

# Behaviour change techniques used in dietary and physical activity interventions in type 2 diabetes treatment: A systematic review and meta-analysis

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**Keywords:** *Biology & Life Sciences / Biomedical Science*

## Abstract

*Type 2 diabetes is one of the leading causes of death worldwide with over 25% of health expenditure currently being spent on type 2 diabetes. Dietary and physical activity interventions are key to type 2 diabetes treatment. The purpose of this systematic review is to identify behaviour change techniques used in dietary and physical activity interventions in the treatment of type 2 diabetes. Dietary and physical activity interventions produced statistically significant and clinically relevant changes in body weight and HbA<sub>1c</sub>. Future research must identify effective methods for maintaining these positive metabolic changes in the longer term.*

## 1. Introduction

Dietary and physical activity interventions are the cornerstone of type 2 diabetes treatment. Making short or long term changes to dietary habits or increasing physical activity require changes in behavior.

**Objective:** The purpose of this systematic review is to identify behaviour change techniques used in dietary and physical activity interventions in type 2 diabetes treatment, which result in changes to body weight and HbA<sub>1c</sub>, and to identify effective features of interventions identified (delivery mode, setting, theoretical basis, frequency, intensity, interventionist and fidelity to intervention protocol).

## 2. Methods

**Data sources:** The databases Cochrane Library, CINAHL, EMBASE, PubMed, PsycINFO, and SCOPUS were systematically searched identifying relevant studies published between 2014 and 1985.

**Study Selection:** This review includes published randomized controlled trials of interventions, which focus exclusively on diet and physical activity behaviours in the treatment of type 2 diabetes. This review excludes interventions that focus on multiple behaviours, diabetes prevention, RCT's that target multiple chronic diseases, gestational diabetes or type 1 diabetes.

**Study appraisal:** All included studies were assessed to determine methodological quality and risk of bias. The risk of bias in individual studies was assessed using the Cochrane Collaboration risk of bias tool. Fidelity to

intervention protocol was carried out on identified studies using guidelines published by Bellg *et al.*, [1]. Content of included studies will be coded independently by two experienced coders for behaviour change techniques (BCT's) using Michie *et al.*'s v1 taxonomy of 93 different behaviour change techniques [2].

## 3. Results

Eighteen RCT's fulfilled the inclusion criteria. Weight loss achieved at 3, 6 and 12 months was -2.7kg, -3.4kg and -3.44kg respectively for intervention group compared to +0.5kg, -0.4kg and -0.44 respectively for control group. HbA<sub>1c</sub> at 3, 6 and 12 months was -1.13%, -0.56%, and -0.33% respectively for intervention group compared to -0.2%, +0.05% and -0.26 respectively for control group. BCT results are currently being coded.

**Limitation:** As a result of the large heterogeneity of reporting methods observed for dietary and physical activity behaviors, this information will not be included in the meta-analysis.

## 4. Conclusion

Diet and physical activity interventions achieved a significant HbA<sub>1c</sub> reduction at 3 and 6 months however, effect size was reduced at 12 months. BCT coding is currently being carried out to determine which BCT's are associated with greater effectiveness in achieving weight loss and reducing HbA<sub>1c</sub>.

## 5. Acknowledgements

The authors would like to thank the Irish Research Council for providing funding for this project.

## 6. References

1. Bellg, A. J. *et al.*, 2004. Enhancing treatment fidelity in health behavior change studies: Best practices and recommendations from the NIH Behavior Change Consortium. *Health Psychology*, 23, 443-451.
2. Michie, S., *et al.*, 2013. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46, 81-95.