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## Accepted Manuscript

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## Longitudinal patterns of mental health service utilisation by those with mental-physical comorbidity in the community

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**Abstract**

*Objective:* Successful healthcare integration demands an understanding of current service utilisation by people with comorbidity. Physical illness may impact on mental health service use (MHSU), but longitudinal studies of comorbidity and MHSU are rare. This study 1) estimated associations between mental-physical comorbidity and longitudinal MHSU patterns; 2) tested whether associations between comorbidity and continuous MHSU are driven by “need”.

*Methods:* Survey data from a South East London community cohort were used (N=1052). Common mental disorder symptoms (CMDS) were measured using the Clinical Interview Schedule Revised and self-report of long-standing disorders. A checklist of common conditions measured chronic physical conditions. MHSU captured self-reported use of mental health services in the past year at two time points. “Need” indicators included CMDS at follow-up, suicidal ideation, somatic symptom severity, self-rated health, daily functioning problems and perceived functioning limitations due to emotional health. Analyses used logistic and multinomial regression.

*Results:* Continuous MHSU (at both time-points) was twice as commonly reported by those with comorbidity than those without physical comorbidity (30.9% vs 12.3%). CMDS at follow-up, suicidal ideation, and perceived functioning limitations due to emotional health only partially explained the association between CMDS-physical comorbidity and continuous MHSU. In the adjusted model, comorbidity remained associated with continuous MHSU (RRR=3.23, 95% CI: 1.39-7.51;  $p=0.002$ ), while the association for non-comorbid CMDS was fully attenuated (RRR=1.08, 95% CI: 0.40-2.93;  $p=0.85$ ).

*Conclusion:* CMDS-physical comorbidity was strongly associated with continuous MHSU, and “need” did not account for this association, suggesting that comorbidity itself represents a “need” indicator.

Key words: Service use, mental disorders, mental-physical comorbidity, multimorbidity  
community health, help-seeking

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## Introduction

Mental-physical comorbidity is common and associated with poor health outcomes, significant reductions in functioning, and increased healthcare utilisation and costs[1,2]. Healthcare integration – co-coordinating care across sectors for targeted patient groups – might be a solution to address the burden of mental-physical comorbidity. Successful integration requires an understanding of the specific existing problems that people with comorbidity face in terms of accessing, using and benefiting from services. Whilst the impact of comorbidity on physical healthcare use has been studied extensively, its impact on mental health service use (MHSU) is unclear. On the one hand, several studies report small to modest increases in MHSU by those with comorbid mental-physical illness [3–5]. This suggests that increased “need” in terms of poorer perceived health and functioning and greater mental illness severity among those with comorbidity may increase MHSU [6,7]. Access to services might also be facilitated through regular healthcare contacts among those with physical comorbidity. On the other hand, other evidence suggests that people with comorbidity use services less and delay help-seeking longer [8,9]. Such “crowd-out” effects could be due to psychiatric symptoms being misattributed to physical conditions, presenting barriers to MHSU.

Drawing conclusions from this mixed evidence base is complicated by variations in methodology and service context. The cross-sectional design of most these studies represents a further limitation. Understanding the longitudinal association between mental-physical comorbidity and MHSU is important given the recurrent nature of mental illnesses, the long-term course of chronic physical conditions, and their mutually reinforcing effects. Thus, this study explores prospective associations between mental-physical comorbidity and patterns of MHSU in a universal healthcare context by applying Andersen’s behavioural model[10]. The behavioural model states that “predisposing”, “enabling”, and “need” factors may impede or

facilitate service utilisation [10]. Predisposing factors influence service uptake either by elevating need (e.g. old age) or by affecting the ability to cope with health problems (e.g. education). Enabling factors directly impede or facilitate service use (e.g. social support), while “need” includes perceived and evaluated measures of health. This framework allows for considering the relative contribution of these inter-related components, which can otherwise be difficult to discern. Therefore, we hypothesised that: 1) common mental disorder symptoms (CMDs) and comorbid physical illness is associated with more continuous MHSU over time compared to those reporting CMDs without physical illness, and that 2) increased “need” would account for this difference, independently of “predisposing” and “enabling” factors.

## Methods

### *Sample*

Prospective survey data from the South East London Community Health Study (SELCoH) waves 1 and 2 were used (N=1052) [11–13]. SELCoH 1 took place in 2008–2010 and recruited 1698 adults (aged  $\geq 16$ ) from 1075 private households in the boroughs Southwark and Lambeth, identified through stratified random sampling (household participation rate: 51.9%, within household participation rate: 71.9% [11]). SELCoH 2 followed-up respondents approximately 2 years later in 2011–2013, interviewing 1052 participants from 689 households. SELCoH 1 and 2 were representative of the ethnically and socioeconomically diverse catchment population of South East London [13,14].

Of SELCoH 1 respondents, 94% (N=1598) consented to being recontacted. 136 could not be traced, and 21 could not complete the survey due to health reasons or being deceased. Of remaining consenting and approached respondents (n=1432), 73.5% (n=1052) part-took in SELCoH 2. SELCoH 1 and 2 respondents shared similar socio-demographic and

socioeconomic characteristics [13]. Interview procedures were similar at both time-points. Trained interviewers conducted structured face-to-face computer-assisted interviews in participants' homes. Twenty-nine respondents who had relocated out of London completed a shorter version of the SELCoH 2 survey through computer-assisted telephone interviews. Ethical approval was granted by the King's College London research ethics committee for both waves (references CREC/07/08-152 and PNM/10/11-106). For further study details, see Hatch et al. [11,13].

