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Editorial

Dissemination reports are concise informative reports of health-related research supported by the Health and Medical Research Fund (and its predecessor funds) administered by the Food and Health Bureau. In this edition, we present nine dissemination reports of projects related to mental health, sleep medicine, and physical activity. In particular, three projects are highlighted for their potentially significant findings, impact on healthcare delivery and practice, and/or contribution to health policy formulation in Hong Kong.

Schizophrenia spectrum disorders account for the majority of all psychiatric cases worldwide and these patients often have suboptimal compliance with antipsychotic medication. Chien et al[1] conducted a randomised controlled trial in 134 Chinese patients with schizophrenia spectrum disorders to evaluate the effects of motivational interviewing adherence therapy. They found that compared with routine care, adherence therapy was an effective alternative for people with schizophrenia with poor medication adherence and short duration of illness. Adherence therapy significantly improved patient adherence to antipsychotic medication, insight into illness/treatment, and re-hospitalisation rate, as well as psychotic symptoms and functioning over 12-month follow-up.

Insomnia is the most common sleeping complaint and leads to fatigue, irritability and impaired function. Although effective pharmacological treatments for insomnia are available, their use is limited by concerns regarding long-term efficacy and the potential for abuse, dependence, and adverse effects. Chung et al[2] conducted a randomised, assessor-blind, parallel-group trial with a 3:3:1 ratio of acupuncture alone, combined acupuncture with auricular acupuncture, and waiting list in 224 Chinese subjects with clinically defined insomnia disorder. They found that acupuncture alone and a combination of acupuncture and auricular acupuncture were well-tolerated and better than the waiting list for the treatment of insomnia. Acupuncture alone and combination treatment both produced durable effects on sleep, anxiety, and depressive symptoms, and improved daytime functioning up to at least 13 weeks after treatment.

Adolescence is a critical period for predicting adult obesity, which is a major contributor to chronic non-communicable diseases. Cerin et al[3] conducted surveys in 1299 secondary school students and their primary caregivers to identify obesity-related behaviours, including physical activity, diet, neighbourhood and household environment, and parental practices. They found that environmental factors were the strongest correlates of physical activity and sedentary behaviour, while availability of certain foods at home and self-efficacy for eating or avoiding certain foods were the strongest correlates of adolescents' dietary behaviours. The authors conclude that intervention strategies to promote a healthy and active lifestyle in Hong Kong adolescents should involve communities, schools, and families.

We hope you will enjoy this selection of research dissemination reports. Electronic copies of these dissemination reports and the corresponding full reports can be downloaded individually from the Research Fund Secretariat website (https://rfs2.fhb.gov.hk/). Researchers interested in the funds administered by the Food and Health Bureau also may visit the website for detailed information about application procedures.

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Adherence therapy for schizophrenia: a randomised controlled trial

WT Chien *, EFC Cheung, JHC Mui, R Gray, G Ip

KEY MESSAGES

1. Compared with routine care, adherence therapy is an effective alternative for people with schizophrenia with poor medication adherence and short duration of illness.
2. Adherence therapy can significantly improve patient adherence to antipsychotic medication, insight into illness/treatment, and re-hospitalisation rate, as well as psychotic symptoms and functioning over 12-month follow-up.
3. Adherence therapy can be cost-effective over the 12-month follow-up.

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Introduction

People with schizophrenia spectrum disorders account for 60% to 70% of all psychiatric cases worldwide. Their non-adherence rate to antipsychotic medication is 25% to 70%.[1] New (atypical) antipsychotics have little evidence in improving medication adherence because of side-effects of tardive dyskinesia and metabolic and weight problems.

Medication adherence in patients with schizophrenia spectrum disorders during the early stage of illness can be enhanced by effective psychosocial and relapse prevention interventions that improve understanding/coping with the illness and medication use. A systematic review suggested inconsistent and short-term effects of adherence therapy in schizophrenia.[2] Nonetheless, adherence therapy based on motivational interviewing technique showed evidence to improve both insight and adherence to medication over 6-month follow-up.[3] Therefore, further research with longer-term follow-up and diverse patient populations is recommended.

This randomised controlled trial aimed to evaluate the effects of motivational interviewing adherence therapy (and its cost-effectiveness) for Chinese patients with schizophrenia spectrum disorders on medication adherence, re-hospitalisation rate, and psychosocial outcomes over 12-month follow-up; and to examine its strengths and weaknesses from the perspectives of participants and therapists. Primary outcomes were medication adherence rate, mental status, and number and length of psychiatric re-hospitalisations. Secondary outcomes included patients' insight into medication/treatment and functioning.

Methods

This study was approved by the Human Research Ethics Committee of The Chinese University of Hong Kong (HEARS20120008112) and the Clinical Research Ethics Committees of the New Territories East Cluster (NTE2012.258) and Kowloon West Cluster (KW2012.3.0183) of Hospital Authority. Patients with schizophrenia who were non-adherent to medication were recruited from two community psychiatric nursing services centres (at New Territories West and Kowloon West) and were referred by psychiatrists. Non-adherence was defined as cessation of oral antipsychotics prescribed at admission or complete cessation of medication for at least 1 month after discharge based on reports from the psychiatrist, community psychiatric nurse (CPN), and/or patient.[2,3] Inclusion criteria were (1) Hong Kong Chinese residents aged 18 to 65 years, (2) primary diagnosis of schizophrenia or its subtypes for ≤3 years, (3) taking oral antipsychotics for >1 month, and (4) with Positive and Negative Syndrome Scale (PANSS) score of >60 and judged by a CPN/psychiatrist as non-adherent. Patients were excluded if they had co-morbidity of learning disability, organic brain disease, and/or visual/language/communication difficulty, or participated in any medication management programme.

Of 380 eligible patients, 67 were stratified according to the two services centres and randomly selected from each centre by matching random numbers with the potential participant list. The participant list was concealed to the outcome assessors, centre staff (except the trained CPNs for adherence therapy), and researchers. With a study power of 80% and a significance level of 0.05, 67 patients in each group (n=134) were recruited

to detect a medium effect size of 0.48),[2,3] with an estimated attrition rate of 20%.

Adherence therapy was based on motivational interviewing technique and in-depth behavioural analysis. Six 2-hour sessions (over 3 months) focused on principles of expressing empathy, developing discrepancies between client's beliefs and evidence, supporting self-efficacy, avoiding argumentation, and rolling with resistance to behavioural change.[3] Fidelity of the six CPNs to the treatment protocol was ensured with supervised practice and examination of audio-taped sessions by using a validated adherence therapy competency scale (ie, 91% to 95% rated to be competent).[3]

Routine care consisted of monthly home visits, mental health assessment, administration of medications, and brief education (2 hours every 3-4 weeks) by CPNs, psychiatric consultations by psychiatrist, and referrals to community care, and welfare services by psychiatrist/medical social worker.

Participants were assessed on: medication adherence, using the Adherence Rating Scale (ARS); symptom severity, using PANSS; number and lengths of re-hospitalisations; symptom remission; insight into illness/treatment; and functioning at baseline (T0) and at one week (T1), 6 months (T2), and 12 months (T3) after completion of the interventions. Participants' demographic and clinical data were collected at baseline. All instruments demonstrated satisfactory internal consistency and construct validity.[1] Internal consistency and inter-rater reliability were strongly correlated with the results (Cronbach's α=0.85-0.94; intraclass correlation coefficients for ARS and PANSS were 0.81 and 0.89, respectively). Process evaluation was performed to identify the strengths and limitations of adherence therapy with (1) observation of two randomly selected sessions to assess the quality of adherence therapy implementation and (2) semi-structured interviews with 19 selected participants (13 in adherence therapy and 6 in routine care) based on different levels of medication adherence at post-test T1, and all six CPNs conducted the adherence therapy.

Homogeneity of study groups was checked at baseline, and outcome analysis was based on intention to treat. With violations of multivariate normality, multicollinearity and outliers for MANOVA test found among the outcome variables and very few missing data noted, the interaction [group x time] treatment effects on mean scores of the primary outcomes were examined using repeated-measures ANCOVA test, followed by Helmert contrasts tests. The co-variants included the nature of readmission, duration of illness, number and dose of antipsychotics, and Drug Attitude Inventory mean score. The numbers of patients' re-hospitalisations over each follow-up period were converted to average times of re-admissions per month, which were normally distributed. The percentages of patients being hospitalised over each follow-up period were compared between the two study groups, as were the numbers and percentages of patients with symptom remission. Comparisons of outcomes between two services centres and comparisons of adherence therapy participants with attendance of >3 sessions and those with ≤3 sessions were performed using ANCOVA test. Levels of significance for baseline and post-tests (using Bonferroni correction) were set at 0.05 and 0.01, respectively.

The qualitative interview data were content analysed immediately after each interview. Cost-effectiveness analysis was performed to verify the value of the additional resources associated with adherence therapy, using an incremental cost-effectiveness ratio on each of the primary outcomes at three post-tests as follows[4]:

$$\frac{\textit{cost with the AT} - \textit{cost of the routine care}}{\textit{outcome with the AT} - \textit{outcome of the routine care}}$$

Results

Characteristics and baseline scores of study participants

Of 134 participants at baseline, 128 were included in data analysis (attrition rate, 4.5%). Three participants failed to attend >3 adherence therapy sessions. One participant in routine care and two participants in adherence therapy withdrew from the study. One participant in adherence therapy declined to complete T1. The mean attendance to sessions was 4.8 (standard deviation [SD], 1.0; median, 5.0; range, 2-6). Participants of the two groups at baseline were comparable (P>0.12, Table 1); 86% to 88% of participants were deemed poorly adherent to medication at baseline, with a mean ARS score of 1.39 to 1.48.

Treatment effects of adherence therapy

Repeated-measures ANCOVA tests on the outcome measures indicated significant interaction (group x time) treatment effects in the adherence therapy group, which had greater improvements over time than the routine care group in terms of insight into illness/treatment (P=0.009, effect size=0.58), symptom severity (P=0.008; positive symptoms, P=0.008; negative symptoms, P=0.005; effects sizes=0.69-0.73), functioning (P=0.009, effect size=0.63), medication adherence (P=0.008, effect size=0.71), and average number of re-hospitalisations (P=0.01, effect size=0.52) [Table 2]. The adherence therapy group had greater improvement in symptom remission at post-tests (P=0.005, effect size=0.60).

Results of Helmert contrasts test indicated that the adherence therapy group had greater

TABLE 1. Demographic and clinical characteristics of participants at baseline (n=134)*

Characteristics	Adherence therapy (n=67)	Routine care (n=67)	χ^2	P value
Gender			1.50	0.26
Male	37 (55.22)	36 (53.73)		
Female	30 (44.78)	31 (46.27)		
Age, y	28.87±9.54	29.53±9.96	1.48	0.28
18-29	21 (31.34)	22 (32.84)		
30-39	28 (41.79)	27 (40.30)		
40-49	11 (16.42)	10 (14.93)		
≥50	7 (10.45)	8 (11.94)		
Diagnosis			1.02	0.39
Schizophrenia	35 (52.24)	36 (53.73)		
Other psychotic disorders	32 (47.76)	31 (46.27)		
Nature of last admission			1.58	0.23
Voluntary	40 (59.70)	42 (62.69)		
Compulsory/involuntary	27 (40.30)	25 (37.31)		
Employment status			1.58	0.24
Employed (full-time)	23 (47.76)	25 (37.31)		
Employed (part-time)	13 (19.40)	11 (16.42)		
Unemployed	14 (20.90)	12 (17.91)		
Others (eg, intermittent job)	7 (10.45)	8 (11.94)		
Education level			1.81	0.19
Primary school	12 (17.91)	13 (19.40)		
Secondary school	42 (62.69)	39 (58.21)		
University/college	13 (19.40)	15 (22.39)		
Duration of illness, mo	22.91±12.68	23.42±14.38	2.15	0.12
<6	18 (26.87)	17 (25.37)		
6-12	21 (31.34)	23 (34.33)		
13-24	12 (17.91)	15 (22.39)		
25-36	10 (14.93)	12 (17.91)		
Treatment setting			1.31	0.30
Outpatient department	66 (98.51)	67 (100.00)		
Day hospital/centre	10 (14.93)	11 (16.42)		
Others (eg, sheltered workshop and social club)	17 (25.37)	18 (26.87)		
Living situation			1.01	0.31
Supervised care	10 (14.93)	9 (13.43)		
Family residence	39 (58.21)	38 (56.72)		
Living alone	18 (26.87)	20 (29.85)		
Monthly household income, HK$			1.02	0.31
5000-10 000	10 (14.93)	11 (16.42)		
10 001-20 000	20 (29.85)	21 (31.34)		
20 001-30 000	21 (31.34)	19 (28.36)		
>30 000	16 (23.88)	16 (23.88)		
Accommodation			1.83	0.18
Private household	24 (35.82)	29 (43.28)		
Public housing	28 (41.79)	24 (35.82)		
Others (eg, hostel and long-stay care home)	15 (22.39)	14 (20.90)		

* Data are presented as mean±standard deviation or No. (%) of participants

TABLE 2. Repeated-measures ANCOVA (group x time) tests for outcomes at baseline (T0), immediately after completion of intervention (T1), 6 months post-intervention (T2), and 12 months post-intervention (T3)*

Instrument	Adherence therapy (n=63)				Routine care (n=65)				F†	P value	Effect size
	T0	T1	T2	T3	T0	T1	T2	T3			
Insight and Treatment Attitudes Questionnaire	9.12±4.14	11.18±6.67	12.88±6.80	13.96±7.01	9.33±3.31	9.91±5.45	9.57±6.12	11.01±6.82	6.98	0.009	0.58
Positive and Negative Syndrome Scale	80.19±11.10	74.01±15.10	68.12±14.81	60.01±13.92	81.13±12.01	80.18±15.11	82.45±12.03	80.01±14.31	7.32	0.008	0.70
Positive symptoms	18.02±4.89	16.13±4.54	14.65±3.98	13.02±4.13	18.21±4.12	18.23±4.65	19.79±5.56	18.02±6.98	7.21	0.008	0.69
Negative symptoms	20.68±5.01	18.23±5.91	16.70±5.67	15.12±6.01	20.82±5.76	20.90±5.87	20.38±6.43	21.13±9.87	7.78	0.005	0.73
Symptom remission		(f=4, 6.35%)	(f=8, 12.70%)	(f=10, 15.87%)		(f=2, 3.08%)	(f=2, 3.08%)	(f=3, 4.62%)	5.61	0.005	0.60
Specific Level of Functioning Scale	140.01±18.22	150.91±22.35	169.23±27.65	173.13±29.11	138.34±17.18	138.65±19.71	146.01±30.34	143.88±29.81	7.00	0.009	0.63
Adherence Rating Scale	1.48±0.98	2.21±1.06	3.10±1.20	3.31±1.50	1.39±1.01	1.47±1.02	1.71±1.23	1.56±1.43	7.34	0.008	0.71
Re-hospitalisation											
Number	1.41±0.98	1.30±0.90	1.12±1.01	1.01±0.88	1.50±0.92	1.39±1.11	1.58±1.00	1.82±1.10	5.12	0.010	0.52
Duration	9.12±2.98	8.90±5.88	8.70±5.11	9.83±5.98	10.01±4.02	12.05±8.98	10.01±9.84	12.12±10.88	3.20	0.097	0.23

* Data are presented as mean±standard deviation or No. (%) of participants

improvements than the routine care on the three primary outcomes at post-tests: (1) psychotic symptoms (PANSS score) decreased at T1, T2, and T3 (mean difference=6.17, 14.33, and 20.00; standard error [SE]=0.05, 2.80, 1.70; P=0.001, P=0.005 and P<0.001, respectively); (2) medication adherence rate (ARS score) increased at T1, T2, and T3 (mean difference=0.74, 1.39, and 1.75; SE=0.05, 0.04, and 0.07; P=0.02, P=0.01, and P=0.007, respectively); and (3) number of re-hospitalisations reduced at T2 and T3 (mean difference=0.46 and 0.81; SE=0.02 and 0.30; P=0.03 and P=0.01, respectively). The adherence therapy group also indicated greater improvements in secondary outcomes in terms of functioning and treatment insight at T2 and T3 (P=0.03–0.001). The percentages of patients being hospitalised over T1 to T4 were 45%, 32%, 24%, and 17% in the adherence therapy group and 44%, 40%, 38%, and 48% in the routine care group, respectively. The difference between groups was significant (P=0.008, Kruskal Wallis test). However, the types and doses of psychotropic medication, nature of admission (voluntary/compulsory), frequency of defaulted follow-up, and types/frequency of participation in other psychosocial interventions did not differ significantly between groups at post-tests (P>0.20). All mean outcome scores did not differ significantly between the six adherence therapy subgroups and two services centres at post-tests (P>0.10), and between adherence therapy participants who attended ≤3 sessions and those who attended >3 sessions (P>0.08).

Cost-effectiveness of adherence therapy

The total costs of adherence therapy (n=63) were higher than those of routine care (n=65) by HK$85 500 and HK$12 380 at T1 and T2, respectively, but lower than those of routine care by HK$51 065 at T3 (Table 3). The average cost per case of adherence therapy was higher than that of routine care at T1 and T2 but similar to routine care at T3. At T1, T2, and T3, the number of patients with clinically significant improvements in medication adherence (n=10, 21, and 28, respectively) and symptom severity (n=20, 28, and 35, respectively), and reduction in numbers of re-hospitalisations in the past 4 months (-20, -30, and -43 re-hospitalisations, respectively) were consistently higher in the adherence therapy group than in the routine care group (P<0.001, χ^2 test).

Compared with routine care, adherence therapy resulted in additional 1, 12, and 21 cases with significant improvement on medication adherence at extra costs of HK$85 500 and HK$952 and (reduced) HK$1824 per case, and additional 13, 23, and 25 cases with significant improvement on symptom severity at extra costs of HK$7125, HK$538 and (reduced) HK$1548 per case at T1, T2, and T3, respectively. In addition, adherence therapy resulted in 10, 48, and 75 fewer re-hospitalisations at additional costs of HK$8550 at T1 and HK$258 at T2, and reduced cost of HK$681 per case for one admission at T3. In sum, adherence therapy was an effective intervention with low extra costs, particularly saving costs for outcome improvements at the 12-month follow-up.

