

–0’0; Self-Determination Theory Applied to Physical Education: A Systematic Review and Meta-Analysis

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Abstract

In this review we examined the evidence regarding self-determination theory within the school physical education context. We applied a multilevel structural equation modelling approach to meta-analyze data from a systematic review that identified 265 relevant studies. In line with theory, autonomous motivation was positively correlated with adaptive outcomes, and negatively correlated with maladaptive outcomes. Introjected regulation was modestly correlated with both adaptive and maladaptive outcomes. External regulation and amotivation both showed negative relationships with adaptive outcomes, and positive relationship with maladaptive outcomes. Also supporting SDT, autonomy, competence, and relatedness satisfactions were strongly correlated with autonomous student motivation, and less strongly, but still positively, correlated with introjected regulation. Weak negative correlations were found between autonomy, competence, and relatedness and external regulation. Amotivation had moderate negative correlations with needs satisfaction. Findings further revealed that teachers more greatly impact classroom experiences of autonomy and competence, whereas relatedness in physical education is associated with both peer and teacher influences.

Keywords: classroom learning, physical education, motivation, meta-analysis, autonomy.

Educational Impact and Implications Statement

We found that the different types of motivation identified in SDT differentially predict student outcomes in predicted ways, and that these motivations are systematically associated with instructor supports for students' basic psychological needs. Although teachers can support all three students' psychological needs, teachers appear to have greater influence on students' autonomy and competence, whereas peers seem to have more impact on students' relatedness. These results have implications for the design of teacher and peer focused interventions.

Self-Determination Theory Applied to Physical Education: A Systematic Review and Meta-Analysis

Introduction

A recent bibliometric study highlighted that motivation is the leading theme within the field of sport and exercise psychology across different contexts, such as sport, exercise, health psychology, and school physical education (Lindahl, Stenling, Lindwall, & Colliander, 2015). Understanding the processes concerning motivation is crucial to engaging students in activities from which they can benefit physiologically and psychologically. Self-determination theory (SDT; Deci & Ryan, 1985) is one theory that attempts to explain the processes of motivation. Although SDT has emerged as one of the most popular theories of motivation employed in physical education research (Lindahl et al., 2015), no systematic review of SDT-based research has been undertaken in this context. In this study, we systematically reviewed and meta-analyzed evidence from SDT-based research applied to the context of school physical education.

Most children and adolescents globally are insufficiently physically active, placing them at increased risk of ill-health and ill-being (Boddy, Fairclough, Atkinson, & Stratton, 2012; Cohen et al., 2011; Ekelund, Luan, Sherar, & et al., 2012; Spittaels et al., 2012). Physical education presents an opportunity to not only help students be active during the school day, but also acquire the knowledge, skills, and motivation to be active outside school hours and in later life (Cohen, Morgan, Plotnikoff, Callister, & Lubans, 2015; Gu & Solmon, 2015; Jaakkola & Washington, 2013; Lonsdale et al., 2017; Shen, 2014). Indeed, many government curricula highlight outcomes such as positive attitudes and motivation towards physical activity as important goals of physical education (e.g., Australian Curriculum, Assessment and Reporting Authority, 2016). Nonetheless, many students do not have positive experiences in physical education (Moreno-Murcia, Coll, & Pérez, 2009; Taylor & Ntoumanis, 2007), with many showing poor quality motivation towards physical activity and low physical self-concept.

Self-determination theory is potentially a viable framework from which to understand student experiences in physical education and develop interventions that could enhance student learning and motivation towards physical activity. This review focuses specifically on SDT in physical education, rather than other educational contexts, because the strategies and contexts of physical education differ from many academic subject matter. For example, in many physical education lessons displays (and by extension, evaluations) of competence are typically public, whereas in academic lessons one's performance can be relatively more covert. Additionally, many of the learning goals of physical education are qualitatively different from academic lessons, with healthy behaviors (e.g., physical activity outside school) a common focus of empirical investigations.

