Long-term Weight Loss in a Primary Care-Anchored eHealth Lifestyle Coaching Program in Denmark: A Randomized Controlled Trial

The impact of socioeconomic background on eHealth

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Introduction

- Increase in global incidence and prevalence of Type 2 Diabetes (T2D) [1]
- Self-management including healthy lifestyle is essential for prevention and treatment of T2D [2]
- Many T2D patients are not treated optimally in Denmark [3, 4]
- Difficulties in achieving and maintaining weight loss [3, 4]
- Electronic health (eHealth) solutions are more effective in achieving a greater weight loss in overweight patients with or without T2D [5]
- Good quality evidence-based interventions are lacking for overweight patients from lower socioeconomic status [6]

[1] Beckman JA, Creager MA. Vascular complications of diabetes. Circ Res 2016; 118:1771–1785.

[2] Medicin DSfA. Type 2-diabetes opfølgning og behandling 2019 [Available from: https://vejledninger.dsam.dk/type2/.

[3] Rungby J, Schou M, Warrer P, Ytte L, Andersen G. Prevalence of cardiovascular disease and evaluation of standard of care in type 2 diabetes: a nationwide study in primary care. Cardiovasc Endocrinol. 2017 Dec; 6

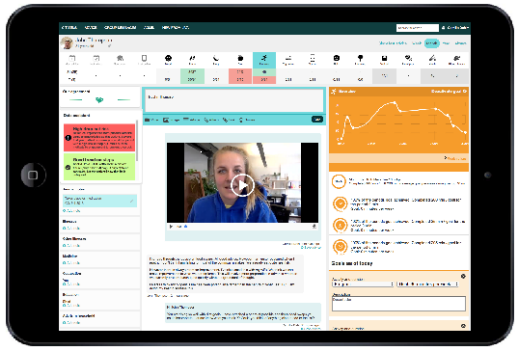
[4] Bo A, Thomsen, R.W, Nielsen, J.S, Nicolaisen S.K, Beck-Nielsen H, Rungby J, Sørensen H.T, Hansen T.K, Søndergaard J, Friborg S, Lauritzen T, Maindal H.T. Early onset type 2 diabetes: Age gradient in clinical and behavioural risk factors in 5115 persons with newly diagnosed type 2 diabetes—Results from the DD2 study. Diabetes Metab Res Rev. 2018 Mar;34

[5] Hesseldal L, Christensen JR, Olesen TB, Olsen MH, Jakobsen PR, Laursen DH, Lauridsen JT, Nielsen JB, Søndergaard J, Brandt CJ. Long term weight loss in a Primary Care-Anchored eHealth Lifestyle Coaching Program in Denmark: Randomized Controlled Trial. J Med Internet Res. 2022 Sep 23;24(9):e39741.

[6] Myers-Ingram, R., Sampford, J., Milton-Cole, R. *et al.* Effectiveness of eHealth weight management interventions in overweight and obese adults from low socioeconomic groups: a systematic review. *Syst Rev* 12, 59 (2023). https://doi.org/10.1186/s13643-023-02207-3

The eHealth Lifestyle Coaching Program

- Goal setting
  - simple and individual
- Real time monitoring
  - user friendly, self-directed and with peer support
- Personal coaching and feedback
  - using an extended back-office library with exercise advise, videos and recipes etc.



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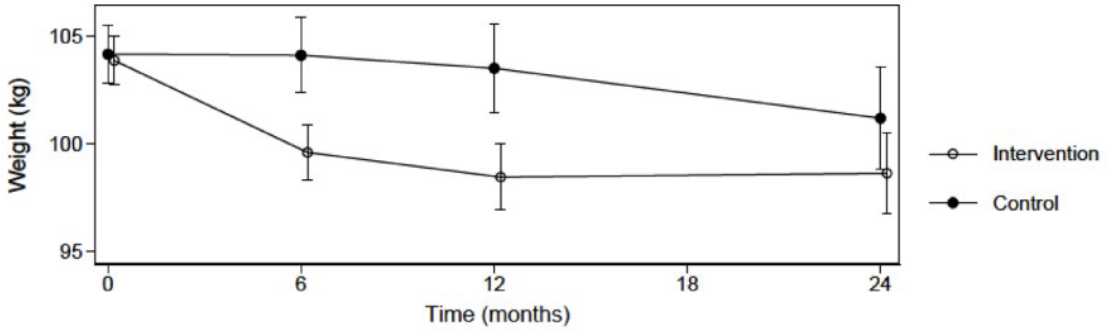
A long-term weight loss seems possible!