Strengths and weaknesses of the interventions used

From the interview and observation data, three themes concerning perceived benefits (strengths) of the adherence therapy were identified, including

TABLE 3. Cost, effectiveness, and cost-effectiveness ratios at baseline (T0), immediately after completion of intervention (T1), 6 months post-intervention (T2), and 12 months post-intervention (T3)

Item	Means for calculation	Adherence therapy (n=63)			Routine care (n=65)		
		T1	T2	T3	T1	T2	T3
Costs (in HK$)							
Cost of adherence therapy	Sum of salary of research assistants (~250 hrs), general expenses (eg, travelling and copying) and facilities and venue fees (15 hrs)	205 000	-	-	-	-	-
Cost of health care services used by patients	Total costs of health care services as required in each intervention, including those requested by patients (and their family caregivers), not for routine care provided by the community nursing service	194 000	216 000	183 000	221 000	224 080	223 000
Cost of patients' hospital stay	Total number of days of hospital stay multiplied by average cost per day (~HK$1500) in psychiatric hospital/unit	810 000 (540 days)	847 500 (565 days)	928 935 (619 days)	892 500 (595 days)	930 000 (620 days)	1 155 000 (770 days)
Total costs of intervention		1 209 000	1 268 500	1,326 935	1 123 500	1 154 080	1 378 000
Cost of intervention per case		19 190± 1098	20 135± 1510	21063± 170	16 977± 1388	17 755± 1692	21 200± 2103
Effectiveness							
No. of cases who indicated significant improvement in medication adherence	Significant change in mean score of Adherence Rating Scale between baseline and each of the three post-tests over 12 months follow-up if the change at post-tests were >1 standard deviations of baseline	10	21	28	9	9	7
No. of cases who indicated significant improvement in symptom severity	Significant reduction of mean score of Positive and Negative Syndrome Scale if the change measured at any of the three post-tests was not >1 standard deviations of baseline	20	28	35	7	5	10
Total reduction of number of patients' re-hospitalisations	Difference on total number of patients' hospitalisations in the past 4 months between the baseline measurement and the three post-tests	-20	-30	-43	-10	18	32
		Adherence therapy vs routine care					
Cost-effectiveness ratio (in HK$)		T1	T2	T3			
Incremental cost per additional case with significantly improved medication adherence	Additional cost per case required for one extra patient in adherence therapy with significant improvement in medication adherence than routine care	85 500	952	-1824			
Incremental cost per additional case with significant reduction of symptom severity	Additional cost per case required for one extra patient in adherence therapy with significant reduction of level of psychotic symptoms than routine care	7125	538	-1548			
Incremental cost per additional case with reduction of one psychiatric hospitalisation	Additional cost per case required for one extra patient in adherence therapy with one hospital admission less than that of routine care	8550	258	-681			

(1) enhanced knowledge about the illness and medication, (2) perceived support from mental health professionals/services, and (3) adoption of effective coping (and problem-solving) strategies in medication adherence. In addition, two themes on difficulties in participation and medication adherence were identified, including (1) challenges in overcoming serious side-effects and (2) symptoms and perceived social stigma and family burden.

There were recommendations for improvements of adherence therapy, including (1) more sessions/opportunities for engaging and discussion about adherence attitude, (2) increasing family and social support, (3) more inputs/

collaborations with health professionals and services to enhance psychosocial resources and support, and (4) more practice and home assignments for improving patients' adherence behaviours.

Discussion

The six-session adherence therapy based on motivational interviewing technique can be effective to improve the medication adherence and subsequently mental health of people with schizophrenia spectrum disorders. Compared with routine care, adherence therapy significantly improved patient outcomes with moderate to large effect sizes (Cohen's d=0.49-0.73) over 12-month follow up. Adherence therapy (originally for addictive and behavioural problems) can be effective in people with schizophrenia.[2,5] Adherence therapy can improve both positive symptoms (hallucination and delusion) and treatment-resistant negative symptoms (anhedonia and social withdrawal). Qualitative interview data indicated that many participants in adherence therapy could perceive/experience the benefits of adherence therapy to their knowledge and skills in medication adherence and illness management.

The completion rate of the intervention was very high (only three participants failed to attend >3 sessions) and the attrition rate was low (4%). Adherence therapy showed clear benefits in terms of psychopathology and treatment insight and adherence for younger adults with schizophrenia at early stage of illness with poor medication adherence (>80%, which is comparable to 60% to 80% of people with schizophrenia being poorly adherent)[1,2] and moderate levels of psychotic symptoms and functioning at recruitment. In contrast, recent studies on medication adherence recruited >50% of participants with fair to satisfactory adherence to medication.[2,5]

Increase in motivation and initiative in treatment adherence is the essence of adherence therapy, in which motivational interviewing helps resolve ambivalence and engage intrinsic motivation and specific goals with participants in order to change their problem behaviours.[6,12] In addition, the cost-effectiveness ratios in reducing number of re-hospitalisations and improving medication adherence and symptom severity favour adherence therapy. As no economic evaluation of adherence therapy for patients with psychotic disorders has been performed,[3] this finding provides evidence that adherence therapy can be cost-effective for people with schizophrenia in community care.

Limitations of this study include: (1) small and selective sample recruited from two services centres only; participants were voluntary to participate and with satisfactory family support and ≤3 years of illness; (2) some confounders of adherence therapy such as 30% of refusal rate, side-effects, and changes in types and dosages of medication, and other community services used over the study period were not examined; and (3) participants and CPNs were not blind to adherence therapy and routine care and might have caused subjective biases on preconceived benefits of adherence therapy.

Conclusion

Adherence therapy for people with schizophrenia spectrum disorders can improve symptom severity, medication adherence, functioning, insight to illness/treatment, and number of re-hospitalisations, as well as cost-saving for outcome improvements over a 12-month follow-up. Adherence therapy in addition to psychopharmacological and other psychiatric treatments has benefits to Chinese patients. Further research on its wider implementation in community-based rehabilitation for diverse patient groups and across cultures is warranted.

Acknowledgements

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Results of this study have been published in (1) Chien WT, Mui JH, Cheung EF, Gray R. Effects of motivational interviewing-based adherence therapy for schizophrenia spectrum disorders: a randomized controlled trial. Trials 2015;16:270. (2) Chien WT, Mui J, Gray R, Cheung E. Adherence therapy versus routine psychiatric care for people with schizophrenia spectrum disorders: a randomised controlled trial. BMC Psychiatry 2016;16:42.

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Duration of early intervention for psychosis: 2 years versus 3 years

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KEY MESSAGES

1. The beneficial therapeutic gains on functional and symptom outcomes attained by an additional year of early intervention for first-episode psychosis patients could not be sustained 2 years after service withdrawal.
2. An apparent lack of efficacy of extended early intervention on maintaining better illness outcomes might be attributable to multiple factors that were not addressed by the current study and thus warrant further investigation to clarify which treatment elements might be critical in enhancing durability of early intervention for psychosis.

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Introduction

Psychotic disorders including schizophrenia constitute one of the highest disease burdens globally and locally. Numerous early intervention (EI) services targeting young people with psychosis have been established worldwide in the past two decades. Substantial evidence has indicated superiority of EI service over standard care in improving clinical and functional outcomes in first-episode psychosis (FEP) patients. Nonetheless, initial therapeutic benefits achieved by EI may not be maintained after the service is withdrawn. Increasing concern is thus raised regarding the sustainability of beneficial effects of EI service and how long EI should be provided to consolidate and optimise these initial treatment gains.

Hong Kong is among the few cities in Asia to implement EI service for psychosis. Early Assessment Service for Young People with Psychosis (EASY) provides 2-year specialised EI for young people presenting with FEP. Patients in EI service have better functioning, milder symptom severity, fewer suicides and hospitalisations, and lower disengagement rate than those in standard care, despite a lack of significant between-group difference in duration of untreated psychosis. In our previous randomised controlled trial comparing 1-year extension of EI service (extended EI) with standard care (SC) in FEP patients, the extended EI group displayed significantly better outcomes than the SC group in functioning, and negative and depressive symptoms at the end of 12-month follow-up.

In the current study, we conducted a 2-year naturalistic follow-up of our cohort with an aim to examine whether the beneficial effects of extended EI on illness outcomes could be sustained after 2 years. During this follow-up period, patients in both groups received standard psychiatric care without provision of specialised EI case management.

Methods

This was a 2-year naturalistic follow-up of our previous single-blinded randomised controlled trial (NCT01202357) comparing 1-year extension of EI service (extended EI) with standard care (SC) in FEP patients. Details of the methodology have been reported elsewhere. Briefly, a total of 160 consecutive FEP patients with a DSM-IV diagnosis of psychotic disorder were recruited from EASY between November 2010 and August 2011 and were randomly allocated to extended EI (n=82) or SC (n=78) for 1 year. Exclusion criteria were intellectual disability, substance-induced psychosis, psychotic disorder secondary to general medical condition, or an inability to speak Cantonese Chinese for research interview. In extended EI, specialised EI was continued for an additional year of case management. A trained case manager took over cases from EASY and was responsible for providing care and coordinating treatment with clinicians, allied health professionals, and community centres. Case management closely aligned with treatment protocols adopted by EASY, focusing specifically on functional enhancement by assisting patients to re-establish supportive social networks, to resume leisure pursuits, and to return to work. Continuous supportive care, psychoeducation, and stress management were also delivered to patients'

caregivers by the case manager. In SC, patients received outpatient medical follow-up with limited community support that focused mainly on crisis intervention, with no case management provided. Two treatment groups did not differ from each other regarding the intensity of medical follow-up by psychiatrists, prescription of antipsychotic medications, and availability of various psychosocial interventions, and community-based services.

In the current study, the cohort were contacted for clinical and functional re-assessments. The study was approved by the local institutional review boards. All patients provided written informed consent. For those aged under 18 years, consent was also obtained from a parent or guardian.

Diagnosis of each patient was verified using Chinese-bilingual Structured Clinical Interview for DSM-IV, informant histories, and medical records. Psychopathology was assessed using Positive and Negative Syndrome Scale (PANSS) and Calgary Depression Scale. Psychosocial functioning was measured by Social and Occupational Functioning Assessment Scale (SOFAS) and Role Functioning Scale (RFS). SOFAS provided global functioning estimate of an individual participant, whereas RFS comprised four subscales for functional levels of various domains including independent living and self-care, work productivity, immediate and extended social networks. Data on socio-demographics, occupational status, service utilisation, suicidal attempt, violence, and treatment characteristics were obtained via medical record review. Complete clinical record data over the 2-year follow-up period were available to all patients for analysis.

Primary outcome was psychosocial functioning as measured by SOFAS and RFS. Attrition analysis comparing completers and non-completers in terms of demographics and baseline characteristics was conducted to ensure no bias was introduced owing to loss to follow-up. Between-group comparisons on socio-demographics, clinical profiles, treatment characteristics, symptom and functioning scores at baseline were performed, as were between-group comparisons on symptom and functional outcomes at 3-year follow-up. Treatment characteristics at follow-up and outcomes on service utilisation and other clinical variables between the two groups were also compared. Repeated-measures analysis of variance followed by post-hoc within-group paired-sample *t*-tests (for those outcome variables that showed significant group x time interactions) were performed to identify any significant longitudinal changes of symptom and functioning scores across 2-year follow-up. All statistical analyses were two-tailed with the level of significance set at P<0.05.

Results

Of the 160 patients from the initial cohort, 143 (76 in the extended EI group and 67 in the SC group) completed clinical and functional assessments at 3-year follow-up. Four patients died, six were lost to follow-up, and seven refused to complete evaluation. Completers and non-completers were comparable with regard to demographics, baseline clinical profiles, symptom severity, and functional levels, except that completers had better social functioning (RFS immediate social network score) than non-completers. There was no significant difference in attrition rate between the extended EI and SC groups (χ^2=1.94, P=0.164). There were no significant differences between the two groups who completed 3-year follow-up in terms of demographics, premorbid adjustment, baseline clinical profiles, symptom severity, and functioning (Table 1)

At 3-year follow-up, the extended EI and SC groups did not differ significantly regarding all functional outcome measures including SOFAS score, RFS total score, and individual RFS functional domain scores (Table 2). There were no significant between-group differences in ratings of various symptom dimensions (including positive, negative, depressive, and general symptoms), medication treatment characteristics, number of psychiatric admissions, length of inpatient stays, outpatient default rate, service disengagement, receipt of welfare allowance (Table 3). The two groups did not differ significantly in rates of relapse, suicide attempt, physical violence, or in the proportions of with all-cause mortality and completed suicides.

Repeated-measures analysis of variance revealed significant group x time interaction in SOFAS (P<0.05), RFS total (P<0.01), RFS independent living (P<0.05) and extended social networks (P<0.05) scores across 2-year follow-up period. There were no significant group x time interactions in other functional and symptom outcome variables. Post-hoc paired-sample *t*-tests revealed that patients in the extended EI group had significant reduction in RFS total score (P<0.01) and RFS extended social network score (P<0.01) over 2 years, whereas patients in the SC group had significant improvement in SOFAS score (P<0.05) and RFS independent living score (P<0.05) over 2 years.

Discussion

There were no significant between-group differences regarding outcomes on symptom severity, functional levels, and service utilisation at 3-year follow-up. The initial therapeutic gains on symptoms and functioning achieved by extended EI could not be maintained after 2 years. This is consistent with the results of two previous studies that also failed to demonstrate sustained superiority of EI over SC in functioning, symptom outcomes, and admission rate of FEP patients at follow-up after withdrawal

TABLE 1. Demographics and baseline clinical, functional, and treatment characteristics of patients who completed 3-year follow-up*

	Extended early intervention (n=76)	Standard care (n=67)	*t* or χ^2	P value
Male gender	52.6 (40)	52.2 (35)	0.002	0.963
Age at entry, y	20.1±3.0	20.4±3.5	0.5	0.632
Tertiary educational level or above	25.0 (19)	29.9 (20)	1.3	0.535
Premorbid Adjustment Scale				
Social score	0.42±0.14	0.44±0.17	0.9	0.375
Academic score	0.40±0.12	0.42±0.16	1.1	0.273
Age at onset, y	20.1±3.0	20.4±3.5	0.5	0.632
Log duration of untreated psychosis	1.9±0.69	1.9±0.75	0.5	0.612
Psychiatric diagnosis			0.4	0.833e
Schizophrenia-spectrum disorders	84.2 (64)	83.6 (56)		
Affective psychosis	10.5 (8)	9.0 (6)		
Other non-affective psychoses	5.3 (4)	7.5 (5)		
Positive and Negative Syndrome Scale				
Positive symptom score	9.3±3.3	8.9±2.6	3.2	0.455
Negative symptom score	11.3±4.7	12.1±5.0	1.3	0.351
General psychopathology score	24.3±7.5	24.3±6.3	0.08	0.936
Calgary Depression Scale total score	2.8±3.2	2.7±3.3	-0.3	0.830
Social and Occupational Functioning Assessment Scale score	57.9±14.7	58.9±13.4	0.4	0.665
Role Functioning Scale				
Work productivity	4.2±1.8	4.7±1.4	1.7	0.094
Independent living	6.1±1.1	6.3±0.8	1.6	0.120
Immediate social network	5.0±1.2	5.1±1.3	0.6	0.574
Extended social network	4.2±1.4	4.1±1.5	0.3	0.741
Use of second-generation antipsychotic	80.3 (61)	86.6 (58)		
Chlorpromazine equivalent dose, mg	310.1±256.9	302.0±249.3	-0.2	0.849

* Data are presented as mean±standard deviation or No. (%) of participants

of EI service. Our longitudinal analyses revealed that this might be attributed to functional decline of patients in the extended EI group as well as gradual functional improvement of patients in the SC group over the 2-year follow-up period. However, changes in raw functioning scores during follow-up were very small and thus such significant differences might not necessarily equate with clinically significant and relevant changes in real-world settings. In addition, patients in the extended EI group still exhibited better (though not significantly) functional levels in both global ratings and across individual functional domains than those in the SC group.

There are several possible explanations for the lack of sustained effects of extended EI on functional outcome at 3-year follow-up. It might be that 3-year duration of specialised EI for FEP is insufficient and therefore not an optimal period for sustained therapeutic effects on functional outcome to take place. A relatively high caseload (1 case manager to 82 patients) of a 1-year extension of EI might represent inadequate treatment in maintaining the initial therapeutic gains. Enhanced SC via recent improvement in local community psychiatric services in Hong Kong might dilute the impact of extended EI on longer-term outcomes. The comparatively shorter duration of untreated psychosis (median, 13 weeks) of our cohort might obscure potential positive effects of extended EI on longer-term outcome in a subgroup of patients who have prolonged untreated initial psychosis. In fact, a large-scale case-control study examining the medium- and long-term effects of early detection on FEP patients has demonstrated that patients with shorter duration of untreated psychosis had significantly better clinical and functional outcomes than those with longer duration of untreated psychosis at 5- and 10-year follow-up. It is thus plausible that complementing specialised EI care with early detection (shortening of treatment delay) might enhance the durability of therapeutic gains attained by extended EI.

There is substantial variation in EI services

TABLE 2. Clinical and functional outcomes in the two treatment groups at 1-year and 3-year follow-up*

	1-year follow-up			3-year follow-up		
	Extended early intervention (n=79)	Standard care (n=77)	P value	Extended early intervention (n=76)	Standard care (n=67)	P value
Positive and Negative Syndrome Scale						
Positive symptom score	8.3±2.5	8.6±2.9	0.500	9.9±3.4	10.2±3.6	0.577
Negative symptom score	8.5±2.5	9.9±3.9	0.009	12.0±4.0	11.9±4.0	0.941
General psychopathology score	19.2±3.7	21.1±5.1	0.010	21.2±5.4	22.1±4.6	0.304
Calgary Depression Scale total score	0.9±1.6	1.9±2.8	0.005	1.6±2.3	2.04±2.8	0.271
Social and Occupational Functioning Assessment Scale score	64.8±13.1	57.9±12.7	0.001	64.8±13.7	61.9±12.5	0.187
Role Functioning Scale						
Total score	22.1±3.2	20.3±3.7	0.002	21.5±3.2	21.0±3.2	0.302
Work productivity	5.1±1.4	4.7±1.5	0.045	5.1±1.5	4.9±1.4	0.436
Independent living	6.5±0.6	6.2±1.0	0.036	6.4±0.6	6.3±0.7	0.390
Immediate social	5.5±0.9	5.1±1.0	0.002	5.3±0.9	5.0±0.9	0.152
Extended social	4.9±1.0	4.3±1.3	0.004	4.7±0.9	4.7±1.0	0.803
Full-time work	58.2±46	48.1±37	0.273	56.6±43	47.8±32	0.292
Treatment characteristics						
Use of second-generation antipsychotic	81.8 (63)	77.2 (61)	0.805	82.9 (63)	83.6 (56)	0.913
Chlorpromazine equivalent dose, mg	322.2±275.8	301.0±295.2	0.618	364.9±281.0	296.5±261.7	0.142

* Data are presented as mean±standard deviation or No. (%) of participants

TABLE 3. Service utilisation and other clinical outcomes in the two treatment groups during follow-up*

	During 1-year follow-up			During 2-year follow-up		
	Extended early intervention (n=82)	Standard care (n=78)	P value	Extended early intervention (n=82)	Standard care (n=78)	P value
Service utilisation						
Psychiatric admission	15.9 (13)	10.4 (8)	0.353	17.1 (14)	16.7 (13)	0.945
Length of admission, d	7.4±20.6	3.5±12.8	0.146	131.5±139.7	174.3±259.0	0.594
Loss to follow-up	18.3 (15)	33.3 (26)	0.029	31.7 (26)	41. (32)	0.220
Service disengagement	3.7 (3)	5.1 (4)	0.650	6.1 (5)	7.7 (6)	0.690
Receipt of welfare allowance	23.8 (19)	12.8 (10)	0.076	39.0 (32)	41.0 (32)	0.796
Outcome						
Relapse	15.9 (13)	19.2 (15)	0.574	25.6 (21)	37.2 (29)	0.115
Suicide attempt	0 (0)	0 (0)		1.2 (1)	1.3 (1)	0.972
Physical violence	3.7 (3)	1.3 (1)	0.336	6.1 (5)	7.7 (6)	0.517
All-cause mortality	0 (0)	0 (0)		1.2 (1)	3.8 (3)	0.287
Suicide	0 (0)	0 (0)		1.2 (1)	1.2 (1)	1.000

* Data are presented as mean±standard deviation or No. (%) of participants

across different regions regarding the content and intensity of service provided, and characteristics of patients enrolled including age range and diagnostic distribution. Given that our findings were based on EI service of comparatively low resources and high caseloads relative to those well-established early psychosis programmes implemented in some Western countries, generalisation of our results to other populations should be made cautiously.