### ***Measures***

#### *Mental health service use*

Self-reported MHSU was measured at both time-points. Respondents were asked about any service use (general practitioner (GP), family doctor, psychological therapist/counsellor or other sources of help), either in person or by telephone, for anxiety, depression or other mental, nervous or emotional problem in the past 12-months. A derived variable of four mutually exclusive categories was derived: 1) No MHSU (at either time-points), 2) Discontinued MHSU (use at SELCoH 1, not 2), 3) SELCoH 2 initiated MHSU (use at SELCoH 2, not 1), and 4) Continuous MHSU (use at both time-points). The term "continuous MHSU" is applied broadly, acknowledging the possibility that respondents may have stopped and started MHSU, or switched service providers between the two time-points.

#### *Mental-physical comorbidity*

Comorbidity was conceptualised as co-occurring common mental disorder symptoms (CMDS) and longstanding physical illness at SELCoH 1. Physical illness was ascertained using a checklist measure asking about any illness, disability or infirmity that had troubled them over a period of time or likely to affect them in future [15]. The checklist comprised 17 illness categories, of which 16 related to physical health (e.g. musculoskeletal conditions,



heart conditions, diabetes). Respondents could also describe in free text other longstanding conditions outstanding from the checklist.

CMDS were measured by the Clinical Interview Schedule Revised (CIS-R) [16]; a structured psychiatric interview schedule validated for lay interviewers. It assesses 14 symptom domains of anxiety and depression, producing a total symptom score. Algorithms may also be applied to indicate ICD-10 diagnoses for 10 psychiatric disorders. The conventional 12 point cut-off indicates the presence of CMDS. Disorders reported by selecting “depression or other neurotic disorder” in the longstanding illness checklist were also included, as were any CMDS described whilst outlining “other” longstanding conditions. The comorbidity variable was composed of three mutually-exclusive categories: 1) No CMDS (neither CMDS nor physical illness, or physical illness only), 2) Non-comorbid CMDS (CMDS only), and 3) CMDS-physical comorbidity (CMDS and physical illness).

#### *Need indicators*

We adopted a broad conceptualization of “need” which considered clinical, functional and risk variables that may indicate that someone ought to be prioritised to receive services. Need indicators included CMDS at follow-up, somatic symptom severity, self-rated health, daily functioning problems, perceived functioning limitations due to emotional health, and suicidal ideation. Whilst we expected these indicators to be associated with comorbidity, we considered them conceptually separate, as they captured illness burden and continuity, beyond the co-occurrence of mental and long-standing physical illness captured by comorbidity.

With the exception of CMDS at follow-up, all need indicators were measured at SELCoH 1. Follow-up measures of CIS-R and self-reported longstanding CMD replicated those at SELCoH 1. Suicidal ideation was measured with an item asking about suicidal thoughts over

the past 12-months [17,18]. The Patient Health Questionnaire 15 somatic symptom severity scale (PHQ-15) captured somatic symptom severity [19]. One item about menstrual problems was excluded, as it was sex specific. Thus, the total score ranging from 0-28 was categorised into low ( $<5$ ), moderate (5-9) and high ( $\geq 10$ ) somatic severity, consistent with research applying the measure to community populations [20,21]. The five-point self-rated health scale from the 12-item Short-Form Health Survey (SF-12) was re-categorised into fair/poor vs. good/very good/excellent [22]. Daily functioning problems indicated reports of struggling with two or more daily life activities (personal care, transport, medical care, household activities and managing money) [23]. Perceived functional limitations due to emotional health were captured by an item from the SF-12 asking about accomplishing less during regular daily activities due to emotional problems in the past 4 weeks [24].

#### *Predisposing factors*

Sociodemographic indicators included gender, age, relationship status, ethnicity, and migrant status, measured at SELCoH 1. Relationship status distinguished between married/cohabitating, single, and divorced/separated/widowed. Ethnic categories were recoded to White and Non-White to accommodate for small cell counts in statistical models. Non-White groups included Black Caribbean, Black African, Mixed, Non-White Other and ethnic groups. The migrant status variable combined birthplace and length of UK residence, generating 3 categories: non-migrants (UK born), migrants residing  $\leq 10$  years in the UK, and migrants residing  $>10$  years in the UK [25]. Socioeconomic variables captured education, employment adversity and benefits receipt over SELCoH 1 and 2. Education measured the highest level of educational attainment, grouping no qualifications; GCSE qualifications (or equivalent high school qualifications), A-level (or equivalent post-16 qualifications); and university degree or above. Transitions from employment/education at SELCoH 1, into unemployment, permanent sickness/disability, carer roles, or early retirement (age  $<65$ ) at

SELCoH 2 were considered “adverse”. Persistent non-participation in employment/education (unemployment, permanent sickness/disability, carer roles, or early retirement) was also considered “adverse”. Stable employment/education and transitions into employment/education were classified as “non-adverse”. All respondents aged  $\geq 65$  were grouped in the “non-adverse” employment group. Benefits receipt considered those reporting receipt of non-health related benefits at either SELCoH 1 or 2. Health-related benefits were excluded to avoid inflated associations due to collinearity.

