INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 15, Issue 2, (2025) E-ISSN: 2222-6990

Effects of Interventions Based on Achievement Goal Theory for Individuals' Physical Activity: a Systematic Review and Meta-Analysis

Zhongliang Xu[1], Samsudin Shamsulariffin[2] and Yaacob Azhar[3]

[1]Department of Sports Studies, Universiti Putra Malaysia, Seri Kembangan, Malaysia, Jalan Universiti 1,43400 Serdang, Selangor, [2]Department of Sports Studies, Universiti Putra Malaysia, Seri Kembangan, Malaysia, Jalan Universiti 1,43400 Serdang, Selango, [3]Yaacob Azhar, Department of Sports Studies, Universiti Putra Malaysia, Seri Kembangan, Malaysia, Jalan Universiti 1,43400 Serdang, Selangor

Email: shamariffin@upm.edu.my, azhar_y@upm.edu.m

Corresponding Author Email: xuzhongliang187@gmail.com

To Link this Article: http://dx.doi.org/10.6007/IJARBSS/v15-i2/24727 DOI:10.6007/IJARBSS/v15-i2/24727

Published Date: 08 February 2025

Abstract

Purpose**:** Motivation plays a crucial role in determining whether an individual engages in or withdraws from physical activity (PA). Achievement goal theory is an important framework for understanding motivation. Therefore, this systematic review aims to analyze the effects of an intervention based on achievement goal theory on an individual's PA. Method: A comprehensive search of seven electronic databases was conducted to identify studies of randomized, cluster-randomized controlled trials (RCTs and C-RCTs) or quasi-randomized controlled trials (Q-RCTs) examining the effects of interventions based on achievement goal theory on individual PA. This systematic evaluation is registered in PROSPERO. Results: Ten studies (2001-2021) were included in this review. The primary outcome was PA, and the secondary outcome was the achievement goals. Meta-analyses showed a nonsignificant effect for PA (g = 0.182, 95% CI = -0.094, 0.457). Narrative results showed a positive effect of the intervention on individuals' achievement goals. Conclusion: Meta-analyses suggest that interventions based on achievement goal theory may be ineffective in increasing individuals' PA levels.

Keywords: AGT, Achievement Goal Theory, Physical Activity, AGT-Based Interventions

Introduction

Physical activity (PA) is any bodily movement that results in energy expenditure by contraction of skeletal muscles (Caspersen, Powell & Christenson, 1985). Regular PA has been found to help prevent non-communicable diseases such as cardiovascular disease, stroke, diabetes, and osteoporosis, as well as prevent high blood pressure, overweight, obesity and improve mental health, quality of life, among others (WHO, 2018). Although regular PA has been

reported to have many benefits for individuals, WHO (2018) states that more than a quarter of adults and 75% of adolescents globally do not engage in sufficient PA. As a result, increasing PA levels is a worldwide challenge (Kohl et al., 2012).

Evidence has shown that motivation can be a solution to physical inactivity, as motivation is a key determinant of an individual's engagement or withdrawal from PA (Ng et al., 2012; Teixeira et al., 2012). Achievement Goal Theory (AGT) has been a dominant theory of motivation and has a vital role in understanding individual PA behaviours (Mascret, Elliot & Cury, 2015; Lochbaum, Sisneros & Kazak, 2023). AGT views individuals as intentional, reasonable, goal-directed organisms, and achievement goals guide subsequent decisions and behaviours in achievement situations (Elliot & Murayama, 2008).

Several studies have examined how AGT-based interventions affect an individual's behavioural and motivational outcomes. A study by Braithwaite, Spray and Warburton (2011) showed that a small positive treatment effect for the mastery of the motivational climate group ($g = 0.103$), with the most consistent and most considerable treatment effect being behavioural outcomes ($g = 0.39, 0.49$). However, because the authors did not conduct a meta-analysis of PA outcomes. Thus, the findings on PA are inconclusive.

Similarly, Kelso et al.'s (2020) study was based on interventions of AGT and self-determination theory and used narrative summaries for the reporting of PA outcomes, their findings showed an increase in students' PA behavior. Their study is just a narrative synthesis of PA.