There are several limitations to the study. The sample was recruited from the EASY programme that provided early intervention to patients aged 15 to 25 years only. Our results may not be generalisable to those with older age at onset of psychosis. Data

regarding the inputs of community psychiatric services in standard care received by patients during the follow-up period were not available, thereby precluding us from estimating the potential confounding (and possibly the diluting effect) of enhanced community care on clinical and functional outcomes at 3-year follow-up. Nonetheless, the strengths of the current study included lack of differential attrition between treatment groups, blinding of research staff involving outcome assessments to treatment allocation, low dropout rate (89.4% of the cohort completed 3-year follow-up reassessment), comprehensive evaluation of functional outcomes encompassing both global functioning and various specific functional dimensions, and availability of complete clinical record data regarding medication treatment, service utilization, and other clinical variables of all patients.

Conclusion

There were no significant differences between the extended EI and SC groups in clinical and functional outcomes at 3-year follow-up. The beneficial treatment effects attained by 1-year extended EI could not be sustained after 2 years in Chinese FEP patients. However, caution should be exercised in interpretation and generalisation of our negative findings to EI services owing to the methodological limitations as well as substantial variation across regions in terms of sociocultural and mental health service contextual factors. In addition, the failure to demonstrate superiority of extended EI on longer-term outcomes might be attributable to an array of factors that could not be adequately addressed by the naturalistic follow-up design. Future research should clarify the differential impacts of treatment intensity (eg caseload), individual intervention elements, treatment delay, as well as the length of service on the durability of EI on long-term outcomes in FEP patients. This may inform further development and enhancement of the EI service model for patients with FEP.

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Mobile self-compassion programme for promotion of public mental health: a randomised controlled trial

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KEY MESSAGES

1. The mobile self-compassion programme is as effective as the mobile cognitive-behavioural psychoeducation programme in enhancing mental health and reducing psychological distress. Improvements are maintained at 3-month follow-up.
2. Both programmes can cultivate self-compassion and improve emotional regulation.
3. Smartphone applications are convenient and highly scalable options to promote public mental health, as face-to-face psychological interventions are expensive with long waiting time.
4. Mobile programmes have high attrition rates. Methods to enhance user experience and retention, such as gamification and personalisation, should be considered.

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Introduction

The prevalence of common mental disorders in Hong Kong is estimated to be 13.3%, with the highest prevalence among young adults aged 26 to 35 years.[1] Nonetheless, only 26% of these individuals sought mental health services in the past year. As mental illness causes tremendous burden to individuals, families, and society, mental health promotion should be propagated in the community.

Smartphones and tablet devices are convenient alternatives to face-to-face interventions and make mental health promotion and universal prevention more accessible for those who would otherwise not seek help owing to inconvenience, stigma, and other help-seeking barriers.

Mobile applications based on cognitive behavioural approach have been developed to help people cope with stress, to increase emotional awareness, and to promote wellness.[2] In addition, cultivating self-compassion (defined as a caring attitude towards oneself in the face of hardship or perceived inadequacy[3]) can also enhance mental health. The present study compared the mobile self-compassion programme with the mobile cognitive-behavioural programme in terms of efficacy in enhancing mental health and reducing psychological distress.

Methods

The study was approved by the Joint Chinese University of Hong Kong-New Territories East Cluster Clinical Research Ethics Committee (Ref. No. CRE-2013.160-T).

Young adults were targeted. Inclusion criteria were (1) age of at least 18 years, (2) ability to read and understand Chinese, (3) having a smartphone or tablet, and (4) having consistent Internet access. In March 2015, an application named Living with Heart was developed, parallel with the website: www.livingwithheart.hk. Those who downloaded the application and confirmed that they were over 18 years old were randomly assigned to either the mobile self-compassion programme or the mobile cognitive-behavioural programme.

Participants were asked to fill in an online questionnaire that assessed mental well-being (Well-being Index), psychological distress (K6), self-compassion (Self-Compassion Scale), and emotional regulation (Affective Control Scale) at baseline, post, and 3-month follow-up. Participants also completed the Client Satisfaction Questionnaire after the programme. In addition, their progress (in percentage) was recorded.

Of 1543 users who activated accounts for randomisation, 1458 completed the pre-survey, with 705 enrolled in the self-compassion programme and 753 in the cognitive-behavioural programme (Fig). Only 340 (22%) completed the post-assessment after the 4-week programme, and 224 (14.5%) completed the 3-month follow-up.

Results

Participants in both groups were similar in terms of demographics. They had a mean age of 33.57

years; 73.7% were female; 80.2% received tertiary education; 26.1% were college students; 54% were working full-time. Both groups reported similar usage satisfaction (t(338)=1.596, P=0.111). No significant differences in baseline demographics and outcomes were found between dropouts (n=1118) and retained users (n=340), except for education level (χ^2 (6)=14.52, P=0.024). Table 1 shows outcome scores at baseline, post, and 3-month follow-up.

Linear mixed model was used to test for the group and time effect on the outcomes (Table 2). In both groups, mental health increased at post-programme (mean difference=0.24, 95% confidence interval [CI]=0.12-0.36, P<0.001) and at 3-month follow up (mean difference=0.22, 95% CI=0.08-0.37, P=0.001). Psychological distress decreased at post-programme (mean difference= -0.23, 95% CI= -0.29 to -0.16, P<0.001) and at 3-month follow-up (mean difference=0.098, 95% CI=0.01-0.19, P=0.031). Self-compassion (F(2)=22.998, P<0.001) and emotional regulation (F(2)=9.93, P<0.001) improved in both groups over time. The effect sizes were small. These effects did not differ between groups.

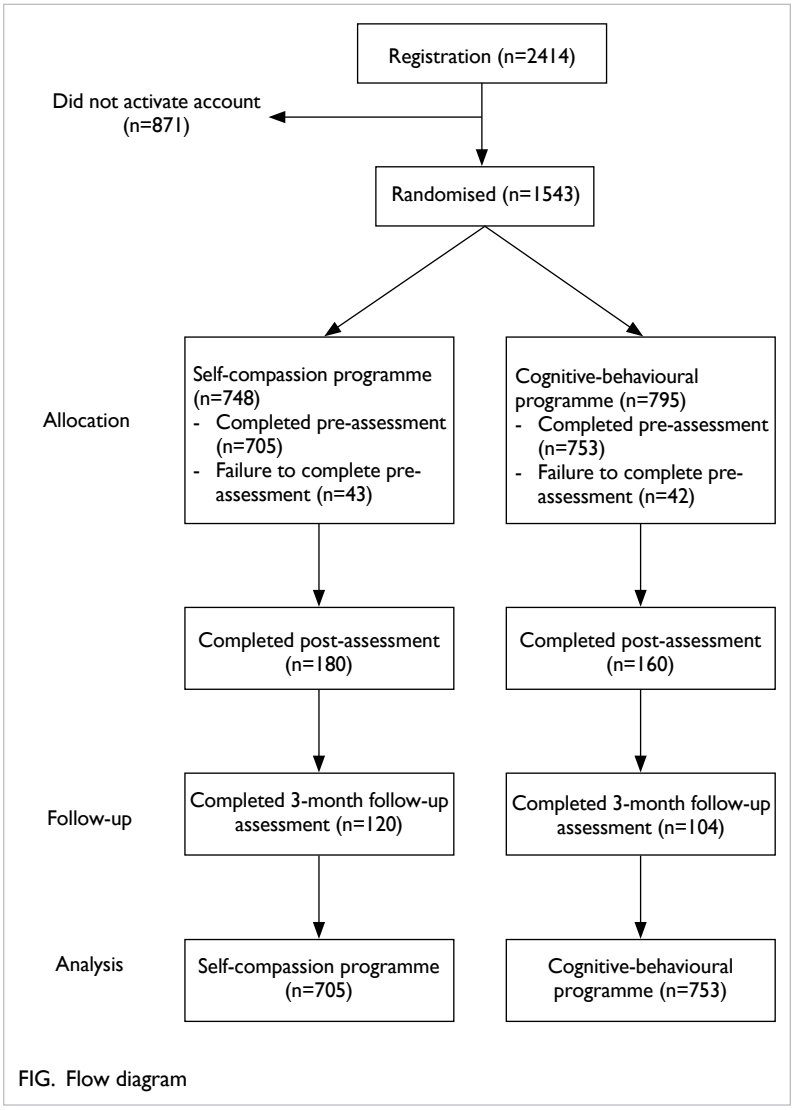

FIG. Flow diagram

Discussion

The 4-week Living with Heart programme significantly improved mental health and reduced psychological distress in our participants, and these improvements were sustained at 3-month follow-up. Mobile self-compassion and cognitive-behavioural training programmes are highly scalable and convenient alternatives to face-to-face psychological interventions. These findings support an unguided mobile application for mental health promotion in Hong Kong, particularly when resources for individuals with mild-to-moderate stress or anxiety/depressive symptoms are limited.

Several limitations have to be considered when interpreting the results. The attrition rate was relatively high, which might affect the generalisability of the findings. Nonetheless, high attrition rate is common in Internet-based intervention studies.[4] Future studies should consider gamification or personalisation[5] of feedback to enhance engagement and increase the personal relevance of the training. In addition, the comparison study design (instead of a waitlist or placebo control) precluded the possibility of a placebo effect in explaining the improvement in mental health. Future studies should consider adding a placebo-control condition in the application such as reading an electronic book not related to psychology, but this may increase the cost of the study. Furthermore, both self-compassion and

TABLE 1. Outcomes between self-compassion programme and cognitive-behavioural programme

	Mean±standard error					
	Self-compassion programme (n=705)			Cognitive-behavioural programme (n=753)		
	Pre	Post	3 months	Pre	Post	3 months
Well-Being Index	2.99±0.04	3.25± 0.07	3.27±0.08	2.99±0.04	3.34±0.07	3.43±0.08
Kessler Psychological Distress Scale	2.44±0.03	2.15±0.05	2.28±0.06	2.48±0.03	2.23±0.06	2.23±0.07
Self-Compassion Scale	2.79±0.03	3.03±0.05	2.91±0.06	2.80±0.03	3.01±0.05	2.93±0.06
Affective Control Scale	4.32±0.04	4.06±0.07	4.27±0.08	4.35±0.04	4.18±0.08	4.14±0.09

TABLE 2. Overall time effects and effect sizes across conditions

	Self-compassion programme (n=705)		Cognitive-behavioural programme (n=753)		Overall time effect, mean difference (95% confidence interval)	
	Cohen's d		Cohen's d		Post vs pre	3 months vs pre
	Post vs pre	3 months vs pre	Post vs pre	3 months vs pre		
Well-Being Index	0.27	0.28	0.35	0.35	-0.31 (-0.42 to -0.20)‡	-0.32 (-0.45 to -0.19)‡
Kessler Psychological Distress Scale	0.35	0.19	0.30	0.30	0.24 (0.12 to 0.36)‡	0.22 (0.08 to 0.37)†
Self-Compassion Scale	0.32	0.16	0.27	0.17	-0.23 (-0.29 to -0.16)‡	-0.13 (-0.21 to -0.05)†
Affective Control Scale	0.02	0.01	0.01	0.02	0.21 (0.095 to 0.33)‡	0.13 (-0.01 to 0.27)

* P<0.05
† P<0.01
‡ P<0.001

cognitive behavioural training showed no significant differences in improving various aspects of mental health. Future studies should consider exploring possible moderators that may distinguish individuals who are more suitable for self-compassion training than cognitive behavioural training. This way, participants can be assigned to interventions that are more compatible to their preferences.

Conclusion

Both mobile self-compassion training and mobile cognitive-behavioural training were effective in improving mental health and reducing distress. Although attrition may be high, they are easily accessible and can be an important augmentation to face-to-face interventions in mental health promotion and universal prevention.

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Consultation pattern of Hong Kong primary care attenders for psychological distress

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KEY MESSAGES

1. About one quarter of primary care attenders have high risk of psychological distress.
2. Among psychologically distressed patients who seek help from health care professionals, half do so with general practitioners / family doctors.
3. Of patients who have experienced psychological distress, nearly 60% have been asked by their regular doctors about psychological problems.
4. Distressed patients treated by general practitioners / family doctors have a longer average consultation time when presenting with psychological problems.
5. Among distressed patients referred to psychiatrists / clinical psychologists, 91.5% follow the referral instruction.

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Introduction

Patients with psychological distress have low rates of help seeking, notwithstanding the high prevalence of common mental disorders such as anxiety and depression.[1] A study reported that 25% to 40% of primary care consultations had a significant psychological component.[2] Some involve minor or self-limiting episodes of anxiety, depression, and adjustment reactions. A substantial number of consultations involve more severe and chronic problems, with associated medical, social, and psychological morbidities.[3]

In Hong Kong, the number of psychiatrists is 4 per 100 000 population. Primary care physicians (PCPs) are expected to play a role in caring for patients with common mental health problems. Nonetheless, PCPs may not be able to identify patients with psychological problems, especially when patients present primarily with physical symptoms and do not mention psychological problems.[4] Delays in, or lack of, seeking help may worsen the psychiatric symptoms and outcomes. In Hong Kong, information is limited about the consultation patterns of primary care attenders for psychological distress including anxiety and depressive symptoms. This study aims to collect such information from primary care attenders.

Methods

A cross-sectional survey was conducted among primary care attenders to collect data on their consultation pattern for psychological distress in the health care system. Ethics approval was obtained from the Institutional Review Board of The University of Hong Kong / Hospital Authority Hong Kong West Cluster (UW 09-326) and the Research Ethics Committee of Kowloon Central Cluster / Kowloon East Cluster (KC/KE-13-0091).

Based on a focus group, individual interviews, and a literature review, a help-seeking preference questionnaire was developed. The questionnaire was pilot-tested for its face and content validity with eight laypeople. All respondents rated most of the items as comprehensible and relevant. Minor modifications were made based on feedback. The revised questionnaire was further tested with 28 patients. The internal consistency (Cronbach's alpha coefficient) of the four sections with 38 items on attitudes was 0.725, showing high internal consistency.

In addition, the Chinese version 12-item General Health Questionnaire[5] (GHQ-12) was used to identify respondents with different degrees of psychological distress. It is a widely used and well-validated screening instrument for psychological distress in primary care. Psychological distress refers to an emotional state characterised with anxiety and/or depressive symptoms.

The target population was Chinese patients aged ≥18 years who attended primary care services. Private and public PCPs were invited to help recruit participants. A random sample was obtained; about half were recruited from private primary care

settings and the other half from public primary care settings. The sample was selected from over 10 districts of Hong Kong.

Without any information about the proportion of primary care attenders with psychological distress who would seek help from PCPs, we made use of the most conservative choice with the proportion being 0.5. To ensure the error would be at most 0.10 with 95% confidence interval, a sample size of 384 was required. According to a World Health Organization study, over 25% of primary care consultations had a significant psychological component.[2] Thus, we needed to sample 1536 (384/0.25) patients.

One out of every three attenders at the clinic waiting area was invited by research assistants to complete the GHQ-12 and the help-seeking preference questionnaire. To encourage response, HK$20 was offered to the respondents as incentive. Participants were free to withdraw at any time. All personal information was kept strictly confidential. Primary care attenders who had significant hearing difficulty, mental retardation, or were unable to communicate in Chinese were excluded. Most participants completed the questionnaire by themselves. For some elderly participants with difficulties in reading, the research assistants helped to administer the questionnaire.

The quantitative data were analysed using JMP (Release 10.0.0). Frequencies and percentages were used to summarise the responses on the question items. Pearson Chi-squared test was used to evaluate the difference in response distributions between groups. A p value of <0.05 was considered statistically significant.

Results

Excluding 22 incomplete interviews, 1626 patients successfully completed questionnaires. The response rate for eligible subjects was 72.3%. Of the 1626 respondents, 847 were recruited from 13 private clinics (52.1%) and 779 (47.9%) from six public clinics. Excluding missing values, our sample consisted of 548 (35.8%) males and 983 (64.2%) females. The age distribution was similar to that of the Hong Kong population in the 2011 Census, despite the smaller group size of people aged ≥70 years. The monthly household income of our sample was also similar to that of 2011 Census. However, our sample had more people with higher education.

Respondents were classified into four GHQ score ranges of 0-1 (n=826, 50.8%), 2-3 (n=359, 22.1%), 4-6 (n=295, 18.2%), and ≥7 (n=145, 8.9%) [Table 1]. Of the respondents, 440 (27.1%) had a cut-off score of ≥4 indicating high to very high risk of psychological distress.

Of the respondents, 650 (40.0%) reported to have had ever experienced psychological distress and 912 (56.1%) had not. The remaining 64 (3.9%) gave uncertain or missing responses. Of the 650 respondents who had ever experienced distress, 384 (59.1%) had been asked by their medical practitioners (whom they usually saw) about psychological problems, and 406 (62.5%) had mentioned psychological problems to their medical practitioners. However, when considering how often they did so, only 182 (28.0%) reported that their medical practitioners sometimes / often asked about psychological problems, and 220 (33.8%) sometimes/ often mentioned psychological problems to their medical practitioners.

TABLE 1. Distribution of General Health Questionnaire score of respondents

Score	Risk	No. (%)
0-1	Low	826 (50.8)
2-3	Moderate	359 (22.1)
4-6	High	295 (18.2)
≥7	Very high	145 (8.9)

Of the 650 respondents with experience of distress, 229 (35.2%) had sought help from health care professionals. Particularly, 114 (17.5%) had been treated by general practitioners (GPs) / family doctors for their distress, and 33 (5.1%) from traditional Chinese medicine practitioners. For the respondents treated by GPs / family doctors, 30.2% were treated by drugs, 17.7% by counselling, and 52.1% by both.

