

Weight loss interventions for adolescents with Down syndrome: a systematic review

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Introduction

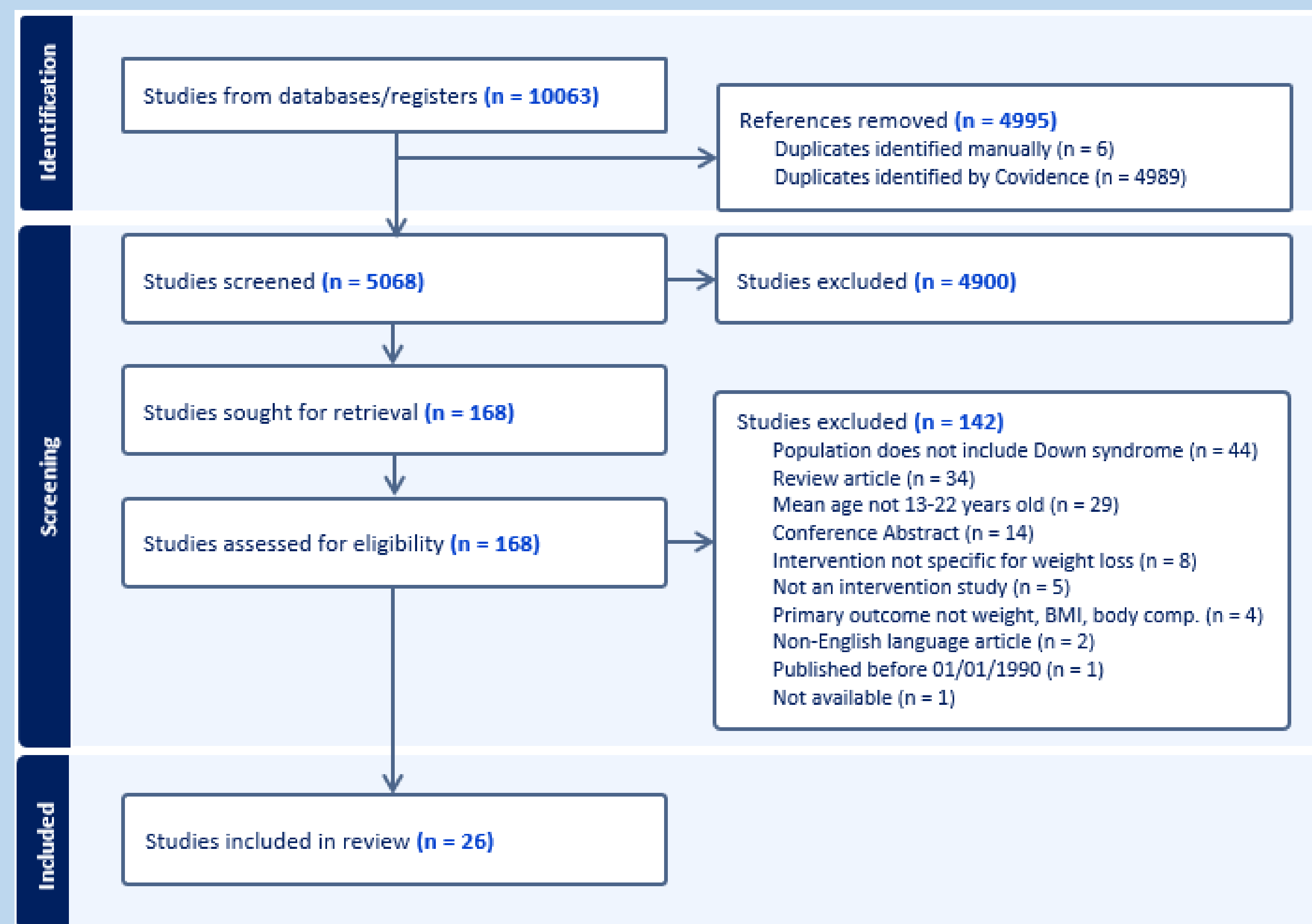
Youth with Down syndrome (DS) experience high rates of overweight and obesity, which has been associated with several negative health outcomes including obstructive sleep apnea, insulin resistance, dyslipidemia, and gait disorders, thus weight loss interventions are warranted. Previous reviews only included few studies with mostly small sample sizes.