In limiting our review to the physical education context and excluding research conducted on motivational processes and outcomes in other subjects, we also sought to examine an illustrative model of the motivational sequence outlined in SDT (i.e., need support → need satisfaction → motivation → outcomes). By understanding the potential effect needs support may have on students' outcomes, this review will be able to help delineate what might optimally be a focus in physical education interventions and training.

Theoretical Background

Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2017) describes the process through which motivation develops and how it influences human behavior and wellbeing. Embedded within SDT, the basic psychological needs mini-theory states that for high quality motivation to develop and for individuals to achieve optimal functioning, three fundamental needs must

be fulfilled – the need for autonomy, the need for competence, and the need for relatedness (Garn, McCaughtry, Martin, Shen, & Fahlman, 2012; Standage, Duda, & Ntoumanis, 2005; Taylor & Lonsdale, 2010; van Aart, Hartman, Elferink-Gemser, Mombarg, & Visscher, 2015). Autonomy can be defined as one's need to experience a sense of willingness in one's actions. Competence refers to one's need to experience effectiveness in one's interactions with the world, while relatedness refers to a need for connectedness with significant others, satisfaction with the social world, and a feeling of being accepted (Ryan & Deci, 2017). If these needs are met, people are more likely to be well, and to be autonomously motivated. In contrast, when these needs are not met (or only partially fulfilled), individuals tend to regulate their behavior based on controlled reasons (McDavid, Cox, & McDonough, 2014; Mouratidis, Barkoukis, & Tsorbatzoudis, 2015; Ntoumanis, 2001; Standage et al., 2005).

SDT also postulates different types of motivation (Ryan & Deci, 2000a). Organismic integration theory is a sub-theory within SDT that describes these different types of motivation, known as behavioral regulations. SDT goes beyond a binary conceptualization of intrinsic and extrinsic motivation as it outlines four different types of motivation under the broad category of extrinsic motivation. Figure 1 depicts six types of regulation on what it is known as a self-determination continuum, ranging from amotivation (i.e., lack of motivation) to the most autonomous forms of motivation (e.g., intrinsic motivation, identification) (Ntoumanis, 2001; Standage et al., 2005). The four different types of extrinsic motivation vary in their individual characteristics, as well as in the amount of autonomy they represent (e.g., Litalien et al., 2017). The least autonomous form of extrinsic motivation is external regulation (doing an activity for contingent rewards or punishments controlled by others), followed by introjected regulation (acting to avoid sense of guilt or anxiety or to protect contingent self-worth). On the more autonomous side are identified regulation (when the task is aligned with personal values), and integrated regulation (when activity is fully assimilated with individual's sense of self). Indeed, although these different types of motivation form a continuum, they have also been categorized in some analyses as autonomous motivations (intrinsic motivation, integrated, and identified regulation; e.g., Cheon, Reeve, & Moon, 2012; Haerens, Aelterman, Vansteenkiste, Soenens, & Van Petegem, 2015; Hagger et al., 2009; Shen, McCaughtry, Martin, & Fahlman, 2009; Yoo, 2015) and controlled motivations (introjected and external regulation; e.g., Aelterman et al., 2012; De Meyer et al., 2016; Gairns, Whipp, & Jackson, 2015; Karagiannidis, Barkoukis, Gourgoulis, Kosta, & Antoniou, 2015; Lodewyk & Pybus, 2013; Mouratidis et al., 2015; van Aart et al., 2015).

Insert Figure 1 here

Internalization is often considered one of the most challenging aims in teaching, because not all tasks or activities are intrinsically motivating (Deci et al., 1991), and yet may be important to students. Helping students develop more internalized value and autonomous motivation for such activities is thus an aim of instruction. SDT hypothesizes that support for basic psychological needs enhances internalization. In the field of physical education, social agents (e.g., teacher and peers) vary in terms of how much they support or thwart students' basic psychological need satisfaction. SDT predicts that this directly influences students' need satisfaction and frustration, which in turn, predicts how autonomous or controlled students become in classrooms (Koka, 2013, 2014; Tessier, Sarrazin, & Ntoumanis, 2010; Van den Berghe, Cardon, Tallir, Kirk, & Haerens, 2016). Finally, more autonomous forms of student motivation are associated with more desirable cognitive, behavioral, and affective outcomes for students (Ntoumanis, 2001; Ntoumanis, Taylor, & Standage, 2010; Standage et al., 2005). This sequence is illustrated in Figure 2 – adapted from Vallerand (1997), in which support from social agents is depicted as a direct predictor of students' perception of need satisfaction, and an indirect predictor of motivation and adaptive experiences and/or learning outcomes.