### *Enabling factors*

Social network size was measured in SELCoH 1 and counted the number of weekly contacts with different groups of people (e.g. friends, family), categorising them into  $\leq 2$ , 3-4 and  $\geq 5$ . Checklists measured stressful life events at both time-points, using a combination of measurements relevant to inner-city populations [26,27]. The total count of reported lifetime events in SELCoH 1 and 2 was categorised into:  $\leq 2$ , 3-5, and  $\geq 6$ , accounting for similar events across time-points.

### *Analysis*

Cross-tabulations described prevalence distributions by MHSU and independent variables, testing differences with chi-square tests. To address aim 1, multinomial regression models tested associations between comorbidity and MHSU patterns, using ‘no MHSU’ as the reference. Multinomial regression models produce odds ratios estimated in relation to a reference category, referred to as relative risk ratios (RRRs). Thus, the RRR’s estimated the risk of reporting discontinued, initiated and continuous MHSU, relative to ‘no MHSU’. Unadjusted associations were tested first, followed by adjusted models, adding predisposing and enabling factors incrementally. In addressing aim 2, we tested whether need indicators were associated with 1) comorbidity, and 2) MHSU, independently of other need indicators, in bivariate and multivariate regression models. Need indicators meeting these pre-requisite

criteria were separately added to the adjusted model to examine their impact on the association between comorbidity and MHSU. Need indicators that remained associated with MHSU were carried forward to a fully-adjusted model.

Analyses were carried out using Stata 14 [28]. Using the Stata *svy* command, analyses applied robust standard errors making adjustments for the clustered survey design, non-response at the household level, and attrition and changes in household composition between time-points.

## Results

74.7% of respondents did not report MHSU at either time-point, 8.5% reported continuous MHSU over both time-points, 9.5% reported discontinued MHSU between SELCoH 1 and 2, and 7.3% reported SELCoH 2 initiated MHSU. A quarter of the sample reported CMDS at SELCoH 1, of which 52.6% had at least one physical illness. This was substantially higher than the prevalence of physical illness among without CMDS (33.7%). Overall, the prevalence of CMDS-physical comorbidity was 13.1%, and 11.8% reported non-comorbid CMDS.

Table 1 shows the distribution of MHSU by comorbidity, need indicators and predisposing and enabling factors. 30.9% of respondents in the CMDS-physical comorbidity group reported continuous MHSU – more than double the prevalence of the non-comorbid CMDS group. The prevalence of initiated MHSU in the comorbidity group was also elevated; 14.3% reported SELCoH 2 initiated MHSU compared to 6.9% in the non-comorbid group. In contrast, discontinued MHSU was nearly twice as frequently reported by the non-comorbid group compared to the comorbidity group. It is nevertheless noteworthy that most with CMDS, either with or without comorbidity, did not make use of mental health services. Continuous MHSU was more prevalent among those reporting greater “need” according to all

indicators. Continuous MHSU was more frequently observed in women, persons aged 50-59, and those of divorced/separated/widowed relationship status, and more prevalent among those reporting small social networks and more stressful life events. MHSU did not vary by ethnicity, migrant status or education.

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No qualifications	74	78.0	3	3.9	5	5.9	10	12.3	
GCSE	120	71.5	22	13.2	12	7.2	14	8.1	
A-level	186	72.3	26	9.4	22	7.4	28	11.0	
Degree or above	406	76.6	48	9.2	41	7.4	35	6.7	
Adverse employment conditions <sup>d</sup>									<0.001
No	651	79.0	71	8.7	55	6.4	49	6.0	
Yes	132	59.8	27	12.2	24	10.2	38	17.9	
Benefits <sup>c</sup>									<0.001
No	597	77.9	68	8.9	55	6.9	46	6.3	
Yes	184	66.0	30	10.9	25	8.5	41	14.6	
<b>Enabling factors</b>									
Social network size									0.016
2 or less	50	63.0	14	17.7	5	5.9	10	13.4	
3-4	211	72.6	24	9.4	20	6.7	30	11.3	
5 or more	520	77.1	61	8.6	54	7.6	46	6.7	
Stressful life events									<0.001
2 or less	140	82.7	11	6.5	16	8.8	4	2.0	
3-5	359	78.0	35	7.9	34	7.1	29	7.0	
6 or more	261	67.3	47	11.8	28	7.1	53	13.8	

Frequencies are unweighted; mean and percentage estimates are weighted and account for household clustering.

MHSU, mental health service use; CMDS, common mental disorder symptoms

<sup>a</sup> MHSU at both time-points

<sup>b</sup> Move out of or persistently out of employment or education in working age (<65).

<sup>c</sup> Benefits are non-health related

***Aim 1. Comorbidity and patterns of mental health service use***

Relative to 'no MHSU', the non-comorbid and comorbid groups were at greater risk of discontinued, SELCoH 2 initiated, and continuous MHSU, compared to those reporting no CMDS (Model 1, Table 2). The association between comorbidity and continuous MHSU was particularly strong (RRR=16.04, 95% CI: 9.13-28.18). Non-comorbid CMDS was associated with discontinued and continuous MHSU, but not initiated MHSU. Post-hoc analyses contrasting comorbidity against non-comorbid CMDS found that comorbidity was associated with 3 times greater relative risk of continuous MHSU (RRR=3.37, 95% CI: 1.62-7.00),  $p=0.001$ ), and initiated MHSU (RRR=2.77, 95% CI: 1.20-6.43,  $p=0.017$ ), but not associated with discontinued MHSU (RRR=0.70, 95% CI: 0.36-1.37,  $p=0.29$ ; not shown).

