

## **Effectiveness of a community-based self-care promoting program for community-dwelling older adults: A randomized controlled trial**

### **Abstract**

**Background:** The existing health care system tends to be focused on acute diseases or patients with high levels of need, and is not ideal for meeting the challenges of an aging population. This study introduced a community-based self-care promoting program for community-dwelling older adults, and tested its effects on maintaining health.

**Objectives:** To determine whether the program can increase self-efficacy, quality of life, basic and instrumental activities of daily living, and medication adherence, while reducing health service utilization for community-dwelling older adults.

**Methods:** Researchers randomly assigned 457 older adults to receive the intervention ( $n=230$ ) or be controls ( $n=227$ ). The intervention included assessment and education of self-care and health-promoting behaviors, co-produced care planning, and self-efficacy enhancing components supported by a health-social partnership. The control group received placebo social calls. The outcomes were measured at pre-intervention (T1) and three months post-intervention (T2).

**Results:** Analysis showed that the intervention group had a significantly higher score in self-efficacy ( $p = .049$ ), ADL ( $p = .012$ ), IADL ( $p = .021$ ) and the physical components of quality of life ( $p < .001$ ) at T2 than at T1. The program also significantly improved the mental component of quality of life ( $p < .001$ ) and medication adherence ( $p < .001$ ), as well as reducing the total number of health service attendances compared to the control group ( $p = .016$ ).

**Conclusion:** The program can help enhance the self-efficacy of community-dwelling older adults towards self-care, which may in turn enable them to maintain optimal well-being while remaining in the community.

Keywords: self-care, aging in place, self-efficacy, health-social partnership, older people

### **Key points:**

- The health-social partnership plays an important role in meeting the long-term health and social needs of older adults.
- This study shows that the implementation of a community-based self-care program can improve quality of life and medication adherence, and reduce health service utilizations.
- Our findings support the importance of strong collaborative practice in the production of effects at the microsystem level.

## **Introduction**

Self-care is an integral behavior that older adults perform to maintain their ability in activities, but one can also go beyond the daily activity level by taking healthy measures to optimize well-being. Many self-care programs are either disease- or hospital-based, implying that they provide supportive transitional programs to older adults recently discharged from hospital or those with complex and intensive needs. These programs, targeted at frail older adults, tend to focus on multi-morbid conditions and impairment in physical functioning [1]. Older adults who have chronic diseases but are functionally independent rarely receive attention. In fact, they often encounter health and social issues in their daily living, such as difficulty adhering to a medication regimen and poor knowledge of available health care and social services, similar to frail older adults [2]. This group of older adults warrants more attention from a community integrated team that includes health and social partners, to maintain their stay in the community and prevent the possible decline of functional status. The concept of the health-social partnership has been widely promoted, but its implementation is still not fully developed or grounded in practice due to a lack of commitment at the management and organizational levels [3]. In order to adequately meet the long-term health and social needs of older adults, researchers must put the health-social partnership into practice and develop a proactive and sustainable self-care supportive program in the community.

This study adopts the concept of self-care, referring to the promotion of healthy measures to optimize well-being, among older adults dwelling in the community. This means an alternative

practice that is distinct from the existing orientation towards an acute care healthcare delivery system. A health-social partnership team in the community promotes aging in place. A three-month intervention program, constructed based on the conceptual framework, was introduced in this study. We hypothesized that participants receiving a community-based self-care promoting program would demonstrate greater improvement in self-efficacy, quality of life, basic and instrumental activities of daily living, and medication adherence, as well as having lower health service utilization compared to those receiving usual care.