A needs supportive environment encompasses support for autonomy, competence, and relatedness. In the education context, supporting students' autonomy means nurturing their inner motivational resources by respecting their attitudes and suggestions (e.g., adopting the students' perspective to do an activity), providing rationales to attribute meaningfulness to learning (e.g., explaining why a task is important and where/when it could be used), relying on non-controlling language, providing opportunities for choice, displaying patience to allow students the time they need for self-paced learning to occur, and acknowledging and accepting expressions of negative affect (Reeve, 2009). For example, an experimental study of 1,158 physical education students by Cheon et al. (2012) found that students' autonomous motivation, amotivation, classroom engagement, skill

development, future intentions to exercise, and academic achievement improved for students whose teachers were more supportive of their autonomy.

Competence support refers to the way the teacher organizes and delivers the activities. Competence support is seen in SDT as supported by structure. When teachers provide clear expectations of the students (e.g., sticking to the rules they have set in the class), demonstrate consistent contingencies for behavior (e.g., not acting differently regardless of students' performance on a task), offer efficacy-relevant feedback and help (e.g., showing different ways for the students to solve a problem), and monitor during the lesson (e.g., checking if students are ready before he/she goes on) (Belmont, Skinner, Wellborn, & Connell, 1992). Within the physical education context, for example, an empirical study by Sanchez-Oliva, Sanchez-Miguel, Leo, Kinnafick, and García-Calvo (2014), with 1,692 Spanish students, found that competence support from the teacher predicted students' autonomous motivation, which in turn positively predicted students' enjoyment, perceived importance of physical education, and intentions to further participate in out of school physical activity.

Relatedness support (i.e., involvement) includes teachers taking time to express enjoyment in their interactions with students, showing affection (e.g., demonstrating that he/she cares about the students), displaying attunement (e.g., teacher showing that he/she knows the students well), being dependable (e.g., being there for the students when needed), and dedicating resources (e.g., spending time and talking with the students). For example, an experimental study by Sparks, Lonsdale, Dimmock, and Jackson (2017) found teacher relatedness support predicted students' enjoyment, confidence in their teacher's ability, and their estimation of their peers' confidence in their ability.

Teachers may also engage in controlling behavior, where they determine what students should do during the lesson without considering students' perspectives or input, rely on pressure-inducing language, and pressure students to think, feel, and behave in a specific ways (Reeve, 2009). In the school physical education context, research has found that perceptions of controlling teaching predicted undesirable outcomes, such as poor quality student motivation, fear of failure, and less engagement (Bartholomew et al., 2018; De Meyer et al., 2016; De Meyer et al., 2014; Haerens et al., 2015; Van den Berghe et al., 2016).

Insert Figure 2 here

Previous Reviews

Researchers have reviewed some of the evidence involving SDT constructs and related consequences in the context of school physical education (e.g., Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003; Chen, Chen, & Zhu, 2012; Ntoumanis & Standage, 2009; Van den Berghe, Vansteenkiste, Cardon, Kirk, & Haerens, 2014). However, none of these reviews have applied a meta-analytic approach to examine tenets of the SDT-based motivational sequence model in physical education (Ryan & Deci, 2017; Vallerand, 1997). For example, Ntoumanis and Standage's (2009) review was narrative, rather than systematic, and Van den Berghe et al.'s (2014) systematic review did not include a meta-analysis. Other reviews included meta-analyses, but focused on a relatively narrow aspect of the model. For example, Chatzisarantis et al. (2003) examined the associations among perceived competence, self-determined motivation, and intentions towards physical activity in the exercise, sport, and physical education settings, while Chen et al. (2012) reviewed the association between motivation and competence-based outcomes. Our review includes a systematic approach designed to include all relevant literature and:

1. use meta-analysis to quantify the mean associations proposed in the motivational sequence model,
2. explore moderating factors associated with heterogeneity in effect sizes among existing studies,
3. test the motivational sequence model using path analysis, and
4. identify promising avenues for intervention to improve students' experiences in physical education.

