The effect of the Teaching Personal and Social Responsibility Model on personal and social responsibility in physical education: a systematic review and meta-analysis

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Introduction

The educational context is an ideal environment to cultivate physical, psychosocial, and cognitive benefits for young people (Lindgren & Barker, 2019). Specifically, the Physical Education (PE) subject allows students to participate in tasks that promote adaptive consequences such as higher cognition and academic performance (García-Hermoso et al., 2021), development of motor skills (Estevan et al., 2023) or achieving a better quality of life (Bermejo-Cantarero et al., 2023).

To improve these adaptive consequences, teachers modify their teaching techniques to adapt to cultural changes and to better achieve the positive consequences derived from them (Casey & Kirk, 2020; Kirk, 2013). Thus, a continuous and constant change is taking place from teaching models (where the teaching-learning process is focused on the teacher) to Pedagogical Models (PMs) (where it is focused on student learning) (Casey, 2014). Therefore, PMs emerged from the combination of context, subject matter, and teachers' and students' expectations and behaviors, conceived as a whole construct (Casey & Kirk, 2020).

Thus, promoting positive behaviors and experiences in the PE classroom is an objective to be achieved by teachers (Lindgren & Barker, 2019). In this regard, Teaching Personal Social and Responsibility model (see Figure 1, TPSR) has been widely used to promote adaptative behaviors and reduce antisocial behaviors (Pozo et al., 2018). This model has been shown to be effective in producing significant changes in personal and social responsibility (Pozo et al., 2019), motivation (Merino-Barrero et al., 2020) and participation (Manzano-Sánchez et al., 2019).

** Insert Figure 1 here, please **

The TPSR model posits that students must learn to be responsible for their own and others' well-being, as well as to incorporate these control strategies into their daily lives, with the aim of being better in their social environment. Thus, education about social values is promoted through responsibility, autonomy and integral development, in the different social contexts where it is applied (Pozo et al., 2018). Its development in the educational context is carried out through the implementation of five levels of responsibility proposed by Hellison (2011): (1) respect for the rights and feelings of classmates, (2) effort and participation, (3) personal autonomy (students being able to deal with their own time), (4) helping others and leadership, and (5) transferring attitudes and behaviors outside the classroom. Therefore, individuals are allowed to develop individual and collective responsibility guidelines according to the implicit values of today's society (Hellison, 2011).

Traditionally, the application of the TPSR model-based program has been developed mainly in after-school or community-based programs with voluntary participation, and usually with a low number of participants (Hellison, 2011). This fact is in stark contrast to the nature of PE classes that include students with a wide range of interests and motivations (Dyson et al., 2021a). However, it is necessary to use the educational context to learn behaviors and attitudes through school-based programs that can be transferred to other settings (Hellison, 2003). It is precisely this transferability that the TPSR seeks, fostering students' personal and social development, as well as their perception of self-efficacy, elements that, in PE, have an essential value due to the pedagogical characteristics of the subject (Pan & Hsu, 2024). To this end, regardless of the content covered in the subject, it is essential to integrate skills linked to communication, cooperation and conflict resolution, encouraging reflection and decision-

making by students when regulating their behavior (Hsu et al., 2022). For this reason, PE must generate experiences based on responsible student behavior that are transferred to their daily lives, contributing to their formation as responsible and committed citizens. This allows them to link their positive emotions with behavioral commitment to the group, acquiring more adaptive responsibilities towards others (Simonton & Shiver, 2021).

There seems to be a paucity of research that has reviewed the TPSR model in PE (Pozo et al., 2018). The systematic review conducted by Pozo et al. (2018) meta-analyzed the TPSR model programs within PE context, finding 22 studies that developed programs, both quantitative and qualitative. Most of the studies included in this review showed positive effects of the TPSR model on aspects of personal and social responsibility (i.e., increased respect, self-control, self-esteem, effort, self-concept, sense of well-being, emotional stability, autonomy, or leadership, as well as a decrease in anxiety, depression, and perceived stress).

As previously indicated, much of the research in the educational context based on the TPSR model has been carried out using a qualitative methodology, while the use of quantitative designs has been scarcer (Wright et al., 2010). Among the few works that have used quantitative methodology, Manzano-Sánchez and Gómez-López (2023) conducted research with students from primary and secondary education, testing levels of motivation, basic psychological needs and social responsibility, showing the increase of these variables after the application of the intervention program, both in primary and secondary education students. Similarly, Pozo et al. (2019) developed an eight-month intervention program with Primary School students, revealing significant improvements in personal and social responsibility and positive youth development values. Moreover, Manzano-Sánchez et al. (2019) showed increases in personal responsibility, and intrinsic

motivation and basic psychological needs in girls. Following these results, García-García et al. (2020) analysed personal and social responsibility, prosocial and antisocial behaviour, empathy, and perception of violence in youth, revealing a positive effect on personal responsibility and a negative effect on perceived violence. Manzano-Sánchez et al. (2021) conducted an eighty-month intervention program with secondary students examining personal and social responsibility, motivation, basic psychological needs, prosocial and antisocial behaviors, perception of violence and resilience, demonstrating an increase in personal and social responsibility, psychological mediator index, self-determination index, resilience, climate, and prosocial behavior. Consistent with these findings, Merino-Barrero et al. (2020) assessed the impact of a sustained TPSR model in primary and high school students, indicating a significant increase in their personal and social responsibility, self-determined motivation, basic psychological needs, satisfaction and sportspersonship. The previous studies presented consistently small sample sizes (Borenstein et al., 2021), ranging from approximately 40 participants in the smallest cases (e.g., García-García et al., 2020) to around 200 participants in the largest (e.g., Manzano-Sánchez & Gómez-López, 2023). This limitation in sample size reduces the statistical power of individual studies and prevents more robust and consistent conclusions (Knudson & Lindsey, 2014). Moreover, they showed mixed results in their findings, with the significance of personal (non-significant differences in Pozo et al. (2019) or García-García et al. (2020) studies) and social responsibility (significant differences in Pozo et al. (2019) or García-Merino et al. (2020) researches) varying across different studies.

As just stated, these studies collectively highlight several conditions that align with the criteria for conducting a meta-analysis. There is notable variability in the sample populations, which range from elementary school students (Pozo et al., 2019; Manzano-Sánchez & Gómez-López, 2023) to high school students (Manzano-Sánchez et al., 2021),

as well as methodological differences, such as the duration and design of the interventions. Although most studies report positive effects on personal and social responsibility, motivation, and other psychosocial variables, the magnitude and scope of these effects vary, suggesting potential inconsistencies in the findings. Furthermore, the relatively small sample sizes in individual studies (e.g., Pozo et al., 2019; García-García et al., 2020) make a meta-analytic approach particularly useful for synthesizing results and addressing variability in a systematic manner.

However, the review conducted by Pozo et al. (2018) did not analyze the effect size of the TPSR-based model on students' personal and social responsibility, nor did it synthesize the variables in a unified way, or they did not include the specific investigations that were developed in the context of the PE, since all of them are after 2018. Furthermore, the authors did not test or show the possible effects that TPSR may have on the study variables. Therefore, to improve knowledge of the application of the TPSR model and its consequences on psychosocial variables (emphasizing personal and social responsibility), the first meta-analysis of original research on this topic is carried out.

In addition, Borenstein et al. (2009) argued that a meta-analysis is useful when there are inconsistencies in previous studies and can help provide a clearer picture of the cumulative effects. In addition, heterogeneity in experimental designs, lack of consistency in the selection of outcome variables justify the need for further analysis. Due to these methodological limitations, the need for a meta-analysis that allows more concise conclusions on the effect of the TPSR model on students' psychosocial variables is warranted. This information would be of great interest for PE teachers, school administrators, local, state, federal policy makers, etc., with the aim to understand the

positive impact of the TPSR model on student development and behavior (Woo et al., 2024).

The difficulty in applying the TPSR model in the PE context is evident, since there are few programs that have been developed until then. From a critical approach from culturally relevant pedagogy, the barriers to its implementation are shown, including the heterogeneity of the students (Pinkerton & Martinek, 2023). To achieve this, patience, making decisions about the inclusion of social justice issues based on what's personally meaningful for students as well as context (Baker et al. 2023), among other aspects, are essential for its proper functioning. Furthermore, influencing some levels over others, such as the level of respect, which is more complex to implement, compared to helping others, effort and autonomy, seems essential for the best implementation of the TPSR model (Baker et al., 2023; Melendez Nieves et al., 2021; Pinkerton & Martinek, 2023). For this reason, in addition to the necessary implementation of the model for the improvement of students' personal and social responsibility, it is necessary to analyze its effects from a quantitative point of view, obtaining concrete results that make it possible to verify its reliability and validity in the context in which it is applied (Shen et al., 2022). According to Borenstein et al. (2021), vote counting has important limitations. Although it is a commonly used technique for summarizing studies, it does not provide accurate answers about the effects of an intervention on the variables of interest, as it does not consider the effect size or the magnitude of the results of individual studies. Instead, it simply counts the number of studies with significant results, which can lead to incorrect and biased interpretations. While the positive quantitative findings seem to support the applications of the TPSR model, these studies should be meta-analyzed to avoid the biased interpretations that come with vote counting. A meta-analysis will provide a more objective and comprehensive evaluation of the TPSR model's effectiveness.

