



## Research Letter

## The effectiveness of the Keeping the Body in Mind Xtend pilot lifestyle program on dietary intake in first-episode psychosis: Two-year outcomes



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## ABSTRACT

**Background:** Severe mental illness is characterised by a 15-year mortality gap driven by cardiometabolic disease. Antipsychotic treatment leads to increased appetite and rapid weight gain. The 12-week lifestyle pilot intervention improved dietary intake and prevented antipsychotic-induced weight gain. Here we report two-year outcomes.

**Method:** Participants were exposed to an extended program. Weight and waist circumference were measured, and food frequency questionnaire completed.

**Results:** Diet quality was higher, and discretionary food intake was 40% lower, at two-years compared to baseline. Weight and waist-circumference did not increase.

**Conclusion:** This pilot study demonstrated sustained effectiveness of a dietetic intervention in youth with first-episode psychosis with improvements in diet quality and no increase in weight secondary to antipsychotic medication initiation.

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## Introduction

The 15-year mortality gap in people with severe mental illness (SMI) compared to the general population has been labelled a “scandal” given that the primary driver is preventable cardiovascular disease [1]. More needs to be done to reduce these health inequalities [2]. People experiencing their first-episode of psychosis (FEP) gain a mean 12 kg in their first two-years of treatment with antipsychotic medication (APM) [3], and continue to gain weight throughout the course of the illness [4]. Evidence supporting the role of lifestyle interventions in SMI is increasing [5]. Pragmatic weight-gain mitigation strategies have been largely unexplored.

We previously reported that the 12-week Keeping the Body in Mind (KBIM) lifestyle intervention program successfully improved dietary intake and attenuated antipsychotic-induced weight-gain during the first three months of treatment in youth with FEP, compared to standard care [6,7]. We hypothesised that an extended lifestyle programme (KBIM Xtend) will maintain improved dietary intake and prevent weight-gain over the first two-years of APM treatment.

## Methods

This pragmatic, single-arm study was an extension of the initial 12-week KBIM intervention. Ethical approval was obtained from the South Eastern Sydney Local Health District Human Research Ethics Committee (ref no: 13/040; LNR/13/POWH/85).

Participants were being treated in a community-based early psychosis programme. Inclusion criteria were: (i) FEP; (ii) age

15–25 years; and (iii) less than one month of treatment with APM. Details of the 12-week intervention have been previously described [6,7]. In the KBIM Xtend program, individualised consultations, cooking groups and exercise components remained available to participants, with less intensive follow-up.

Discretionary food intake, glycaemic load and sodium intake were measured at baseline and two-years using a validated semi-quantitative food frequency questionnaire (FFQ) [8]. The Australian Recommended Food Score (a measure of diet quality) was calculated from the FFQ [9]. Height, weight and waist circumference were measured at baseline and two-years. Clinically significant weight-gain was defined as  $\geq 7\%$  of baseline weight [10]. BMI was calculated and categorised as per World Health Organisation criteria [11]. International Diabetes Federation criteria were used to classify metabolic risk for waist circumference [12].

Paired sample t-tests were used on baseline and two-year data (SPSS Version 22 Package (Chicago, IL, USA)). Partial eta squared ( $\eta_p^2$ ) effect sizes were calculated for mean change scores and considered small at 0.10, medium at 0.25, and large at 0.40. Missing data were accounted for using last-observation carried forward. Energy underreporting was determined using the Goldberg equation [13]. Statistical significance was set at  $p < 0.05$ .

## Results

At two-years, data were available from 12 of the original 18 participants (67%) (Table 1). Of the six participants lost to follow-up, three transferred to another health service, two were not contactable, and one was in full-time employment. Of the

**Table 1**  
Demographic details of 12 participants who completed two-year follow-up.

	Participants who completed two-year follow-up (n = 12)	
	n	%
Age (Mean, SD)	19.9	2.4
Female	5	42
Ethnicity		
Caucasian	4	33
Asian	4	33
Middle Eastern	3	25
Maori/Pacific Islander	1	9
DSM-IV diagnosis		
Schizophrenia	6	50
Bipolar disorder	4	33
Depression with psychosis	2	17
Psychotropic medications at entry to program		
Antipsychotic		
Olanzapine + Quetiapine	1	8
Quetiapine	5	42
Risperidone	4	34
Olanzapine	1	8
Paliperidone	1	8
Mood stabiliser		
Lithium	2	17
Antidepressant		
Citalopram	2	17
Escitalopram	1	8
Venlafaxine	1	8

12 who completed two-year measures, four participants (33%) had no change in dose or type of APMs during the follow-up period, one participant switched from quetiapine to clozapine plus aripiprazole, one participant prescribed antipsychotic polypharmacy was switched to aripiprazole and lithium, one participant switched from olanzapine to sodium valproate (mood stabiliser), and two participants switched from risperidone to aripiprazole. Three participants ceased antipsychotic medication and continued antidepressant medication (n = 2) or lithium (n = 1).