Aims

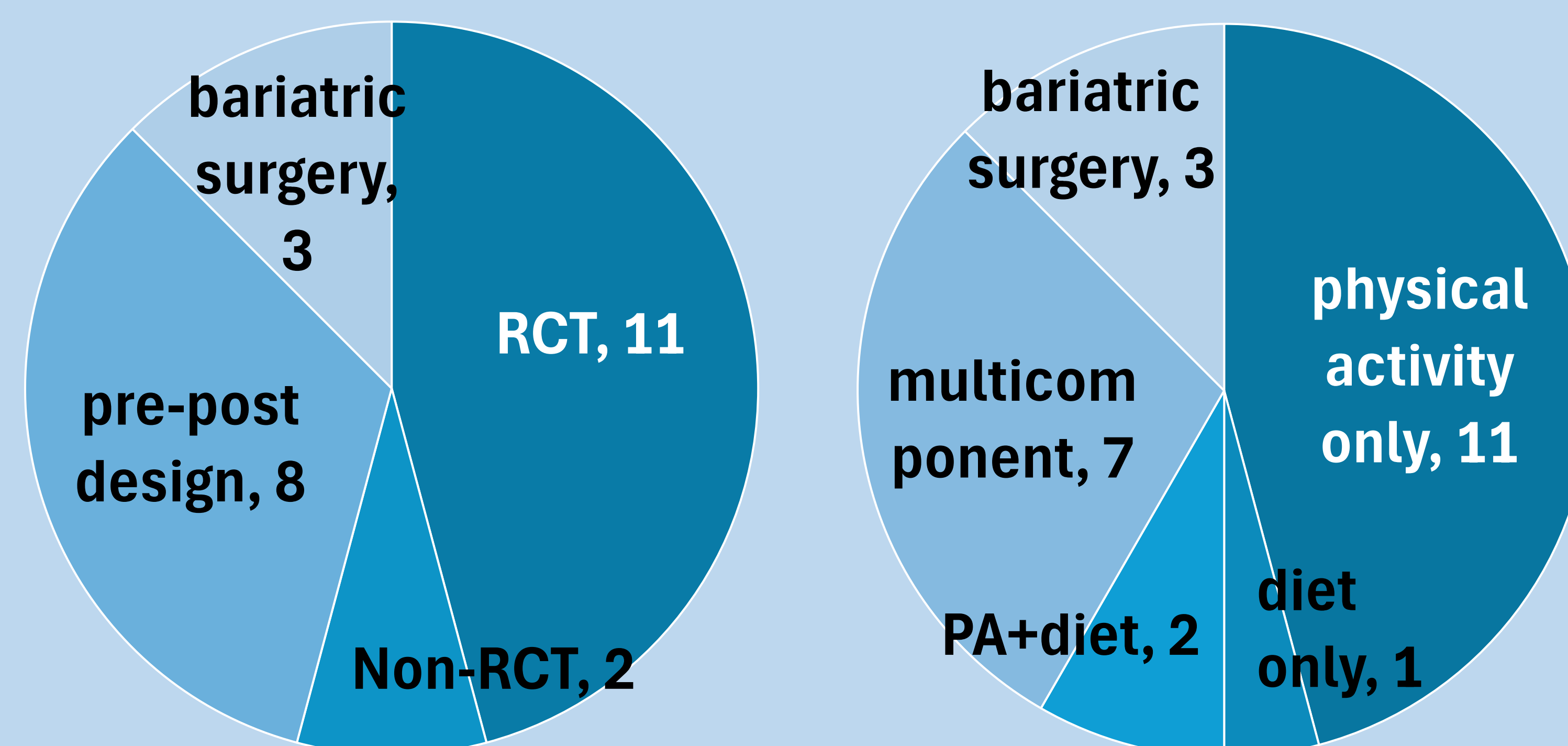
We aimed to systematically review weight loss interventions for adolescents with DS to better understand the most effective strategies (e.g., physical activity, nutrition, multicomponent, pharmacological, surgical) for weight loss in adolescents with DS, and to identify the current gaps in the literature.