## **Methods**

The present study was a randomized controlled trial conducted in multiple districts in Hong Kong. The recruitment and data collection of the study took a total of 22 months, from April 2016 to February 2018. The trial is reported according to the CONSORT statement for parallel groups [4]. Older adults were eligible if they were aged 60 or over and cognitively competent to perform self-care behaviors, based on a Chinese version Mini-Mental Status Examination score greater or equal to 18 [5]. Participants were excluded if they were bed bound, not reachable by phone, or not living at home, and already engaged in structured health or social programs. A research assistant who was not involved in the intervention recruited participants from a membership list provided by the district community center. She would call an off-site research assistant who had an assignment schedule generated from the software Research Randomizer [6]. The group assignments were sealed and opened sequentially at the time of randomization. The research assistant who collected the data was blinded, but the participants and healthcare

providers were not. Approval was obtained from the ethics sub-committee of the study university.

### Intervention group

The providers included a health-social care team led by a registered nurse case manager (NCM) and supported by community workers (CW) and social workers (SW). A three-month program was arranged, the first involving a more intensive arrangement that was treated as a loading dose, followed by the second and third months as a maintenance dose. Supplementary figure 1 shows the program flow (available in Age and Ageing online).

The construction of intervention components in this study was based on the three levels developed in Bronfenbrenner's ecological theory: the microsystem, mesosystem, and macrosystem levels [7]. The microsystem level comprises activities at the individual level involving the case manager and the older adults. Bandura's social cognitive theory was adopted to build up clients' self-care confidence for health management, and the NCM delivered self-efficacy enhancing interventions to the clients [8]. The mesosystem level focuses on the interrelationships between older adults and the people who have close connections with them. During the first home visit, the NCM conducted a comprehensive client assessment using the Omaha system [9], then taught them to perform self-care in health maintenance, including medication adherence and health-promoting activities. The NCM engaged the clients in co-developing realistic, achievable goals. The NCM and CW provided telephone follow up and

home visits to evaluate the progress of the older adults, and made referrals for further support when necessary.

The intervention in this study did not rely on NCM and CW only. At the macro-system level, a health-social partnership structure that involved a CW, a SW, and community centers was formed to support the NCM at the mesosystem level, in turn strengthening the self-care ability of clients at the microsystem level. The community resources embedded in the health-social partnership, operated by the SW, were made available for use if the NCM found them appropriate in helping to achieve the client goal of optimal well-being. The partnership among the health-social team members was underpinned by Gittel's relational coordination theory, which advocates frequent discussion of clients' progress [10] governed by standardized protocols for referral and documentation. Table 1 displays how the strategies were developed according to a conceptual guide.

#### Control group

Clients in this group received a monthly placebo social call from trained students to rule out possible social effects.

#### Measurements

The primary outcome was self-efficacy. The Chinese version of the General Self-efficacy Scale (CGSE) was used to measure participants' self-efficacy level (range 10-40) [11].

Secondary outcome measures included quality of life (12-item Short Form Health Survey version 2—Chinese (HK) version [3]; range 0-100), activities of daily living (ADL) (Modified Barthel Index—Chinese version [12]; range 0-100), instrumental activities of daily living (IADL) (the Lawton Instrumental Activities of Daily Living scale—Chinese version [13]; range 0-27), medication adherence (Adherence to Refills and Medications Scale [14]; range 12-48, the lower the better), and health service utilization. All questionnaires adopted in the current study reported satisfactory validity and reliability. Data collected at baseline (T1) and at the three month, immediate post-intervention point (T2) are reported.

## Analyses

The study adopted generalized estimating equations (GEEs) to determine the differences or changes between the intervention and control groups (between-group effects), as well as the within-group (time) and interaction (group x time) effects. Linear link function was used for continuous outcomes, including self-efficacy, quality of life, ADL, IADL, and medication adherence. Poisson link function was employed for count data such as health service utilization outcome. Unstructured working correlation matrix was adopted to indicate the same spacing between measurements for each subject. Adjusted GEE models were employed to evaluate each outcome variable. The confounding variables were controlled in the analysis process to ensure unbiased effect estimation. Intention-to-treat (ITT) was considered the primary analysis.

## Results

We screened 843 community-dwelling older adults for eligibility, of whom 457 eligible participants agreed to join the program and were randomized into either intervention or control groups. Figure 1 shows the CONSORT diagram.