In summary, the study indicates that AGT-based interventions that implement achievement goals strategies may positively impact PA behaviours (Braithwaite, Spray & Warburton, 2011; Kelso et al., 2020). Therefore, there is a need to comprehensively assess the effects of AGT-based interventions on individuals' PA, and examine the effects of interventions on individuals' achievement goals.

Methods

Literature Sources and Selections

This study followed the guidelines of PRISMA (Page et al., 2021), and registered in PROSPERO (CRD42024362090). Seven electronic databases were searched on December 12, 2023: Cochrane Library, Ebscohost (all databases), ERIC, Proquest, Pubmed, Scopus, and Web of Science (all databases). The following keywords were used: "achievement goal" or "AGT" or "achievement goal theory" or "3×2 achievement goal" or"2×2 achievement goal" or "task goal" or "self goal" or "other goal" or "performance goal" or "mastery goal" or "ego goal" and "physical activity" or "exercise" or "physical exercise" or "sport" and "intervention" or "experimental" or "random" or "RCT" or "randomized controlled trial" or "trial"

Eligibility Criteria and Exclusion Criteria

Eligibility Criteria

The systematic review includes studies that met PICOS criteria.

Participants: Participants were healthy individuals of any age (including children/adolescents and adults or older). Intervention: The AGT-based intervention promoted individual PA. Comparison: Not applicable. Outcome: Primary outcome: To assess individuals' PA, PA can be measured subjectively (e.g., self-report questionnaire) or objectively (e.g., pedometer or

accelerometer). Secondary outcome: assesses the individual's achievement goal (e.g., task goal or self goal or other goal or performance goal or mastery goal or ego goal, etc.). Studies: Randomized, cluster randomized controlled trials (RCTs and C-RCTs) or quasi-randomized controlled trials (Q-RCTs).

Exclusion Criteria

The study excluded non-intervention studies such as descriptive, correlational, and longitudinal studies, non-AGT-based intervention studies, grey literature, books, protocol studies, conference abstracts, doctoral dissertations and unpublished studies, systematic reviews or meta-analyses, and intervention studies for non-healthy populations.

Screening

The following strategies were used to screen the literature based on the PRISMA flowchart: first, initial screening, two reviewers screened the titles and abstracts of all the literature based on the inclusion and exclusion criteria of the literature, second, full-text screening, two reviewers independently conducted full-text reading to screen the literature that met the inclusion criteria.

Extraction of Data

One author extracted the data for the study. Another author checked its accuracy. The following information was extracted: authors, date of publication, country, age of participants, sample size, study design, intervention, and primary and secondary outcomes (PA and achievement goals).

Quality of Methodology

Two reviewers checked the methodological quality of all included studies using the Cochrane Collaboration tool for assessing risk of bias in randomized trials (Higgins et al., 2011).

Data Analysis

Meta-analysis was performed in this study using Comprehensive Meta-analysis (version 4.0). The primary outcome of this study was a continuous variable, therefore, effect sizes were calculated using Hedges' g. Effect sizes were determined using Cohen's criteria: 0.2 for a small effect, 0.5 for a moderate effect, and 0.8 for a large effect (Cohen, 1988). Effect sizes were calculated using the post-intervention measurements' mean, standard deviation, and sample size. A random effects model accounted for heterogeneity between studies (Hedges & Vevea, 1998). When there were multiple intervention groups in the same study, we chose the one with the highest level of reinforcement for the meta-analysis. The i^2 was used to assess the heterogeneity between the studies; a p-value of less than 0.10 showed the existence of heterogeneity in the studies. The degree of heterogeneity of the studies was measured by the i^2 statistic (Higgins et al., 2003), 25% = low heterogeneity, 50% = moderate heterogeneity, 75% = high heterogeneity. Publication bias was tested for significance using funnel plots and Egger's regression test with a p-value of 0.05 or less (Egger et al., 1997).

Secondary outcomes**:** Due to differences in the data collection and measurement instrument timing, we provided a narrative summary of the results for the different achievement goals.

Certainty of Evidence

Two authors independently assessed the certainty of the evidence for the results of the current study using the GRADE (Guyatt et al., 2008) technique. The GRADE categorizes the quality of the evidence into four levels based on assessing five dimensions: study limitations, inconsistent results, intermittent evidence, insufficient precision, and publication bias -high, moderate, low, and very low.