6 months	12 months	24 months
Average weight loss of 4,4% (4,2 kg) after 6 months [1]	Average weight loss of 4,6% (4,5 kg) after 12 months [2]	Average weight loss of 4,3% (4,4 kg) after 24 months [3]

[1] Christensen JR, Laursen DH, Lauridsen JT, Hesseldal L, Jakobsen PR, Nielsen JB, Søndergaard J, Brandt CJ. Reversing Type 2 Diabetes in a Primary Care-Anchored eHealth Lifestyle Coaching Programme in Denmark: A Randomised Controlled Trial. Nutrients. 2022 Aug 19;14(16):3424. doi: 10.3390/nu14163424. PMID: 36014930; PMCID: PMC9414066.
[2] Hesseldal L, Christensen JR, Olesen TB, Olsen MH, Jakobsen PR, Laursen DH, Lauridsen JT, Nielsen JB, Søndergaard J, Brandt CJ. Long term weight loss in a Primary Care-Anchored eHealth Lifestyle Coaching Program in Denmark: Randomized Controlled Trial. J Med Internet Res. 2022 Sep 23;24(9):e39741.
[3] Christensen JR, Hesseldal L, Olesen TB, Olsen MH, Jakobsen PR, Laursen DH, Lauridsen JT, Nielsen JB, Søndergaard J, Brandt CJ. Long-term weight loss in a 24-month primary care-anchored telehealth lifestyle coaching program: Randomized controlled trial. J Telemed Telecare. 2022 Dec;28(10):764-770.

Socioeconomic background and eHealth

The aim was to investigate:

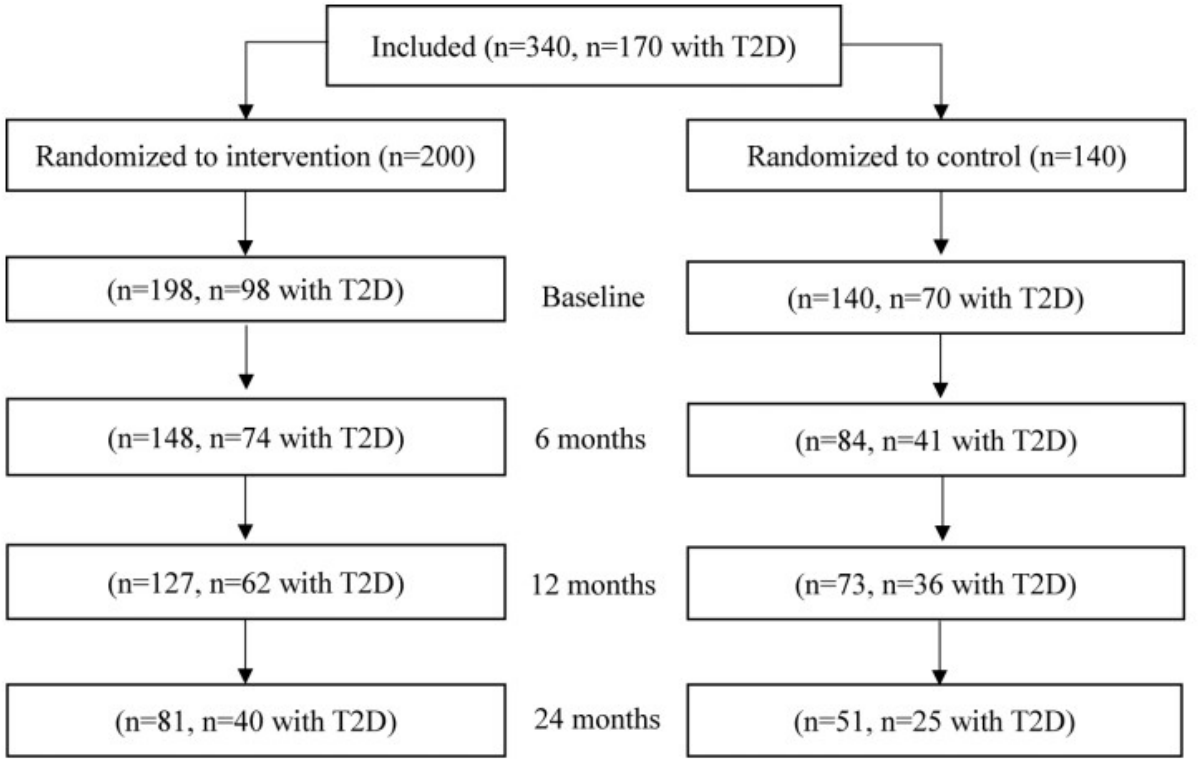
1) Whether socioeconomic aspects have an impact on the effectiveness of a digital lifestyle coaching program in reducing weight in obese patients - with and without T2D

2) Which lifestyle changes are best supported by the digital lifestyle coaching program?