#### Baseline characteristics

Most of the participants were female (75.1%). The mean age was 78, with a standard deviation of 7.92. Many said they took care of themselves (89.5%); others were attended by their children (44.4%), friends (2.2%), or neighbors (2.2%). There were no significant differences in demographic and clinical data between the intervention and control groups. The intervention dose volume provided is shown in Supplementary Table 1 (available in Age and Ageing online).

#### Primary outcome—Self-efficacy

Statistically significant time effects were found in self-efficacy level (Wald  $\chi^2 = 3.72$ ,  $p = .049$ ), with a higher average mean difference between baseline and three months in the intervention group compared with the control group. No significant group (Wald  $\chi^2 = 2.00$ ,  $p = .16$ ) or interaction effects were detected between groups and time (Wald  $\chi^2 = 3.77$ ,  $p = .052$ ).

#### Secondary outcomes

##### Quality of life (QoL)

There were statistically significant between-group and group-time interaction effects on the mental component of QoL score (MCS) (Wald  $\chi^2 = 13.7$ ,  $p < .001$ ; Wald  $\chi^2 = 6.63$ ,  $p = .01$ ) but not on the physical component of QoL score (PCS).

#### Activities of daily living (ADL)

When compared with T1, the ADL scores in both groups increased over time (Wald  $\chi^2 = 6.29$ ,  $p = .012$ ). No statistically significant between-group or group-time interaction effects were noted.

#### Instrumental activities of daily living (IADL)

Significant time effects were found between T1 and T2 in the IADL scores. Relative to the baseline scores, mean IADL scores increased by 0.7 and 0.5 respectively in the intervention and control groups. However, there were no statistically significant between-group or group-time interaction effects.

#### Medication adherence

The GEE model showed that there were significant between-group (Wald  $\chi^2 = 13.8$ ,  $p < .001$ ), time (Wald  $\chi^2 = 7.37$ ,  $p = .007$ ), and group-time interaction effects (Wald  $\chi^2 = 10.6$ ,  $p = .001$ ), with the intervention group having better scores for medication adherence.



## Health service utilization

Outcomes of health service utilization included total general out-patient department (GOPD), general practitioner (GP), and emergency department (ED) visits, and number of hospital admissions. The program significantly reduced total health service attendances compared to the control group (Wald  $\chi^2 = 0.15$ ,  $p = .016$ ). Participants in the intervention group were 33% less likely to attend and utilize health services (OR: 0.67; 95 percent CI: 0.52-0.93,  $p = .016$ ). Fewer hospital admissions were also noted in the intervention group than in the control group (OR: 0.61; 95 percent CI: -1.31-0.27,  $p = .19$ ), but the difference was not significant. Examination of mean and p-value for time effects confirmed that both groups reduced attendances from the baseline (56.3% vs 33.3%), but the group-by-time interaction indicated that the intervention had a greater impact on reducing total health service attendances (Wald  $\chi^2 = 1.53$ ,  $p = .016$ ). The results for all outcomes are shown in table 2.

## Discussion

A substantial body of empirical research has tried to integrate the concept of aging in place into practice. However, owing to frequent hospital use, researchers are inclined to design programs for frail older adults with multiple chronic diseases, rather than for relatively healthy ones [15]. A survey revealed that 35% of older adults who lived independently in the community did not possess the necessary skills or knowledge to perform self-care or receive sufficient support when needed [16]. It is crucial to support them in the community in order to prevent adverse effects that can lead prematurely to dependent living. To our knowledge, the present study is

one of few that empower and motivate community-dwelling older adults to master self-care health management by adopting a health-social partnership network in the community. The results indicate that this community-based program was able to improve self-efficacy, ADL, IADL and medication adherence, enhance QoL, and reduce total health service attendances.