Of the 440 respondents at high or very high risk of distress, 114 (25.9%) had sought help from health care professionals. Particularly, 53 (12.0%) had been treated by GPs / family doctors for their distress, and 19 (4.3%) by traditional Chinese medicine practitioners.

The median consultation time increased from 6-8 minutes for usual consultation (any kind of health problems) to 9-11 minutes when distress had been mentioned to the medical practitioners. For the distressed respondents treated by GPs / family doctors, they had a higher median consultation time for both usual consultation (9-11 min) and consultation with distress mentioned (12-14 min) [Table 2]. The consultation time of the distressed group treated by GPs / family doctors was significantly longer than the other group for both conditions.

Of the 650 respondents with experience of distress, 71 (10.9%) received formal referrals to see psychiatrists / clinical psychologists and 91.5% of them followed the referral instruction, whereas 45 (6.9%) were advised to do so and only 28.9% of them followed the advice.

TABLE 2. Comparison of consultation time between groups for usual consultation and consultation with distress mentioned

Consultation	No. (%)				P value
	<6 min	6-8 min	9-11 min	>11 min	
Usual					0.0003
All (n=1600)	411 (25.7)	620 (38.8)	245 (15.3)	324 (20.2)	
Distressed group treated by general practitioners / family doctors (n=114)	14 (12.3)	40 (35.1)	21 (18.4)	39 (34.2)	
Distress mentioned					0.0038
Distressed group (n=349)	69 (19.8)	85 (24.4)	74 (21.2)	121 (34.7)	
Distressed group treated by general practitioners / family doctors (n=91)	9 (8.9)	16 (15.8)	25 (24.8)	51 (50.5)	

Discussion

Among distressed patients who sought help from health care professionals, about half were treated by GPs / family doctors for their distress. This proportion is lower than that reported in European countries and Australia (65% on average).[6,7]

There are three major observations on the primary care attenders' consultation pattern for psychological distress. First, of the respondents who had ever experienced distress, 59.1% had been asked by their medical practitioners (whom they usually saw) about psychological problems, but only 28.0% reported that their medical practitioners sometimes/often did so. This suggested that the PCPs had a significant but not sufficiently high awareness of patients' distress. Second, the group of distressed patients treated by GPs / family doctors had a longer average consultation time than other respondents for both usual consultation and consultation with distress mentioned. This suggested the importance of the length of consultation time in recognising and managing distress. Third, among the distressed patients who were referred to psychiatrists / clinical psychologists, over 90% followed the referral instruction. However, for those being advised to do so, less than one third followed the advice. This indicated that the doctors should make a formal referral if needed.

Conclusion

Policy makers may take note of the impact of PCPs' awareness of psychological distress, the length of consultation time, and referral approach to enhance the help-seeking rate in primary care settings.

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Co-occurrence of schizophrenia and smoking: a qualitative study

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KEY MESSAGES

1. The smoking and quitting behaviours of people with schizophrenia are mostly similar to non-psychiatric populations, but smokers with schizophrenia claim that smoking enables them to better cope with the illness and the adverse effects of antipsychotic medications.
2. Most participants perceive smoking cessation methods ineffective and are not interested to join the smoking cessation programme. They believe that banning of smoking is the most effective way to help them quit.
3. Most participants were not motivated to quit smoking and perceived quitting smoking as very tough owing to their schizophrenia condition.
4. To facilitate smoking cessation in people with schizophrenia, it is important to (1) encourage clinicians to address the internal barriers of quitting and psychological needs of those with schizophrenia; (2) encourage family and clinicians to provide authentic human caring and constant presence that trigger more powerful change in the patients' internal motivation rather than external motivation from authoritarian regulations or instrumental support; (3) teach individuals acceptance-related skills to increase their psychological flexibility and acceptance of cravings to smoke; and (4) provide support to access smoking cessation services.

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Introduction

Among people with mental illnesses, the prevalence of smoking is highest among those with schizophrenia, ranging from 58% to 90%.[1] Compared with the general population, those with schizophrenia live on average 10 fewer years.[2] The causes of this disparity are multifactorial; smoking accounts for most excess mortality among those with schizophrenia.[3]

Although the smoking rate among the general population is declining, no such trend is observed in psychiatric populations. A meta-analysis reported that individuals with schizophrenia have great difficulty in quitting smoking and have significantly lower smoking cessation rate than the general population or smokers with other psychiatric illnesses.[1]

Few qualitative studies have explored the experiences of tobacco use and cessation from the perspectives of psychiatric populations. Only one qualitative study explored the beliefs and attitudes on smoking behaviours among persons with schizophrenia.[4] Factors that influence smoking and quitting in Chinese people with schizophrenia are underexamined. This may lead to failure in designing and implementing effective smoking cessation programmes to the specific needs of this population. The present study aimed to identify and examine the subjective experiences of tobacco use and quitting in Chinese people with schizophrenia.

Methods

This qualitative study used face-to-face individual semi-structured interviews. A total of 23 people with schizophrenia were recruited from the community residential mental health service settings that provide counselling and transitional residential care. The inclusion criteria were (1) a diagnosis of schizophrenia, (2) referred by medical doctors, (3) currently or previously using tobacco, (4) interested in taking part in a face-to-face individual interview, and (5) able to communicate in Cantonese. Those with disorientation, developmental disabilities and/or organic conditions were excluded.

Purposive sampling was used. Case managers referred potentially eligible subjects. Written informed consent was obtained. Interviews were arranged at a time of their convenience at the centre where they received services.

Data were collected by one research assistant and five masters students under supervision of the first author. The research assistant and all masters students had been trained by the first author to conduct semi-structured interviews based on the interview guide, using probing questions, and how to handle silence. Credibility was established by extensive use and cross-referencing of interview data, field notes, memos, discussions in supervision, consultations with experts in the field, and wide reading of research in smoking and mental illness.

Experts in community mental health care and tobacco use provided feedback on the guiding questions. Three pilot interviews were conducted to ensure the credibility of the guiding questions.

Demographic data including age, sex, and socioeconomic status were obtained. Semi-structured interviews with open-ended questions related to mental illnesses and smoking behaviours were conducted to obtain rich narrative data. Interviews began with general questions about the current smoking habit and smoking history, together with their experience on smoking cessation. If there was connection between smoking and their mental health illness, the perception and experience on smoking or cessation, barriers to cessation, views on cessation methods were explored. Interview was stopped until no new findings on key categories were obtained. Each interview took 30 to 45 minutes and was audio-recorded. The audio-taped data were transcribed verbatim. Essential findings were then translated to English for reporting.

Data were analysed through the latent qualitative content analysis based on an inductive approach[4] to identify main categories (themes) and patterns among the sub-categories. Analysis involved active reading, verifying, and organising data. The unit of analysis for coding and themes/categories development was an entire statement from the transcripts. The analysis helps to explore and interpret the underlying meanings of the texts (data) that lead to meaningful units of sub-categories. The sub-categories were then condensed to achieve the status of a theme.[4] In other words, like the codes being developed as the first step of this analysis, name was given to each sub-category corresponding to the meanings of its coding. The coding and sub-categories were constantly checked, rechecked, and compared with other data in order to verify the meanings and discover common themes from the data being coded and categorised. To assure trustworthiness of results, each transcript was analysed by two investigators independently and they subsequently met to review the results (peer debriefing) to achieve consensus, credibility, and confirmability of the process.

TABLE. Characteristics of participants (n=23)

Pseudonym	Sex/ age, y	Years of smoking	Age of first smoking, y	Cigarettes smoked per day
Jason	M/41	29	12	-
Kelvin	M/46	31	15	6
Edgar	M/46	26	20	20
David	M/53	18	35	7
Ryan	M/44	26	18	20
Ann	F/51	37.5	13	3
Henry	M/49	27	22	45
Paul	M/50	37	13	10
Richard	M/26	11	15	20
Chris	M/62	-	20	25
Rock	M/43	25	18	20
Sam	M/48	8	20	15
Johnson	M/45	27	18	30
Peter	M/55	35	20	20
Max	M/50	29	21	20
Joe	M/42	14	28	7
Elvis	M/45	27	18	20
Calvin	M/50	30	20	15
Chris	M/58	33	25	3
Michael	M/54	34	20	25
Gordon	M/62	37	25	20
Kevin	M/57	37	20	6
Tim	M/53	30	23	20
Mean±SD (range)		**27.66±8.35 (8-37.5)**	**19.96±5.14 (12-35)**	**17.14±9.89 (3-45)**

Results

The age of participants ranged from 26 to 62 years; only one was female (Table). All participants were living in three centres with roommates. Prior to institutionalisation, most were living in public housing. Of the participants, 50% were employed and most received Comprehensive Social Security Assistance as the primary source of income. In addition, some also received income from the Disability Allowance Scheme. Most participants achieved secondary education levels. Most participants had been admitted to a psychiatric hospital before (78.5%) and received regular psychiatric follow ups in the last year (93.1%). Most started smoking on or before 25 years old (~91%) and had smoked for at least 20 years (>75%). One third tried quitting smoking before.

Four main themes emerged from the analysis: (1) smoking rationale, (2) environment and culture, (3) cognitively minimising the problems of smoking, and (4) beliefs about cessation methods.

Smoking Rationale

Perceived relationship between smoking and illness

Most participants perceived that there was no relationship between schizophrenia and smoking. For example, Henry commented that, *"There is nothing to do with smoking. Why are there many people who don't have mental illness... a lot of people smoke but no mental illness at all... now you see."*

Participants were generally not serious about quitting smoking. They perceived quitting as very challenging, with some related the difficulties to their illness. For example, Gordon described that having

schizophrenia was already tough enough and he could not quit smoking or his psychotic symptoms could intensify: *"Schizophrenia is too suffering, I can't quit… if I could recover from schizophrenia after smoking cessation, I would do that… but I don't recover from schizophrenia. I can't quit… even so I'll smoke again."* *"I hear voices (if I quit), I hear the TV scolding me, the radio also scolds me, people around and the entire world scold me too."*

Perceived relationship between smoking and medications

Several participants related smoking with antipsychotics. For example, Tim claimed that antipsychotics increased his urge to smoke: *"I really need to take 1-2 puffs of cigarette after taken the antipsychotic medications… maybe because those medications make me craves for a cigarette."* David reported that he smoked more when he suffered from more adverse effects from antipsychotics: *"Side effects of the antipsychotics are strong, then I will take more cigarettes… say if the side effects are not that strong. I can then take fewer cigarettes."* According to Sam, smoking helped to reduce adverse effects of antipsychotics when he was asked about the smoking effects in relation to medications: *"It helps… I don't feel that much tired, and that much sleepy. Sometimes after the injection, I feel sleepy and very tired… When I smoke, it stimulates me to feel energetic, not worrying about being sleepy."* However, David also suggested a negative influence of smoking on the effects of antipsychotics and in turn on his illness. He considered that cigarette smoking would reduce the effects of antipsychotics and thus accelerate the illness relapse rate: *"Your recurrence of illness will speed up (if continue to smoke)… all the medications are well calculated and taken in the hospital. But when I go out and smoke two packs of cigarettes, it will reduce half the drug efficacy of my medications, and this will then affect (my illness)."*

Environment and culture

Cigarette smoking depending on institutional smoking regulations

Many participants reported that their cigarette smoking depended on the smoking regulations of the institutions. They restricted themselves from smoking when the environment does not permit. Interviewer: *"Assuming that you're in the hospital and can't smoke, what would you do to refrain yourself from smoking?"* David: *"hmm… we're not allowed to smoke in the ward and so we just don't smoke."* Interviewer: *"Okay, so if the environment allows, you'll smoke. If not, you don't. Is that right?"* David: *"Yes."* Interviewer: *"Okay, so you stayed in the hospital for half a year, you didn't even smoke one cigarette at all?"* David: *"No."*

Participants who had been admitted to hospitals also reported that they restricted their cigarette smoking in the hospital owing to strict monitoring by staff. For example, Elvis stated: *"Our hospital has very strict monitoring… if you smoke, they will put you to a correctional room."*

Some participants reported that they quit smoking while they were in hospital owing to the smoke-free policies. However, most resumed smoking upon discharged. For example, Max stated, *"I did not smoke for 3 months in the hospital because of the restriction. I smoked again after I was discharged."* Nonetheless, a few participants reported that they smoked in hospitals when cigarettes were available. Elvis reported that he smoked in hospital as his *"family members brought cigarettes to hospital"* and Michael mentioned that he smoked in hospital as someone sold cigarettes in the hospital.

Cigarette smoking owing to institutional environment

Many of participants' peers in the community-based residential settings smoke and this culture influenced them to smoke, even though some had quitted smoking during hospital stay. Ryan stated, *"in my previous dormitory (of the community-based residential settings) there were more than 70% of people smoke... everyone smoke, and very naturally you will smoke too."* Two participants mentioned that the mundane environment in the community-based residential area or day-care centre caused them to smoke. Ryan said, *"The previous hostel where I lived in… I always stayed there… with nothing to do there. Then I always smoked. I applied for a day-care hospital, joining some groups… making artwork… then I can smoke less frequently."*

Smoke whenever accessible

Many participants reported that they complied with the smoke-free policies in the community-based residential settings by not smoking inside the block. However, they smoked outside their residential block or somewhere else during work, without violating the smoke-free regulations. For example, Richard reported that, *"when the manager is back, we will have to go near the rubbish bin near the entrance (of the community-based residential are) to smoke."* This was to make sure they do not violate the rules of smoking 'inside' the residential area. It was clear that, in the residential care setting, schizophrenic patients who smoke do so depending on the institutional smoking regulations and culture.

Cognitively minimising the problems of smoking

Perceived benefits in smoking

Most participants described benefits of smoking, in

particular, how smoking can help them to cope or escape from their negative emotions or mood. They also talked about the different moods contributing to their smoking tendency. For example, moods such as boredom were recurring emotions that trigger the smoking craving. Chris said *"being caught in a day-care center... I felt so pathetic and boring... and I started smoking again."* Many participants said smoking serves as way to cope with their routine and structured institutional life. Max said smoking helps *"to kill time easier... gave me (him) something to do."* Some participants believed cigarettes helped to relieve everyday stress, such as workplace pressure (eg Edgar said *"sometimes when I work... I face some job stress... therefore, I want to smoke."*) and negative emotions (eg Rock said *"when I am upset and feel troubled, I will smoke."*). Many strongly expressed that smoking acts as psychological support for them. Smoking can be as simple as just satisfying their smoking craving. To other participants, smoking provided them with a sense of comfort or enjoyment. Max said *"after 2 hours of work, I want to take some rest, I will smoke as a way to enjoy myself."* Some believed cigarettes had an enhancing effect on their alertness and concentration. Richard said *"I rely on cigarettes when I work... after I smoke... I can then concentrate... and work efficiently."* Others believed cigarettes provided a companionship to them over the years and throughout their journey of mental illness. Rock said: *"the meaning of smoking is that it has accompanied me for many years... at that time when I was just 19 years old and started smoking, that thing (schizophrenia) happened... smoking has accompanied me many years."* In addition, smoking serves a way to engage or make friends. Joe said: *"the attractive thing of smoking is... being able to know more friends."* It is apparent that smoking serves a special purpose for most participants.

Minimising problems of smoking

Many participants were able to name the harmful effects of smoking on physical health, but some did not think that those harmful consequences would happen to them. When asked whether one is afraid of developing cancer owing to smoking, Kevin replied: *"I am not scared... it won't happen to me that easily"* and Rock noted: *"I have been smoking for more than 20 years, there has been no problem. Then what problem would there be?"* Some participants also had misunderstanding that drinking herbal tea or beer can help to detoxify or soothe the harmful effects of smoking to health.

Decisional balance for smoking: pros greater than cons

Some participants faced a dilemma of whether to smoke, but they often perceived the benefits of smoking to be greater than its negative effects. For example, Elvis described his inner struggle but finally decided to give up quitting: *"It's such a dilemma... sometimes I feel like there is a devil and an angel living in my brain. The angel asked you to quit smoking quickly... the devil then asked you to smoke... they are like two people speaking in my heart.* Interviewer: *"Do you still have this dilemma now?"* Elvis: *"Not at the moment. I decided to smoke. It is a choice. In fact there is nothing I can do. I have nothing to do at the moment, no hobby, therefore, I smoke. Smoking serves as a little enjoyment in life for ordinary people like me."*

Most participants generally did not think too much about smoking or quitting as they had regarded smoking as a kind of *'habit'* and that they have *'got used to smoking'*. For example, Edgar described smoking as part of their daily routine: *"smoking... is like... a part of life, similar to eating"*.

Normalise smoking behaviour

When asked about the feelings and experience of their smoking behaviours, some participants tried to normalise smoking. Rock said, *"smoking does not cause me any disturbance, I have a lot of friends and relatives who smoke."* Some justified their smoking behaviours with reference to significant figures. Gordon said: *"Deng Xiaoping smoked and therefore, everyone of us can smoke... he also smoked in front of the television... even Deng Xiaoping could smoke, therefore, I smoke as well."* Some compared smoking with other addictive behaviours such as taking drugs, gambling, and drinking coffee, and thought that smoking was a relatively healthier habit. Johnson said, *"some people gamble, I don't gamble, neither am I addicted to drinking coffee. I only have nicotine craving. If I smoke then I won't have diabetes... drinking coffee is also not good for health."*

Searching for ways to minimise the negative effects of smoking

Some participants tried to minimise the negative effects of smoking such as financial burden and high amount of nicotine by using illicit cigarettes. Those illicit cigarettes are believed to be *'much cheaper'* and *'won't lead to heavy craving as there is only little amount of nicotine'.* Data analysis identified the participants' experience as 'cognitively minimising the problems of smoking'.

Beliefs about cessation methods

Lack of knowledge or misunderstanding of smoking cessation methods

Participants generally had minimal knowledge of current smoking cessations methods. Some did not know how to access smoking cessation services, or what services or methods are available to assist them to quit smoking. Even though some had heard

of certain tools for smoking cessation (eg nicotine patches), there were some misunderstandings. For example, Ann asserted that, *"Methadone… can be taken in government hospitals…which is used for smoking cessation."* Ann pointed out that no one had promoted the importance of smoking cessation and its services in the community-based residential setting and sheltered workshops.

Perceived smoking cessation programmes as ineffective

Participants perceived smoking cessation programmes or tools as not useful in smoking cessation. For example, Gordon described nicotine chewing gum and nicotine patch, which did not help him to reduce his cigarette smoking. Interviewer: *"You had (nicotine) chewing gum before, did you feel that it was ineffective (in helping you to quit smoking)?"* Gordon: *"It was just chewing gum… it is not useful."* Interviewer: *"Does it mean that your amount of cigarette smoking remained the same after having chewing gum?"* Gordon: *"Yes."* Interviewer: *"How about nicotine patch?"* Gordon: *"I always apply (the patch), but nothing had changed."*

Some participants claimed that they would not want to participate in smoking cessation programmes, as they perceived them as ineffective though without trying. These participants often repeated that whether to smoke depends on oneself, in particular one's will power and self-control. For example, Sam summarised the personal beliefs of many participants regarding what it took to quit smoking or reduce cigarette smoking: *"...quitting needs to rely on oneself, nicotine patch only has around 40% help in helping one to quit… the most important thing is to rely on one's will power… you just have to force yourself not to smoke… some people were successful in this way."*

Suggestions of smoking cessation methods

Many participants believed in law enforcement of banning smoking. Jason said *"…ask the government to ban smoking, don't sell cigarettes"* Data analysis demonstrated that patients with schizophrenia dwelling in the residential setting had misunderstandings about smoking cessation methods.