Results

Study Selection and General Characteristics

A total of 1643 documents were searched in seven electronic databases, and 1118 (525 duplicates) remained after merging all the documents using the Mendeley (version 1.19.8) reference manager. Twenty-eight literatures remained after the initial screening. Ten documents were identified after manually searching for relevant citations and systematic reviews, for 38 documents entered into the full-text review. After the reviewer read the full text of the 38 documents, ten documents fulfilled the inclusion criteria for the study.

As can be seen from Table 1, ten studies were published between 2001 and 2021, eight Q-RCTs (80%) and two RCTs (20%), with 4892 participants. Sample sizes ranged from 75 to 639 participants.

Table 1

Description of Included Studies

Author	Countries	Study design	Participants' age	Sample size	Intervention	Research outcomes	
						Achievement goals	Physical activity
Christodoulidis (2001)	Greece	Q-RCT	15-16 years old	IG=105 CG=529	Duration: one academic year. IG: 25 daily lessons. Students participate in goal-oriented activities and a three-minute presentation on health and exercise. CG: regular classes.	Self-reported questionnaire.	Self-reported questionnaire.
Digelidis (2003)	Greece	Q-RCT	11-14 years old	IG=262 CG=521	Duration: one year. IG: 88 regular lessons, 70 lessons on teaching skills and game design and 17 lessons on health and	Self-reported questionnaire.	Self-reported questionnaire.

					exercise issues. CG: regular classes 3 times a week.		
Cecchini (2014)	Spain	Q-RCT	12-17 years old	IG=223 CG=224	Duration: 12 weeks. IG: a specially designed curriculum based on Epstein's TARGET strategy (Task, Authority, Recognition, Grouping, Evaluation, Time). CG: regular classes.	Not reported	Self-reported questionnaire.
Gråstén (2015)	Finland	Q-RCT	12-14 years old	IG=208 CG=639	Duration: one academic year. IG: task-based teaching lessons. CG: regular lessons.	Self-reported questionnaire.	Self-reported questionnaire.
Cecchini-Estrada (2017)	Spain	RCT	18-27 years old	IG=204 CG=204	Duration: 12 weeks. IG: participate in courses that promote mastery goal-oriented strategies. CG: regular lessons.	Self-reported questionnaire.	Metabolic equivalents (METs) - minutes/week of MVPA (METs-MVPA).
Gråstén (2017)	Finland	Q-RCT	13-16 years old	IG=143 CG=97	Duration: one academic year. IG: participation in physical education sessions involving task climate support, and additional physical activities. CG: regular lessons.	Self-reported questionnaire.	Self-reported questionnaire and accelerometers.

Gråstén (2019)	Finland	Q-RCT	11-13 years old	IG=265 CG=396	Duration: two years. IG: 26 (90- 120 minutes) practice education lessons. CG: regular lessons.	Self-reported questionnaire.	Self-reported questionnaire and Actigraph GT3X+ accelerometer.
Kokkonen (2019)	Finland	Q-RCT	Average 10.87 years old	IG=196 CG=186	Duration: one year. IG: a creative physical education programme (task climate). CG: physical education classes (two specific traditional sports: Finnish baseball and football).	Self-reported questionnaire.	Self-reported questionnaire.
Cechini (2021)	Spain	Q-RCT	12-17 years old	IG=175 CG=148	Duration: 5 months. IG: a specially designed curriculum based on Epstein's TARGET strategy (Task, Authority, Recognition, Grouping, Evaluation, Time). CG: regular physical education classes.	Not reported	Self-reported questionnaire.
Zarrett (2021)	United States	RCT	Average 12.14 years old	IG=92 CG=75	Duration: 10 weeks. IG: participate in 10 weeks of Play intervention after school program for 1.5 hours, 3 days a week. CG: regular lessons.	Not reported	Minutes of moderate to vigorous physical activity.

Note: IG=Intervention group, CG=Control group, RCT=Randomized controlled trials, Q-RCT=quasi-randomized controlled trials.