Previous preventive self-care programs have produced inconclusive evidence of their effectiveness. Bleijenberg implemented comprehensive geriatric assessment and care planning with independent community-dwelling older adults [17]. The intervention group showed no significant differences in quality of life or health services utilization compared to the control group. Another program taught community-dwelling older adults the necessary knowledge to follow therapeutic regimens and recognize chronic diseases [18]. Consistent with our results, this study improved QoL in the intervention group, but their adherence rate to therapeutic regimens was found to be low. Non-adherence to lifestyle change and self-care seems to be a major problem for community-dwelling older adults. A systematic review reported that half of the studies had difficulty promoting self-care adherence to community-dwelling older adults because most were unwilling to follow the recommended health-promoting behaviors for what they considered to be merely a preventive measure with no immediate visible effects [19].

The strength of this study was that it integrated and incorporated the intervention components used to enhance compliance with health-promoting self-care behaviors at the three levels depicted in ecological theory. At the microsystem level, the NCM increased participants' self-efficacy level towards self-care using Bandura's self-efficacy theory. Bandura asserted that developing self-efficacy not only was useful in influencing ability to engage in behavior, but also activated initiation and motivation to actually execute and comply with the regimen. In the

mesosystem, the NCM engaged participants to sustain the co-produced plan. In the macrosystem, this program provided a supportive health-social network enabling older adults to obtain resources in the community without needing to seek help in hospital [3]. The high recruitment and low attrition rates (i.e. 11%, which is less than the average of 15-20% [3]) in our study reflected that the health-social partnership was taking effect and participants were keen to participate.

At the completion of this study, with participants' consent, health-social records were transferred to the community centers for continued follow-up. Keeping these profiles in the community provided several benefits at both individual and community levels. At the individual level, keeping personal health information can help the health-social care team to plan and maintain an individualized treatment regimen. It also helps to create a first health-social care contact point for older adults in case they have to seek help at the local community center. Community centers can collaborate with multiple health stakeholders to provide community health services aiming to address various health needs [20], continuous health surveillance and preventive self-care for older adults dwelling in the community [21].

While many studies have acknowledged the importance of health-social partnerships, providers in the team tended to work in silos, with no sharing of client records, unclear delineation of responsibilities, and few interdisciplinary meetings due to shortage of personnel and lack of support from professional organizations [22]. The health and social service departments in Hong Kong and elsewhere are highly compartmentalized, hindering the provision of comprehensive care and generates unnecessary duplication of services [23]. Even in countries that have introduced structural reforms for mandatory partnerships, such as Scotland and

Norway, the actual process was reported to be poor [24]. Collaborative efforts at different levels, interlinking and supporting each other, are essential in order to achieve sustainability [25]. Our findings confirm the importance of strong collaborative practice at various levels to facilitate the effects of aging in place in the community.

The current study built a model with evidence for supporting aging in place in the community. Future studies are encouraged to use e-health applications to replace some of the human contact time and test its cost-effectiveness.

There were several limitations in this study. Firstly, it only measured outcomes immediately after the completion of the program, making the sustained effect of this program uncertain. Secondly, this study is not generalizable to a wider aging population, since the sample excluded subjects who were frail or bedbound, and those with dementia. Last, but not least, this study did not measure the beneficial effects to all providers involved in the coordination of care. By exploring their experiences, future studies can strengthen the relationships in the team and build a higher-performance working model to deliver more quality outcomes for participants.

## **Conclusion**

Health programs introduced at the community level tend to be overly health-focused, neglecting the importance of the social factors that may affect health. This study tried to address this gap by developing a community-based self-care promoting program supported by a health-social partnership framework for community-dwelling older adults. The findings demonstrate that the program enhanced older adults' self-efficacy, QoL, ADL, IADL, and

medication adherence, and reduced their health service utilization. This study provides a reference framework for designing health and social care to promote aging in place.

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### **Declaration of Conflicts of Interest:**

The authors have no conflicts of interest.