Purpose and Hypotheses

The overarching purpose of this review was to examine the evidence regarding the tenets of SDT within the physical education context. To achieve this aim, we first explored the strength of each of the associations proposed in the SDT-based model summarized in Figure 2 – these meta-analytic findings are the critical components of this study. Then, we examined potential demographic moderators of these associations (i.e., age, sex, country, culture – to test the SDT tenet that such

associations are expected to be universal). SDT claims that the need for autonomy is a universal need. As such it should be related to positive functioning in all countries. However, culture may play a moderating role in the way in which basic needs are met (or not met) and the types of mechanisms by which they effect well-being. For example, Hofstede's (2001) classification of individualism and collectivism highlights that individual needs and goals are valued more in individualistic-oriented cultures, than it is in collectivistic-oriented societies. The differential influence of the relationship between social context and autonomy perceptions has yet not been tested in any synthesis of the SDT-physical education-based literature. Next, we conducted moderation analyses to examine the influence that methodological study characteristics (i.e., risk of bias) had on the effect sizes. We then examined an illustrative model outlined in Figure 2 – which represents the SDT motivational sequence and provides the best overview complexity of the theory. In this model, teacher support is hypothesized to predict students' motivation and functioning (i.e., needs satisfaction, motivation, and outcomes).

Methods

Reporting in this review aligns with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2009).

Eligibility Criteria

Our review is limited to studies meeting the following criteria: (a) written in English and published in peer-reviewed journals before January 2017; (b) included a sample of children or adolescents; (c) conducted in the physical education lesson context; (d) included quantitative assessment and statistical analysis of the relationship between at least two of the following constructs outlined in SDT: needs support (e.g., teacher support, peer support); needs satisfaction (e.g., autonomy, competence, relatedness); motivation (at least one form of motivation outlined in SDT); or cognitive, affective, or behavioral outcome related to physical education (e.g., experiences during physical education lessons or physical education learning outcomes). Qualitative studies that were identified in the search were kept aside for a separate review that is not reported here.

Information Sources

Studies were identified through four electronic databases PsychINFO, PubMed, Scopus, and SPORTDiscus. Potential studies were searched by using different combinations of two groups of keywords.

Search

In January 2017, we conducted systematic searches of titles and abstracts to identify studies that related to at least one of the following three topics:

- a) Social environment in physical education ("need* support" or "autonomy support" or "competence support" or "relatedness support" or "structure" or "involvement" or "control* teach*" or "motivational climate" or "motivational atmosphere" or "need* frustrat*" or "need* thwart*" or "hostil*" or "chaos" or "impersonal") AND "physical education";
- b) Needs satisfaction in physical education ("need* satisf*" or "need* fulfil*" or "autonomy" or "competence" or "relatedness" or "belonging*") AND "physical education";
- c) Motivation in physical education ("self-determin*" or "intrinsic motivation" or "intrinsic interest" or "extrinsic motivation" or "autonomous motivation" or "controlled motivation" or "amotivation" or "perceived locus of causality") AND "physical education".

Study Selection

The screening process began after the deletion of duplicate studies identified in the initial search. The titles and abstracts were independently screened for eligibility by three researchers, DV, RC and TH, with two researchers screening each record. Three researchers, DV, KO and TH, carried out the full-text review of the potentially eligible studies. Once again, two researchers independently reviewed each article. We included a fourth researcher (CL) to discuss any discrepancies regarding inclusion until consensus was reached (see Figure 3).