Adjusting for predisposing and enabling factors moderately attenuated the association between comorbidity and continuous MHSU from 16.04 (95% CI: 9.13-28.18) to 14.31 (95% CI: 7.61-26.92) and 13.01 (95% CI: 6.71-25.22), respectively (Models 2 and 3, Table 2). In contrast, this adjustment did not influence associations between comorbidity and non-comorbid CMDS with discontinued or initiated MHSU.



**Table 2** Models testing the effect of predisposing and enabling factors on associations between comorbidity and MHSU

	No MHSU (n=785)	Discontinued MHSU (n=99)	SELCoH 2 initiated MHSU (n=81)	Continuous MHSU <sup>a</sup> (n=87)
	RRR	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
Model 1: Comorbidity				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	6.44*** (3.83-10.84)	1.70 (0.79-3.68)	4.76***(2.34-9.67)
CMDS-physical comorbidity	1.00	4.51*** (2.45-8.28)	4.73***(2.64-8.48)	16.04***(9.13-28.18)
Model 2: Comorbidity + Predisposing factors				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	6.07*** (3.55-10.39)	1.55 (0.68-3.54)	3.42***(1.67-6.99)
CMDS-physical comorbidity	1.00	4.84*** (2.49-9.40)	4.62***(2.54-8.39)	14.31***(7.61-26.92)
Model 3: Comorbidity + Predisposing factors + Enabling factors				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	6.23*** (3.58-10.86)	1.51 (0.63-3.60)	3.47***(1.67-7.21)
CMDS-physical comorbidity	1.00	4.69*** (2.33-9.41)	5.07***(2.69-9.56)	13.01***(6.71-25.22)

\*\*\*<0.001; MHSU, mental health service use; RRR, relative risk ratio; CI, confidence interval; CMDS, common mental disorder symptoms

“No MHSU” represent the reference category in the multinomial regression.

<sup>a</sup>MHSU at both time-points

***Aim 2. The role of need indicators***

Preliminary analyses assessed the pre-requisite criteria of need indicators, testing that they were associated with 1) comorbidity, and 2) MHSU, independently of one another. As expected, all need indicators met the first criterion: strong associations were observed between CMDS-physical comorbidity and all need indicators, compared to the no CMDS group (Table A1). Compared to non-comorbid CMDS, comorbidity was also associated with greater “need” for all indicators with the exception perceived functioning limitations due to emotional health (Table A1). Analyses testing criterion 2 indicated that all need indicators were strongly associated with continuous MHSU in unadjusted associations, but self-rated health and daily functioning problems were not associated with any of the MHSU outcomes independently of other need indicators (Table A2). They were therefore not analysed further, while CMDS at follow-up, suicidal ideation, somatic symptom severity and perceived functioning limitations due to emotional health were carried forward to subsequent analyses.

The individual impact of need indicators on the associations between comorbidity and MHSU were separately tested, whilst adjusting for other explanatory factors (Table 3). All need indicators substantially attenuated the association between comorbidity and continuous MHSU, although comorbidity remained strongly associated with continuous MHSU ( $RRR's > 5$ , Table 3). The greatest attenuating effect was observed for CMDS at follow-up, followed by perceived functioning limitations due to emotional health. Both of these need indicators also fully attenuated the association between non-comorbid CMDS and continuous MHSU. CMDS at follow-up was also strongly associated with initiated MHSU, and attenuated the associations between comorbidity the other MHSU outcomes.

**Table 3** Models testing the effect of individual need indicators in associations between comorbidity and MHSU <sup>a</sup>

	No MHSU (n=785)	Discontinued MHSU (n=99)	SELCoH 2 initiated MHSU (n=81)	Continuous MHSU <sup>b</sup> (n=87)
	RRR	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
CMDS at follow-up				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	5.25*** (2.96-9.30)	0.82 (0.33-2.03)	1.91 (0.87-4.19)
CMDS-physical comorbidity	1.00	3.68*** (1.80-7.55)	2.15* (1.05-4.39)	5.47*** (2.67-11.22)
CMDS at follow-up	1.00	1.93* (1.03-3.63)	8.03*** (4.30-15.01)	8.84*** (4.51-17.35)
Suicidal ideation				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	5.90*** (3.34-10.41)	1.51 (0.64-3.60)	3.06** (1.40-6.66)
CMDS-physical comorbidity	1.00	4.07*** (1.99-8.34)	5.04*** (2.64-9.63)	9.88*** (5.13-19.04)
Suicidal ideation	1.00	2.72* (1.03-7.17)	1.03 (0.31-3.49)	5.65*** (2.49-12.80)
Somatic symptom severity				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	6.17*** (3.39-11.26)	1.04 (0.42-2.58)	2.71* (1.25-5.88)
CMDS-physical comorbidity	1.00	4.12*** (1.84-9.26)	3.31** (1.60-6.85)	9.85*** (4.54-21.36)
Somatic symptom severity				
Low		1.00	1.00	1.00
Moderate	1.00	0.82 (0.45-1.47)	3.00*** (1.66-5.43)	2.26* (1.15-4.44)
High	1.00	1.36 (0.64-2.89)	2.51 (1.12-5.65)	1.96 (0.86-4.47)
Perceived functioning limitations due to emotional health				
Comorbidity				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	5.79*** (3.24-10.35)	1.55 (0.62-3.87)	1.88 (0.80-4.41)
CMDS-physical comorbidity	1.00	4.46*** (2.22-8.96)	5.21*** (2.65-10.22)	8.38*** (4.19-16.74)

Perceived functioning limitations due to emotional health	1.00	1.20 (0.68-2.10)	0.93 (0.44-1.96)	3.65***(1.93-6.92)
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\* $<0.05$ ; \*\* $<0.01$ ; \*\*\* $<0.001$ ; MHSU, mental health service use; RRR, relative risk ratio; CI, confidence interval; CMDS, common mental disorder symptoms

<sup>a</sup> All models adjust for predisposing and enabling factors

<sup>b</sup> MHSU at both time-points

"No MHSU" represent the reference category in the multinomial regression.