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Figure 1 CONSORT diagram

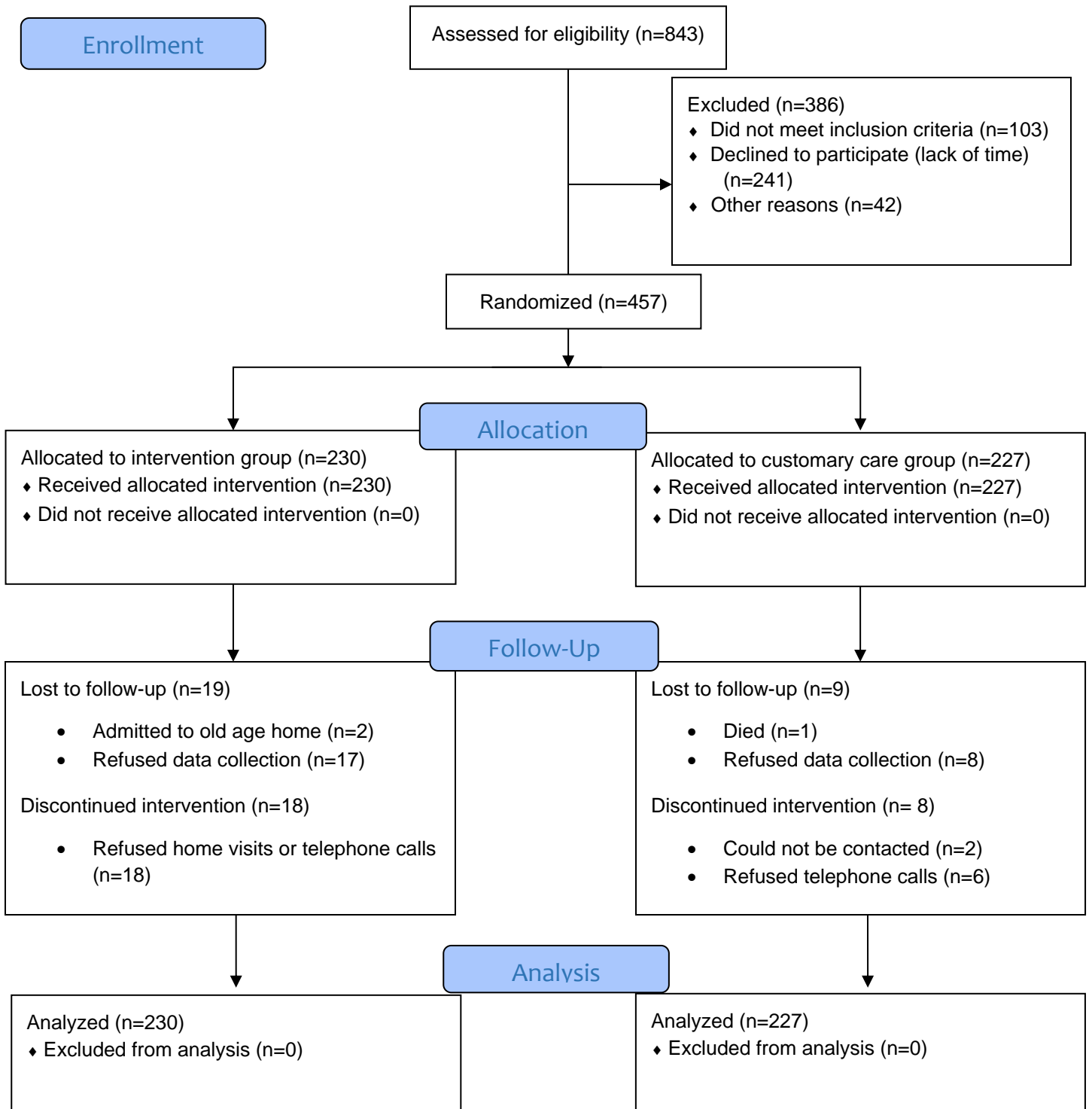


Table 1 Interventions in study and control groups according to conceptual framework