Data Collection Process

The first author extracted all the data, which were independently checked by four researchers (TH and GA each completed 70% of the checking process, and JL and DA verified the remaining 30%). Discrepancies between the data extraction table and the original article were discussed and then resolved by further review by the first author. Extracted data included descriptive study information (e.g., publication year, study design, sample size, school stage, age range, mean and standard deviation, and

country of publication), measures of need support, measures of need satisfaction, measures of behavioral regulations, and measures of physical education outcomes, and the results of statistical analysis that examined the relations between two variables (as illustrated in Figure 2).

For our meta-analyses, we followed Cheung's (2014) recommendation and extracted relationships among scores derived from measures at baseline. This strategy allowed us to extract results from different study designs, including cross-sectional, longitudinal, and experimental and then combine them in the meta-analyses (see for example, Owen et al., 2016; Tod & Edwards, 2015; White et al., 2017). We also extracted coefficients from experimental studies so that we could compare these relationships with coefficients derived from cross-sectional studies.

Risk of Bias

Risk of bias was assessed using a tool that was based on items from two checklists: the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; Von Elm et al., 2014) guide and the CONSolidated Standards of Reporting Trials (CONSORT) statement. Items included: a) description of eligibility criteria and/or sufficient description of the sample such that the population from which it was drawn can be determined; b) sampling procedures adequately described and appropriate (i.e., likely to generate a representative sample of the population described in criterion a); c) proportion (0 to 1) of variables that were measured using assessment tools with supportive reliability and validity evidence reported in the article); d) power calculation reported and study adequately powered to detect hypothesized relationships; and e) analyses adjusted for covariates. Kappa statistic (K) was employed to test interrater reliability of percentage agreement (Cohen, 1968). Discrepancies were discussed until 100% consensus was reached. Studies were then classified with either low risk of bias ($>50\%$) or high risk of bias ($<50\%$).

Summary Measures and Synthesis of Results

Commonly used summary measures in the retrieved studies included the correlation coefficient (r), standardized regression analysis coefficient (β), and standardized mean difference (Cohen's d). All results were first converted into a correlation effect size (r). Rosenthal's (1994) formula was used to convert Cohen's d to r , while Peterson and Brown's (2005) formula allowed conversion from β to r . Although the combination of beta coefficients with different metrics (e.g., correlations) may be a limitation – as the number of covariates accounted for in multivariate analysis generally vary across studies – a beta coefficient can still be converted to r if it ranges from $-.50$ to $.50$ (Hunter & Schmidt, 2004; Peterson & Brown, 2005; Bowman, 2012). We requested from the authors the correlations where they were not reported in the original paper. We were successful in many cases, and only worked with beta coefficients when we did not receive a response from the authors. Less than 0.4% effect sizes fell outside the required range ($-.50$ to $.50$) and these correlations were, therefore, excluded from the main analyses. We conducted sensitivity analyses to test whether the inclusion of these extreme effect sizes (by rounding extreme values up to $-.50$ or down to $.50$) would affect the results, and no important differences were found (contact the corresponding author for details). We then corrected the effect sizes for attenuation (Charles, 2005) by using reported internal consistency for each measure (e.g., Cronbach's alpha). If not reported, $.70$ was used as an estimate of reliability measure. Next, given that the variance depends strongly on the correlation (Borenstein, 2009), we z -transformed the adjusted effect sizes for analysis and reversed them back into r for presentation. We defined effect sizes as > 0.1 (weak), > 0.3 (moderate), and > 0.5 (strong) (Cohen, 1988).