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In the fully-adjusted model CMDS-physical comorbidity remained strongly associated with continuous MHSU, relative to no MHSU (RRR=3.23, 95% CI: 1.39-7.51, Table 4), while the association between non-comorbid CMDS and continuous MHSU was fully attenuated.

Compared to non-comorbid CMDS, the comorbidity group had over three times greater relative risk of continuous MHSU (RRR=3.17, 95% CI: 1.17-8.58,  $p=0.023$ , not shown).

Both non-comorbid CMDS and CMDS-physical comorbidity were associated with greater relative risk of discontinued MHSU. Although effect sizes suggested that the non-comorbid group was at greater risk of discontinued MHSU than the comorbidity group, post-hoc tests found no statistical difference (RRR=1.64, 95% CI: 0.72-3.75,  $p=0.24$ , not shown). Neither non-comorbid CMDS nor CMDS-physical comorbidity were associated with SELCoH 2 initiated MHSU.

CMDS at follow-up was the strongest covariate of continuous and SELCoH 2 initiated MHSU, indicating that mental health at SELCoH 2 was a determinant of SELCoH 2 service uptake, independently of mental health at SELCoH 1. Suicidal ideation and perceived functioning limitations remained strongly associated with continuous MHSU. An inverse U-trend was observed such that those reporting moderate, but not high, somatic symptom severity were at increased relative risk of SELCoH 2 initiated MHSU, compared to low severity. Stressful life events were associated with greater relative risk of continuous MHSU. Low education was associated with lower relative risk of placement in all MHSU outcome categories; indicating that low education was associated with greater risk of no MHSU at either time-point.

**Table 4** Associations of comorbidity and MHSU patterns over time, adjusting for explanatory factors

	No MHSU (n=785)	Discontinued MHSU (n=99)	SELCoH 2 initiated MHSU (n=81)	Continuous MHSU <sup>a</sup> (n=87)
	RRR	RRR (95% CI)	RRR (95% CI)	RRR (95% CI)
<b>Comorbidity</b>				
No CMDS		1.00	1.00	1.00
Non-comorbid CMDS	1.00	5.16*** (2.73-9.76)	0.77 (0.29-2.01)	1.08 (0.40-2.93)
CMDS-physical comorbidity	1.00	3.00* (1.28-7.05)	2.04 (0.92-4.53)	3.23** (1.39-7.51)
<b>Need indicators</b>				
CMDS at follow-up	1.00	1.75 (0.87-3.51)	7.42*** (4.05-13.61)	7.75*** (3.88-15.48)
Suicidal ideation	1.00	2.53 (0.99-6.46)	0.91 (0.26-3.19)	3.56** (1.45-8.71)
<b>Somatic symptom severity</b>				
Low		1.00	1.00	1.00
Moderate	1.00	0.74 (0.40-1.34)	2.52** (1.35-4.68)	1.80 (0.85-3.80)
High	1.00	1.10 (0.47-2.54)	1.62 (0.70-3.72)	1.08 (0.41-2.84)
Perceived functioning limitations due to emotional health	1.00	1.10 (0.61-1.97)	0.73 (0.34-1.57)	2.46** (1.25-4.86)
<b>Predisposing factors</b>				
Female	1.00	1.68 (0.96-2.95)	1.39 (0.80-2.42)	0.85 (0.46-1.57)
Age (continuous)	1.00	0.99 (0.97-1.02)	1.00 (0.98-1.02)	0.98 (0.96-1.01)
<b>Relationship status</b>				
Married/Cohabiting		1.00	1.00	1.00
Single	1.00	0.84 (0.47-1.50)	1.00 (0.49-2.06)	1.24 (0.63-2.42)
Divorced/Separated/Widowed	1.00	0.66 (0.27-1.62)	0.94 (0.42-2.09)	1.64 (0.70-3.84)
Non-White ethnicity	1.00	0.61 (0.34-1.10)	0.71 (0.36-1.40)	0.51 (0.25-1.04)
<b>Migrant status</b>				
UK born		1.00	1.00	1.00
≤10 years in the UK	1.00	1.46 (0.72-2.99)	1.46 (0.64-3.32)	1.78 (0.79-4.02)
>10 years in the UK	1.00	0.92 (0.46-1.83)	1.77 (0.84-3.73)	1.45 (0.71-2.97)
<b>Education</b>				