Discussion

Smoking played an important role in the lives of participants. Although they considered quitting at times, it was not enough to lead many of them to quit owing to the lack of cessation support throughout their recovery journey. The data provided important clues to understand how smoke-free policies and culture in hospitals and rehabilitation settings facilitated or hampered their smoking behaviours.

Most participants did not perceive smoking to be related to schizophrenia. However, some suggested that smoking may serve unique functions for individuals with schizophrenia such as reduction of adverse effects of antipsychotics, similar to a previous study.[5] One participant suggested that quitting might intensify psychotic symptoms, suggesting a self-medication model. Indeed, individuals with schizophrenia were reported to smoke to self-medicate positive symptoms,[6] and nicotine withdrawal or attempts to cut down or quit smoking led to exacerbation of psychotic symptoms.[7] However, no long-time adverse effect on the behaviour of psychiatric patients was observed following the introduction of a smoking ban.[8] One participant believed that smoking might reduce the efficacy of their medications and thus have a negative effect on the illness prognosis. This is consistent with a review of studies that smoking induces the metabolism of some antipsychotic medications and thus smokers with schizophrenia may require higher doses of medications to control symptoms.[9] In addition, a few participants believed that having schizophrenia would make smoking cessation more challenging. This was in line with a study that individuals with schizophrenia encountered great difficulty in quitting.[5] Future research is needed to explore how living with schizophrenia makes quitting more difficult, and how clinicians can address the needs of patients with schizophrenia in smoking cessation treatments.

With regard to perceived attitudes of smoking and quitting, participants were mostly similar to the general population[5] and individuals with schizophrenia in a previous study.[10] Participants generally lacked motivation to quit smoking and were not considering change. They regarded smoking as part of their daily living and perceived many psychological and social benefits of smoking. Cigarettes seemed to provide a consistent and dependable companionship that some participants may be lacking in other relationships. This role of cigarettes may seem like an exaggeration for most people, but not for these participants who were often segregated and stigmatised. Cigarettes have become a form of psychological support, and these participants perceived cigarettes as a tangible being that had accompanied them for many years, even through past negative experiences. This suggests that it is important for clinicians to address patient psychological needs when providing smoking cessation services. Most participants were aware of and were able to name the negative consequences of smoking, including cancer, dyspnoea, stomach ache, hypertension, increasing heartbeat, losing weight, and producing more sputum. However, the perceived positive effects of smoking appeared to outweigh the perceived adverse effects and risks associated

with other health behaviours. The participants faced dilemmas of whether to smoke, in line with a previous research.[11] In addition, participants often normalised and provided justifications for their smoking behaviours and avoided believing their susceptibility to harmful health outcomes. They found ways to minimise the negative effects of smoking such as using illicit cigarettes to reduce level of nicotine. These behaviours suggest that these participants had a tendency to utilise avoidance-oriented coping strategies, including denying, minimising the seriousness of the situation, modifying and eliminating the conditions that gave rise to the problem, and changing the perception of an experience in a way that neutralises the problem. This is consistent with previous research that found avoidance-oriented coping was common among individuals with schizophrenia.[12] This desire to escape from uncomfortable emotional states has been identified as the most common trigger for relapse.[13] Acceptance and Commitment Therapy may be useful, because it teaches participants acceptance-related skills to reduce avoidance and increase psychological flexibility. Participants can re-contextualise problematic cognitions and have more realistic views of the negative impact of smoking on them, which in turn may reduce their cigarette smoking.

Our findings also suggest that cigarette smoking in individuals with schizophrenia is related to the smoke-free policies and cultures of mental health institutions. Most participants reported that they smoked if the environment allowed or if they had access to cigarettes; participants restricted their cigarette smoking or quit if the environment did not permit, with strict monitoring or penalty such as in hospitals. However, many participants reported that, despite having quit smoking, they resumed smoking upon discharge from hospital, when they were free from restrictions or due to peer influences in the residential settings. It is also important to educate family members on providing support and avoiding actions such as providing cigarettes to help patients to quit smoking.

In addition, participants generally had little knowledge of or misunderstood current smoking cessation methods. This has implications on the availability of smoking cessation programmes and education within the mental health settings. It seems that throughout the course of their mental illness recovery, smoking was rarely addressed and there was a lack of education regarding smoking cessation tools. Indeed, this was echoed by one participant that no cessation programmes were available to them and no staff has promoted smoking cessation in the community-based residential area. It has been reported that the issue of smoking is typically ignored in mental health settings.[14] This could be because mental health providers often have limited training in addressing tobacco use. They may assume that people with mental health cannot or are not interested to quit smoking, or that symptom management should take precedence over preventive health measures.[14] This is a significant problem, given that people with schizophrenia have high rates of smoking.[15] Efforts should be made to promote the importance of smoking cessation and to educate individuals on the benefits of using bupropion or varenicline for reducing or abstaining from smoking. It is essential to train mental health professionals to address the issue of smoking, to view smoking cessation as a priority or as their responsibility, and to take an active role in addressing smoking as part of the mental health treatment or routine clinical care. This includes assessing patient tobacco use, providing cessation counselling, and referring smokers to local resources for additional information and cessation support. For individuals with schizophrenia, interactions with mental health professionals are often their only access to preventive health counselling.

When asked about their thoughts of current smoking cessation programmes, most participants perceived them as ineffective, regardless if they have used these programmes before. One possible reason is that the participants did not feel that these programmes have specifically targeted their needs. They believed quitting would depend on one's willpower and self-control (internal factors). At the same time, participants perceived they would only be able to quit if smoking were banned, suggesting that they encountered internal barriers to change. These findings have implications in current smoking cessation programmes. Effective smoking cessation interventions should address their internal barriers of change and to tailor assistance accordingly. Smoking cessation programmes for people with schizophrenia should also focus on teaching stress management and coping skills, given that several participants reported smoking to cope with adverse drug effects or boredom.

Limitations

Findings were based on the views of a purposive sample living in a community-based residential setting. Results may not be generalisable to other ethnic groups or people with schizophrenia in general given that smoking is influenced by various biological, psychological, and environmental factors. Future studies should use a more structured qualitative methodology, such as grounded theory, in order to advance the data analysis process. Nevertheless, the use of qualitative methodology allowed for gathering of rich data (regarding factors that influence smoking and quitting) that could not be obtained using aggregated quantitative measures.

Regarding the current status of the participants with schizophrenia, it is difficult to confirm if participants have any cognitive distortions during the interview. Some participants had difficulties in articulating their thoughts or experiences clearly, although the researchers put every effort to identify participants who were mentally stable, with the help of the staff. Participants were also re-interviewed when messages were unclear. Furthermore, many have had schizophrenia since age 27 years on average, and most had started smoking before the onset of mental illness. They did not think too much about smoking and quitting. Therefore, recall bias cannot be eliminated. Moreover, patients with schizophrenia are a heterogeneous group and 23 participants may not be adequate for making a firm conclusion. Although the number of participants was small, the findings provide guidance for future research directions.

Conclusions

There are barriers to smoking cessation for individuals with schizophrenia, including internal factors (psychological needs, illness-related difficulties, tendency to utilise avoidance coping strategy, lack of will power and self-control) and external factors (peer influence in community-based residential settings, the lack of cessation programmes available and limited cessation support within mental health services). To facilitate smoking cessation in people with schizophrenia, it is important (1) to encourage clinicians to address the psychological needs and internal barriers to quitting in patients with schizophrenia; (2) to encourage family and clinicians to provide authentic human caring and a constant presence that triggers more powerful change in the patients' internal motivation rather than the authoritarian regulations or instrumental support; (3) to teach acceptance-related skills to patients with schizophrenia, to increase their psychological flexibility and acceptance of cravings to smoke; and (4) to improve access to smoking cessation services.

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Combined electroacupuncture and auricular acupuncture for primary insomnia: a randomised controlled trial of dose-response effect

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KEY MESSAGES

1. Acupuncture alone and a combination of acupuncture and auricular acupuncture were well-tolerated and better than the waiting list for the treatment of insomnia.
2. Acupuncture alone and combination treatment both produced durable effects on sleep, anxiety, and depressive symptoms, and improved daytime functioning up to at least 13 weeks after treatment.
3. Augmentation of acupuncture by auricular acupuncture to enhance efficacy was not supported.
4. Future head-to-head comparisons between Chinese medicine treatments and conventional therapies for insomnia are required.

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Introduction

Acupuncture possesses a mild hypnotic effect.[1-3] Auricular acupuncture is a form of acupuncture in which seeds, needles, or other materials are applied to the acupoints on the outer ears for a few days to 2 weeks. Acupuncture and auricular acupuncture are based on distinct Chinese medicine theories. Combination of acupuncture and auricular acupuncture may be more effective than either alone. We hypothesised that combined acupuncture and auricular acupuncture was more efficacious than acupuncture alone for treating insomnia.

Methods

This was a randomised assessor-blind parallel-group trial with a 3:3:1 ratio of combination treatment, acupuncture alone, and waiting list. Assessments were conducted at baseline, 1 week, 4 weeks, and 13 weeks after treatment. The trial was registered at ClinicalTrials.gov (NCT01891097). All procedures were approved by the local institutional review board (HKU/HA HKW IRB UW 12-340).

Participants were recruited from June 2013 to May 2015. Inclusion criteria were: (1) aged ≥18 years, (2) fulfilling the DSM-5 diagnosis of insomnia disorder, and (3) sleep onset latency or wake after sleep onset >30 minutes and sleep efficiency <85% for at least three nights based on a 1-week sleep diary at baseline.

Exclusion criteria were: (1) any current major depressive disorder, generalised anxiety or panic disorder, manic or hypomanic episode, substance use disorder, organic mental disorder, or schizophrenia or other psychotic disorder, as defined by the DSM-5 criteria; (2) a Hamilton Depression Rating Scale score of >18; (3) a suicide item score of ≥3 in the above scale; (4) any unstable psychiatric conditions or serious physical illnesses; (5) any sleep disorders including sleep phase disorders, parasomnia, obstructive sleep apnoea (apnoea-hypopnoea index of ≥10), or periodic limb movement disorder (periodic limb movement disorder index of ≥15) detected by overnight polysomnography; and (6) having received any acupuncture or auricular acupuncture during the previous 12 months.

Psychotropic medications, hypnotics, herbal remedies, and over-the-counter medications that were intended for insomnia could be continued, but dose escalation was not disallowed. Introduction of any new insomnia treatment during the study period was disallowed. Acupuncture treatment was provided free of charge. A HK$200 travel allowance was given after completion of all study procedures.

Subjects were treated three times per week for 3 consecutive weeks. Treatments were performed by a registered Chinese medicine practitioner with at least 3 years of experience in acupuncture. To ensure treatment quality, the first five sessions of each type of treatment were supervised by experienced acupuncturists. The thrice-weekly treatment schedule was selected to enhance treatment adherence, whereas the 3-week treatment duration was chosen to examine the short-term effect of acupuncture.

In the combination treatment group, subjects

were needled bilaterally at Ear Shenmen, Sishencong (EX-HN1), Anmian, Neiguan (PC6), Shenmen (HT7), and Sanyinjiao (SP6), and unilaterally at Yintang (EX-HN3) and Baihui (GV20), using the traditional style of acupuncture. The acupoints on the head, hands, and legs were treated using 0.25×25 mm needles, whereas those on the ears were treated using 0.20×25 mm needles. The depth of insertion was between 2 and 25 mm. Deqi was achieved if possible. An electric stimulator was connected to all needles and delivered a constant current of 4 Hz frequency. The needles were left for 30 minutes and then removed. Borneol crystals were placed at Ear Shenmen, Heart, Kidney, Liver, Spleen, Occiput, and Subcortex on the left and right side of the ear in alternation between sessions. Borneol crystals were used instead of magnet pellets or Semen Vaccariae because the former could produce continuous chemical stimulation in addition to mechanical stimulation. Subjects were asked to press the borneol crystals lightly for 5 minutes, three times a day, and remove them after 48 hours.

In the acupuncture group, subjects received acupuncture in the same way. In the waiting-list controls, subjects were assessed at baseline, week 4, and week 7; afterwards, they were randomised to receive combination treatment or acupuncture in a 1:1 ratio.

The primary outcome was the sleep diary–derived sleep efficiency. Secondary outcomes included other sleep diary parameters, actigraphy measures, Insomnia Severity Index, Pittsburgh Sleep Quality Index, Hospital Anxiety and Depression Scale, and Sheehan Disability Scale. In addition, two outcome measures (Multidimensional Fatigue Inventory and Epworth Sleepiness Scale) and two outcome predictors (Dysfunctional Beliefs and Attitudes about Sleep and Sleep Hygiene Practice Scale) were added. Treatment expectancy was assessed using the Credibility of Treatment Rating Scale. Adverse events were monitored after the 3rd, 6th, and 9th treatment using a structured adverse event form.[4]

We estimated the sample size based on sleep diary–derived sleep efficiency. A 5% and 10% difference in sleep efficiency between combination treatment and acupuncture and between acupuncture and waiting list were planned. With an assumption of 25% dropout, a sample size of 96, 96, and 32 for combination treatment, acupuncture, and waiting list, respectively, was needed.

The intention-to-treat approach was used. The primary analysis was mixed-effects group-by-time interaction. Missing data were handled by the mixed-effects model. Standardised effect size was computed by dividing the difference in means with the pooled standard deviation. Dichotomous outcome was assessed using the χ^2 or Fisher exact test. Statistical analyses were performed using SPSS (Windows version 21; IBM Corp, Armonk [NY], US).

Results

A total of 841 subjects were assessed for eligibility, of whom 413 were screened and 224 were randomised (Fig). The mean age of the 224 participants was 53.4 years and 75.4% were female (Table 1). About 63% had insomnia disorder as the primary psychiatric condition, whereas 29% had previous major depressive episodes. At baseline, the mean Insomnia Severity Index score was 19.5, mean Pittsburgh Sleep Quality Index score was 13.4, and mean Hamilton Depression Rating Scale score was 6.3. Of the 192 participants allocated to the two treatment groups, 16 (8.3%) could not complete all treatments. The attrition rate in the two groups was comparable.

There was no significant group-by-time interaction in sleep diary–derived sleep efficiency. However, significant interactions were found in total sleep time and sleep quality (Table 2), with acupuncture superior to combination treatment at 1 week after treatment. In addition, acupuncture was more effective than waiting list in improving total sleep time and sleep quality at 1 week and 4 weeks after treatment, but no significant difference was detected between combination treatment and waiting list. The within-group effect size of acupuncture for sleep diary–derived sleep efficiency variables ranged from 0.16 to 0.45 at 1 week after treatment (Table 2), with mean effect size of 0.32. For combination treatment, the mean effect size was 0.22.

There were significant group-by-time interactions in Insomnia Severity Index and Pittsburgh Sleep Quality Index scores but no significant difference between acupuncture and combination treatment. However, compared with waiting list, combination treatment resulted in lower Insomnia Severity Index score, whereas acupuncture produced lower scores of both Insomnia Severity Index and Pittsburgh Sleep Quality Index at 1 week and 4 weeks after treatment (data not shown).

The only significant difference between acupuncture and combination treatment was the fatigue score at 1 week after treatment, with greater reduction of fatigue after acupuncture. Compared with waiting list, acupuncture produced significantly greater reduction in anxiety, depression, and fatigue and greater improvement in family and social functioning, whereas combination treatment produced significantly greater improvements in anxiety, depression, daytime sleepiness, and occupational, family, and social functioning (data not shown). Results on outcome predictors were not analysed in this report.