Statistical Analysis

Meta-analysis. We conducted main analyses and moderator analyses using a multilevel structural equation modelling (SEM) approach (Cheung, 2014; Viswesvaran & Ones, 1995). The multilevel SEM approach handles assumption of dependence among the effect sizes in cases where multiple effect sizes are reported within a single study. In this review, the number of effect sizes within each paper ranged from 1 to 273. Using the meta3 function of the MetaSEM package (Cheung, 2015) in R version 3.3.2 (R Core Team, 2016), we employed three-level (effect size, within-study individual differences, and between-study individual differences) random-effects models to meta-analyze correlations in this study (Table 1). This technique allowed us to explore heterogeneity at the within-study level (Level 2) and between-study level (Level 3). We calculated heterogeneity in the effect sizes using the Q statistic, which represents the weighted sum of squared deviations. We also considered the I^2 statistic, which shows the proportion of the observed variance that reflects true difference in the effect sizes (Borenstein, 2009), to explore the proportion of variability in effect sizes due to true heterogeneity.

For each effect size, we calculated 95% likelihood-based confidence intervals (CIs) (Cheung, 2014). Based on Higgins' et al (2003) recommendations, when I^2 values were above .25, we considered effect sizes to be moderately (between .25 and .50) or highly (above .75) heterogeneous, and we investigated potential moderators that could influence these associations. We carried out moderation analysis on meta-analyzed correlations when there were at least two effect sizes in each subgroup (Borenstein & Higgins, 2013). We calculated the proportion of variance (R^2) in effect sizes that could be attributed to the inclusion of the moderator variable, as well the heterogeneity in effect sizes in each group (I^2). Potential moderators included demographic variables, such as age (children, mean age <10; preadolescents 10.1 < to 14; adolescents, mean age >14), country (due to the large number of different countries we decided to moderate by only the most popular countries, UK and USA), culture (individualistic or collectivistic; Hofstede, 2001) and sex, as well as methodological variables, such as risk of bias within studies (see Table 3).

Path Analysis. After completing the meta-analyses to determine the strength of relations between variables, we tested an illustrative structural model representing the motivational sequence outlined in SDT (i.e., Figure 2, need support → need satisfaction → motivation → outcomes). We created a correlation matrix using meta-analyzed correlations from the 3-level models described above. We used this correlation matrix input to fit the path model. As noted previously, these meta-analyzed correlations were based on data from cross-sectional studies or from the baseline correlations in longitudinal or experimental studies. We were not able to test the full hypothesized path model using longitudinal or experimental data due to the lack of matrix coverage in the data used to run the path analysis. For the data we extracted, five of the 66 correlations did not have data from longitudinal or experimental studies and a further four associations only had data from one longitudinal study.

For the path model, we estimated total, direct, and indirect effects via a structural equation modelling approach using the Lavaan package (Rosseel, 2012) in R (Cheung, 2014), with standard errors given via the delta method (Dowd, Greene, & Norton, 2014). Following Viswesvaran and Ones (1995) recommendation for calculating uncertainty estimates, we used the harmonic mean of the sample sizes across the different cells in the meta-analyzed correlation matrix.

The illustrative model's exogenous variables were the different types of support the physical education teacher can provide. In order to meaningfully compare autonomy support with other aspects of needs support, we only examined those studies that included all three types of needs support, plus studies in which the autonomy support measure was specifically designed to measure autonomy support only and not competence or relatedness.

Because very few studies have looked at peer support, we decided not to include this construct in the model, even though it may be a source of support in physical education that is distinct from teacher influences (González-Cutre, Ferriz, et al., 2014; González-Cutre, Sicilia, Beas-Jiménez, & Hagger, 2014; Koka, 2014). Next in the model, we analyzed the needs for autonomy, competence, and relatedness separately. Then, we combined intrinsic motivation, integrated and identified regulation into *autonomous motivation* for three reasons: (a) in order to have a parsimonious model that could be feasibly estimated; (b) 32 studies (12.1%) included in our review combined the autonomous motivation constructs - we would not have been able to include these studies' data in our hypothesized model if we did not combine these motives across all studies, because these studies did not provide information that enabled us to test each regulation separately; and (c) due to the strong associations found among these motives (intrinsic motivation and integrated regulation $r = .88$, intrinsic motivation and identified regulation $r = .88$, integrated regulation and identified regulation $r = .84$; see Table 1). This decision was also supported by the findings from Howard, Gagné, and Bureau's (2017) meta-analysis, in which autonomous motivation constructs were more strongly inter-correlated than controlled motives. We treated introjected regulation, external regulation and amotivation as distinct constructs for analysis because their associations were not as strong ($r = .530$ to $r = .576$) as the associations among intrinsic motivation, integrated regulation and identified regulation. We examined the type of outcome as adaptive and maladaptive rather than affective, behavioral, and cognitive. The reason for this was that the associations involving this latter group of constructs were relatively similar. Due to the large number of different adaptive and maladaptive outcomes found in this study and the complexity of the model tested in this meta-analysis, it was not feasible to present results associated with each outcome. Instead, we present meta-analyzed correlations for the nine most frequently examined outcome variables (three affective, three cognitive and three behavioral). For greater detail on the meta-analyses involving each