The majority of the studies were in Europe, with the most significant number of study sites in Finland (n=4; 40%), followed by those in Spain (n=3; 30%), Greece (n=2; 20%), and the United States (n=1; 10%). The age of the participants in these studies was predominantly child adolescents (n=9; 90%), and in only one study were the participants adults. Most of the main outcomes of the study (how PA was reported) were self-reported questionnaires, with only 2 articles describing PA outcomes in the form of minutes, metabolic equivalents (METs, based on the conversion of self-reported questionnaires). Most of the secondary outcomes (achievement goals) were self-reported questionnaires, and only three articles did not report achievement goal outcomes.

Methodological Quality Assessment

Table 2 shows the risk of bias for each study. The results show that Cecchini-Estrada and Méndez-Giménez (2017) and Zarrett et al. (2021) were moderate risk of bias (one criterion was rated as high), and the other eight studies were high risk of bias (two or more criteria were rated as high).

Table 2
Assessment of Methodological Quality

Authors	Design	RSG	AC	BOP	BOA	IOD	SR	GSAB	TOM
Christodoulidis (2001)	Q-RCT	High	High	High	High	Low	Low	High	Low
Digelidis (2003)	Q-RCT	High	High	High	High	Low	Low	High	Low
Cecchini (2014)	Q-RCT	High	High	High	High	Low	Low	Low	Low
Gråstén (2015)	Q-RCT	High	High	High	High	Low	Low	High	Low
Cecchini-Estrada (2017)	RCT	Low	Low	Low	High	Low	Low	Low	Low
Gråstén (2017)	Q-RCT	High	High	High	High	Low	Low	Low	Low
Gråstén (2019)	Q-RCT	High	High	High	High	Low	Low	Low	Low
Kokkonen (2019)	Q-RCT	High	High	High	High	Low	Low	Low	Low
Cechini (2021)	Q-RCT	High	High	Low	High	Low	Low	Low	Low
Zarrett (2021)	RCT	Low	Low	High	Low	Low	Low	Low	Low

Note: RSG=random sequence generation, AC=allocation concealment, BOP=blinding of participants /personnel, BOA=blinding of outcome assessment, IOD=incomplete outcome data, SR=selective reporting, GSAB=group similarity at baseline, TOM=timing of measurement, RCT=randomized controlled trial, Q-RCT= Quasi-randomized controlled trial, Low=low risk of bias, High=High risk of bias.

Effect of the Intervention on the Primary Outcome (PA)

Meta-analysis of 10 studies was conducted, as shown in Figure 1, which revealed a small and non-significant effect size and high between-study heterogeneity of AGT-based interventions on individual PA ($g = 0.182$, 95% CI = -0.094, 0.457, $p = 0.197$, $i^2 = 95.03\%$).

Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Christodoulidis2001	0.337	0.107	0.011	0.127	0.547	3.142	0.002
Digelidis2003	-0.062	0.076	0.006	-0.210	0.086	-0.819	0.413
Cecchini2014	0.902	0.099	0.010	0.707	1.096	9.094	0.000
Grastén2015	0.125	0.080	0.006	-0.031	0.281	1.565	0.118
Cecchini-Estrada2017	0.360	0.100	0.010	0.164	0.555	3.610	0.000
Grastén2017	0.150	0.131	0.017	-0.108	0.407	1.139	0.255
Grastén2019	0.151	0.079	0.006	-0.004	0.307	1.908	0.056
Kokkonen2019	-0.916	0.107	0.012	-1.127	-0.706	-8.533	0.000
Cechini2021	0.486	0.113	0.013	0.265	0.708	4.300	0.000
Zarrett2021	0.294	0.156	0.024	-0.012	0.599	1.886	0.059
	0.182	0.141	0.020	-0.094	0.457	1.290	0.197

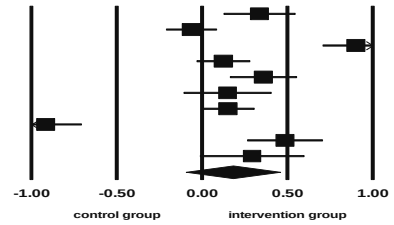

Figure 1 Forest plot of PA results

Publication Bias

Funnel plots (as shown in Figure 2) and Egger's test showed no publication bias was found in 10 studies (intercept = 2.50, p = 0.74 two-tailed).