Thus, this complexity of the TPSR model has led to it being developed in a hybrid way with other PMs to know its incidence within PE classes (García-Castejón et al., 2022; Menéndez-Santurio & Fernández-Río, 2016). Thus, the studies conducted by García-Castejón et al. (2021) demonstrated the effectiveness of jointly using the TPSR model with other PMs such as Teaching Games for Understanding (TGFU), improving psychosocial variables such as personal and social responsibility, motivation, in addition to improving enjoyment in classes. On the other hand, Menéndez-Santurio and Fernández-Río (2016) hybridized the TPSR model with the Sport Education Model, also showing the potential of the connection through an improvement in prosocial behaviors and relatedness.

In summary, the systematic review conducted by Pozo et al. (2018) identified improvements at the psychosocial level without testing the effect of the TPSR model on students' personal and social responsibility (Pozo et al., 2018). In conducting this meta-analysis, several studies included in the review by Pozo et al. (2018) were excluded because they were review studies or editorials (according to the eligibility criteria of Kirk et al., 2013) and due to their qualitative design. Moreover, several of the studies included in the review by Pozo et al. (2018) have small sample sizes, which compromises the generalizability of the results and may limit the ability to detect significant effects. Therefore, a meta-analysis is needed to improve the precision of the estimates by increasing the total sample size, providing more robust results and drawing more convincing conclusions (Vaske et al., 2002; Martin & Martin, 2012; Watson & Thomas, 2024). Furthermore, this meta-analysis focuses on the age of the participants and the duration of the programs to understand the effects of the TPSR model, which will allow us to establish more general conclusions (Thomas et al., 2018). Therefore, the aims of this study are: 1) to examine the effects of PE interventions based on the TPSR model on

students' personality and social responsibility; and 2) to analyze whether the different ages of the students and the duration of the intervention (i.e., number of sessions) may influence its overall effectiveness.

2. Method

This systematic review and meta-analysis was registered in PROSPERO (the fast-tracking registration for systematic reviews and meta-analysis with registration number: CRD42023455324) and developed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement, which helps transparently document why the review was done, what the authors did, and what they found, published in 2021 (Page et al., 2021).

2.1 Eligibility criteria

In this systematic review and meta-analysis, studies were required to meet the following PICOS (Participants, Intervention, Comparison, Outcomes, Study) criteria: 1) Aim: Researches that examine the effects of TPSR Model on social and psychological variables within the context of PE, 2) Participants: apparently healthy children and adolescents aged 6-18 years, 3) Context: PE, 4) Type of study: quantitative research including quasi-experimental, randomized controlled trials (RCT), etc. and published in a peer-reviewed journal, 5) Main outcome: TPSR Model within PE context and social and psychological consequences, and 6) Date: from 2013 to August 2023. This time frame has been chosen for the beginning of the methodological and scientific consideration of PMs and the development of values in PE (Kirk, 2013), which aligns with the specific objectives of this meta-analysis. Searching was restricted to Spanish and English languages.

The exclusion criteria were the following: 1) Secondary studies (systematic reviews, conferences, research protocols, editorials, letters were excluded); 2) Qualitative

studies; 3) Studies that conceptualize teaching methods differently or from other theories; 4) “Researches that duplicate the sample with similar objectives to the main one”; 5) Studies out of context of PE; and 6) Studies that employed hybridization (use of two or more PMs) with similar objectives).

2.2 Literature search

Studies were identified by comprehensively searching the representative electronic databases in the scope of this systematic review up to February 2024: Web of Science (WOS), Scopus, SPORTDiscus, PubMed, and ERIC. Potential studies were searched on a string combining terms, text words, several Boolean truncators (e.g “PE" OR "Primary school*" OR "Secondary school*) and subject headings). Likewise, indicative of TPSR model, teaching personal and social responsibility model, psychological consequences included in PE intervention programs of Primary and Secondary students were included in the search. Therefore, these different combinations did not include restricting terms and contained a high number of references to screen but minimized the risk of missing crucial researches. An example of the search strategy for WOS can be found in Supplemental Table 1. Likewise, a manual search was carried out in the reference lists of potential investigations, to identify any investigation that could have been omitted.

2.3 Study selection

First, two authors ([redacted]) completed the search and compared their results to ensure that the same number of investigations had been found. Second, Duplicate records and records marked as ineligible were removed using the Microsoft Excel (Microsoft, Redmond, WA, USA). For this step, one of the authors (JLAS) downloaded the main data from the articles (title, authors, year, date, and database) to an Excel spreadsheet. Third, title, abstracts, and method sections were independently

screened for eligibility by two authors ([redacted]), with two researchers screening each record. Subsequently, the full text of the remaining records was reviewed to verify inclusion/exclusion criteria. Regarding records without full text, the investigators contacted the original studies' authors to complete the data-collection process. Any disagreements were resolved with a third reviewer until a 100% consensus was reached.

2.4 Data extraction

Two researchers ([redacted]) independently reviewed the full text of the selected studies. One researcher extracted the information from the selected articles ([redacted]), and the other researcher ([redacted]) checked the data for accuracy. Inconsistencies were resolved by discussion between them. The following information was extracted from the studies that met the selection criteria (see Table 1): author(s), country, design, theoretical background (TPSR model), sample, age, female (%), intervention description, outcomes (i.e., personal and social responsibility, motivation), intervention components and intervention duration. If more information about the researches included was required, the authors of the primary studies were contacted via e-mail.

2.5 Methodological quality assessment

Information on the authors, affiliations, date, and source of each research included in this study was hidden to avoid bias in the measurement of the methodological quality of the articles. The reviewers ([redacted]) assessed the methodological quality independently (i.e., high quality, medium quality, and low quality). In case of disagreements, a third review author was asked to resolve the disagreement ([redacted]), and uncertainties were discussed until a consensus was reached. The methodological quality of studies was measured using the Mixed Method Appraisal Tool (Hong et al., 2018) . This checklist comprises two different parts: checklist (part 1) and explanation of the criteria (part 2). The first part asks about the screening questions that indicates that studies

277 are empirical (i.e., S1: Are there clear research questions? S2: Do the collect data allow
278 to address the research questions?), following of 5 items depending on the type of research
279 that are assessed: (a) target population; (b) intervention and outcome measures
280 assessment; (c) complete data outcome; (d) cofounders accounted; (e) avoid of
281 contamination. Each item was classified as yes (1 point), no (0 points), can´t tell (C), and
282 was scored 1 point if the article provided a sufficient description of the item or 0 points
283 if the publication did not provide an adequate description of the item. Moreover, it was
284 considered "can´t tell" if an insufficient or unclear description of the item was provided,
285 while not applicable was assigned in cases where the criterion to be evaluated could not
286 be applied. The maximum possible score that could be achieved was 7 points (all positive
287 items). Based on the Quality Assessment of Controlled Intervention Studies if the 'yes'
288 answers were >75% of the total, an article was considered of good quality; if they were
289 ≤75% but ≥50%, an article was scored as fair quality; if they were <50%, the article was
290 scored as poor quality. Therefore, a score greater than 6 indicated good quality, 4–5 was
291 fair quality, and studies scoring below 4 were deemed poor quality (National Institutes of
292 Health National, 2015).

293 **2.6 Risk of bias**

294 The "Risk of Bias" was assessed using the Cochrane Collaboration tool for
295 assessing the risk of bias in randomized controlled trials (RCTs) (Higgins et al. 2011).
296 Two researchers ([redacted]) conducted the measurement of methodological
297 quality independently. In case of disagreement, a third reviewer [redacted] was consulted,
298 and doubts were discussed until a consensus was reached. This instrument is composed
299 of eight items that assesses the following aspects: (a) timing of measurement; (b) group
300 similarity at baseline; (c) selective reporting; (d) incomplete outcome data; (e) blinding
301 of outcome assessment; (f) blinding of participants/personnel; (g) allocation concealment;

(h) random sequence generation. Each item was rated as low (+), high (-), or unclear risk of bias (?), the latter indicating a lack of information or uncertainty about possible bias.

2.7 Statistical analysis

To analyse the effects of school programs based on the TPSR model, a separate meta-analysis was conducted for personal responsibility and social responsibility. When the data reported in the studies were insufficient, the researchers were contacted to obtain additional information. All analyses were performed using STATA software (v17; Stata Corp, College Station, TX, USA).

Effect sizes were analysed using the DerSimonian-Laird inverse random-effects variance model because heterogeneity between studies was expected (Cooper, 2019). Study effect sizes were calculated by subtracting change differences between the intervention and control groups (CG) (Morris, 2008). Because the outcomes of interest were continuous variables, Hedges' g of effect size was used to represent the standard mean difference between the means of the intervention (IC) and CG. According to Cooper (2019), effect sizes for Hedges' g were classified as small ($0 \leq g \leq 0.50$), medium ($0.50< g \leq 0.80$) and large ($g > 0.80$). For personal and social responsibility, positive effect sizes indicated greater personal and social responsibility after the intervention. On the contrary, a negative effect size indicated less personal and social responsibility after the intervention. Next, two separate random-effects meta-analyses were conducted for the outcomes of personal responsibility and social responsibility. Pooled effect sizes were estimated using 95% confidence intervals (CI).