of the outcomes, please see the full dataset in supplemental material. We focused our analysis of indirect effects on the influence teachers could have on other variables. We made this decision because this social agent represents a construct that could most directly be influenced in an intervention, as opposed to needs satisfaction and motivation which would be influenced indirectly.

Results

Study Selection

After duplicates were removed, 9,555 records remained for screening, of which 605 were retained for full-text review. Of these, 265 articles met the criteria to be included in the review (see Appendix). We tried to contact the authors of the 13 articles that did not provide sufficient information to be included in the meta-analyses, but received no response (see Figure 3).

Study Characteristics

A table with all the data extracted from each study is available through Open Science Framework (<https://tinyurl.com/y8vehmsr>). Most studies employed a cross-sectional design ($k = 159$), followed by experimental ($k = 62$) and longitudinal ($k = 44$) designs. Of these studies, 64.8% provided data from samples in Europe, 22.8% from North America, 8.2% from Asia, and 3.7% from Australia and Oceania. No studies from South America or Africa were identified. In total, data from 133,958 students aged 13.92 years ($SD = 1.64$ years) were included (see supplementary material for detailed study characteristics), yielding 6,570 effect sizes.

Risk of Bias Within Studies

Regarding risk of bias within individual studies, the kappa coefficient ($K = 0.81$) indicated strong initial agreement between the two raters (Cohen, 1968; McHugh, 2012). Nearly all studies (96.25%) exhibited low risk of bias. See supplementary material for details.

Synthesis of Results

Most research within physical education has involved older children and adolescents, with less attention paid to young children. As can be seen in Table 1, behavioral and affective outcomes of student participation in physical education have been studied extensively; cognitive outcomes have been examined less frequently.

Most of the evidence regarding social context and SDT constructs examined teachers' provision of autonomy support. There were almost three times more effect sizes relating to teacher autonomy support, than competence support, relatedness support or controlling behavior. Relatively few studies have looked at the association between peer support and constructs outlined in SDT (see Table 1).

In terms of the associations involving need satisfaction and motivation variables, competence has received substantially more empirical attention than autonomy or relatedness. Finally, the evidence involving the different forms of behavior regulations and outcomes in physical education shows that intrinsic motivation has been studied most extensively, followed by amotivation, external regulation, identified regulation and introjected regulation. The most autonomous form of extrinsic motivation, integrated regulation, has rarely been studied in this context (see Table 1).

Insert Figure 3 here

Meta-analyses. Table 1 shows the 319 meta-analytic correlations that emerged from the dataset, of which 57 were strong, 127 were moderate, 124 were weak, and 11 correlations were very weak ($< .1$). Associations involving teachers' need support were mostly in the expected direction. The meta-analyzed correlations between needs support factors were strong – all above .75. It is important to note that 'autonomy support' has often been conceptualized and measured as an omnibus term for 'needs support' (which could include competence and relatedness items). As a result, comparisons between 'teacher autonomy support' and other aspects of needs support can be difficult to make. Teacher's relative need support (i.e., a combination of autonomy, competence and relatedness support, and controlling behavior) had a strong positive association with autonomy, and a moderate positive association with relatedness, and competence. While the meta-analyzed correlation between teacher's relative need support and autonomous motivation was positive, teacher's relative need support correlated negatively with external regulation and amotivation.