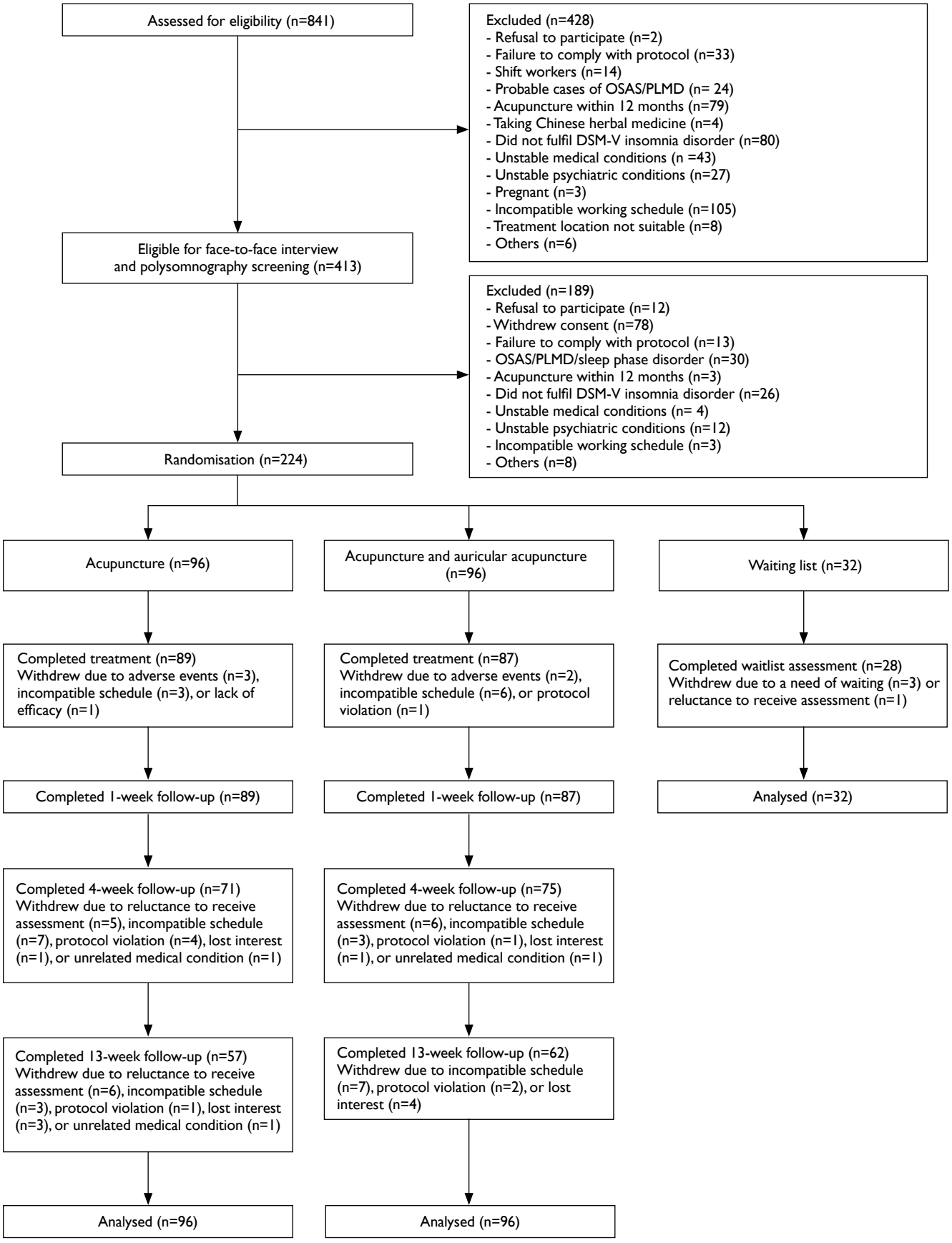

FIG. Study flowchart

TABLE 1. Demographic and clinical characteristics of the participants*

Variables	Combination (n=96)	Acupuncture alone (n=96)	Waiting list (n=32)	Total (n=224)
Age, y	53.7±9.5	53.1±9.5	53.7±10.7	53.4±9.6
Female	70 (72.9)	78 (81.3)	21 (65.6)	169 (75.4)
Education attainment, y	10.7±3.9	11.0±3.8	12.1±3.7	11.0±3.8
Marital status				
Never married	12 (12.5)	10 (10.4)	4 (12.5)	26 (11.6)
Married/cohabiting	70 (72.9)	69 (71.9)	19 (59.4)	158 (70.5)
Divorced/widowed	14 (14.6)	17 (17.7)	9 (28.1)	40 (17.9)
Occupation				
Professional and associate professional	13 (13.5)	7 (7.3)	7 (21.9)	27 (12.1)
Skilled and semi-skilled worker	21 (21.9)	21 (21.9)	4 (12.5)	46 (20.5)
Unskilled worker	10 (10.4)	3 (3.1)	2 (6.3)	15 (6.7)
Retired	16 (16.7)	20 (20.8)	10 (31.3)	46 (20.5)
Unemployed/housework	36 (37.5)	45 (46.9)	9 (28.1)	90 (40.2)
Insomnia duration, y	12.0±9.9	13.5±11.2	11.3±10.5	12.5±10.6
Previous treatment for insomnia	83 (86.5)	95 (99.0)	31 (96.9)	209 (93.3)
Western medication	60 (62.5)	68 (70.8)	26 (81.3)	154 (68.8)
Psychological treatment	12 (12.5)	11 (11.5)	5 (15.6)	28 (12.5)
Over-the-counter drug	46 (47.9)	58 (60.4)	19 (59.4)	123 (54.9)
Chinese herbal medicine	7 (7.3)	11 (11.5)	6 (18.8)	24 (10.7)
Acupuncture	21 (21.9)	23 (24.0)	10 (31.3)	54 (24.1)
Others	25 (26.0)	36 (37.5)	11 (34.4)	72 (32.1)
Primary psychiatric diagnosis				
Insomnia disorder	60 (62.5)	60 (62.5)	21 (65.6)	141 (62.9)
Major depressive disorder	25 (26.0)	30 (31.3)	10 (31.3)	65 (29.0)
Generalised anxiety disorder / panic disorder / post-traumatic stress disorder	10 (10.4)	5 (5.2)	1 (3.1)	14 (6.3)
Bipolar disorder	1 (1.0)	1 (1.0)	0 (0)	2 (0.9)
Current psychotropic medications other than hypnotics	29 (30.2)	26 (27.1)	8 (25.0)	63 (28.1)
Selective serotonin reuptake inhibitor	10 (10.4)	8 (8.3)	2 (6.3)	20 (8.9)
Serotonin and noradrenalin reuptake inhibitors	2 (2.1)	0 (0)	0 (0)	2 (0.9)
Tricyclic antidepressant	3 (3.1)	4 (4.2)	1 (3.1)	8 (3.6)
Others	5 (5.2)	6 (6.3)	2 (6.3)	13 (5.8)
Combination	9 (9.4)	8 (8.3)	3 (9.4)	20 (8.9)
Equivalent dose of antidepressants in fluoxetine, mg/d	19.2±15.5	20.9±20.3	19.5±12.1	19.9±17.0
Current hypnotics	32 (33.3)	31 (32.3)	18 (56.3)	81 (36.2)
Benzodiazepines	7 (7.3)	1 (1.0)	3 (9.4)	11 (4.9)
Non-benzodiazepine hypnotics	14 (14.6)	16 (16.7)	11 (34.4)	41 (18.3)
Combination	4 (4.2)	12 (12.5)	2 (6.3)	18 (8.0)
Antihistamine or melatonin	7 (7.3)	2 (2.1)	2 (6.3)	11 (4.9)
Equivalent dose of hypnotics in diazepam, mg/d	6.0±8.6	6.6±8.5	6.6±8.5	6.4±7.7
Chronic medical illnesses†	29 (30.2)	22 (22.9)	15 (46.9)	66 (29.5)
Insomnia Severity Index score	18.7±4.9	20.3±4.1	19.9±4.4	19.5±4.5
Pittsburgh Sleep Quality Index score	12.7±2.8	13.7±3.0	14.5±2.7	13.4±3.0
Hamilton Depression Rating Scale score	6.3±3.0	6.3±2.7	6.3±2.8	6.3±2.8

* Data are presented as mean±standard deviation or No. (%) of participants.
† Significant group difference (P=0.04, Chi-squared test)

TABLE 2. Sleep diary–derived variables across study time points in linear mixed-effects models

Variables	Waiting list (n=32)	Within-group effect size	Acupuncture alone (n=96)	Within-group effect size	Combination (n=96)	Within-group effect size	Acupuncture vs waiting list	Combination vs waiting list	Acupuncture vs combination
	Mean±SE*		Mean±SE*		Mean±SE*		P value†	P value†	P value†
Sleep efficiency									
Baseline	60.8±2.6		57.8±1.5		60.8±1.5				
1 week after treatment	64.6±2.8	-0.25	64.6±1.5	-0.45	64.7±1.5	-0.26	0.21	0.96	0.07
4 weeks after treatment	63.3±2.8	-0.17	64.9±1.6	-0.46	65.7±1.6	-0.31	0.08	0.42	0.20
13 weeks after treatment	-		65.4±1.7	-0.48	66.8±1.7	-0.38	-	-	0.39
Sleep onset latency									
Baseline	64.7±8.3		77.1±4.8		61.2±4.8				
1 week after treatment	61.9±8.8	0.06	67.6±4.9	0.20	49.0±4.9	0.26	0.41	0.20	0.61
4 weeks after treatment	57.1±8.8	0.16	61.5±5.2	0.32	50.4±5.1	0.22	0.28	0.73	0.41
13 weeks after treatment	-		61.7±5.4	0.31	48.7±5.3	0.25	-	-	0.65
Wake after sleep onset									
Baseline	70.5±8.3		65.1±4.8		65.8±4.8				
1 week after treatment	53.8±8.9	0.34	57.4±4.9	0.16	59.2±4.9	0.14	0.37	0.27	0.85
4 weeks after treatment	64.1±9.0	0.13	51.0±5.3	0.29	50.0±5.2	0.32	0.43	0.20	0.85
13 weeks after treatment	-		47.8±5.7	0.34	51.9±5.5	0.28	-	-	0.64
Total sleep time									
Baseline	297.1±13.7		285.4±7.9		292.4±7.9				
1 week after treatment	313.5±14.3	-0.21	320.2±8.0	-0.45	310.3±8.0	-0.23	0.14	0.89	0.042
4 weeks after treatment	306.6±14.5	-0.12	322.4±8.5	-0.46	312.6±8.4	-0.25	0.035	0.36	0.08
13 weeks after treatment	-		321.0±9.0	-0.43	325.4±8.7	-0.41	-	-	0.82
Sleep quality									
Baseline	2.2±0.1		2.0±0.1		2.2±0.1				
1 week after treatment	2.2±0.1	-0.04	2.4±0.1	-0.69	2.4±0.1	-0.36	0.001	0.09	0.017
4 weeks after treatment	2.2±0.1	0.01	2.3±0.1	-0.54	2.4±0.1	-0.34	0.004	0.08	0.19
13 weeks after treatment	-		2.4±0.1	-0.63	2.5±0.1	-0.54	-	-	0.48

* Adjusted for the last assessment
† For group by time interaction

Sleep onset latency was reduced to a greater extent at 4 weeks after treatment in acupuncture than waiting list (P=0.048). No significant group-by-time interaction was found in other actigraphy-derived measures (data not shown).

There was no significant difference in treatment credibility between the three groups at baseline and 1 week after treatment (data not shown).

Discontinuation rate due to adverse events was 2.1% and 3.1% for acupuncture and combination treatment, respectively (Fig). The most common adverse event was needle site bruise (26.6%), followed by headache and other painful symptoms (21.4). The incidence of adverse events was comparable between acupuncture and combination treatment (P=0.22, Mann-Whitney *U* test).

Discussion

Augmenting acupuncture by auricular acupuncture for treatment of insomnia was not supported. In fact, acupuncture was marginally better than combination treatment for prolonging sleep diary–derived total sleep time, improving sleep quality, and reducing fatigue at 1 week after treatment. Nonetheless, the two groups were comparable in terms of sleep diary–derived sleep efficiency and other secondary outcomes. Hence, acupuncture and combination treatment were largely similar in efficacy for the treatment of insomnia. Both treatments were well-tolerated (based on the low discontinuation rate) and resulted in durable effects on sleep, anxiety, and depressive symptoms and daytime functioning up to at least 13 weeks after treatment.

Acupuncture with or without auricular acupuncture had a mild hypnotic effect, with a mean effect size of 0.22 to 0.32 for sleep diary measures at 1 week after treatment. Our previous studies reported a mean effect size of 0.48 for primary insomnia[1] and

0.12 for residual insomnia associated with major depression at 1 week after treatment.[2,3]

Compared with pharmacological and psycho-behavioural therapies that have a mean effect size of 0.84 and 0.79, respectively, acupuncture seems to be less effective in terms of sleep diary–derived variables.[5] However, there are limited randomised controlled trials comparing Chinese medicine treatments with pharmacological and psycho-behavioural therapies for insomnia.

There are several limitations in our study. Participants were not blind to their treatment allocation. Those on the waiting list were told that they would be eventually treated, and thus the likelihood of symptom over-reporting was low. In addition, participants allocated to different groups had similar expectation toward acupuncture; hence, the influence of treatment expectancy on outcome was minimal. A standard acupuncture protocol was used; therefore, the effectiveness of acupuncture might be lower.

Conclusion

Augmentation of acupuncture by auricular acupuncture to enhance efficacy in treatment of insomnia was not supported. Future head-to-head comparisons between Chinese medicine treatments and conventional therapies for insomnia are required.

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Relative contribution and interactive effects of psychological, social, and environmental correlates of physical activity, sedentary behaviour, and dietary behaviours in Hong Kong adolescents

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KEY MESSAGES

1. Multilevel psychological, social, and environmental factors, and their interactions were all important correlates of obesity-related behaviours (physical activity, sedentary behaviour, and dietary behaviours) and body mass index in Hong Kong adolescents.
2. Parents may influence adolescents' obesity-related behaviours by being good role models, establishing appropriate rules about eating and providing material and emotional support for obesity-preventive behaviours.
3. Schools and communities may provide opportunities for engagement in physical activity and healthy eating, as well as for reducing sedentary behaviour and intake of unhealthy foods.
4. Environmental correlates of adolescents' obesity-related behaviours somewhat varied by sex, age, and level of enjoyment of specific behaviours.

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Introduction

Adolescence is a critical period for predicting adult obesity, which is a major contributor to chronic non-communicable diseases.[1] The prevalence of overweight/obesity in Hong Kong adolescents has been increasing, owing to insufficient physical activity, excessive sedentary behaviour, and unhealthy dietary behaviours.[2] It is important to identify modifiable factors to improve these obesity-related behaviours (ORBs).

Socio-ecological models posit that behaviours are affected by multilevel individual, social, and environmental factors, and their interactions.[1] Factors associated with adolescents' ORBs have been examined in Western countries,[1] but such data on Hong Kong adolescents are rare.[2] In the West, self-efficacy was reported to positively relate to physical activity and healthy dietary behaviours, and negatively relate to sedentary behaviour.[2] Social factors including sources of social support, parental modelling, and parenting practices are significant for all ORBs, as are environmental factors with respect to physical activity and sedentary behaviour.[2] The evidence on dietary behaviours highlights the importance of social factors and the home environment (parental modelling, parenting styles/rules, availability of foods), whereas findings about the school and neighbourhood environments are sparse.[3] In Hong Kong, research on the correlates of adolescents' physical activity is limited and inconsistent, as is that on correlates of dietary behaviours and sedentary behaviour.[2]

Using a social-ecological framework, this study investigated the effects of individual, social, and environmental factors, and their interaction, on ORBs and body mass index (BMI) in Hong Kong adolescents.

Methods

This study was approved by the Human Research Ethics Committee for Non-Clinical Faculties of The University of Hong Kong (EA351010). We recruited adolescents and one of their parents/primary caregivers ('dyads') residing in tertiary planning units stratified by transport-related walkability (based on characteristics of the environment [residential density, street intersection density, and mixed land use] that facilitate walking for transportation

purposes), determined by Geographic Information Systems data and Census-based median household income.

Eligible participants were healthy adolescents (aged 11 to 18 years) attending one of 20 participating secondary schools and one of their parents/primary caregivers. They had lived in the selected area for ≥6 months and were planning to reside there in the following 8 months. The overall response rate was 48%. Of 1363 dyads, 1299 (43% boys; mean±standard deviation [SD] age, 14.7±1.6 years; mean±SD BMI, 19.8±3.0) provided valid survey data. Incentives were provided to minimise attrition and boost the response rate.

The study included two surveys 6 months apart (retention rate, 96%) completed by the adolescents, a parental survey, objective assessment of adolescents' height and weight, objective assessment of adolescents' physical activity and sedentary behaviour for 7 days using accelerometers, and objective assessment of participants' neighbourhoods.

The first adolescent survey used validated scales adapted for Hong Kong adolescents[4] to measure ORBs and physical activity–related environmental and psychosocial correlates. The second adolescent survey added items to gauge environmental and psychosocial correlates of sedentary behaviour and dietary behaviours. The parental survey assessed household and adolescent socio-demographics, parental ORBs, neighbourhood and household environment, and parental practices and rules related to ORBs.

Physical activity and sedentary behaviour were objectively assessed for a week in ~40% (n=552) of randomly selected adolescents using an accelerometer (ActiGraph). Adolescents re-wore the accelerometer if they did not have enough valid hours (<10 hours per weekday; <8 hours per weekend) for ≥4 weekdays and 1 weekend day. A valid hour was an hour with no >30 consecutive minutes of '0' activity counts. Data were scored as minutes spent in sedentary and moderate-to-vigorous physical activity using Freedson's thresholds developed for adolescents.[2] Time being sedentary used a cut-off of <100 counts per minute.

Neighbourhood was defined as an 800-m crow-fly radial buffer area. Environmental audits of 50% street segments within the buffer areas were conducted using the Environment in Asia Scan Tool – Hong Kong version and the Public Open Space Tool, and integrated into a Geographic Information Systems database containing other data (eg, walkability). Environmental audits assessed the number of publicly accessible parks, public transit points, food outlets, and public recreational facilities.

Generalised linear mixed models and zero-inflated negative binomial models with robust standard errors (accounting for clustering at the tertiary planning unit level and school level) were used to address all research questions. A significance level of P<0.05 was used.

Results

Table 1 shows descriptive statistics of adolescents (n=1299) and those who participated in accelerometer monitoring of physical activity and sedentary behaviour (n=552). On average, both boys and girls accumulated the recommended amount of physical activity of ≥60 minutes of moderate-to-vigorous physical activity per day. However, both girls and boys did not meet the recommended daily intake of fruit (≥2 servings) and vegetables (≥3 servings).

Individual-level psychological, social, and environmental factors were all independent correlates of self-reported adolescents' physical activity and sedentary behaviour, except for active transport (ie, cycling or walking) to/from school (Table 2). Environmental factors were the strongest correlates of physical activity and sedentary behaviour, with physical activity unexpectedly negatively associated with neighbourhood walkability and aesthetics. Availability of certain foods at home and self-efficacy for eating or avoiding certain foods were the strongest correlates of adolescents' dietary behaviours (Table 3). The home social environment (parental modelling and rules) also played an important role. Eating disinhibition was predictive of unhealthy dietary behaviours.

The associations of environmental correlates with ORBs sometimes depended on adolescents' sex, age, and level of enjoyment of a specific ORB. For example, traffic safety as perceived by parents was positively related to active transport to destinations other than school only in older adolescents (P<0.01) and access to services only in boys (P<0.01). An unhealthy school food environment was predictive of lower vegetable intake in those with low enjoyment eating fruits and vegetables only (P<0.05) and was predictive of higher sugar-sweetened drink consumption in younger adolescents (P<0.001).

BMI was negatively related to physical activity equipment in home (b= −0.12, 95% confidence interval [CI]= −0.19 to −0.04, P<0.01), transport-related walkability (b= −0.11, 95% CI= −0.19 to −0.03, P<0.01), and fresh vegetable intake (b= −0.03, 95% CI= −0.03 to −0.01, P<0.05). An unhealthy school food environment predicted a higher BMI (b=0.17, 95% CI=0.02-0.35, P<0.05), as did parental (b=0.08, 95% CI=0.02-0.14, P<0.01) and adolescent (b=0.06, 95% CI=0.01-0.11, P<0.05) amount of sedentary behaviour. In the accelerometry subsample, moderate-to-vigorous physical activity (b=0.01, 95% CI=0.00-0.02, P<0.05) and neighbourhood aesthetics (b=0.50, 95% CI=0.20-0.79, P<0.001) were unexpectedly positively related to BMI, whereas the

TABLE. 1 Physical activity, sedentary behaviour, dietary behaviours, and body mass index of adolescents

Variable	Boys (n=558)	Girls (n=741)	P value
Physical activity			
Physical activity at school, min/week	169±84	158±70	<0.001
Physical activity outside school, days/week with ≥60 min	2.4±1.9	1.7±1.6	<0.001
Active transport to/from school, times/week	5.0±4.6	4.3±4.5	>0.05
Active transport to other destinations, times/week	7.6±5.7	7.8±5.8	>0.05
Sedentary behaviour out of school, hours/day	6.1±3.1	6.2±3.0	>0.05
Dietary behaviours			
Fresh fruit consumption, times/week	6.5±5.6	7.3±5.7	>0.05
Fresh fruit consumption, servings/day	1.6±1.2	1.8±1.2	<0.05
Fresh vegetable consumption, times/week	9.2±6.0	9.9±6.0	>0.05
Cooked vegetable consumption, servings/week	1.8±1.1	1.8±1.1	>0.05
Deep fried or fatty food consumption, times/week	4.4±4.9	3.5±3.5	<0.001
Consumption of any snacks, times/week	4.0±4.7	4.7±4.8	<0.05
Sugar-sweetened drink consumption, times/week	5.5±5.2	4.7±4.8	<0.05
Body mass index, kg/m^2	20.2±3.2	19.6±2.8	<0.01
Accelerometer monitoring	**Boys (n=253)**	**Girls (n=299)**	
Average daily monitor wear time, min/day	779±89	794±84	<0.05
Average valid days of wear	7.5±1.9	7.3±1.7	>0.05
Accelerometer-assessed moderate-to-vigorous physical activity, min/day	108±36	100±33	<0.01
Accelerometer-assessed sedentary time, min/day	574±151	604±114	>0.05

* Data are presented as mean±standard deviation

associations with proximity to commercial facilities (b= –0.42, 95% CI= –0.75 to –0.09, P<0.05) and frequency of family meals (b= –0.29, 95% CI= –0.56 to –0.02, P<0.05) were in the expected direction.