A sensitivity analysis was also performed by removing studies one at a time to assess the robustness of the summary estimates (Cooper, 2019). This also indicated whether an individual study accounted for a substantial proportion of the heterogeneity. We then assessed between-study heterogeneity using Cochran's Q test (with alpha set at

$p < 0.10$) and the I^2 statistic. The significance level for Cochrane's Q statistic was set at $p < 0.10$, due to the low number of studies included in the meta-analysis (Higgins et al., 2011). The degree of inconsistency of real effects between studies refers to the variability in the results of the studies included in the meta-analysis. This inconsistency is measured with the I^2 statistic. The I^2 describes the percentage of the total variation between studies that is attributable to real differences between studies (i.e., heterogeneity) (Borenstein et al., 2021; Deeks et al., 2023). Thus, I^2 determines the proportion of effects that are real across studied pooled into a meta-analysis (reported as a percentage point). This heterogeneity between observed and true effects is measured using cut-points; the larger the percentage, the larger the percent of observed effects across the pooled studies represent true effects (i.e., real effects) (Borenstein, 2020). The magnitude of inconsistency was considered low if $I^2 < 25\%$, moderate if $I^2 = 25\%$ - 50%, high if $I^2 =$ 50% - 75%, and very high if $I^2 > 75\%$ (Borenstein, 2020). If τ^2 is less than 1 (Cooper, 2019), it does not suggest substantial heterogeneity between studies and, therefore, subgroup analysis is not necessary. Publication bias was checked by visual inspection of the Funnel Plot in the outcome measures (an asymmetric, rather than symmetric, inverted funnel shape indicated publication bias). In addition, the asymmetry of the Funnel Plot was statistically assessed using Egger's linear regression test (Higgins et al., 2011) to quantify the bias captured by the Funnel Plot and to test whether it was significant ($p <$ 0.05). Finally, a random-effects meta-regression was performed to evaluate the relationship between the age of the participants and the duration of the intervention (number of sessions) with the effect size on personal responsibility and social responsibility.

3. Results

3.1 Study selection

A total of 874 records were identified through database searches (Figure 2). After screening for duplicates, and records marked as ineligible, 451 records remained. Finally, 36 records were obtained for full-text review. Of those studies, 30 were excluded for several reasons (Supplemental Table 2). Also, a Supplemental Table 3 has been included where the reasons for exclusion of studies from the review by Pozo et al. (2018) can be consulted. Finally, six studies were included in this systematic review, and all studies were included in the meta-analysis.

** Insert Figure 2 here, please **

3.2 Study characteristics

Table 1 shows the descriptive information of the studies included in this systematic review and meta-analysis. The studies included in this systematic review were carried out between 2013 and 2023, with the methodological and scientific considerations of benefits in the educational context serving as the starting point for the research (Kirk, 2013). All studies were performed in Spain. Regarding the study design, all the studies were controlled trials (random assignment and were masked) and included both girls and boys. The youngest students were between 10 and 11 years old (Manzano-Sánchez & Gómez-López, 2023), the oldest students were between 14 to 18 years old (Manzano-Sánchez et al., 2019). Studies were grouped according to students' age: participants between 5 and 11 years were categorized as children, and participants between 12 and 17 years were categorized as adolescents. In total, there was one study conducted exclusively with children (Pozo et al., 2019), two studies targeted adolescents, (Manzano-Sánchez et al., 2019; Manzano-Sánchez et al., 2021) and three studies targeted both children and adolescents (Merino-Barrero et al., 2019; García-García et al., 2020; Manzano-Sánchez & Gómez-López 2023).

Regarding the duration of the study, three studies had a moderate duration (four – six months), (Merino-Barrero et al., 2019; García-García et al., 2020; Manzano-Sánchez et al., 2023), and three studies were longer than 6 months (Pozo et al. 2019; Manzano-Sánchez et al., 2019; Manzano-Sánchez et al., 2021). The sample sizes ranged from 57 (García-García et al., 2020) to 408 students (Manzano-Sánchez & Gómez-López 2023). In all the studies, the teachers responsible for the IG received specific training to enhance their knowledge in the implementation of TPSR model.

In six studies, the IG was compared to the CG. Furthermore, six studies reported that CG received no intervention, (Pozo et al. 2019; Manzano-Sánchez et al., 2019; García-García et al., 2020; Merino-Barrero et al., 2020; Manzano-Sánchez et al., 2021; Manzano-Sánchez et al., 2023).

In relation to the instruments used, all (6 studies) use the Personal and Social responsibility questionnaire by Escartí et al. (2011), which assesses students' perception of personal and social responsibility in physical education. Furthermore, the study by Merino-Barrero et al. (2020) used the tool for assessing responsibility-based education to assess strategies to teach responsibility (Escartí et al., 2013), which uses variables related to teacher observation and student observation. Only one study (Pozo et al. 2019) employed the Values Scale for Positive Youth Development, structured into 6 related factors and with a total of 28 items. On the other hand, different instruments (Questionnaire to assess motivation in the PE class (Sánchez-Oliva et al., 2017) and The PE Motivation Questionnaire (Sánchez-Oliva et al., 2013) were used by Manzano-Sánchez et al. (2019) and Merino-Barrero et al (2020), respectively, whereas the Spanish version of the "Échelle de Motivation en Éducation" (Núñez et al., 2010) were used by Manzano-Sánchez et al. (2021) and Manzano-Sánchez and Gómez-López (2023) to analyze motivation in PE classes. Basic Psychological Needs (Moreno-Murcia et al.,

2008) were analyzed in 3 investigations (Merino-Barrero et al., 2020; Manzano-Sánchez et al., 2021; Manzano-Sánchez and Gómez-Mármol, 2023) using The Spanish version for school context of the Basic Psychological Needs Scale in Exercise Scale (Moreno-Murcia et al. 2008). This scale is composed of a total of 12 items that evaluate the satisfaction of the three basic psychological needs in physical exercise contexts: competence (four items), autonomy (four items) and relationship with others (four items), by means of a Likert scale from 1 (totally disagree) to 5 (totally agree).

The behaviors of sportspersonship were measured by the Multidimensional Sportspersonship Orientation Scale (Martín et al., 2006), which evaluates five different types of sports orientations through a 5-point scale. The violence through the daily school violence questionnaire (Eisenberg et al., 2005) and perception of violence was assessed with the Questionnaire on School Violence (Álvarez-García et al., 2011), in Merino-Barrero et al. (2020), García-García et al. (2020) and Manzano-Sánchez et al. (2021), respectively. This scale has a value between one and six, with a total of 34 items.

The intention to be physically active was analyzed with The Intention to be Physically Active Scale (Moreno et al., 2007) in the study by Merino-Barrero et al. (2020), which measures aspects related to the practice of physical activity and its performance in leisure and free time. Regarding behaviors, two studies (García-García et al., 2020; Manzano-Sánchez et al., 2021) analyzed prosocial and antisocial behaviors with the adolescence social skills inventory (Inglés et al., 2003). This instrument is composed of thirty-eight items that are divided into six skills subscales. Furthermore, with respect to behaviors, these two studies analyzed empathy with the interpersonal reactivity index (Gómez-Mármol et al., 2018), and school social climate with the questionnaire to assess social school climate (Trianes et al., 2006) and resilience with the resilience scale (Sánchez-Teruel & Robles-Bello, 2015), respectively. This scale has two factors and a

total of 14 items. Finally, comparative perception of the level of physical activity performed with the comparative physical activity scale (Prochaska et al., 2001) and perception of the level of physical activity practice with the physician-based assessment and counseling for exercise questionnaire (Prochaska et al., 2001), were analyzed in the study by García-García et al. (2020).

*** Insert Table 1 in here, please ***

3.3 Methodological quality assessment

Results of the methodological quality assessment are provided in Supplemental Table 4. Thus, 16.7% of the studies (n = 1) were considered "high quality," and 83.3 % (n = 5) were considered "medium quality".

3.4 Risk of bias

Figure 3 provides an overview of the risk of bias for all included studies and for each category. The overall risk of bias is provided in Supplemental Figure 1. The highest risk of bias among the studies was found in the domains of random sequence generation (random assignment). The lowest risk of bias across studies was found in the rest of domains assessed. The latter is not included in the standard Cochrane Collaboration tool for assessing risk of bias in randomized trials (Higgins et al., 2011).

*** Insert Figure 3 in here, please ***

3.5 Results of individual studies: personal and social responsibility

The individual results of each of the included studies are shown in Table 1. Of the 6 included studies, 2 investigations found a significant change in personal and social responsibility in general (Merino-Barrero et al., 2020; Manzano-Sánchez & Gómez-López, 2023). Another study found these significant differences only in low socioeconomic levels (Pozo et al., 2019). One study found significant differences in social responsibility (Manzano-Sánchez et al. 2021), while another study found significant

differences only in personal responsibility (Manzano-Sánchez et al., 2019). On the other hand, the study by Pozo et al. (2019) found differences on the positive youth development values. Regarding motivation, the study by Manzano-Sánchez et al. (2019) found significant differences in girls, basic psychological needs and intrinsic motivation in the study by Merino-Barrero et al. (2020). Likewise, intrinsic motivation and basic psychological needs improved in the study by Manzano-Sánchez et al. (2021), as well as in the study by Manzano-Sánchez and Gómez-Mármol (2023).

On the other hand, sportspersonship and the intention to be physically active were improved in the study by Merino-Barrero et al. (2020), resilience in the study by Manzano-Sánchez et al. (2021). It is highlighted that the study by García-García et al. (2020) did not find significant differences in any variable.

3.6 Synthesis of results: Effects of TPSR-based interventions on school about personal and social responsibility

a) Personal responsibility

The effect of school programs based on the TPSR model on personal responsibility is shown in Figure 4. More detailed information on the individual studies included in the meta-analysis for personal responsibility can be found in Supplemental Table 5. Since the sensitivity analysis did not find any outliers or influential power studies (Supplemental Figure 2) all studies were included in the analyses. The overall analysis for personal responsibility resulted in a significant small effect size with high heterogeneity (g = 0.38; 95% CI: [0.17, 0.58], p = <0.01, I^2 = 59.39%). These results show that programs based on the TPSR model significantly improved students' personal responsibility. As can be seen in Supplemental Figure 3, the funnel plot turned out to be symmetric and Egger's test was not significant (Z = -1.84, p = 0.06).