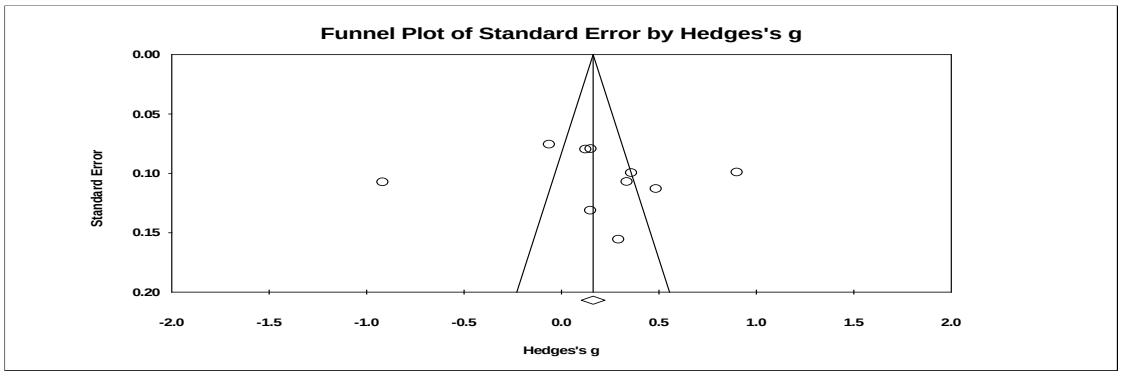

Figure 2 Funnel plot

Secondary Outcomes

Seven of the ten studies reported the effects of AGT-based interventions on individual achievement goals. Four studies showed intervention effects in self-reported task goal favouring the intervention group (Christodoulidis, Papaioannou & Digelidis, 2001; Digelidis et al., 2003; Gråstén et al., 2017; Kokkonen et al., 2019), six studies have shown significant positive effects of self-reported ego goal on control groups (Christodoulidis, Papaioannou & Digelidis, 2001; Digelidis et al., 2003; Gråstén et al., 2015; Gråstén et al., 2017; Gråstén & Yli-Piipari, 2019; Kokkonen et al., 2019). Gråstén and Yli-Piipari (2019) showed a significant negative effect on self-reported task goal in the control group. Cecchini-Estrada and Méndez-Giménez (2017) found a significant positive effect on self-reported mastery approach goal in the intervention group, performance-approach, mastery avoidance, and performance-avoidance goals were found to have a significant adverse effect on the intervention group.

Certainty of Evidence

The results of the meta-analysis of PA were assessed according to the GRADE assessment of certainty of evidence (Table 4). The results showed that the effect of AGT-based interventions on individual PA presented very low certainty of evidence.

Table 4
Certainty of Evidence

Number of studies	SD	RoB	IC	ID	IP	OC	IM	CE
PA (n=10)	RCT (n=2), Q-RCT (n=8)	Serious	Very serious	Not serious	Not serious	None	Meta-analysis revealed no significant effect (Hedges' g = 0.182, 95% CI = -0.094; 0.457)	⨁◯◯◯ Very low

Note: CE= Certainly, IC= Inconsistency, ID= Indirectness, IM= Impact, IP= Imprecision, OC= Other considerations, RoB= Risk of bias, SD= Study design.

Discussion

Primary Outcomes

Although the effect sizes of the interventions were generally favourable, our analyses of ten RCTs or Q-RCTs (4892 participants) found very low certainty of evidence. As shown in Figure 1, eight of the ten studies had effect sizes favourable to the intervention group. However, the results of the meta-analysis showed that the total effect size of the AGT-based intervention on PA in individuals was small (g = 0.178, 95% CI = -0.094, 0.457, p = 0.197, i^2 = 95.03%), statistically non-significant, and highly heterogeneous.

This result is inconsistent with previous results on the effects of interventions on PA using the theoretical framework of AGT (Kelso et al., 2020). Kelso et al. (2020) indicated that interventions based on self-determination theory and AGT had increased student PA behaviour. However, their study only provided a narrative summary of the results of PA and did not conduct a meta-analysis of the results of PA. Furthermore, the study by Kelso et al. (2020) was not based on a single intervention theory. Therefore, which theory substantially impacts PA behaviour needs to be made clear. Therefore, further research is needed to explore whether AGT-based interventions impact individuals' PA behaviour to develop more effective interventions.