Ecological model	Theory	Content	Strategies
Microsystem	Bandura's social cognitive theory	Mastery experience	<ul style="list-style-type: none"> <li>■ Explore past successful experience in handling health care issues</li> <li>■ Remind them of helpful strategies</li> </ul>
		Vicarious experience	<ul style="list-style-type: none"> <li>■ Provide pictures, newspaper clips or video of celebrities who have successfully adhered to self-care behavior</li> </ul>
		Social and verbal persuasion	<ul style="list-style-type: none"> <li>■ Give verbal encouragement</li> </ul>
		Physiological and affective states	<ul style="list-style-type: none"> <li>■ Monitor and write down physiological status, i.e. vital signs, regularly on a booklet</li> <li>■ Encourage to state concern about their work</li> </ul>
Mesosystem	Omaha system	Problem classification scheme	<ul style="list-style-type: none"> <li>▪ Assess four domains including environment, psychosocial, physiological and health-related behavior</li> </ul>
		Intervention scheme	<ul style="list-style-type: none"> <li>▪ Set contract goals and formulate an individual care plan with clients</li> <li>▪ Provide information of health-promoting and self-care activities</li> </ul>
		Problem rating scale for outcomes	<ul style="list-style-type: none"> <li>▪ Evaluate knowledge, behavior and status after implementing the interventions</li> </ul>

Macrosystem	Gittel's relational coordination theory	Routines	<input type="checkbox"/> Standardized protocol
		Information systems	<input type="checkbox"/> Referral form and record
		Meetings	<input type="checkbox"/> Bimonthly case conference (frequency can be negotiated)
		Boundary spanner	<input type="checkbox"/> Nurse case manager can provide strong leadership and help to integrate others' work
Control group	/	Placebo social call	<input type="checkbox"/> The social questions, such as "Where are you going tomorrow?" and "What is your favorite TV program?" were set in the protocol

Table 2 Results in adjusted models

Variables		Adjusted Model		
		$\beta$ (OR)	95% CI	<i>p</i>
Self-efficacy				
	Group	0.90	(-0.33, 2.06)	.16
	Time	-0.80	(-1.70, -0.010)	.049*
	G*T	-1.30	(-2.63, 0.010)	.052
	G*T	(1.04)	(0.78, 1.38)	.79
BADL				
	Group	-0.60	(-1.44, 0.16)	.12
	Time	-0.90	(-1.55, -0.19)	.012*
	G*T	0.20	(-0.72, 1.13)	.67
IADL				
	Group	-0.60	(-1.16, 0.060)	.077
	Time	-0.50	(-0.070, 5.30)	.021*
	G*T	-0.20	(-0.73, 0.42)	.59
Medication adherence				
	Group	-0.80	(-1.20, -0.37)	< .001*
	Time	0.60	(0.16, 0.97)	.007*
	G*T	1.00	(0.40, 1.59)	.001*
Quality of life				
	PCS			
	Group	-1.20	(-2.87, 0.40)	.14
	Time	-3.70	(-4.97, -2.44)	< .001*
	G*T	0.20	(-1.52, 1.92)	.82
	MCS			
	Group	3.90	(1.86, 6.03)	< .001*
	Time	-0.30	(-1.91, 1.25)	.68
	G*T	-3.00	(-5.33, -0.72)	.010*
GOPD visit				
	Group	(0.61)	(0.33, 1.23)	.18
	Time	(1.82)	(1.04, 3.03)	.036*
	G*T	(1.49)	(0.63, 3.35)	.38
GP visit				

	Group	(0.74)	(0.52, 1.06)	.10
	Time	(1.22)	(0.94, 1.72)	.12
	G*T	(1.49)	(0.95, 2.20)	.082
ED visit				
	Group	(0.82)	(0.39, 1.57)	.48
	Time	(1.49)	(0.87, 2.83)	.14
	G*T	(1.49)	(0.58, 3.49)	.30
Total health service attendances				
	Group	(0.67)	(0.52, 0.93)	.016*
	Time	(1.49)	(1.15, 1.84)	.002*
	G*T	(1.49)	(1.08, 2.16)	.016*
Hospital admissions				
	Group	(0.61)	(0.27, 1.31)	.19
	Time	(1.65)	(0.93, 3.06)	.084
	G*T	(1.35)	(0.53, 3.13)	.57

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