Insert Figure 4 here, please

The random effects meta-regression model showed that neither student age (β = -0.01; 95% CI: -0.01, 0.15; p = 0.09) (Figure 5) nor duration of interventions (β = -0.01; 95% CI: -0.05, 0.02; p = 0.41) (Figure 6) was associated with significant changes for personal responsibility.

Insert Figure 5 here, please

Insert Figure 6 here, please

b) Social responsibility

Figure 7 shows the effect of school programs based on the TPSR model on social responsibility. Supplemental Table 6 shows the detailed information for each of the studies included in the analyses for social responsibility. The sensitivity analysis (Supplementary Figure 4) for social accountability found no changes in the results and no influential studies, so all studies were included in the analyses. The results for social responsibility showed a small significant effect size with high heterogeneity (g = 0.20; 95% CI: 0.01, 0.38; p = <0.01; I^2 = 51.50%). These findings highlight that interventions based on the TPSR model are effective in improving students' social responsibility. Inspection of the Funnel Plot and Egger's Test for social responsibility is shown in Supplemental Figure 5. The funnel plot was found to be symmetric, and Egger's test was not significant (Z = 0.869, p = 0.46).

Insert Figure 7 here, please.

The random effects meta-regression model showed that students' age (β = -0.07; 95% CI: -0.15, 0.02; p = 0.11) (Figure 8) and duration of interventions (β = 0.01; 95% CI: -0.01, 0.02; p = 0.47) (Figure 9) were not associated with significant changes in social responsibility

Insert Figure 8 here, please.

Insert Figure 9 here, please.

4. Discussion

The aim of this systematic review and meta-analysis was to analyze research based on interventions using the TPSR model to increase personal and social responsibility variables in children and adolescents in the PE context. The positive effects of the implementation of this PM in PE have been demonstrated according to the present meta-analysis, increasing two essential educational elements such as personal and social responsibility. The main findings of the present study demonstrate that after the application of the TPSR model in the context of PE, personal and social responsibility improve.

First, the results of our study showed that interventions based on the TPSR model had a small effect. Therefore, the results of our study should not be overinterpreted, as the effect sizes were not large enough (Vaske et al., 2002). Similarly, Watson and Thomas (2024) suggest careful interpretation of the findings, especially when the effects are small. Based on these research approaches, the results of our study should be interpreted with caution.

These findings reflect the effectiveness of the TPSR model in the context of PE, seeking, through motor skills, to cultivate respectful, critical and responsible students and citizens (Casey & Kirk, 2020). According to these findings, other previous systematic reviews have found the relevance of the TPSR model in generating positive consequences. Thus, the systematic review developed by Shen et al. (2022) showed the positive effects of the TPSR model in school-based and out-of-school sports and physical activity settings (kinesiology context) on children's meaningful and transferable life skills (Shen et al., 2022). This results in positive changes in behaviour, improved interpersonal skills and emotional processes, as well as improved academic performance (Hellion & Walsh, 2002).

The TPSR model clearly indicates that for its application in PE, responsibility must be integrated in all its dimensions, both from a more individual and group perspective (Koutelidas et al., 2022). It is essential that the student accepts his or her commitments under a premise of personal self-regulation, to subsequently make collective decisions that enable the group's success to be achieved (Ward, 2020). For this purpose, it is crucial that the teacher integrates teaching styles based on responsibility in their teaching practice. Thus, they will be able to establish delimiting pedagogical strategies that allow, through systematic observation, the students to make positive decisions both for themselves and for the well-being of the group (Hemphill et al., 2015).

Regarding the methodological quality and risk of bias of the research found in this systematic review, it is necessary to pay more attention to randomization in the selection of participants, considering the disparity and variety existing in educational classrooms, regarding students' demographics. To do this, it is recommended using criteria of representativeness of the total sample, as well as increasing the sample size, as well as showing the diversity of the existing students in the classes. This is especially important in methodological designs to be implemented in PE, as they are applied in classrooms with very diverse student characteristics, which entails considering their variety (Landi et al., 2020). As indicated by Parmaxi and Zaphiris (2020), it is always desirable in classroom application research to clearly delimit what is to be measured and what the existing extraneous variables are, especially when dealing with behavioral variables of the TPSR model.

Researches have also found that since there are no specific studies in childhood makes it necessary to work on the implementation of this model from the first years of compulsory education (Pozo et al., 2018). In this regard, students could be encouraged to develop basic principles of commitment, both to themselves and to others, through

meaningful practices that can be implemented throughout their schooling (Kutelidas et al., 2022). This application of the TPSR model from early stages can lead to the acquisition of transversal issues such as solidarity and empathy towards the teacher and other classmates (Severinsen, 2014). It is essential that this responsibility is fostered in students from an early age, linking physical pedagogical treatment with classroom practices based on compliance with common rules and respect for others. In addition, its application in the early stages can improve the child's belief in self-efficacy (Min & Wei-Ting, 2024).

Regarding the duration of the interventions, in the present research, only three studies with interventions that lasted longer than 6 months were found. This seems to be an important limitation, as short intervention designs limit the possibilities of attributing the effects achieved to the implementation of pedagogical models. This fact is much more evident if the large number of skills that teachers are required to master are considered (Dyson et al., 2021). Therefore, it is essential to develop longitudinal interventions studies that clearly determines how the TPSR model influences the responsibility acquired by students, highlighting the key elements that need to be addressed, as well as the main limitations (Hsu et al., 2022).

On the other hand, another important aspect to highlight extracted from the present review is the small number of participants in some of the studies. While this should not be a limitation in qualitative research designs, it may be a limitation in quantitative research, as a small sample size does not guarantee that the intended effects are representative (Navalta et al., 2024). However, it is positive that in all the research included in this review, all the teachers in the experimental groups received training on the TPSR model. According to this issue, Meléndez Nieves et al. (2021) indicated that the teaching of the TPSR model is not well integrated into the curriculum of initial teacher

training, which leads to the difficulty teachers have in applying it with guarantees in their professional practice.

Another remarkable aspect of the research is that it does not specify what exactly was done in the control groups. It would be necessary for the research to describe exactly what is done in the control groups, and not to focus exclusively on direct instruction designs, but for example on contrasting different pedagogical models (Ahmed & Kanaan, 2021). Martinek and Hellison (2016) establish the need for TPSR model, due to its transformative power, to be applied in the classroom with very well-defined aims, specifically delimiting the contexts in which it is carried out and specifying application programs that allow its effects on the intended variables to be verified.

Moreover, the research analyzed in this research has shown that neither the age of the student nor the duration of the interventions may be associated with significant changes in personal and social responsibility. This result presents a positive interpretation, since the responsibility variable should be worked on in the student from the early stages, always adapting the level of demand of the tasks (Simonton & Shiver, 2021). In this sense, it is important that TPSR model is applied transversally throughout the course, and not only at specific moments or with specific content (Pinkerton & Martinek, 2023). It would therefore be necessary for the TPSR model to form part of the teaching programs of schools, as well as to be linked to internal regulations, allowing the model to be applied transversally in all subjects. This would make it possible to cultivate a basis of responsibility in students from an early age, also involving families (Santos et al., 2020). What must be kept in mind is that when the TPSR model is applied to PE, it should be associated with behavioural and attitudinal variables of the student, using the content as a vehicle to nurture positive emotions towards learning (Simonton & Shiver, 2021). This improvement in the level of personal and social responsibility must be

measured and contrasted in the students through the search for specific strategies that consider the heterogeneity of the classroom (Sánchez-Alcaraz et al., 2021).

5. Conclusion

This systematic review and meta-analysis show that there is not much research in PE that applies the TPSR model in the classroom to measure psychological and behavioural variables. Moreover, most of the interventions are of short duration, making it necessary to apply this model longitudinally throughout the academic year. However, all research measures personal and social responsibility variables, which is very positive. It is also positive that there are no significant differences according to the age of the student, which allows us to verify the good effects of the model at all educational stages.

This systematic review and meta-analysis is a relevant contribution to the existing literature on the subject, as there are no previous studies that review the effects of the TPSR model in PE on psychological and behavioural variables. However, it has some limitations, such as not addressing the context related to teachers and students' families. Likewise, the small sample size is a problem for establishing generalizations, so further perspectives must address larger samples in their research to achieve greater generalization. Furthermore, the fidelities of the interventions were not analyzed during the interventions, so this implementation-fidelity of the investigations could not be quantified. Additionally, one limitation of this study is that the tool used to assess bias, based on the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins et al., 2011), does not report psychometric properties such as inter-rater reliability; however, this aspect was mitigated through a consensus-based approach among the reviewers. Besides, the studies analyzed have been conducted in Spain, so this could represent a limitation of generalization to other countries/cultures. As future lines of research, it seems relevant to analyze research that applies this model to measure other variables

related to student motivation, as well as other aspects related to the type of content to be addressed in PE, including teacher characteristics as an essential element. Another limitation of the study was that only sex-related data were descriptively extracted, which did not allow us to determine if the effect of the interventions are different between boys and girls. Therefore, for future research, it would be valuable to investigate how sex- and gender-related phenomena might be associated with the results of the TPSR model, as suggested by Garver et al. (2023) and Heidari et al. (2016). Similarly, it would be interesting to carry out research with the TPSR model of a qualitative nature, as well as to carry out designs with control groups that carry out hybridizations with other PMs.