Discussion

This study identified individual-level psychological, social, and environmental factors independently associated with ORBs and BMI in Hong Kong adolescents. In line with socio-ecological models of health,[2] all categories of factors contributed to ORBs. This confirms the need to consider multilevel influences on adolescents' ORBs and obesity. Individual-level psychological constructs (self-efficacy and enjoyment) and social factors (parental modelling, social support, and/or parental rules) were consistent predictors of ORBs. Environmental characteristics associated with neighbourhood safety and/or access to public transport, destinations/facilities and/or physical activity equipment were associated with higher levels of activity.

Of particular relevance to Hong Kong are the negative associations of transport-related walkability (defined as high residential and intersection density) and aesthetics (defined as green, well-maintained, usually hilly areas), and the positive association of access to public transport with moderate-to-vigorous physical activity. In Hong Kong, lower-density, lower-traffic, not-too-steep areas, with good access to public transport may be more physical activity–friendly environments for adolescents than high-density areas surrounded by green steep slopes. Low-density locations with good public transport may provide more open space for active play and opportunities for accrual of amounts of active transport similar to those living in high-density areas owing to a high level of regional accessibility. It is important to note that neighbourhood walkability was negatively related to not only physical activity but also BMI.[5] Reasons underlying these associations are yet to be established; it is possible that high-density walkable areas in Hong Kong do not provide suitable places for engagement in higher-intensity physical activity. Assuming similar levels of adiposity across Hong Kong, this would result in adolescents from high-density walkable areas having lower BMI. Alternatively, it is also plausible to assume that adolescents living in high-density walkable areas may regularly engage in large amounts of low-intensity physical activity (eg, walking for different purposes) that can contribute to lower levels of adiposity and hence lower BMI.

The availability of foods at home, parental dietary behaviours, and rules about eating were consistent correlates of adolescents' dietary behaviours. These findings suggest that the home

TABLE 2. Individual-level psychological, social, and environmental correlates of physical activity and sedentary behaviour

Variable	e^b (95% CI)	P value
Physical activity at school, min/week		
Physical activity–friendly school policy	1.04 (1.01-1.06)	<0.01
Parental leisure-time physical activity	1.01 (1.00-1.02)	<0.05
Self-efficacy for physical activity	1.08 (1.05-1.12)	<0.001
Physical activity outside school, days/week with ≥60 min		
Physical activity equipment at home	1.03 (1.01-1.05)	<0.01
Street connectivity	0.88 (0.82-0.95)	<0.01
Neighbourhood aesthetics	1.10 (1.02-1.17)	<0.01
Social support for physical activity from adults	1.07 (1.02-1.12)	<0.01
Social support for physical activity from siblings and friends	1.06 (1.02-1.11)	<0.01
Self-efficacy for physical activity	1.37 (1.31-1.44)	<0.001
Enjoyment of physical activity	1.12 (1.05-1.20)	<0.001
Odds of any active transport to/from school		
Proximity to school	2.04 (1.69-2.46)	<0.001
Social support for physical activity from siblings and friends	1.24 (1.08-1.43)	<0.01
Social support for physical activity from adults	0.78 (0.67-0.91)	<0.01
Parental rules about physical activity	0.95 (0.91-0.99)	<0.01
Non-zero weekly frequency of active transport to/from school		
Proximity of child's school	1.08 (1.05-1.11)	<0.001
Active transport to other destinations, times/week		
Traffic safety	1.12 (1.01-1.24)	<0.05
Proximity to commercial facilities	1.11 (1.06-1.17)	<0.001
Social support for physical activity from siblings and friends	1.07 (1.03-1.11)	<0.001
Self-efficacy for physical activity	1.15 (1.09-1.21)	<0.001
Enjoyment of physical activity	1.08 (1.02-1.13)	<0.01
Accelerometry-assessed moderate-to-vigorous physical activity, min/day		
Transport-related walkability	0.98 (0.98-0.99)	<0.05
Neighbourhood aesthetics	0.93 (0.91-0.96)	<0.001
Proximity to transit points	1.03 (1.02-1.04)	<0.05
Attitude towards physical activity	1.09 (1.02-1.16)	<0.01
Self-efficacy for physical activity	1.04 (1.01-1.07)	<0.01
Sedentary behaviour (out of school), hours/day		
Screen media in the bedroom	1.03 (1.02-1.05)	<0.001
Proximity to commercial facilities	0.95 (0.92-0.98)	<0.001
Parental sedentary behaviour	1.02 (1.01-1,03)	<0.001
Self-efficacy for reducing sedentary time	0.94 (0.92-0.97)	<0.001
Enjoyment of sedentary behaviour	1.06 (1.01-1.11)	<0.01
Accelerometry-assessed sedentary behaviour, min/week		
Neighbourhood-level income (ref: low)	1.11 (1.05-1.18)	<0.001
Safety from crime	0.95 (0.90-0.99)	<0.05
Proximity to public transit points	0.98 (0.96-0.99)	<0.05

Abbreviation: e^b = antilogarithm of regression coefficient denoting proportional difference in outcome associated with 1 unit increase in the correlate

TABLE 3. Correlates of dietary behaviours

Variable	e^b (95% CI)	P value
Fresh fruit consumption, times/week		
# of food outlets (objective measure)	1.00 (1.00-1.01)	<0.05
Availability of fresh fruits and vegetables at home	1.22 (1.14-1.30)	<0.001
Parental rules about eating	1.02 (1.00-1.03)	<0.05
Parental consumption of fruits	1.15 (1.09-1.22)	<0.001
Self-efficacy for eating fruits and vegetables	1.17 (1.10-1.25)	<0.001
Enjoyment of fruits and vegetables	1.06 (1.00-1.12)	<0.05
Fresh vegetable consumption, times/week		
Availability of fresh fruits and vegetables at home	1.18 (1.12-1.24)	<0.001
Parental rules about eating	1.01 (1.00-1.02)	<0.05
Self-efficacy for eating fruits and vegetables	1.17 (1.12-1.22)	<0.001
Deep fried or fatty food consumption, times/week		
Availability of unhealthy snacks at home	1.20 (1.09-1.32)	<0.001
Self-efficacy for eating low-fat foods	0.85 (0.80-0.91)	<0.001
Eating disinhibition	1.02 (1.01-1.02)	<0.001
Consumption of any snacks, times/week		
Availability of unhealthy snacks at home	1.29 (1.17-1.43)	<0.001
Availability of healthy snacks at home	1.14 (1.04-1.24)	<0.01
Attitude towards eating high-fat foods	1.20 (1.04-1.38)	<0.05
Self-efficacy for eating low-fat foods	0.91 (0.84-0.98)	<0.05
Eating disinhibition	1.03 (1.02-1.04)	<0.001
Sugar-sweetened drink consumption, times/week		
Availability of sugar-sweetened beverages at home	1.14 (1.05-1.23)	<0.001
Attitude towards drinking sugar-sweetened beverages	1.22 (1.07-1.38)	
Self-efficacy for reducing sugar-sweetened beverages	0.85 (0.80-0.90)	
Eating disinhibition	1.02 (1.01-1.02)	

Abbreviation: e^b = antilogarithm of regression coefficient denoting proportional difference in outcome associated with 1 unit increase in the correlate

environment is an important determinant of dietary behaviours. Schools were also identified as potentially important environments for establishment of a healthy lifestyle. In fact, the availability of snack and drink vending machines and fast food at school were associated with higher BMI.

Behavioural factors contributing to BMI were sedentary behaviour, fresh vegetable consumption, and physical activity. Physical activity is associated with lower adiposity and accumulation of more (lean) muscle mass.[2] The relatively low average BMI of the sample would explain the unexpected finding. It is also possible that heavier adolescents engaged in more physical activity to lose or control weight.

Environmental correlates of adolescents' ORBs varied by sex, age, and level of enjoyment of a specific behaviour. Interventions should target those who are less intrinsically motivated to engage in obesity preventive behaviours. For example, unhealthy school food environments may have a particularly negative impact on the dietary behaviours of younger adolescents and those who do not enjoy eating fruit and vegetables. Hence, school-based interventions supportive of healthier food options may be effective in developing healthy dietary behaviours in these adolescents. Residential density and traffic safety emerged as possible facilitators of physical activity in older adolescents and those who did not enjoy physical activity. This indicates that promotion of walking programmes in environments that facilitate walking for transport (ie, areas with good traffic safety and high residential density) may be effective in increasing physical activity in these adolescents.

Conclusion

Intervention strategies to promote a healthy and active lifestyle in Hong Kong adolescents should

involve communities, schools, and families. It is important for schools to provide access to physical activity and to set policies that limit the availability of unhealthy food options (eg, vending machines selling sugar-sweetened beverages). Communities and policy-makers should provide convenient and safe opportunities for obesity-preventive physical activity and dietary behaviours to adolescents and their families. Families would benefit from interventions aimed at developing parenting practices and behaviours promoting healthy eating and physical activity in their adolescent children.

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Integrated adventure-based training and health education programme in promoting regular physical activity among childhood cancer survivors

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KEY MESSAGES

1. Physical inactivity remains a common problem among childhood cancer survivors.
2. The adventure-based training programme is effective in promoting the adoption and maintenance of regular physical activity among childhood cancer survivors.
3. The adventure-based training programme is suitable to be implemented in the Hong Kong Chinese context.
4. Health care professionals should form multidisciplinary partnerships to maintain the adventure-based training programme in the long run.

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Introduction

Advancement in cancer screening and medical treatment has increased the survival rates for childhood cancer. However, improved survival rates are highly associated with increased physiological and psychological problems that severely affect survivors' quality of life (QoL).[1] Although regular physical activity can help ameliorate some treatment-related adverse effects,[2] physical inactivity is common in childhood cancer survivors.[3] It is crucial for health care professionals to enhance the adoption and maintenance of regular physical activity among childhood cancer survivors. Adventure-based training has been used to change cognitive thinking and behaviours in different populations.[4] Nevertheless, rigorous empirical scrutiny is imperative to examine its effectiveness, in particular to integrate adventure-based training with health education to promote regular physical activity among childhood cancer survivors.

Methods

This is a randomised controlled two-group pretest and repeated posttest study. Hong Kong Chinese childhood cancer survivors were included if they were (1) aged 9 to 16 years, (2) able to speak Cantonese and read Chinese, and (3) did not engage in regular physical activity for the past 6 months. Those with evidence of recurrence or second malignancies, physical impairment, or cognitive and learning problems were excluded. A full spectrum of cancer subtypes and treatments was included to increase the generalisability of the findings.

After informed consent, participants were randomly allocated into either the experimental or control group. In the experimental group, participants took part in four separate 1-day adventure-based training sessions over a 6-month period. Before each training session, participants received a 40-minute briefing session that contained health education components. Adventure activities were conducted by two qualified trainers, with increasing levels of difficulty. These activities included icebreaking and team-building games, shuttle runs, rock climbing, high- and low-level ropes courses and descending. In the control group, participants attended leisure activities organised by a community centre on four different days. Activities included cartoon film shows, handicraft workshops, chess games, health talks on the prevention of influenza and healthy diet, day visits to museum and theme park.

The primary outcomes were physical activity levels and self-efficacy. The secondary outcomes were physical activity stages of change and QoL. Assessment was conducted before the intervention (T1) and at 3 months (T2), 6 months (T3), 9 months (T4), and 12 months (T5) after starting the intervention.

The sample size calculation was based on a study that examined the effectiveness of an adventure-based training programme in Hong Kong Chinese children's QoL, in which intervention effect sizes were medium.[4] To predict this effect size of

differences in outcomes between two groups at a 5% significance level and a power of 0.80, at least 64 participants in each group were required. To allow for a potential 20% attrition, 16 participants were added per group; a total of 160 participants were required.

Intention-to-treat analysis was used. Missing data was substituted by the last-observation-carried-forward procedure. Inferential statistics (independent *t*-test and X^2) was used to assess the comparability of the experimental and control groups. Mixed between-within group ANOVA was conducted to determine whether the training programme is effective in promoting the adoption and maintenance of regular physical activity among childhood cancer survivors.

Results

Data collection lasted for 28 months from February 2014 to May 2016. A total of 528 childhood cancer survivors were assessed for eligibility. Of them, 308 met the inclusion criteria, but 146 failed to participate. The remaining 162 (52.6%) participants were randomly assigned to either the experimental (n=85) or control (n=77) group. Throughout the study period, 23 participants dropped out (11 from the experimental group and 12 from the control group). The attrition rate was 85.8%. A Consolidation Standards of Reporting Trials flowchart is shown in the Fig. The two groups were comparable in terms of demographics, clinical characteristics, and outcome measures at baseline (Table).

For physical activity levels, a mixed between-within group ANOVA demonstrated a significant main effect for time ($F_{2, 157}$=50.70, P<0.0001, partial eta squared=0.56), a significant interaction effect ($F_{2, 157}$=37.69, P<0.0001, partial eta squared=0.48), and a significant main effect for intervention ($F_{1, 160}$=27.40, P<0.0001, partial eta squared=0.15). Post hoc test using the Bonferroni adjusted alpha identified significant differences in physical activity levels between the experimental and control groups at T3, T4, and T5. Referencing Cohen's guidelines,[5] the partial eta squared of 0.15 suggested a large effect size.

For physical activity self-efficacy, a mixed between-within group ANOVA indicated a significant main effect for time ($F_{2, 157}$=15.35, P<0.0001, partial eta squared=0.28), a significant interaction effect ($F_{2, 157}$=17.14, P<0.0001, partial eta squared=0.30), and a significant main effect for intervention ($F_{1, 160}$=9.20, P<0.0001, partial eta squared=0.05). Post hoc test using the Bonferroni adjusted alpha identified significant differences in self-efficacy between the experimental and control groups at T4 and T5. The partial eta squared (0.05) indicated that the effect size of the intervention was small to moderate.

For QoL, a mixed between-within group ANOVA revealed a significant main effect for time ($F_{2, 157}$=12.60, P<0.0001, partial eta squared=0.24), a significant interaction effect ($F_{2, 157}$=12.44, P<0.0001, partial eta squared=0.24), and a significant main effect for intervention ($F_{1, 160}$=3.94, P=0.04, partial eta squared=0.02). Post hoc test using the Bonferroni adjusted alpha identified a significant difference in QoL between the experimental and control groups at T5. The partial eta squared was 0.02, indicating a small-to-moderate effect size.

The Friedman test indicated a significant difference in the stages of change in the experimental group but not in the control group over time. Post hoc test using the Bonferroni adjusted alpha identified significant differences in stages of change in the experimental group between T1 and T2, T1 and T3, T1 and T4, and T1 and T5.

Discussion

Participants in the experimental group reported higher physical activity levels and self-efficacy than those in the control group. Additionally, more participants in the experimental group moved

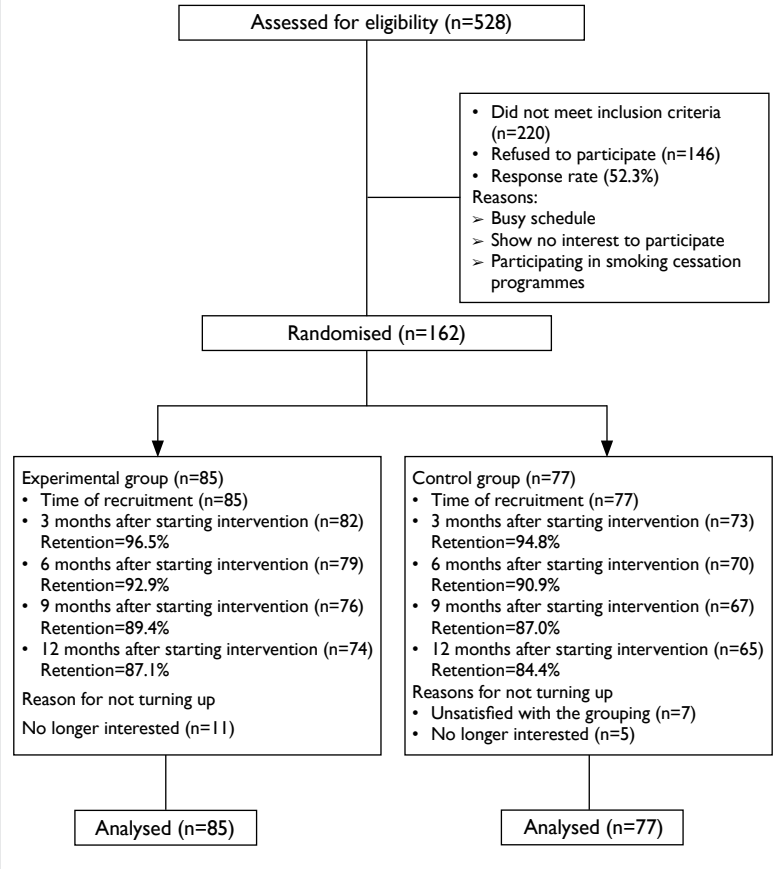

FIG. Consolidation Standards of Reporting Trials flowchart

TABLE. Demographic and clinical characteristics of participants (n=162)*

Characteristic	Experimental (n=85)	Control (n=77)	χ^2 or *t*	P value
Sex				
Male	44 (51.8)	41 (53.2)	0.36	0.88
Female	41 (48.2)	36 (46.8)		
Diagnosis				
Leukaemia	35 (41.2)	33 (42.9)	0.34	0.99
Lymphoma	20 (23.5)	19 (24.7)		
Brain tumour	10 (11.8)	8 (10.4)		
Bone tumour	12 (14.1)	9 (11.6)		
Neuroblastoma	8 (9.4)	8 (10.4)		
Parents' educational attainment				
Primary school or below	13 (15.3)	9 (11.7)	1.13	0.77
Lower secondary school	27 (31.8)	22 (28.6)		
Upper secondary school	29 (34.1)	32 (41.6)		
Tertiary education	16 (8.8)	14 (18.1)		
Treatment received				
Surgery	10 (11.8)	3 (3.9)	3.57	0.31
Chemotherapy	56 (65.9)	55 (71.4)		
Radiotherapy	3 (3.5)	4 (5.2)		
Mixed method	16 (18.8)	15 (19.5)		
Time since treatment was completed, mo				
6-12	25 (29.4)	24 (31.2)	3.73	0.59
13-24	22 (25.9)	21 (27.2)		
25-36	15 (17.6)	13 (16.9)		
37-48	7 (8.2)	10 (13.0)		
49-60	14 (16.5)	6 (7.8)		
>60	2 (2.4)	3 (3.9)		
Age, y	12.2±1.9	12.0±2.0	0.78	0.44
Physical activity stages of change				
Pre-contemplation	20 (23.5)	18 (23.4)	0.11	0.99
Contemplation	49 (57.6)	44 (57.1)		
Preparation	16 (18.9)	15 (19.5)		
Physical activity levels	2.9±2.3	2.9±2.4	0.23	0.82
Physical activity self-efficacy	9.2±3.5	9.2±3.2	-0.09	0.93
Quality of life	70.5±14.9	69.6±11.0	0.45	0.66

* Data are presented as mean±standard deviation or No. (%) of participants

through the stages from pre-contemplation to maintenance than in the control group. Adventure-based training can increase the self-efficacy of childhood cancer survivors, which is crucial in promoting the adoption and maintenance of regular physical activity.