No qualifications	1.00	0.25*	(0.06-0.99)	0.37	(0.12-1.14)	0.27*	(0.09-0.80)
GCSE	1.00	1.10	(0.53-2.25)	0.60	(0.23-1.58)	0.39	(0.15-1.01)
A-level	1.00	0.95	(0.51-1.76)	0.75	(0.37-1.50)	0.73	(0.35-1.48)
Degree or above		1.00		1.00		1.00	
Adverse employment conditions <sup>d</sup>	1.00	1.39	(0.76-2.54)	1.59	(0.86-2.94)	1.66	(0.89-3.08)
Benefits receipt <sup>c</sup>	1.00	0.79	(0.43-1.45)	0.88	(0.47-1.67)	1.38	(0.71-2.68)
<b>Enabling factors</b>							
Social network size							
2 or less		1.00		1.00		1.00	
3-4	1.00	0.53	(0.22-1.28)	0.86	(0.26-2.87)	1.79	(0.59-5.41)
5 or more	1.00	0.67	(0.30-1.51)	1.58	(0.47-5.31)	2.09	(0.65-6.72)
Stressful life events							
0-2		1.00		1.00		1.00	
3-5	1.00	1.45	(0.67-3.13)	0.87	(0.42-1.79)	3.12*	(1.01-9.68)
6 or more	1.00	2.16	(0.97-4.81)	0.74	(0.33-1.64)	4.31*	(1.29-14.40)

\* $<0.05$ ; \*\* $<0.01$ ; \*\*\* $<0.001$ ; MHSU, mental health service use; RRR, relative risk ratio; CI, confidence interval; CMDS, common mental disorder symptoms; 'No MHSU' (n=884) represents the reference category in the multinomial regression (not shown).

<sup>a</sup> Refers to MHSU at both time-points

<sup>b</sup> Working aged (<65) persons moving out of or persistently out of employment or education between SELCoH 1 and 2.

<sup>c</sup> Benefits are non-health related

"No MHSU" represent the reference category in the multinomial regression.

## Discussion

In support of hypothesis 1, people with CMDS-physical comorbidity made more persistent use of mental health services than those with CMDS without physical comorbidity. This is consistent with previous community studies testing the association between mental-physical comorbidity and MHSU [3,29]. However, we found a stronger association ( $RRR=3.23$ ) compared to past cross-sectional studies (effect sizes  $<2$ ), which may point to the importance of considering the longitudinal association between chronic physical conditions and MHSU. A prospective study using Danish registers and linked survey data reported strong associations between self-reported mental stress and MHSU [30]. For example the highest vs lowest quintile of stress had an adjusted incidence rate ratio of 4.96 for GP talk therapy. Stratifying this analysis by multimorbidity did not modify associations, suggesting that the impact of mental stress on MHSU was constant at all levels of multimorbidity, contrasting the results from our study. However, important methodological differences, such as the analytical approach and the conceptualisation and measurement of comorbidity and MHSU could account for these discrepancies. Results from a prospective Dutch population study using more comparable methods showed that the association between physical illness and continuous MHSU was fully attenuated in their adjusted model [31]. Since that study examined mental and physical illness separately, our study might indicate that prospective associations might be captured more comprehensively by jointly considering mental and physical illness.

### *Strengths and limitations*

This study makes important contributions to the literature, as the first study to examine longitudinal MHSU among those with and without mental-physical comorbidity in a community sample, as opposed to patient samples. The study also considered a comprehensive range of predisposing and enabling factors that is typically unavailable in



patient samples. Another strength is its comprehensive assessment of various need indicators including clinical severity, functioning, and self-reported health.

Some limitations with respect to measurement and study design ought to be raised. Whilst self-report assessments of physical illness have been shown to have high reliability when validated against health records, specifically for ascertaining mental-physical comorbidity [32], the possibility remains that self-report may have produced an inaccurate estimate of comorbidity. With regards to mental health care covariates, respondents were not directly asked about perceived need which may have explained differences between the comorbid and non-comorbid groups. Further, the MHSU measure captured any use over the past year, but not MHSU quantity or fluctuations within the time-intervals between the surveys. It is therefore possible that MHSU occurred but was not captured between these time points. In addition, sample size did not allow for exploring transitions between primary and secondary care. This is necessary in order to understand the reasons for continuous MHSU and is an important area for future research. Conceptual overlap between comorbidity and the “need” indicators is also a possible limitation; however analyses illustrated that while the variables were related, they represented distinct concepts (Table A1, Appendix A).

### *The role of need indicators*

CMDS at follow-up and suicidal ideation were strongly associated with continuous MHSU. This is consistent with previous research showing that MHSU increases with clinical severity [5,33]. Independent of these “clinical need” indicators, perceived functioning limitations due to emotional health also demonstrated a strong association with continuous MHSU. This finding is supported by research indicating that perceived functional impairments mediate the association between mental disorders and MHSU [34]. It is likely that the specific attribution to mental health explains why this functioning impairment was associated with continuous MHSU, while daily functioning problems were not.

Since mental illness severity and perceived health and functioning tends to be poorer among those with mental-physical comorbidities [7], we expected that the associations between comorbidity and MHSU could be driven by increased “need”. Surprisingly, the hypothesis that greater “need” would fully account for this association was not supported. We discuss possible explanations of this finding below.