We believe that this research may be of interest to all those PE teachers interested in fostering personal and social responsibility in their students. It is also of interest to school management teams and families, thus promoting guidelines for the acquisition of values that are addressed by the entire educational community.

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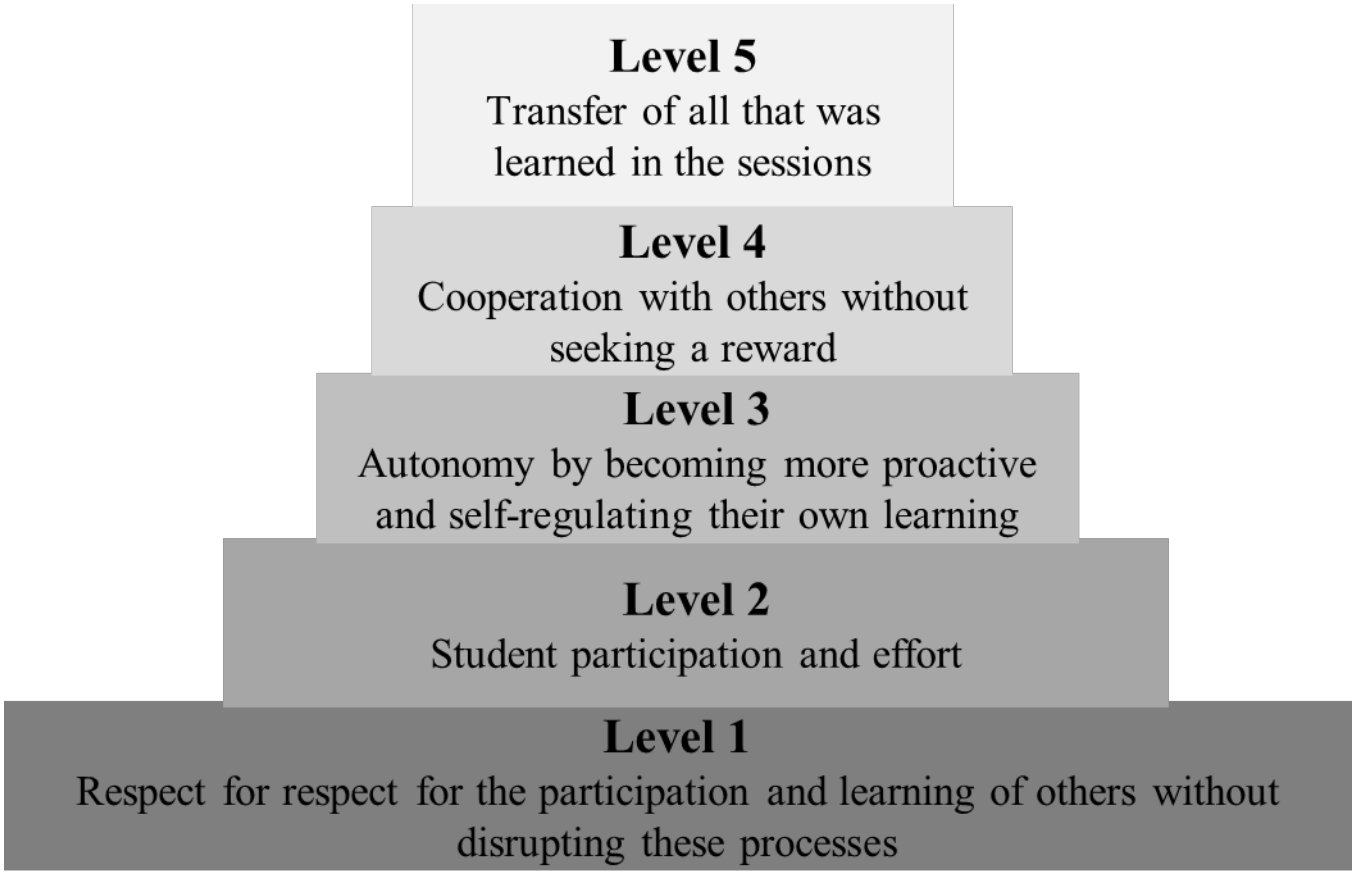
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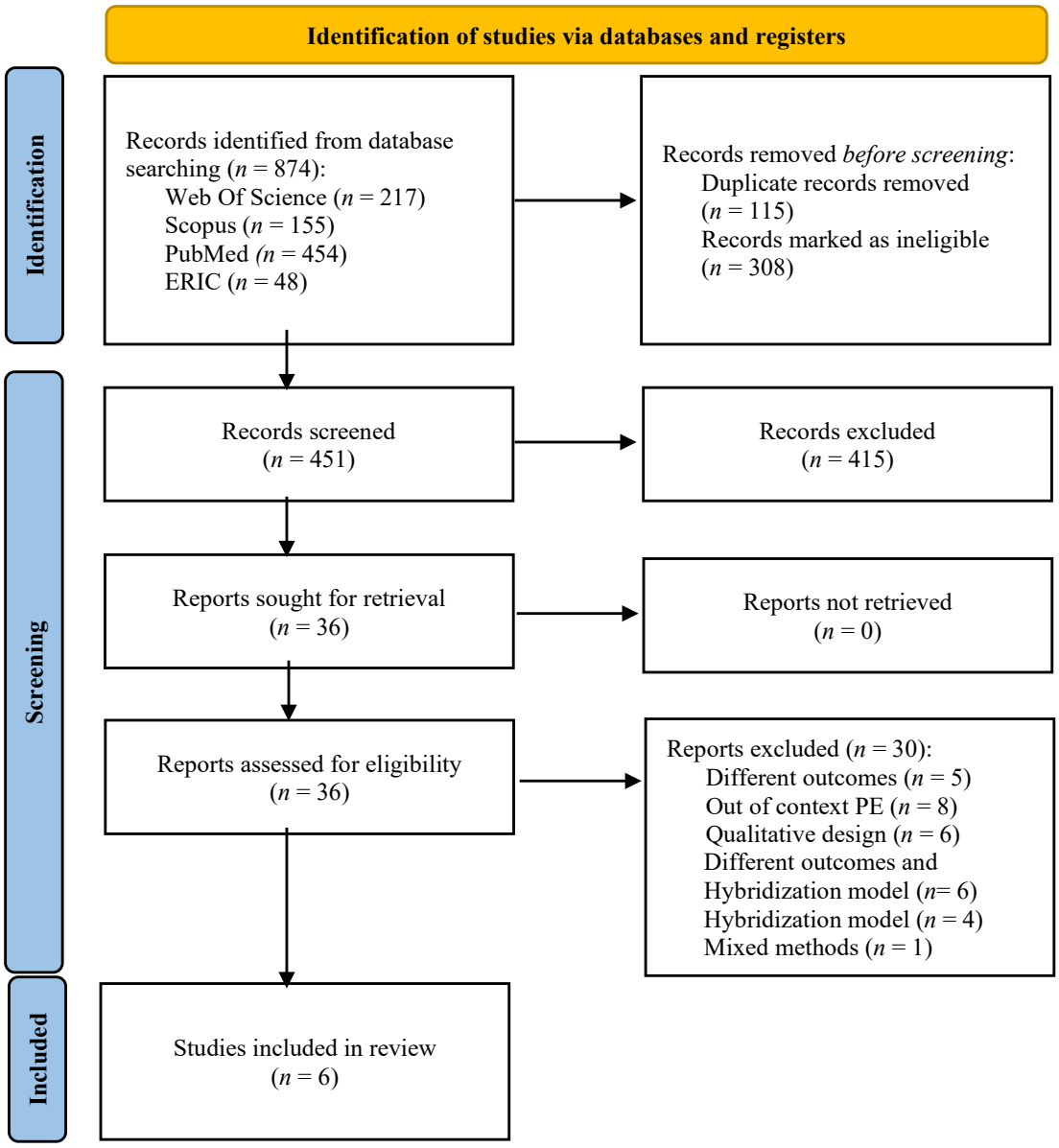
An asterisk (*) denotes studies included in the meta-analysis of this study.

846 **Figure 1.** Diagram of the TPSR model (Hellison, 2011)



847

Figure 2. Preferred reporting items for systematic reviews and meta-analyses (PRISMA) flow diagram.