The mean number of contacts with the dietitian over the two-years was 24.3 (range 11–52); 9.2 in the initial 3-months and 15.1 in the KBIM Xtend program.

Diet quality was 2.3 points higher at two-years compared to baseline, predominantly driven by increased vegetable variety and amount (Table 2). Discretionary food intake and glycaemic load were 40% (1421 kJ/day) lower and 27% lower at two-years respectively compared to baseline. Sodium intake was 308 mg/day lower at 2-years compared to baseline.

Increases in weight and waist circumference was 1.8 kg, and 0.6 cm respectively, at two-years (Table 2). Seventy-five percent of participants did not experience clinically significant weight gain. Last-observation carried forward analysis for all 18 original partic-

ipants were identical to that seen in those with 2-year follow-up data.

**Discussion**

The dietetic component of the KBIM Xtend lifestyle program improved diet quality and reduced discretionary food intake at two-years. Combined with concomitant physical activity interventions and best-practice antipsychotic prescribing taking into account metabolic side effects, the weight-gain typically observed with APM did not occur [3]. Replacement of energy-dense, non-nutritious discretionary foods with core foods, particularly vegetables, appeared to be a key contributor to attenuation of antipsychotic-induced weight-gain.

This pilot study had a number of limitations [14]. First, due to the pragmatic nature of this study, which offered intervention to all clients of a service, randomisation to a comparison condition was not undertaken. Second, the small sample size means this study is an important first step, but cannot be considered definitive. Third, consistent with the majority of nutrition assessment tools, responses to the dietary questionnaire were self-reported, potentially reducing accuracy and increasing risk of bias. No nutrition assessment method has so far been validated in an SMI population, a research gap. Fourth, APMs have varying propensities for weight gain and intervention effects on people prescribed specific APMs warrants further investigation.

In conclusion, we demonstrated sustained effectiveness of dietetic services in community-treated youth with FEP. Larger pragmatic studies are needed to confirm these findings.

**Conflicts of interest**

The authors declare that there are no conflicts on interest.

**Ethical statement**

All procedures were conducted in accordance with the study proposal approved by the South Eastern Sydney Local Health District Human Research Ethics Committee. The study did not include informed consent given the pragmatic design and evaluation of the intervention as usual care within the health service.

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**Table 2**  
Mean change of 12 participants from baseline to two-year follow-up.

	Mean at baseline (SD)	Mean at two-years (SD)	Mean change (95% CI)	Paired-samples t-test	Effect Size
<b>Dietary intake</b>					
Diet quality score (ARFS)	28.9 (12.1)	31.8 (11.2)	2.9 (0.8–5.8)	t(11)=2.3, p<0.05	$\eta_p^2 = 0.32$
Vegetable subgroup (ARFS)	8.5 (5.5)	11.6 (6.0)	3.1 (1.6–4.6)	t(11)=4.5, p=0.001	$\eta_p^2 = 0.65$
Discretionary food (kJ)	3547 (2141)	2126 (1080)	-1421 (-3226 to 384)	t(11)=-1.7, p=0.02	$\eta_p^2 = 0.39$
Glycaemic load	116 (38)	85 (25)	-31 (-53 to -9)	t(11)=-3.2, p=0.009	$\eta_p^2 = 0.48$
Sodium (mg)	2656 (868)	2348 (544)	-308 (-893 to 278)	t(11)=-1.2, p=0.27	$\eta_p^2 = 0.11$
<b>Anthropometry</b>					
Weight (kg)	68 (15.5)	69.8 (18.2)	1.8 (-3.3 to 7.0)	t(11)=0.78, p=0.451	$\eta_p^2 = 0.05$
BMI (kg/m <sup>2</sup> )	23.3 (3.2)	23.9 (3.8)	0.6 (-1.0 to 2.2)	t(11)=0.80, p=0.443	$\eta_p^2 = 0.05$
Waist Circumference (cm)	84.7 (11.7)	85.3 (13.2)	0.6 (-4.0 to 5.1)	t(11)=0.28, p=0.783	$\eta_p^2 = 0.01$

ARFS = Australian Recommended Food Score. NA = not applicable.

