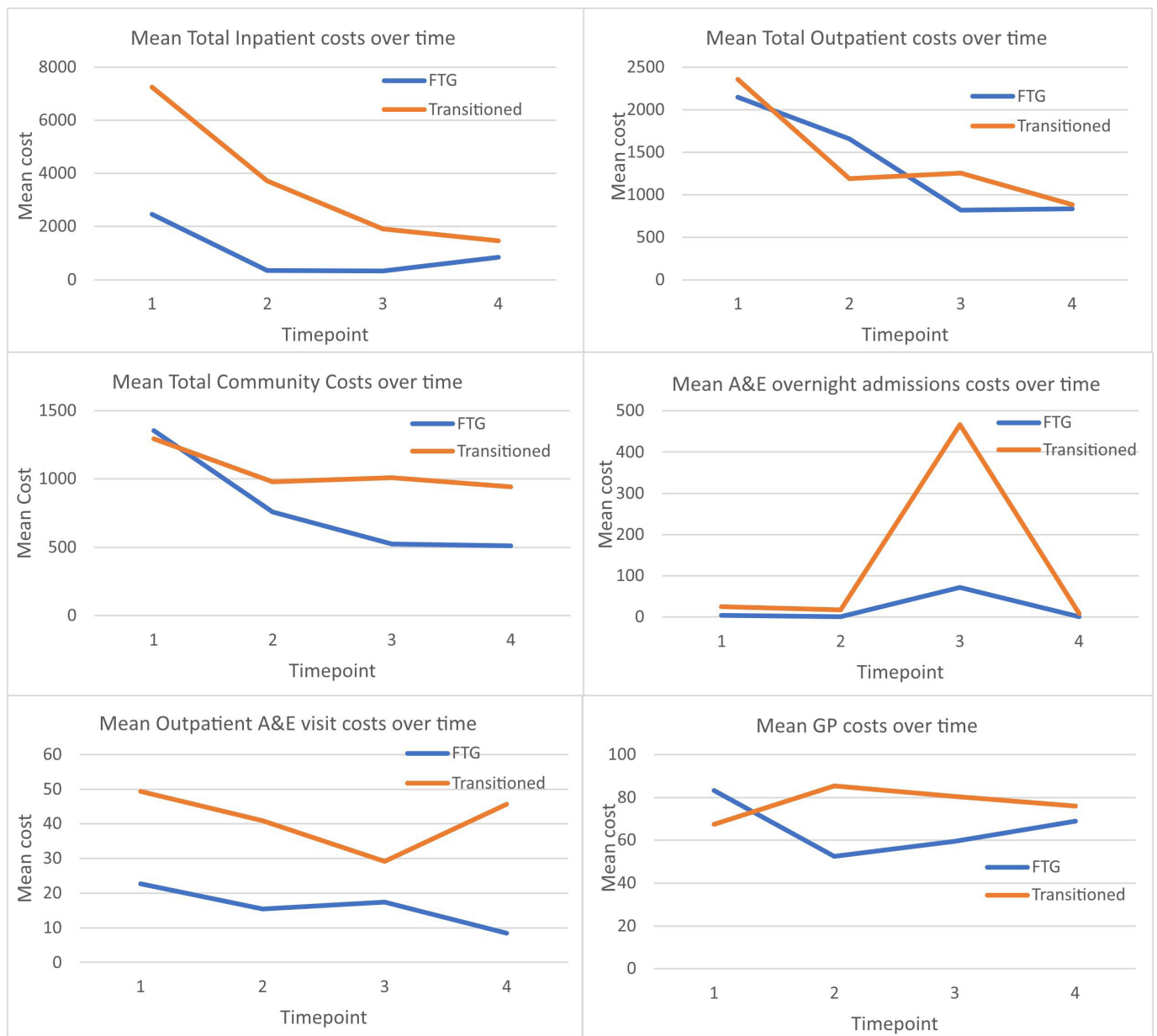


Figure 1 A graph showing the mean total costs over time for each service use variable. For figure 1(D), the high figure for those who transitioned at T3 is skewed by a small number of participants who reported high costs. A&E, Accident and Emergency; FTG, fell through the gap; GP, general practitioner.

