



**Table S1. PRISMA 2020 Checklist**

Section and Topic	Item #	Checklist item: How Behavioral sciences intervention influence in obesity, weight loss and physical activity? A systematic review	Location where item is reported
<b>TITLE</b>			
Title	1	Identify the report as a systematic review.	1
<b>ABSTRACT</b>			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	1
<b>INTRODUCTION</b>			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	1,2
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	2
<b>METHODS</b>			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	2
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	2
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	2
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	2
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	2
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	2
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	2
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	2
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	2
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	2
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	2
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	2
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	2
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	2
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	2
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	2,3
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	2,3



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<b>RESULTS</b>			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	3
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	3,4
Study characteristics	17	Cite each included study and present its characteristics.	3,4,S2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	3,4,S2
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	3,S2
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	3,4,S2
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	3,4,S2
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	3,4,S2
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	3,4,S2
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	3,4,S2
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	3,4,S2
<b>DISCUSSION</b>			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	4-6
	23b	Discuss any limitations of the evidence included in the review.	6
	23c	Discuss any limitations of the review processes used.	6
	23d	Discuss implications of the results for practice, policy, and future research.	6
<b>OTHER INFORMATION</b>			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	6
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	6
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	6
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	6
Competing interests	26	Declare any competing interests of review authors.	6
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	6



## Table S1. PRISMA 2020 Checklist

**Table S2.** Main findings and characteristics of studies on evidence from intervention studies that assessed the influence of Behavioral sciences on obesity, weight loss and physical activity.

Author, year, country	Study design, sample	Instruments	Intervention	Study quality	Outcome
Buscemi et al., 2014 (USA)	Prospective randomized control trial. 202 overweight or obese participants adults.	Demographics and anthropometrics.  The Activity Level Questionnaire–Eating Version (ALQ–EV).	The multicompenet intervention by meetings for weight loss and the development of a healthy lifestyle involved three components: cognitive-behavioral, diet prescription and physical activity prescription in two intervention groups a) group with food reinforcement and b) group without food reinforcement.  18 months of intervention, 48 hours of group meetings.  Weekly (months 1 to 6) and twice a month (months 7 to 18).	70	The intervention demonstrated weight reduction through reinforcement without food and physical activity in overweight and obese patients.
Glanz et al., 2019 (USA)	Randomized controlled trial. 344 participants adults.	Dietary behavior.  Physical activity.  Stages of change for weight loss.	The multicomponent intervention study used a web-based platform to track the participants' weight changes.  The intervention groups were: 1) control and	59	The intervention proved effective in reducing the weight of the study participants.

			Intrinsic motivation/treatment self-regulation.	standard care (weight measurement and wellness guidance); 2) daily lottery incentives (weight loss); 3) environmental strategy of dietary care and physical activity; and 4) combination of environmental strategy and lottery incentives.		
Janssen et al., 2017 (USA)	Randomized controlled trial. 144 participants adults.	Weight loss, mean net weight loss.  Cost calculations, total contact time at one site by multiplying the person-hours per session by the expected number of sessions at one site.  Total staffing costs, multiplied the total time spent on the intervention by hourly compensation for staff.		The multicomponent intervention was developed in two phases: group weight loss meetings with message framing, individual weight loss visits, and group exercise classes.  The two phases differed only in terms of the frequency of meetings and visits.	69	The intervention resulted in weight loss for participants attending community psychiatric rehabilitation programs.
Piepmeyer, Etnier & Fasczewski, 2018 (USA)	Randomized sample. 64 adults.	Current Physical Activity Behaviour National Health Interview Survey.  Total of km cycled.  Polar Heart Rate monitor (F6 computer) with chest strap (T-31 Coded).		Message framing. Exposure to the 3-minute video "Exercise is Medicine™ - Keys to exercise - Exercise and your health".  Three groups: 1) health (no additional information), 2) wealth (information that	68	The charity group intervention increased the participants' physical activity.  Women cycled further in the charity group, while men cycled further in the wealth group.

			Borg Rating of Perceived Exertion Scale. Standard scale in behavioural economics research.	they would receive money per km cycled, and 3) charity (information that every 2 km they would convert the money earned to a charity)		
Shaw et al., 2018 (USA)	Randomized controlled trial. 188 participants adults.	Weights daily, Withings scale.		Intervention with lottery and financial incentives for weight loss and weight maintenance.  The interventions lasted 6 months.  3 intervention groups: 1) lottery-based incentive, 2) financial incentive through direct payment, and 3) control through daily feedback without any incentive.	29	The study showed evidence of weight loss and weight maintenance in the participants.
Snider et al., 2020 (USA)	Randomized controlled trial. Participants adults (n= 48).	Three-Factor Eating Questionnaire (TFEQ-R-18). Positive and Negative Affect Schedule (PANAS). Ad libitum eating task.		Intervention with message framing and financial incentives. 1) appetizer tasting test, 2) preference rating.  5 attempts to adjust the delay discount.  The product combinations for each of the three tasks were (a) money-now/money-later, (b)	63	The intervention demonstrated that a stressful situation increases reinforcement for snack food in obese participants.

			snack-now/money-later, and (c) snack-now/weight-loss-later.		
Takebayashi et al., 2022 (Japan)	Cluster randomized controlled trial. 122 participants adults.	Survey of the three nudge groups:  Basic characteristics, number of subjects who had self-weighing habit after 6 months, changes in behavioral stage or mindset and weight maintenance.	Message framing intervention for regular self-weighing.  1 hour of workshops after being assigned to one of the nudge stimulus groups: 1) questionnaire group (attractive type nudges), 2) implementation intentions group (social type nudges) and 3) growth mindset group (timely type nudges), 4) reference group (no stimuli).	44	All the interventions were effective in regular self-weighing, but the growth mindset intervention was more effective.
van der Swaluw et al., 2018a (Netherlands)	Cluster randomized trial. 163 overweight participants adults.	Goal attainment (week gym attendance $\geq 2$ )	Lottery with financial incentives intervention to increase physical activity in overweight adults.  1) Weekly short-term lotteries (13 weeks - 100 euros); 2) Combination of short-term and long-term lotteries (26 weeks - 5,400 euros); and 3) Control group with no lotteries.	66	The intervention proved effective in increasing physical activity in the short term.
Van der Swaluw et al., 2018b (Netherlands)	Cluster randomized trial. 163 overweight participants adults.	Goal-attainment (week-gym attendance $\geq 2$ )	Lottery with financial incentives intervention to	74	Commitment lotteries can support regular gym attendance over the long term (up to 52 weeks).

		Scales to measure weight (KERNTM; 0.1% precision).	increase physical activity in overweight adults.		
			1) Weekly short-term lotteries (13 weeks - 100 euros); 2) Combination of short-term and long-term lotteries (26 weeks - 5,400 euros); and 3) Control group with no lotteries.		
Zenko et al., 2016 (USA)	Randomized controlled trial. 46 adults.	Feeling Scale. Visual analog scale (VAS). Empirical Valence Scale (EVS). Physical Activity Enjoyment Scale (PACES). Rating of Perceived Exertion (RPE). Incidental and Planned Exercise Questionnaire (IPEQ-WA).	The physical exercise and psychological satisfaction intervention took place in laboratory visits: (a) maximal exercise test, (b) experimental exercise and (c) evaluation of the results.  2 groups of recumbent cycling tasks of increasing intensity (a) or decreasing intensity (b).	59	The intervention with the increasing intensity group showed a greater duration of pleasure and satisfaction in the post-exercise period as well as in the remembered pleasure.

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