Methods

- This systematic review followed PRISMA guidelines and was registered in PROSPERO (#CRD42022303781).
- Databases were searched through July 28, 2023 (Pubmed, Embase, CINAHL, APA PsycINFO, Web of Science, Cochrane Central Register of Controlled Trials).
- Inclusion criteria:
 - Individuals with DS included
 - Intervention specifically aimed at weight loss
 - Sample of n=5 or more
 - Mean age between 13-22 years old
 - Weight, BMI and/or body composition as primary outcome
 - Peer-reviewed publication, English, after 1990
- Risk of bias was evaluated by Standard Assessment Criteria for Evaluating Primary Research Papers from a Variety of Fields.
- Study screening, evaluation and data extraction were performed by two independent reviewers.
- Significant changes in weight or BMI were summarized by study design and intervention components.



This review showed for the first time that population-specific weight loss interventions can be effective in losing weight in adolescents with Down syndrome



Results

- 26 included papers described 24 unique studies included a total of n=1171 participants, of which n=393 were participants with DS.
- 13/24 had significant weight loss or a decrease in BMI
 - either a multicomponent intervention, a physical activity intervention, or bariatric surgery.
- Synthesis results:

	Design	Intervention Duration	Statistically significant weight loss		Statistically significant BMI decrease	
			Between groups	Within group	Between groups	Within group
Physical activity only						
Gonzalez Aguero 2011	RCT	21 wks	N/A	Yes	N/A	N/A
Nacz 2021	RCT	33 wks	Yes	N/A	Yes	N/A
Suarez-Villadat 2020	RCT	36 wks	No	N/A	Yes	N/A
Suarez-Villadat 2023a	RCT	16 wks	N/A	N/A	N/A	N/A
Suarez-Villadat 2023b	RCT	20 wks	N/A	N/A	N/A	No
Wang 2022	RCT	12 wks	N/A	Yes	N/A	Yes
Yu 2022	RCT	9 mo	Yes	N/A	Yes	Yes
Seron 2014	Non-Randomized Controlled Study	12 wks	N/A	Yes (aerobic only)	N/A	Yes (aerobic only)
Wu 2017	Non-Randomized Controlled Study	12 wks	No	Yes	Yes	Yes
Ordonez 2006	Pre-Post	12 wks	N/A	Yes	N/A	N/A
Messiah 2019	Pre-Post	1-2 yrs	N/A	N/A	N/A (only BMI percentile)	N/A (only BMI percentile)
Diet only						
Hogan 2001	Pre-Post	6 mo	N/A	Yes (weight gain)	N/A	N/A
Physical activity and diet						
An 2019	Pre-Post	14 wks	N/A	N/A	N/A	N/A
Sanner 2020	Pre-Post	4 days	N/A	N/A	N/A (only BMIz)	N/A (only BMIz)
Physical activity, diet plus other components						
Bandini 2021	RCT	6 mo	Yes	Yes	Yes	Yes
Curtin 2013	RCT	6 mo	Yes	N/A	N/A	N/A
Ptomey 2015	RCT	8 wks	No (both intervention)	Yes in both diet groups	No (both intervention)	N/A
Ptomey 2021	RCT	6 mo	Yes (conventional vs Enhanced Stop Light Diet)	N/A	Yes (conventional vs Enhanced Stop Light Diet)	N/A
Haney 2014	Pre-Post	10 mo	N/A	N/A	N/A (BMIz)	N/A (BMIz)
Hinckson 2013	Pre-Post	10 wks	N/A	N/A	N/A	N/A
Pessoa 2023	Pre-Post	6 mo	N/A	N/A	N/A	N/A
Surgeries						
Goddard 2019	Follow up only	1 yr FU	N/A	Yes	N/A	Yes
Hornack 2019	Follow up only	2 yr FU	N/A	N/A	N/A	N/A
Jones 2021	Follow up only	1 yr FU	N/A	N/A	N/A	N/A

Discussion

- This review included 26 studies in adolescents with Down syndrome, and included multicomponent interventions with behavioral strategies as well as laparoscopic sleeve gastrectomies for the first time.
- Further research is needed on weight loss medications and interventions that adhere to recommended multicomponent weight loss intervention guidelines