Table 4 Results of the multilevel model for total healthcare costs

Imputed total cost	Coefficient	t	P value	95% CI
Baseline EQ5D utility score*	18134.70	3.32	0.00	28838.54 to -7430.77
Total baseline ASEBA score	74.63	1.13	0.26	204.58 to 55.32
Total baseline HoNOSCA score	175.24	1.00	0.32	166.70 to 517.17
Transition outcome				
Transitioned*	14676.07	6.82	0.00	10455.49 to 18896.66
Gender				
Male	51.94	0.02	0.98	4148.41 to 4252.30
Age at T1	3179.70	1.76	0.08	6714.10 to 354.70
Ethnicity				
Other	6616.59	1.64	0.10	14520.53 to 1287.34
Primary diagnosis				
Emotional disorders*	6293.34	2.55	0.01	11126.22 to -1460.46
Personality/trauma	1274.81	0.38	0.70	5298.79 to 7848.41
Eating disorders	1804.09	0.29	0.77	14035.77 to 10427.58
Other†*	11569	2.82	0.01	19599.44 to -3538.52
Total baseline IBDCS score	112.70	0.69	0.49	431.32 to 205.91
Length of time at CAMHS*	2097.15	3.15	0.00	3402.75 to -791.54
Previous suicide attempt				
Yes*	6728.77	3.21	0.00	2622.40 to 10835.14

One outlier was removed in this model due to invalid data.
 *Significant at the 95% level.
 †Includes multiple or mixed primary diagnoses.
 ASEBA, Achenbach System of Empirically Based Assessment; CAMHS, child and adolescent mental health services; HoNOSCA, Health of the Nation Outcome Scale for Children and Adolescents; IBDCS, Independent Behaviour During Consultation Scale.

that AMHS often only gave medication, with no psychological therapy,²⁵ while other research has demonstrated a reduction in the frequency of appointments after transitioning.²⁶ Some decrease in healthcare costs could also be due to disengagement from services, or YP's mental health improving over time, as HoNOSCA scores decreased over the course of the study.

Predictors of higher healthcare costs across all settings were transitioning to AMHS and previously attempting suicide. A predictor of lower healthcare costs across all settings was a higher EQ5D utility score, indicating better quality of life. These findings concur with the results of the longitudinal regression, which found that those who transitioned were the most severely ill. As transitioning involves using healthcare services, it is logical that this should result in increased costs, compared with those who fell through the gap. Conversely, the finding that YP who fell through the gap were less likely to have higher healthcare costs indicates that they are less likely to access any kind of support after leaving CAMHS, despite still being unwell. Having an emotional disorder was also a predictor of lower costs, similar to previous studies which found YP with anxiety and depression can fail to meet the eligibility criteria for AMHS (eg, 3). As this study focused on YP with these diagnoses, those who transitioned were therefore likely to be more severely ill, which could explain why there were much higher costs for the transition group. It is important that the mental health needs of YP are met even if they do not meet the AMHS eligibility criteria, as research indicates that young adults who are unable to access mental healthcare can drop out of education or work due to a deterioration in their mental health.²⁶ This population is then at risk of being socially excluded and economically disadvantaged in the long term,²⁷ with poorer psychological outcomes.²⁸ There is an additional economic case for investment in early intervention and prevention of mental illness in youth, given the high

costs of mental illness across an individual's life span, with associated costs to wider society.²⁷

Strengths and limitations

To our knowledge, this is the first study to compare healthcare costs between those who transitioned and those who fell through the gap between CAMHS and AMHS. The analysis was conducted on a large international sample, so it provides a picture of resource use during the transition period across seven European countries.

While this study contained a large sample compared with previous studies, there are likely to be some limitations in terms of representativeness of the sample. First, as clinicians had to screen eligible participants for suitability to take part, the sample may not include the most severely ill. Those more severely ill were also more likely to drop out of the study, which may have led to this group becoming further under-represented. Participants without a diagnosis were excluded, which could lead to bias, as those without a psychiatric diagnosis are more likely to fall through the gap.²⁹ There may also have been some bias introduced by different recruitment practices in each country, as MILESTONE was not originally designed to test for cross-country comparisons in transition. The use of the HoNOSCA cut-off score to determine clinical needs has been used in other research studies, but is yet to be validated. Finally, this sample lacked diversity in YP from minoritised ethnic backgrounds.

Missing data meant that complete case analysis was used to analyse predictors of transitioning. There was a relatively high percentage of missing data in the multilevel models, which was accounted for using multiple imputation even though data may not have been missing at random. Additionally, we used a one-country pooled costing approach due to a lack of high-quality unit costs in all participating countries, whereas an optimal approach

would be to use a split country costing approach including all participating countries. We also did not discount costs at the later data collection time points as data were collected over a relatively short time period; therefore, we decided this would have had minimal impact on our results.

CLINICAL IMPLICATIONS

As only the most severely ill YP transition to AMHS, it is important that there are alternative healthcare or voluntary sector services available for those who do not meet the AMHS threshold but still require ongoing mental health support. This could be through collaborative care models based in primary care, or other community-based mental health services. Similarly, as costs decreased over time for both groups of YP, this indicates a reduction in mental health support when they crossed the CAMHS transition boundary, regardless whether they transitioned. This raises ethical issues in the current model of care regarding the right to access timely mental healthcare for YP. It is imperative that the mental health needs of YP are met after leaving CAMHS, something which may require an increase in funding to meet the demand for care. This is particularly important if we consider that the critical age of the onset of mental disorder is the period between 15 and 25 years of age³⁰: most efforts of mental health services should be targeted to this age group.

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