## References

- [1] Thornicroft G. Physical health disparities and mental illness: the scandal of premature mortality. *Br J Psychiatry* 2011;199:441–2, <http://dx.doi.org/10.1192/bjp.bp.111.092718>.
- [2] Stewart R. Mental disorders and mortality: so many publications, so little change. *Acta Psychiatr Scand* 2015;132:410–1.
- [3] Álvarez-Jiménez M, González-Blanch C, Crespo-Facorro B, Hetrick S, Rodríguez-Sánchez JM, Pérez-Iglesias R, et al. Antipsychotic-induced weight gain in chronic and first-episode psychotic disorders. *CNS Drugs* 2008;22:547–62, <http://dx.doi.org/10.2165/00023210-200822070-00002>.
- [4] Strassnig M, Kotov R, Cornaccio D, Fochtmann L, Harvey PD, Bromet EJ. 20-year progression of BMI in a county-wide cohort people with schizophrenia and bipolar disorder identified at their first episode of psychosis. *Bipolar Disord* 2017;19:336–43, <http://dx.doi.org/10.1111/bdi.12505>.
- [5] Teasdale SB, Ward PB, Rosenbaum S, Samaras K, Stubbs B. Solving a weighty problem: systematic review and meta-analysis of nutrition interventions in severe mental illness. *Br J Psychiatry* 2017;210:110–8, <http://dx.doi.org/10.1192/bjp.bp.115.177139>.
- [6] Teasdale SB, Ward PB, Rosenbaum S, Watkins A, Curtis J, Kalucy M, et al. A nutrition intervention is effective in improving dietary components linked to cardiometabolic risk in youth with first-episode psychosis. *Br J Nutr* 2016;115:1987–93, <http://dx.doi.org/10.1017/S0007114516001033>.
- [7] Curtis J, Watkins A, Rosenbaum S, Teasdale S, Kalucy M, Samaras K, et al. Evaluating an individualized lifestyle and lifeskills intervention to prevent antipsychotic-induced weight gain in first-episode psychosis. *Early Interv Psychiatry* 2016;10:267–76, <http://dx.doi.org/10.1111/eip.12230>.
- [8] Giles G, Ireland P. Dietary questionnaire for epidemiological studies (Version 2). Melbourne: Cancer Council Victoria; 1996.
- [9] Collins CE, Burrows TL, Rollo ME, Boggess MM, Watson JF, Guest M, et al. The comparative validity and reproducibility of a diet quality index for adults: the Australian Recommended Food Score. *Nutrients* 2015;7:785–98, <http://dx.doi.org/10.3390/nu7020785>.
- [10] Sacks GS, Guille C. Weight gain associated with use of psychotropic medications. *J Clin Psychiatry* 1999;60(Suppl 21):16–9.
- [11] World Health Organization. Obesity: preventing and managing the global epidemic. A report of WHO consultation. Geneva: WHO; 2000 [Accessed 22 September 2018]. [http://www.who.int/nutrition/publications/obesity/WHO\\_TRS.894/en/](http://www.who.int/nutrition/publications/obesity/WHO_TRS.894/en/).
- [12] KGMM Alberti, Zimmet P, Shaw J. Metabolic syndrome—a new world-wide definition. A consensus statement from the international diabetes federation. *Diabet Med* 2006;23:469–80, <http://dx.doi.org/10.1111/j.1464-5491.2006.01858.x>.
- [13] Goldberg G, Black A, Jebb S, Cole TJ, Murgatroyd PR, Coward WA, et al. Critical evaluation of energy intake data using fundamental principles of energy physiology: 1. Derivation of cut-off limits to identify under-recording. *Eur J Clin Nutr* 1991;45:569–81.
- [14] Kempen JH. Appropriate use and reporting of uncontrolled case series in the medical literature. *Am J Ophthalmol* 2011;151:7–10, <http://dx.doi.org/10.1016/j.ajo.2010.08.047>.

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