Secondary Outcomes

We should have calculated pooled effect estimates due to the timing of data collection and the diversity of measurement instruments in the studies. Of the ten studies included, only seven reported the effect of an AGT-based intervention on individual achievement goals. Five of these studies reported significant results for AGT-based interventions on achievement goals, i.e., intervention effects that favoured the intervention group. The narrative summary of intervention effects suggests that studies reporting an increase in individual achievement goals mainly used interventions on task goals and ego goals, with only the study by Cecchini-Estrada and Méndez-Giménez (2017) using a 2×2 achievement goal orientation intervention. This may lead us to be unable to distinguish whether absolute criteria for task goals, intrinsic criteria of the individual, or a combination of both impact individual PA behaviour. Because task goals focus either on absolute criteria (the extent to which an individual completes or fails to complete an activity) (Wang, Biddle & Elliot, 2007) or on intrinsic personal criteria (doing better than before) (Conroy, Elliot & Hofer, 2003) or a combination of the two (Riou et al., 2012), this makes it researcher difficult in interpreting the results of the study. A better

understanding of task goals could provide practitioners with more helpful information. Therefore, future research could intervene in individuals' PA behaviour using 3×2 achievement goals to determine the effects of different achievement goals on individuals' PA behaviour to increase PA effectively.

Limitation

There are some limitations to this study. First, the search, although not restricted to the language of publication, yielded only a few non-English articles, and the search also did not include grey literature, which may have led to the exclusion of some articles. Second, no meta-analysis was conducted on the achievement goals included in the study, which prevented us from calculating the pooled effect due to the timing of data collection and the diversity of measurement instruments in the study. Third, only AGT-based interventions were included in this study, therefore, it was not possible to compare the results with therapies based on different theories.

Conclusion

This systematic review and meta-analysis suggest that AGT-based interventions do not appear to affect individuals' PA. The narrative synthesis of the findings suggests that AGT-based interventions positively affect individuals' achievement goals. Therefore, this study suggests that AGT-based interventions do not achieve sustainable changes in individuals' PA behaviours but achieve sustainable changes in individuals' achievement goals.

References

Braithwaite, R., Spray, C. M., & Warburton, V. E. (2011). Motivational climate interventions in physical education: A meta-analysis. *Psychology of Sport and Exercise,* 12(6), 628-638.

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public health reports,* 100(2), 126-131.

Cecchini, J. A., Fernandez-Rio, J., & Mendez-Gimenez, A. (2014). Effects of Epstein's TARGET on adolescents' intentions to be physically active and leisure-time physical activity. *Health education research,* 29(3), 485-490.

Cecchini-Estrada, J. A., & Méndez-Giménez, A. (2017). Motivational climate, 2× 2 achievement goal orientation and dominance, self-regulation, and physical activity in pre-service teacher education. *European Physical Education Review,* 23(4), 461-479.

Cechini, J. A., de Mesa, C. G. G., Areces, R. L. D., & Rodríguez, C. (2021). Teachers motivational climate and target strategies intervention effect on secondary school physical education classes. *Revista iberoamericana de psicología del ejercicio y el deporte,* 16(4), 58-63.

Christodoulidis, T., Papaioannou, A., & Digelidis, N. (2001). Motivational climate and attitudes towards exercise in Greek senior high school: A year-long intervention. *European Journal of Sport Science,* 1(4), 1-12.

Cohen J. (1988). *Statistical power analysis for the behavioral sciences*. (2nd ed). Lawrence Erlbaum Associates.

Conroy, D. E., Elliot, A. J., & Hofer, S. M. (2003). A 2× 2 achievement goals questionnaire for sport: Evidence for factorial invariance, temporal stability, and external validity. *Journal of sport and Exercise psychology,* 25(4), 456-476.