### *Interpretation of the findings*

“Need” for mental health services can be considered as the imbalance between the severity of a mental illness and an individual’s resources to manage it [35]. This notion of “need” is supported by evidence indicating that people prefer to self-manage mental illness if possible [36], and that those who chose not use services rely heavily on social networks [37]. We observed that comorbidity increased “need” by increasing mental illness severity and decreasing functioning; however, our findings also suggest that comorbidity might increase “need” by compromising the resources to manage mental illness. Previous research has indeed found that self-management of health can be particularly challenging for those with comorbid conditions. A qualitative study of patients with comorbidity and their practitioners identified the “capacity” to self-manage health as a major theme [38]. Specifically, respondents described how the capacity to self-manage health was compromised by the burden of day-to-day struggles to cope with illness, disability, and social isolation. This was compounded in the context of deprivation, with some reporting worries over their financial situation and lack of material resources as important barriers to self-managing health. It therefore seems plausible that “need” for mental health services changes in the context of comorbid chronic physical conditions, by affecting the capacity to self-manage mental health. This might be particularly relevant in deprived areas, such as South East London, where individual and community resources are already sparse [39].

Our findings may also reflect “exposure-effects”, whereby regular interactions with healthcare enable mental health service access for persons with physical conditions. While such “exposure-effects” have been observed for treatment initiation[8], our study shows that greater “exposure” might also facilitate treatment continuity. These longitudinal exposure-effects might operate through regular opportunities to adapt mental health treatments according to service users’ preferences. If comorbidity facilitates addressing treatment concerns, this might make service users more likely to adhere to it [40]. Greater service “exposure” could also lead to more trusting relationships with healthcare professionals, thus enabling continuity of care by overcoming “relational barriers” [41]. The recent rise in mental health services targeting patients with specific physical conditions may also facilitate continuous MHSU.

Furthermore, people with comorbid physical illness, may be more likely to perceive their problems as health-related and seek formal help. Those with non-comorbid mental illnesses might be more reluctant to seek help because they perceive their mental health problems related to ‘problems of living’ rather than health problems [42].

### ***“Unmet need”***

Whilst people with comorbidity were more likely to use services, over 40% of people with comorbidity and 55% of people with non-comorbid CMDS made no use of services at either time-point. These figures are consistent with UK and European population based estimates, and might indicate an extensive “unmet need” [23,43]. Even if some are likely to spontaneously remit, this still leaves a substantial proportion of people with mental health problems without potentially beneficial care. Given that a proportion of non-service users will choose not to use services, it is neither feasible nor necessary to aim to treat all with “unmet need”. Some may, choose to use informal sources of help instead for reasons of convenience and existing relationships [44]. Others who face complex social problems may

feel they would gain greater benefits from contacts with services other than healthcare in the first instance. Whether these sources of help outside of mental healthcare services are effective is still not known. It is therefore essential that the limited healthcare resources available are prioritised to those who need services the most, and recognise the clinical and non-clinical barriers that may prevent service use.

### *Policy implications*

The availability of mental health treatments has substantially improved over the past couple of decades, but the prevalence of CMDs remains high. This may partially be due to the failure to optimally target treatments to those in greatest need [45]. Our results indicate that those with mental-physical comorbidity constitute a group with greater need that ought to be prioritised. However, how services should be delivered to optimally treat this group is currently unclear. A growing evidence base indicates that integrated care approaches which streamline mental and physical healthcare needs can be effective; however empirical studies are limited in universal healthcare settings such as the UK [46,47]. Nevertheless, findings from a randomised control trial of primary care practices in the UK has shown that low intensity psychological therapy delivered by practice nurses both effectively reduced depressive symptoms in patients with mental-physical comorbidity and was cost effective [48,49]. Given that chronic diseases need ongoing monitoring and that CMDs often recur throughout the life course, it is also important to ensure continuity of care in the implementation of integrated care approaches.

To deliver this type of care, broader healthcare changes are likely to be needed. Primary care represents a natural place to address comorbidity, however, the disease-specific focus of current practice may inhibit GPs from effectively doing so. Shifting primary care performance targets away from disease-specific goals towards more person-oriented ones, might facilitate the management of comorbid mental-physical illness in primary care [50].

***Conclusion***

Substantial differences in continuous MHSU were found between comorbid and non-comorbid groups, suggesting that previous cross-sectional studies may have under-estimated the role of physical comorbidity in MHSU. Clinical need was an important determinant of continuous MHSU, but we also found that perceived functioning limitations due to mental health were independently associated with more than a two-fold increased risk of continuous MHSU. This suggests that perceived as well as clinically observed needs are important to identify and address. Importantly, comorbidity was associated with this increased service use over time, independently of “need” indicators including psychiatric symptoms, functioning and self-rated health. This suggests that comorbidity captures an aspect of “patient complexity” which the other “need” indicators failed to do on their own. Physical comorbidity should therefore be incorporated into service developments, such that it is considered a “need” indicator in itself.

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## Competing interests

The authors have no competing interests to report.