Education alone is not enough to motivate behavioural change. To promote the adoption and maintenance of physical activity, addition of adventure activities is needed. This approach aimed to stress the importance of regular physical activity, to correct any misconceptions, and to enhance levels of self-efficacy in engaging in physical activity, which results in stage progression from pre-contemplation to maintenance.

In the training programme, participants overcame different physical challenges in an outdoor environment (concrete experience). Trainers guided the participants to evaluate their own performance and think about what they had experienced (reflective

observation). After reflection, the trainers provided constructive comments to reframe any negative interpretations of failure. Also, the trainers directed the participants to consider alternative ways of overcoming challenges (abstract conceptualisation). With proper advice and encouragement, the participants tried alternative approaches to the challenges. Through overcoming increasingly difficult physical challenges, participants could gradually build up their self-efficacy in engaging physical activity.

Finding suitable strategies to ameliorate adverse effects and enhance QoL of cancer survivors is a prime concern for health care professionals. The adventure-based training enabled better QoL than leisure activities at 12 months. Increased physical activity levels enhance physical and psychological well-being and consequently improve QoL in the long run.

There were limitations in this study. The single-blind technique might have caused biases. Non-probability sampling may have undermined the representativeness of the sample. The crucial components of the training programme were not teased out, limiting the generalisability of our findings. Data collection was only up to 12 months. Cost-benefit analysis was not conducted and the applicability of such programme outside the research setting is not known. Results may have been confounded as deficient participants varied in their time since treatment completion. Physical activity levels were self-assessed.

Conclusions

Integrated adventure-based training and health education programme is effective in improving the physical activity levels, self-efficacy, stages of change, and QoL of childhood cancer survivors. Such programme is feasible to be implemented in the Hong Kong Chinese context.

Acknowledgements

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Biomechanical approach in facilitating long-distance walking of healthy elderly people

WCC Lee *, AKL Leung, M Zhang

KEY MESSAGES

1. Regular walking gives tremendous health benefits to elderly people.
2. Gait analysis has been used to evaluate effectiveness of assistive devices on gait of people with neuro-musculoskeletal disorders, but seldom to facilitate long distance walking of healthy elderly people.
3. Our comprehensive gait analysis has revealed biomechanical reasons for lack of walking among elderly people.
4. Changing the forces applied to the lower limbs during walking using modified insoles addresses the biomechanical problem and shows signs of improving ability to walk long distances.

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Introduction

Elderly persons who walk more have lower mortality rate, cognitive decline, and risk of fall. Lack of motivation could be the reason for the sedentary lifestyle. Nonetheless, lack of motivation alone cannot explain the physical inactivity of most people.[1]

Biomechanical factors could play a role in maintaining regular walking. Ageing is associated with significant reduction of muscle strength,[2] which could impair gait. Discomfort and pain at the plantar (bottom) surface of the foot could be another factor. Elderly people usually have lower shock absorption ability of the soft tissue at the plantar foot,[3] and are more susceptible to foot pain upon repeated loading at the feet.

Gait analysis could aid in understanding the cause of difficulty in walking. Taking an additional step in modifying the force systems applied to the lower-limb by use of external devices offer the chance of facilitating long-distance walking. Traditionally, orthopaedic insoles are used to treat patients with foot pain and muscle imbalance caused by muscle and bone related diseases. Little attempt has been made to facilitate long-distance walking of elderly people.

This study aims (1) to identify the changes in gait patterns among healthy adults over long-distance walking, (2) to investigate if modification of shoe inserts facilitates long distance walk of the elderly, and (3) to evaluate the performance in managing different terrains with the use of the new shoe inserts.

Methods

This study was approved by the university's Human Subject Ethic Sub-committee, and informed consent was obtained from all participants. Gait analysis was conducted over-ground along a straight 8-m walkway. An eight-camera motion capture system was synchronised with two force platforms embedded midway on the walkway. Ground reaction forces in the vertical and anterior directions, walking speed, cadence, stance time, step length, angles, moments and powers of the ankle, knee and hip joints were analysed using commercial Visual 3D™(C-Motion, Germantown, US).

Subjects were required to provide a score (allowing decimals in any numbers) based on a Borg CR10 scale (Fig 1), a valid measure to assess fatigue and tiredness after physical activity in older adults,[4] to reveal the degree of perceived exertion. Subjects were also asked to rate their level of lower limbs pain and fatigue as well as walk stability by marking on a 10-cm line in the visual analogue scale (Fig 1).

We recruited 28 subjects aged ≥65 years who were living in a community-based setting and capable of ambulation without any walking aids. They had no cardiovascular or pulmonary diseases, cancer, uncontrolled hypertension, history of fall in the past year, diabetes, lower-limb pain, or deformities that affect walking.

The 28 subjects walked on a treadmill without holding the handrails at self-selected speeds for two consecutive walking sessions of 30 minutes each. Gait analysis and subjective assessments were conducted (1) before the treadmill walking, (2) after

Marks	Exertion scale
0	Nothing at all
0.5	Extremely light
1	Very light
2	Light
3	Moderate
4	Somewhat strong
5	Strong
6	
7	Very strong
8	
9	
10	Extremely strong

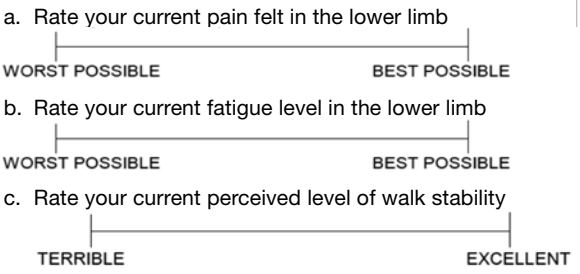

FIG 1. Borg's CR10 scale (upper) and Visual Analogue Scale (lower) assessing perceived level of exertion, pain, fatigue and walk stability

the 1st 30-minute session, and 3) after the 2nd 30-minute session. An additional yes/no question was asked to each subject at the end of the 1st 30 minutes of treadmill walking: "Does this level of exertion normally cause you to stop and take a rest?". Subjects who answered with "No" were assigned to group A. Subjects with a "Yes" answer were assigned to group B.

The 15 elderly subjects (11 males and 4 females) who responded "Yes" participated in an additional trial with the use of orthopaedic insoles. The insoles were incorporated with two features: (1) 5-mm-thick full-length silicone gel insoles and (2) 20-mm Ethylene Vinyl Acetate heel lifts. The full-length insole and the heel lift were adhered together and inserted in a standard running shoe after removing the original shoe insoles.

Each subject participated in two walking sessions, wearing the same types of running shoes. The two sessions were conducted on separate days. The subjects wore the prescribed insoles on both feet in one walking session. On the other walking session, the subjects wore the original insoles provided by the running shoe. The order of the two walking sessions for each subject was randomised.

The 15 subjects were asked to walk upslope, downslope, upstairs, downstairs, and along a circle under four conditions: with and without the use of the prescribed insoles as well as before and after 60 minutes of treadmill walking. In addition to the level of perceived fatigue and pain, subject marked on visual analogue scale to indicate perceived level of walk stability.

All statistical analysis (two-way mixed-design ANOVA and Bonferroni-adjust post hoc tests) was conducted using SPSS (Windows version 20; IBM Corp, Armonk [NY], US).

Results

Four subjects dropped out. Fourteen subjects (9 males and 5 females) were allocated to group A, with a mean age of 69.5 years (SD, 5.0), height of 162.2 cm (SD, 8.2), mass of 62.9 Kg (SD, 9.1). Ten subjects (7 males and 3 females) were allocated to group B with a mean age of 70 y (SD 5.0), height of 162.5 cm (SD 6.8), and mass of 60.3 Kg (SD, 11.9).

The mean score in the Borg scale in group B was significantly increased (higher perceived exertion) from 1.5 (SD 1.0) at baseline to 3.6 (SD 0.8) and 4.2 (SD 0.9) after 30 minutes (P=0.038) and 60 minutes (P <0.001) of walking, respectively. Although the Borg score in Group A increased from 0.94 (SD 0.8) at baseline to 1.1 (SD 0.8) and 1.4 (SD 1.1) after 30 minutes and 60 minutes of walking, respectively, the differences were not statistically significant. Similar results were found in fatigue and pain scores, with only Group B reporting significantly increased levels of pain and fatigue after 30 minutes and 60 minutes of walking. No significant differences in age, height, mass and basal Borg score were found between Groups A and B.

Most significant changes in measured parameters across the three time-points along the long-distance walk occurred in group B only. Compared to the baseline, dominant sided step length and swing time of group B increased significantly after both walking sessions (P<0.001), while in the opposite side the two parameters decreased significantly (P=0.015). On the contrary, stance time decreased significantly in the dominant side and increased significantly in the opposite side after both walking sessions (P<0.001).

After 60 minutes of walking, Group B had significant reductions in the dominant-side (1) plantar flexion angle at about 10% of the gait (P<0.001), (2) dorsiflexion angle at about 50% of the gait (P<0.001), (3) plantar flexor power absorption (~10% of the gait) (P>0.01), (4) plantar flexion angle at about 60% of the gait (P=0.003), plantar flexion moment (P=0.043) and the concentric plantar flexor power generation (P=0.033) (~ 50% of the gait), after the treadmill walking (Fig 2).

All 15 subjects completed the two walking

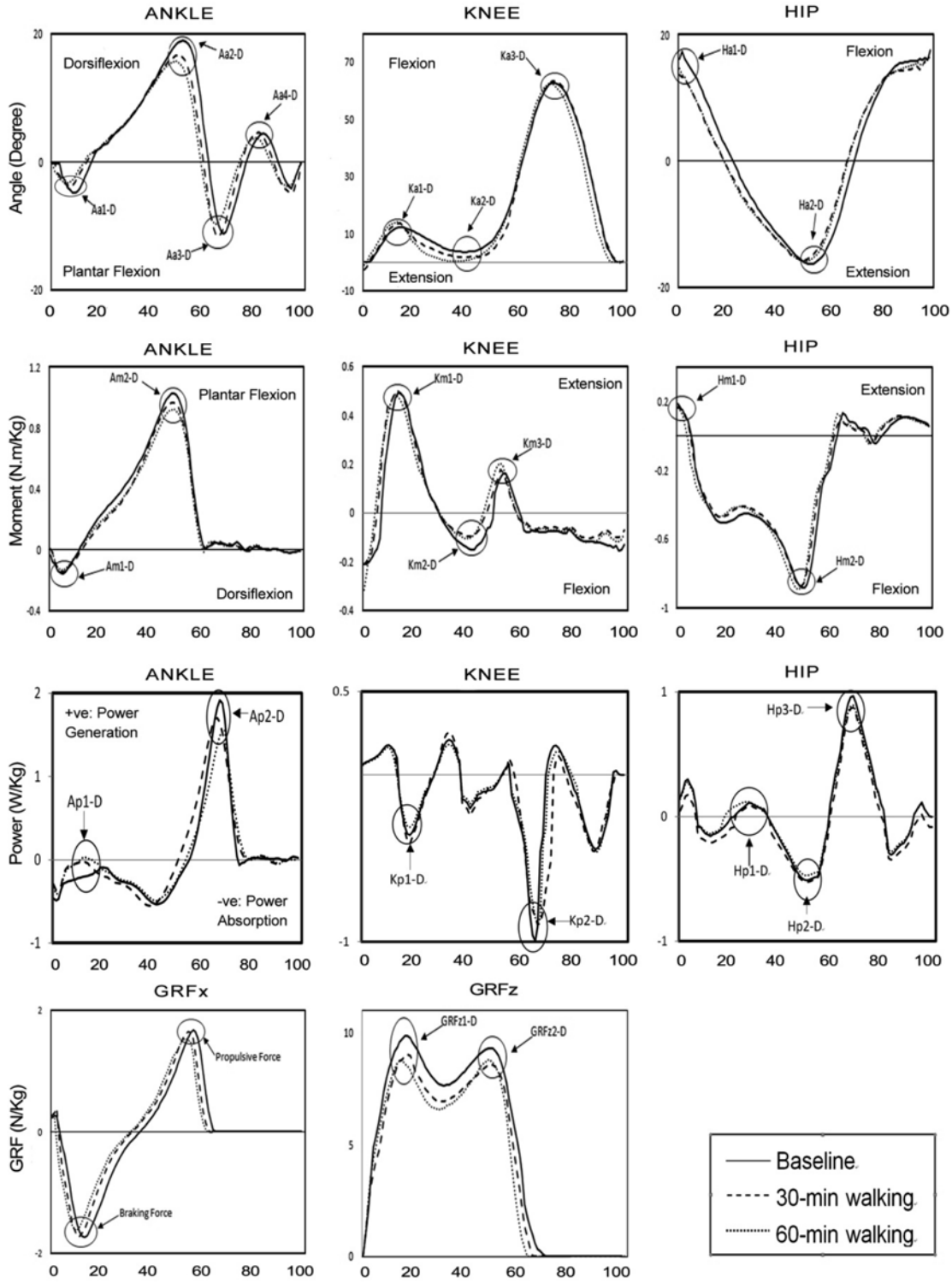

FIG 2. Group B joint angles, moments and powers of the ankle, knee, and hip joints and the ground reaction forces averaged among the subjects in a complete gait cycle for the dominant side.

sessions. They had a mean age of 71.6±6.1 years, height of 162.8±7.4 cm, and weight of 63.3±6 Kg.

Without using the prescribed insoles, the subjects gave significantly higher scores on Borg's scale (perceived higher level of exertion) than the same group of subjects using the insoles ($P<0.001$) after 30 minutes and 60 minutes of walking (Fig 3). Significant changes in visual analogue scale scores along the 60 minutes of walking, indicating the subjects perceived significantly more pain and

fatigue, were found only in the session of not using the prescribed insoles only.

The subjects had inconsistent changes in gait patterns along the 60 minutes of walking in the two walking sessions. In many measured gait parameters, significant changes in gait patterns along the treadmill walking were observed only when the prescribed insoles were not used.

No significant differences were found in walk stability visual analogue scale scores comparing between with and without the prescribed insoles in each of the walk conditions.

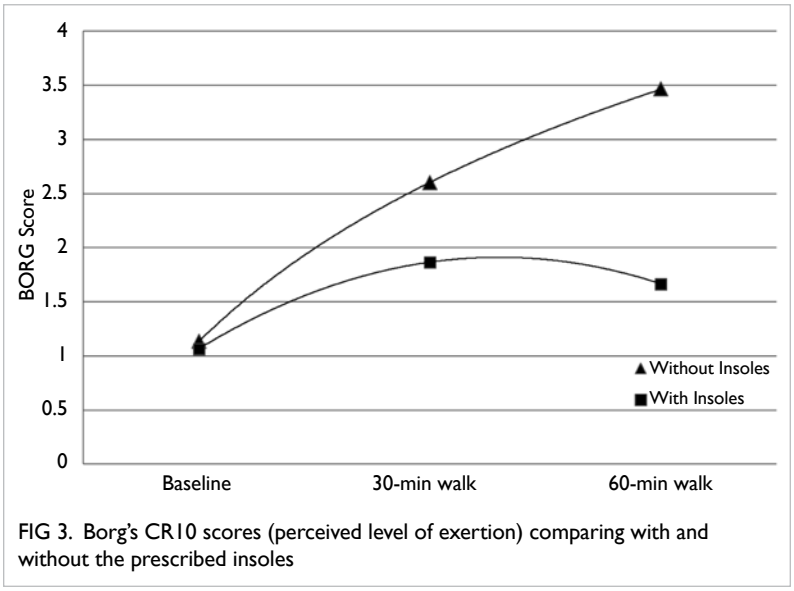

FIG 3. Borg's CR10 scores (perceived level of exertion) comparing with and without the prescribed insoles

Discussion

This is the very first study investigating long-distance walking of the older adults. About half of subject perceived that they would need a rest at or before 30 minutes of walking. They felt significantly increased levels of physical exertion, lower-limb pain and fatigue along the treadmill walking. This phenomenon was not seen in the other group of subjects who did not need rest after the 30 minutes of walking. Their gait characteristics have implied that some biomechanical factors played an important role in their long-distance walking ability.

The step length, stance and swing time at the dominant and the non-dominant legs of Group B changed significantly in opposite directions, widening the differences between both legs, after the long-distance walk. It should be noted that asymmetry in these gait parameters was positively correlated to risk of fall and dependency in daily living activity among older adults.[5] This sparks concern if this implied higher risk of fall in some healthy older adults who are less able to walk long distances.

After the long-distance walk, group B had significant reductions in the plantar flexor power absorption and generation. Such reductions could be signs of fatigue of plantar flexors and fatigue of these muscles could well explain the observed changes in walking pattern along the 60 minutes of walking.

Heel lift and silicon insoles are generally used to relieve plantar pain and to reduce the strain on the plantar flexors. We applied a combination of both and our results showed not only did the prescribed insoles reduce subject fatigue and pain levels, they also have also induced some positive effects on gait patterns. The positive effects could be explained by the characteristic of the silicon-gel insoles acting as shock absorber which help reduce fatigue and plantar pain. Heel lift positioned the ankle in more plantar flexed position during mid-stance of the gait. This may increase muscle activity of the tibialis anterior, while reducing the muscle activity of plantar flexors. No changes in perceived walk stability were found when walking with the prescribed insoles on different walking surfaces. Although gait analysis showed fatigue at the dominant-side plantar flexors, the insoles were applied to both feet for symmetric purposes. Future physical training may well target on the plantar flexors at the dominant side.

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