Methods

- 340 people living with obesity with or without type 2 diabetes were enrolled:
  - N=200 intervention group
  - N=140 control group
  - N=170 (50%) with T2D

- The inclusion criteria:
  - BMI 30-45
  - Age 18-70
  - No eating disorder,
    serious and/or life- threatening diseases
  - Not pregnant or actively planning pregnancy



Recruitment

Patients were recruited via their general practitioners, the Danish diabetes organization, and social media

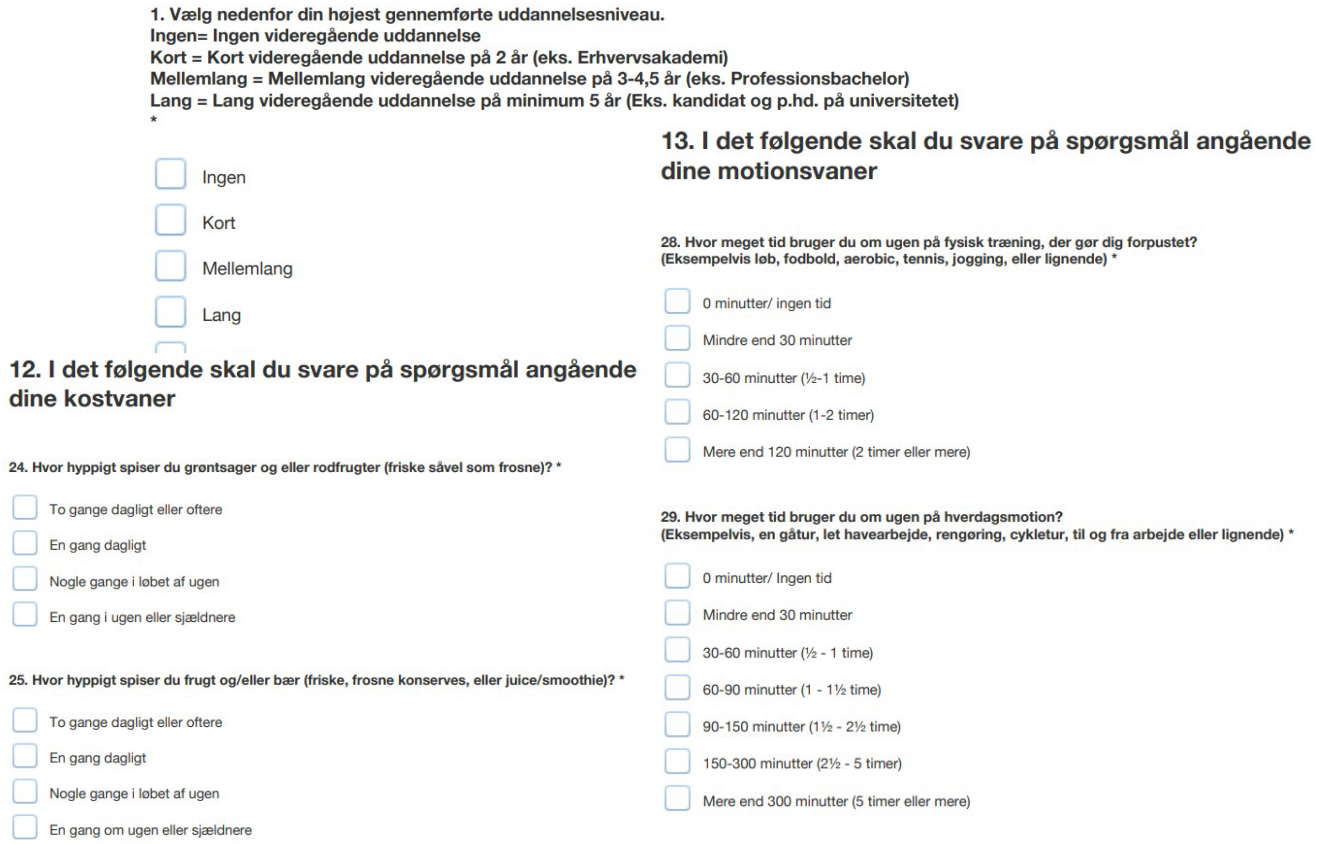
Assessment

Nurse measuring weight at each timepoint

Questionnaires

Demographic questions

Quality of Life and Mental Health scores



1. Vælg nedenfor din højest gennemførte uddannelsesniveau.
Ingen= Ingen videregående uddannelse
Kort = Kort videregående uddannelse på 2 år (eks. Erhvervsakademi)
Mellemlang = Mellemlang videregående uddannelse på 3-4,5 år (eks. Professionsbachelor)
Lang = Lang videregående uddannelse på minimum 5 år (Eks. kandidat og p.hd. på universitetet)
*

- Ingen
- Kort
- Mellemlang
- Lang

12. I det følgende skal du svare på spørgsmål angående dine kostvaner

24. Hvor hyppigt spiser du grøntsager og eller rodfrugter (friske såvel som frosne)? *

- To gange dagligt eller oftere
- En gang dagligt
- Nogle gange i løbet af ugen
- En gang i ugen eller sjældnere