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## Appendix A

Table A1 Unadjusted associations between comorbidity and need indicators <sup>a</sup>

Comorbidity	n	%	RRR /OR	n	%	RRR /OR	(95% CI)	n	%	RRR	(95% CI)
CMDS at follow-up											
	No			Yes							
No CMDS	680	87.2		101	12.8	1.00					
Non-comorbid CMDS	67	53.8	1.00	56	46.2	5.83**	(3.77-9.02)				
CMDS-physical comorbidity	44	30.5	1.00	98	69.5	15.46 <sup>D**</sup>	(10.11-23.63)				
Suicidal ideation											
	No			Yes							
No CMDS	766	98.0		15	2.0	1.00					
Non-comorbid CMDS	110	88.8	1.00	13	11.2	6.22**	(2.81-13.79)				
CMDS-physical comorbidity	112	78.6	1.00	29	21.4	13.47 <sup>D**</sup>	(6.96-26.05)				
Somatic symptom severity											
	Low <sup>c</sup>			Moderate				High			
No CMDS	565	73.1		176	22.3	1.00		37	4.6	1.00	
Non-comorbid CMDS	41	34.5	1.00	57	44.6	4.22**	(2.70-6.58)	25	20.9	9.64**	(5.03-18.50)
CMDS-physical comorbidity	15	10.8	1.00	46	31.8	9.63 <sup>D**</sup>	(5.20-17.82)	80	57.4	84.60 <sup>D**</sup>	(43.58-164.24)
Self-rated health											
	Good/Very good/Excellent			Fair/poor							
No CMDS	706	90.8		72	9.2	1.00					
Non-comorbid CMDS	98	80.1	1.00	25	19.9	2.46**	(1.49-4.05)				
CMDS-physical comorbidity	61	43.4	1.00	80	56.6	12.89 <sup>D**</sup>	(8.39-19.79)				
Daily functioning problems											
	No			Yes							
No CMDS	757	97.6		21	2.4	1.00					
Non-comorbid CMDS	116	93.8	1.00	7	6.2	2.67*	(1.09-6.51)				

CMDS-physical comorbidity	110	78.6	1.00	31	21.4	11.00 <sup>b**</sup>	(6.08-19.92)
	Perceived functioning limitations due to emotional health						
	0-1			2 or more			
No CMDS	732	94.2		46	5.8	1.00	
Non-comorbid CMDS	65	52.0	1.00	58	48.0	15.12 <sup>**</sup>	(9.18-24.90)
CMDS-physical comorbidity	70	49.9	1.00	70	50.1	16.41 <sup>**</sup>	(10.33-26.08)

\* $<0.05$ ; \*\* $<0.001$ ; RRR, relative risk ratio; OR, odds ratio; CI, confidence interval; CMDS, common mental disorder symptoms;

<sup>a</sup>Regression analyses are logistic regressions, with the exception of somatic symptom severity which were tested in multinomial regression models.

<sup>b</sup>The contrasts between the non-comorbid CMDS and the CMDS -physical comorbidity groups were significant at  $p<0.05$ .

<sup>c</sup>Represents the reference category in the multinomial regression.



**Table A2** Unadjusted and block-adjusted associations between need indicators with MHSU patterns

	No MHSU (n=785)	Discontinued MHSU (n=99)	SELCoH 2 initiated MHSU (n=81)	Continuous MHSU <sup>a</sup> (n=87)
	RRR	RRR (96% CI)	RRR (96% CI)	RRR (96% CI)
<b>Unadjusted associations</b>				
CMDS at follow-up	1.00	3.98*** (2.45-6.48)	7.58*** (4.54-12.65)	17.84*** (10.40-30.60)
Suicidal ideation	1.00	4.79*** (2.25-10.18)	1.53 (0.50-4.66)	10.87*** (5.46-21.65)
Somatic symptom severity				
Low		1.00	1.00	1.00
Moderate	1.00	1.54 (0.93-2.54)	3.05*** (1.78-5.22)	3.84*** (2.16-6.84)
High	1.00	3.52*** (2.02-6.13)	4.00*** (2.09-7.65)	9.46*** (5.19-17.23)
Fair/poor Self-rated health	1.00	2.71*** (1.60-4.58)	3.08*** (1.79-5.29)	4.35*** (2.64-7.19)
2 or more Daily functioning problems	1.00	1.78 (0.75-4.27)	2.01 (0.81-4.99)	4.67*** (2.37-9.21)
Perceived functioning limitations due to emotional health	1.00	3.25*** (1.95-5.40)	1.76 (0.93-3.31)	10.22*** (6.12-17.04)
<b>Block-adjusted associations</b>				
CMDS at follow-up	1.00	2.53** (1.42-4.51)	6.04*** (3.47-10.50)	8.77*** (4.57-16.84)
Suicidal ideation	1.00	2.42* (1.05-5.60)	0.77 (0.24-2.46)	3.39** (1.43-8.02)
Somatic symptom severity				
Low		1.00	1.00	1.00
Moderate	1.00	1.10 (0.64-1.89)	2.10* (1.18-3.75)	1.80 (0.88-3.65)
High	1.00	1.50 (0.72-3.12)	1.67 (0.79-3.53)	1.61 (0.74-3.52)
Fair/poor self-rated health		1.48 (0.80-2.73)	1.52 (0.78-2.95)	1.04 (0.52-2.06)
2 or more daily functioning problems	1.00	0.80 (0.28-2.27)	0.73 (0.25-2.13)	1.44 (0.61-3.43)
Perceived functioning limitations due to emotional health	1.00	1.84* (1.03-3.29)	0.81 (0.41-1.62)	3.42*** (1.86-6.28)

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ ; MHSU; mental health service use; CI, confidence interval; RRR, relative risk ratio; CMDS, common mental disorder symptoms;

“No MHSU” represents the reference category in the multinomial regression.

<sup>a</sup> MHSU at both time-points

**Conflicts of interest**

The authors have no competing interests to report.

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**Highlights**

- Mental-physical comorbidity is associated with continuous mental health service use
- Comprehensive adjustments for “need” did not fully account for this association
- Mental-physical comorbidity may therefore represent a “need” indicator in itself