851 **Table 1.** Description of the included studies reports

Author; country/design	Theoretical background	Sample / age / female (%)	Intervention description	Outcomes and Instruments		Intervention components	Intervention duration	Main results
				Outcomes	Instruments **Self-reported**			
Pozo et al. (2019) Spain Design: CT	TPSR	Children 210/10-12 years/not shown IG: 103/10-12 years/not shown CG: 107/10-12 years/not shown	All individuals participated in a few weeks of "normal" PE classes. Subsequently, for 56 sessions (8 months) and twice a week, the intervention program was carried out. Each class lasted approximately 55 minutes. The 4 responsible PE teachers received a 30-hour training course (10 theoretical hours and 20 practical hours). A teacher with 5 years of experience in TPSR conducted the training. CG did not receive any training	**Personal and Social Responsibility** **Positive Youth Development**	**Personal and Social Responsibility** Questionnaire (Escartí et al. 2011) **The Values Scale for Positive Youth Development** (Antolín Suárez et al., 2011)	School curriculum, teacher training and playground intervention	8 months	The intervention had a positive effect on the positive youth development values total score. No changes on the personal and social responsibility, although lower socioeconomic context improved personal and social responsibility.
Manzano-Sánchez et al. (2019) Spain Design: CT	TPSR	Adolescents 85/14-18/52.94 IG: 35/14-18/48.57 CG: 50/14-18/56	The intervention program was developed for 8 months. The teacher responsible for the training received a 5-hour course on theory and practice, as well as continuous training in three weeks-cycle.	**Motivation in PE classes**	**Questionnaire to assess motivation in the physical education class** (Sánchez-Oliva et al., 2007)	School curriculum and teacher training	8 months	The results showed that intrinsic motivation improved in girls in the post-test in the

		CG did not receive any training.					experimental group. Personal responsibility improved in girls and boys in the experimental group, while social responsibility and basic psychological needs did not improve between groups in the post-test.
Merino-Barrero et al. (2020) Spain Design: CT	TPSR	Children and adolescents 72/11-13/48.47 IG: 35/11-13/40 CG: 37/11-13/54.05	Four male teachers (31-59 years) with more than 5 years of experience, participated in the study. None of the participating teachers have had any previous experience with TPSR.	**Personal and Social Responsibility** **Basic Psychological Needs** **Motivation in PE**	**Personal and Social Responsibility** Questionnaire (Escartí et al. 2011) **The Spanish version for school context of the Basic Psychological Needs Scale in Exercise Scale** (Moreno Murcia et al., 2008) **The Physical Education Motivation Questionnaire**	School curriculum, playground intervention and teachers	5 months	The results showed statistically significant differences, with higher values in the IG, for personal and social responsibility, basic psychological needs (autonomy, competence and relatedness),

					(Sánchez Oliva, 2013)		intrinsic motivation, self-determination index, identified regulation, sportspersonship and intention to be physically active.
				Sportspersonship **Intention to be physically active** **Strategies to teach responsibility**	**The Multidimensional Sportspersonship Orientation Scale** (Martín et al., 2006) **The Intention to be Physically Active Scale** (Moreno et al., 2007.) **The Tool for assessing Responsibility-Based Education** (Escartí et al., 2013)		
García-García et al. (2020) Spain Design: CT	TPSR	Children and adolescents 57/11-14/43.85 IG: 26/11-14/38.46 CG: 31/11-14/46.50	The teachers were trained during the first 5 weeks of the course in TPSR, lasting 30 hours. The intervention program was developed for 5 months (29 sessions in total with a frequency of 2 classes a week of 55 minutes each). CG with conventional teaching methodology with no intentional manipulation of the variables	**Personal and Social Responsibility** **Prosocial and Antisocial Behavior** **Empathy** **Violence**	**Personal and Social Responsibility Questionnaire** (Escartí et al., 2011) **Adolescence Social Skills Inventory** (Inglés et al., 2003) **Interpersonal Reactivity Index** (Gómez Mármol et al., 2018) **The daily school violence questionnaire** (Eisenberg et al., 2005)	School curriculum, teacher training, family involvement and playground intervention	5 months	The results showed that there were no significant differences between the different measures over time, and there were no significant interactions according to group or age.

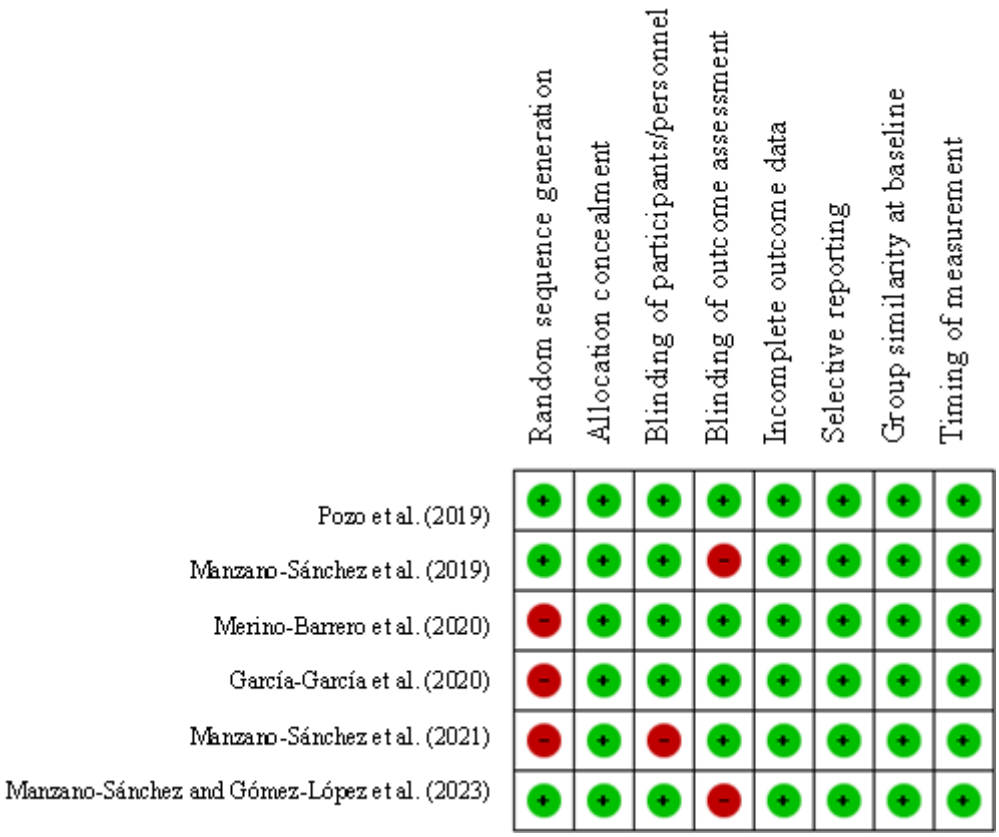
				Comparative perception of the level of physical activity performed	**Comparative Physical Activity Scale** (Prochaska et al., 2001)		
				Perception of the level of physical activity practice	**Physician-Based Assessment and Counseling for Exercise Questionnaire** (Prochaska et al., 2001)		
Manzano-Sánchez et al. (2021) Spain Design: CT	TPSR	Adolescents 257/12-18/41.24 IG1: 90 (IG for global Education)/12-18/64.44 IG2:100 (IG for PE only)/12-18/63.00 CG: 67/12-18/44.77	30 teachers participated in the study (11 men and 19 women). None of them had previous experience with the intervention, except one PE teacher. Teachers received a minimum of 11 hours of training, and subsequently received ongoing training each week from the researchers (during 8 months). CG did not receive any training	**Personal and Social Responsibility**	**Personal and Social Responsibility Questionnaire** (Escartí et al., 2011)	School curriculum, teacher training and playground intervention	8 months	The results of the post-test found significant differences between the CG and EG-GE in resilience and its three dimensions, competence, and social responsibility. Furthermore, significant differences
				Basic Psychological Needs	**The Spanish version for school context of the Basic Psychological Needs Scale in Exercise Scale** (Moreno Murcia et al., 2008)		
				Motivation towards Education Scale	**The Spanish version of the "Échelle de Motivation en**		

				Éducation” (Núñez et al., 2010)		between the CG and EG-PE were only shown in intrinsic motivation (IM) to know. In any case, the outcomes were in favor of the EG-GE or EG-PE, both reaching higher values than the CG.
			Prosocial and Antisocial Behavior	**Adolescence Social Skills Inventory** (Inglés et al., 2003)		
			Perception of violence	**Questionnaire on School Violence** (Álvarez-García et al., 2011)		
			School Social Climate	**Questionnaire to assess school social climate** (Trianes et al., 2006)		
			Resilience	**Resilience Scale** (Sánchez-Teruel & Robles-Bello, 2015)		
Manzano-Sánchez and Gómez-López (2023) Spain Design: CT	TPSR	Children and adolescents 408/10 – 13 years/not shown IG: 216/10 – 13 years/not shown CG: 192/10 – 13 years/not shown	Prior to implementation, all intervention staff attended a 3-hours training in TPSR strategies during a 5-month intervention. IG: over 5 months students participated in two 55-minutes a week training program. CG: students did not receive intervention.	**Motivation in PE**	**The Spanish version of the “Échelle de Motivation en Éducation”** (Núñez et al., 2010)	School curriculum and teacher training	5 months	The experimental group improved all the variables analyzed compared to the control group (which did not improve any variable in the post-test). Thus, statistically significant differences were observed for experience
				Personal and Social Responsibility	**Personal and Social Responsibility Questionnaire** (Escartí et al., 2011)		
				Basic Psychological Needs	**The Spanish version for school context of the Basic Psychological Needs Scale in Exercise**		

					Scale (Moreno Murcia et al., 2008)	motivation, external regulation, amotivation, personal responsibility, and Self-Determination Index (SDI).

Note. CT: Controlled Trial; IG: Intervention Group; CG: Control Group.
*Indicates significant effects (pre to post) with a *p*-values < 0.05; **p-values < 0.01; ***p-values < 0.001

Figure 3. Risk of bias across all included studies.



Note. RSG= random sequence generation; AC= allocation concealment; BoP= blinding of participants/personnel; BoOA= blinding of outcome assessment; IOD= incomplete outcome data; SR= selective reporting; GSaB= group similarity at baseline; ToM= timing of measurement; RCT= randomized controlled trial; CT= controlled trial; + indicates low risk of bias. ? indicates unclear risk of bias; - indicates high risk of bias.

Figure 4. Forest plot showing the effects sizes (Hedges's *g*) of interventions TPSR for personal responsibility.