Digelidis, N., Papaioannou, A., Laparidis, K., & Christodoulidis, T. (2003). A one-year intervention in 7th grade physical education classes aiming to change motivational climate and attitudes towards exercise. *Psychology of Sport and exercise,* 4(3), 195-210.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *Bmj,* 315(7109), 629-634.

Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: critique, illustration, and application. *Journal of educational psychology,* 100(3), 613-628.

Gråstén, A., Watt, A., Liukkonen, J., & Jaakkola, T. (2017). Effects of School-Based Physical Activity Program on Students' Moderate-to-Vigorous Physical Activity and Perceptions of Physical Competence. *Journal of Physical Activity and Health,* 14(6), 455-464.

Gråstén, A., Yli-Piipari, S., Watt, A., Jaakkola, T., & Liukkonen, J. (2015). Effectiveness of school-initiated physical activity program on secondary school students' physical activity participation. *Journal of School Health,* 85(2), 125-134.

Gråstén, A., & Yli-Piipari, S. (2019). The Patterns of Moderate to Vigorous Physical Activity and Physical Education Enjoyment Through a 2-Year School-Based *Program. Journal of School Health,* 89(2), 88-98.

Guyatt, G. H., Oxman, A. D., Vist, G. E., Kunz, R., Falck-Ytter, Y., Alonso-Coello, P., & Schünemann, H. J. (2008). GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *Bmj,* 336(7650), 924-926.

Hedges, L. V., & Vevea, J. L. (1998). Fixed-and random-effects models in meta-analysis. *Psychological methods,* 3(4), 486-504.

Higgins, J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., ... & Sterne, J. A. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *Bmj,* 343.

Higgins, J. P., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *Bmj,* 327(7414), 557-560.

Kelso, A., Linder, S., Reimers, A. K., Klug, S. J., Alesi, M., Scifo, L., ... & Demetriou, Y. (2020). Effects of school-based interventions on motivation towards physical activity in children and adolescents: A systematic review and meta-analysis. *Psychology of Sport and Exercise,* 51, 101770.

Kohl, H. W., Craig, C. L., Lambert, E. V., Inoue, S., Alkandari, J. R., Leetongin, G., ... & Lancet Physical Activity Series Working Group. (2012). The pandemic of physical inactivity: global action for public health. *The lancet,* 380(9838), 294-305.

Kokkonen, J., Yli-Piipari, S., Kokkonen, M., & Quay, J. (2019). Effectiveness of a creative physical education intervention on elementary school students' leisure-time physical activity motivation and overall physical activity in Finland. *European Physical Education Review,* 25(3), 796-815.

Lochbaum, M., Sisneros, C., & Kazak, Z. (2023). The 3× 2 Achievement Goals in the Education, Sport, and Occupation Literatures: A Systematic Review with Meta-Analysis. *European Journal of Investigation in Health, Psychology and Education,* 13(7), 1130-1157.

Mascret, N., Elliot, A. J., & Cury, F. (2015). Extending the 3× 2 achievement goal model to the sport domain: The 3× 2 Achievement Goal Questionnaire for Sport. *Psychology of Sport and Exercise,* 17, 7-14.

Ng, J. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on psychological science,* 7(4), 325-340.

Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... & McKenzie, J. E. (2021). PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. *Bmj,* 372.

Riou, F., Boiché, J., Doron, J., Romain, A. J., Corrion, K., Ninot, G., ... & Gernigon, C. (2012). Development and validation of the French achievement goals questionnaire for sport and exercise (FAGQSE). *European journal of psychological assessment,* 28(4), 313–320.

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *International journal of behavioral nutrition and physical activity,* 9(1), 1-30.

Wang, C. J., Biddle, S. J., & Elliot, A. J. (2007). The 2× 2 achievement goal framework in a physical education context. *Psychology of sport and exercise,* 8(2), 147-168.

World Health Organization. (2018). Global action plan on physical activity 2018-2030: more active people for a healthier world: at-a-glance (No. WHO/NMH/PND/18.5). World Health Organization.

Zarrett, N., Law, L. H., Wilson, D. K., Abraczinskas, M., Taylor, S., Cook, B. S., & Roberts, A. (2021). Connect through PLAY: a randomized-controlled trial in afterschool programs to increase adolescents' physical activity. *Journal of behavioral medicine,* 44, 379-391.