25. Hvor hyppigt spiser du frugt og/eller bær (friske, frosne konserves, eller juice/smoothie)? *

- To gange dagligt eller oftere
- En gang dagligt
- Nogle gange i løbet af ugen
- En gang om ugen eller sjældnere

13. I det følgende skal du svare på spørgsmål angående dine motionsvaner

28. Hvor meget tid bruger du om ugen på fysisk træning, der gør dig forpustet? (Eksempelvis løb, fodbold, aerobic, tennis, jogging, eller lignende) *

- 0 minutter/ ingen tid
- Mindre end 30 minutter
- 30-60 minutter (½-1 time)
- 60-120 minutter (1-2 timer)
- Mere end 120 minutter (2 timer eller mere)

29. Hvor meget tid bruger du om ugen på hverdagsmotion? (Eksempelvis, en gåtur, let havearbejde, rengøring, cykletur, til og fra arbejde eller lignende) *

- 0 minutter/ Ingen tid
- Mindre end 30 minutter
- 30-60 minutter (½ - 1 time)
- 60-90 minutter (1 - 1½ time)
- 90-150 minutter (1½ - 2½ time)
- 150-300 minutter (2½ - 5 timer)
- Mere end 300 minutter (5 timer eller mere)

Participants characteristics

Except for marital status there were no difference between attendees or non-attendees

	6 months		
	Attendance	**Non attendance**	**P-value**
n (%)	232 (68.6)	106 (31.4)	
Age, mean (sd)	52.03 (10.57)	52.45 (11.87)	0.75
Sex (F), n (%)	141 (60.8)	72 (67.9)	0.21
Level of education, n (%)			
None	37 (15.9)	18 (17.1)	
Short	57 (24.6)	27 (25.7)	
Medium	105 (45.3)	54 (51.4)	
Long	28 (12.1)	5 (4.8)	
Don't know	5 (2.2)	1 (1.0)	0.27
Married, n (%)	162 (69.8)	54 (51.4)	<0.001

Results

At 6 and 12 months the intervention related weight loss was greater in participants with short or medium education.

	6 months		
	Number (control,intervention)	**Control**	**Intervention**
All	(84, 148)	-0.65	-3.99
Level of education			
None	(17, 20)	-1.22	-1.70
Short	(20, 37)	-2.20	-5.99**
Medium	(34, 71)	-0.56	-4.03**
Long	(10, 18)	-0.44	-2.88
Don't know	(3, 2)	-3.37	1.50

At 6 and 12 months the intervention related weight loss was insignificantly greater in participants with low everyday physical activity level or low physical training level.

	6 months			12 months			24 months		
	Number (control,intervention)	Control	Intervention	Number (control,intervention)	Control	Intervention	Number (control,intervention)	Control	Intervention
Everyday exercise									
<30 min	(16, 30)	0.52	-3.90	(14, 25)	-0.01	-5.60	(9, 19)	-2.00	-3.71
30 min - 2,5 h	(42, 78)	-1.13	-3.82	(36, 67)	-1.63	-4.03	(28, 41)	-1.85	-4.49
>2,5 h	(26, 40)	-0.58	-4.38	(23, 35)	-1.82	-4.62	(18, 21)	-3.90	-5.04
Physical exercise									
<30 min	(51, 93)	-0.05	-4.20	(44, 78)	-0.62	-5.07	(33, 48)	-2.00	-4.11
30 min - 2h	(27, 42)	-1.62	-3.24	(23, 38)	-2.13	-3.64	(18, 24)	-3.41	-4.42
>2 h	(6, 13)	-1.28	-4.91	(6, 11)	-4.08	-4.25	(4, 9)	-3.08	-6.31

Conclusion

- At 6 and 12 months, the effect of the intervention was more pronounced in participants with short or medium education. However, the difference fated away after 24 months and after 12 month in low-frequency LIVA app users.
- Participants with long education had a modest effect of the intervention in the first 12 months but the effect is maintained leading to the greatest weight loss at 24 months.
- The weight reduction at 6 and 12 months was insignificantly greater in participants with low everyday physical activity level or low physical training level at baseline, indicating that a significant part of the effect of the intervention was related to increased physical activity.
- At 6, 12, and 24 months, the weight reduction in the intervention group was independent of baseline dietary habits, indicating that a significant part of the intervention effect was probably not related to healthier eating habits.

Further research…

- What lifestyle changes supported by the digital lifestyle coaching program had the greatest impact on weight loss?
- Did this differ between different socioeconomic groups, ages or sexes?

Perspectives

Algorithm based eHealth content and treatment plans for different groups of patients

Digital tailored treatment to single patients based on many factors

Extending individualised eHealth solutions to other patient groups

Thank you!

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