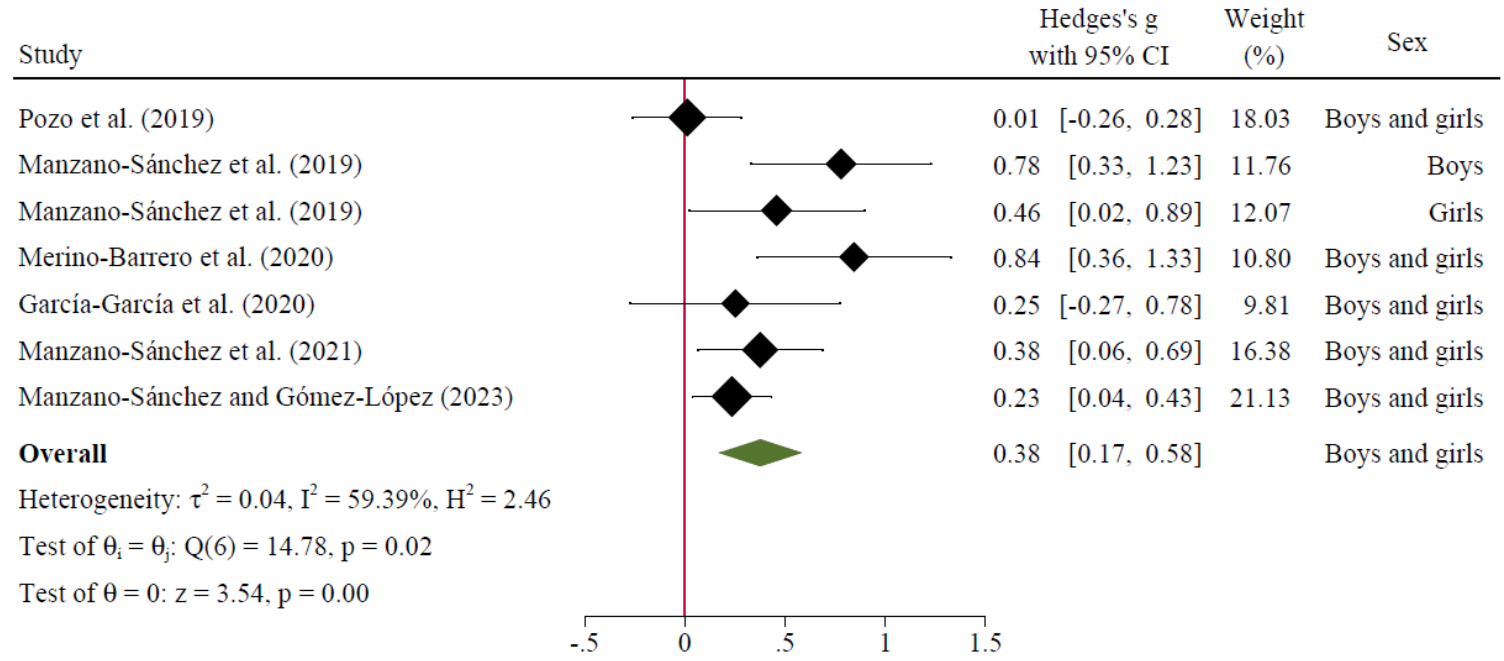
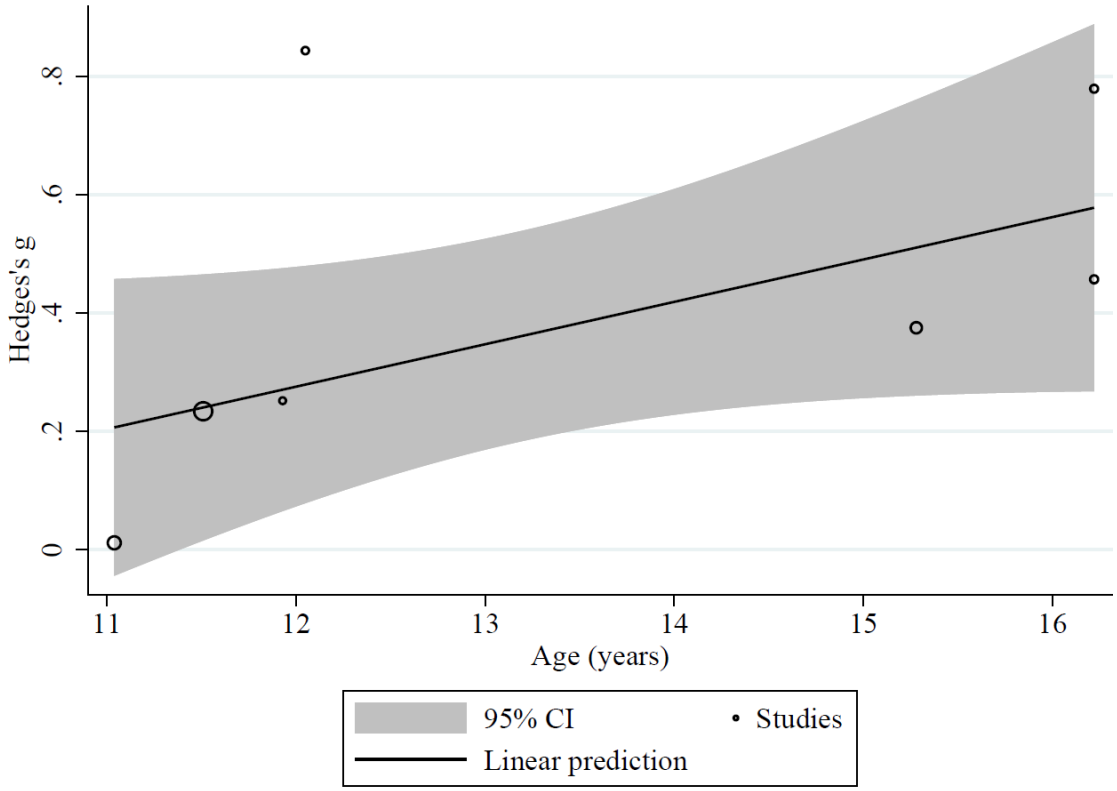
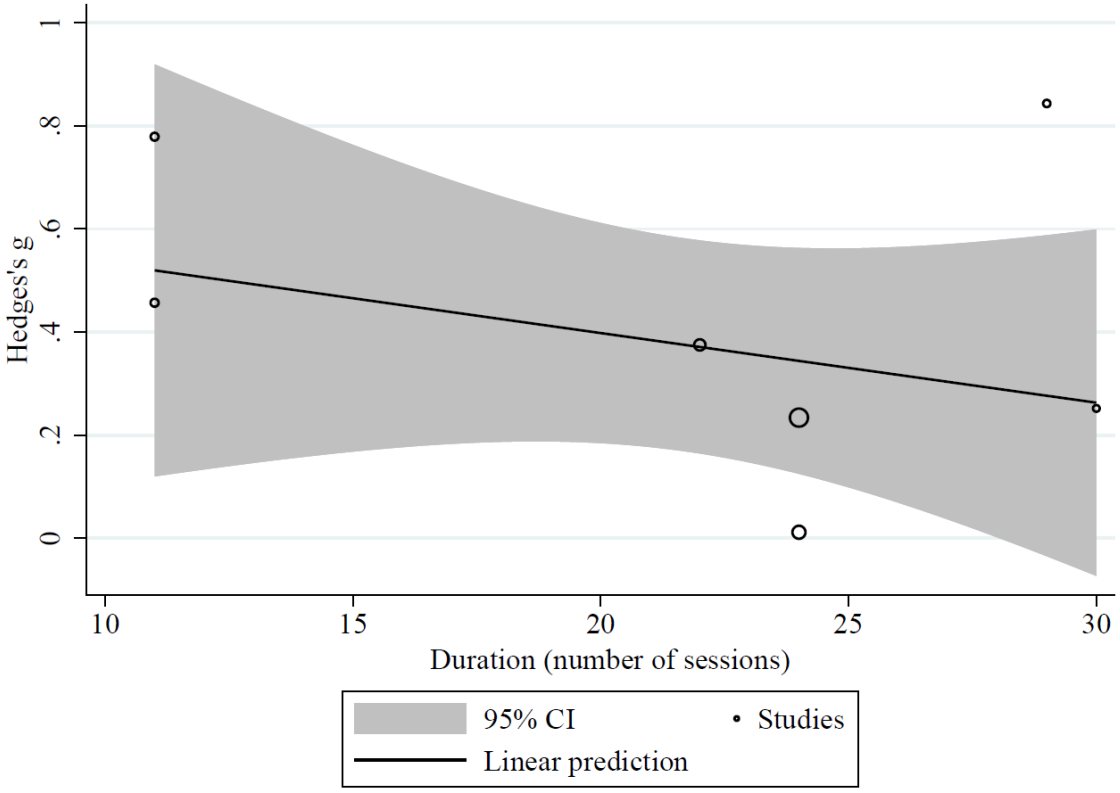


Figure 5. Association between the effect of TPSR interventions associated with students age for personal responsibility.



Note. 95% CI = 95% Confidence interval.

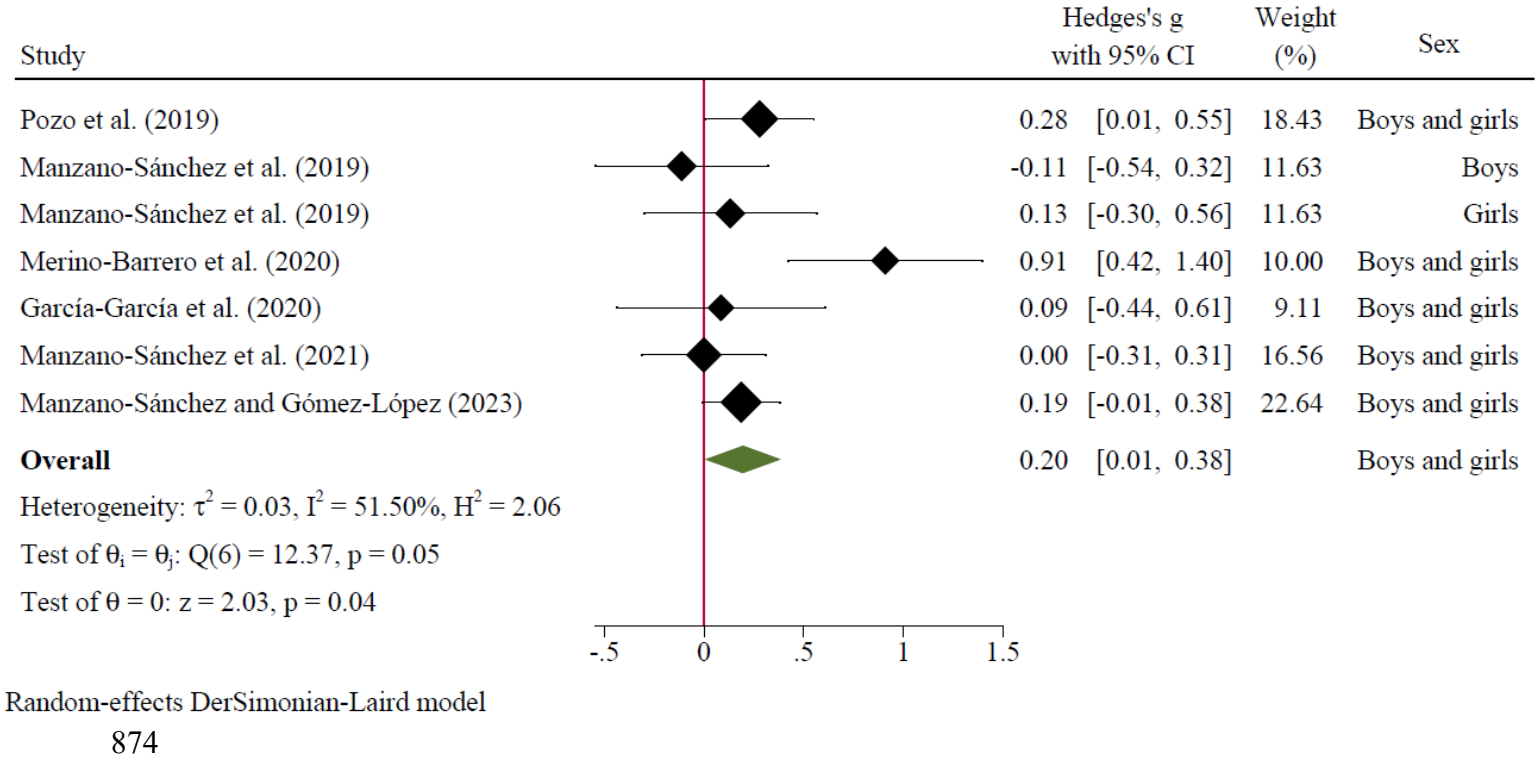
Figure 6. Association between the effect of TPSR interventions associated with duration of the intervention for personal responsibility.



Note. 95% CI = 95% Confidence interval.

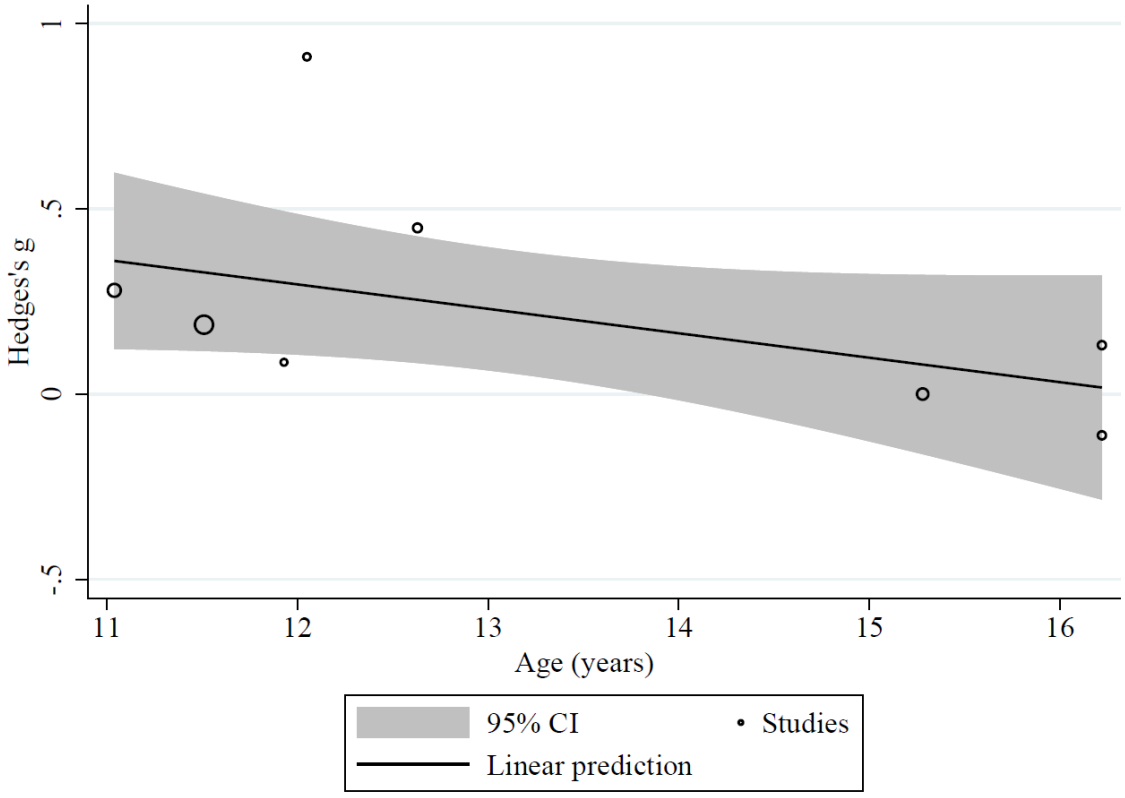
872 **Figure 7.** Forest plot showing the effects sizes (Hedges's *g*) of interventions TPSR for

873 social responsibility.



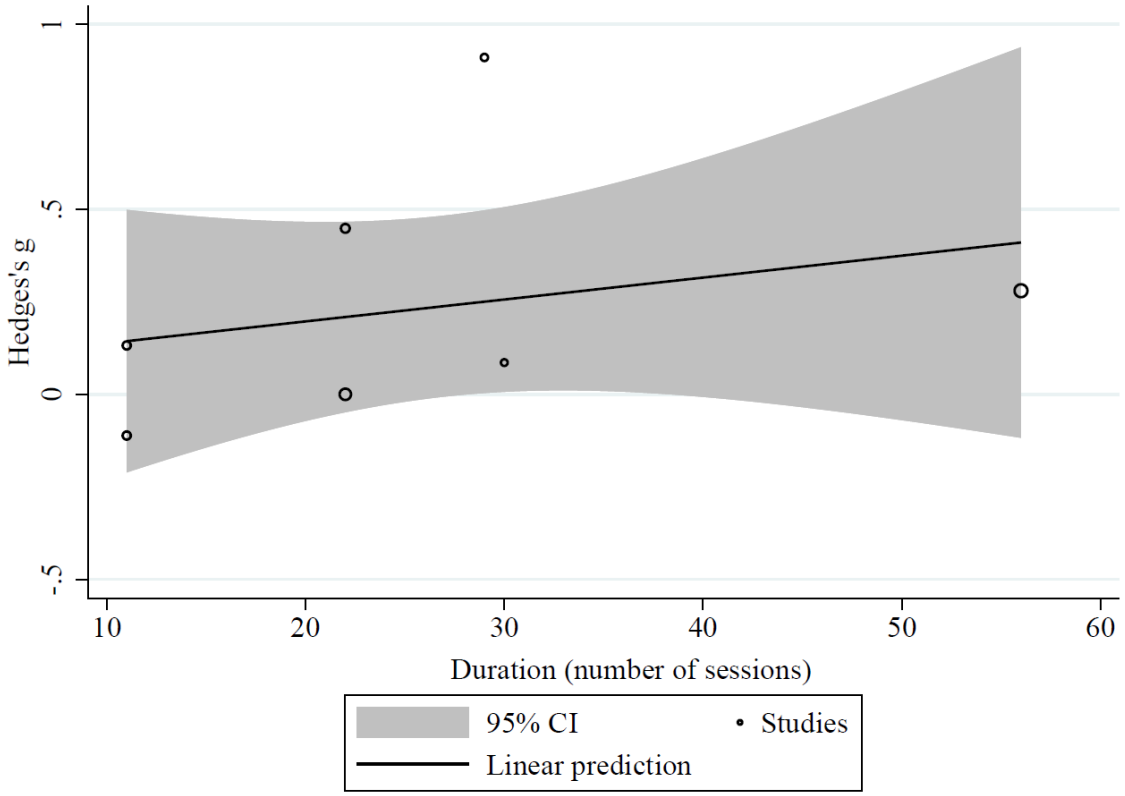
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Figure 8. Association between the effect of TPSR interventions associated with students age for social responsibility



Note. 95% CI = 95% Confidence interval.

Figure 9. Association between the effect of TPSR interventions associated with duration of the intervention for social responsibility.



Note. 95% CI = 95% Confidence interval.