Although the number of studies investigating peer support was small ($k = 5$), the associations involving peer support followed a largely similar pattern to the correlations involving teacher's relative need support. Peer support was negatively correlated with amotivation and maladaptive outcomes, and positively associated with all other variables. Notably, these positive meta-analyzed correlations included controlled forms of motivation – introjected regulation and external regulation.

The meta-analyzed correlations between social context factors and outcomes in physical education ranged from $-.35$ to $.39$. Both teacher's relative need support and peer support in physical education were positively associated with adaptive outcomes, and negatively associated with maladaptive outcomes.

Autonomy, competence, and relatedness were strongly correlated with autonomous motivation, and not so strongly, but still positively correlated with introjected regulation. Weak negative meta-analyzed correlations were found between autonomy, competence, and relatedness and external regulation. Amotivation had moderate negative correlations with needs satisfaction.

Autonomous motivation was positively correlated with adaptive outcomes, and negatively correlated with maladaptive outcomes. External regulation had a weak negative association with adaptive outcomes and a weak-to-moderate positive association with maladaptive outcomes. In contrast, amotivation had a moderate relationship with adaptive outcomes, and a strong positive relationship with maladaptive outcomes. Introjected regulation was positively correlated with both adaptive and maladaptive outcomes, a finding expectable given its place as a partial internalization, still entailing inner conflict.

Inter-factor meta-analyzed correlations among motivation constructs supported the presence of the ordering of self-regulatory motives proposed by SDT. We found strong meta-analyzed correlations between intrinsic motivation and integrated regulation, intrinsic motivation and identified regulations, and between integrated regulation and identified regulation. In contrast, relatively weaker meta-analyzed correlations among introjected regulation, external regulation, and amotivation indicated these constructs were more distant from one another on a continuum of motivation.

Insert Table 1 here

Table 2 compares the results of three-level meta-analyses using data from cross-sectional and experimental studies that examined the relationship between teacher behavior and SDT variables and student outcomes. The pattern of associations from cross-sectional and experimental studies were similar.

Insert Table 2 here

Moderator Analyses. Moderator analyses were conducted on the 66 associations in the path model (Figure 4) to investigate whether study characteristics influenced these effects. Significant moderator effects at both within-study (Level 2) and between-study (Level 3) levels are presented in Table 3. Results of all moderator analyses are available in the supplementary material. Significant moderation effects were found in seven of the 66 associations.

Sex. Sex accounted for a large portion of the within-study (Level 2) heterogeneity in studies that investigated the association between autonomy and competence ($R^2 = .57, p < .001$). Effect sizes were stronger in studies that reported combined results for boys and girls ($r = .67, 95\% \text{ CI } [.60, .73]$), than they were in studies reporting them separately for boys ($r = .28, 95\% \text{ CI } [-.03, .54]$) or girls ($r = .38, 95\% \text{ CI } [.26, .50]$). Sex also explained heterogeneity at the between-study level associations between introjected regulation and amotivation, and between introjected regulation and adaptive outcomes. Stronger effect sizes were found in studies that reported combined results for boys and girls than separate sexes between introjected regulation and amotivation. In contrast, effect sizes were found to be stronger for boys in the association between introjected regulation and adaptive outcomes than they were in studies that reported combined results for boys and girls, or girls only.

Age. In studies that investigated the association between introjected regulation and maladaptive outcomes, age explained 71% ($p = .035$) of the heterogeneity in effect sizes at the between-study level (Level 3). The effect sizes were stronger for preadolescents ($r = .28, 95\% \text{ CI } [.11, .43]$) than they were for adolescents ($r = .04, 95\% \text{ CI } [-.09, .16]$).

Culture. Culture accounted for significant and large portions of the heterogeneity in effect sizes at the between-study level (Level 3) in six associations (see Table 3). Effect sizes were stronger for individualistic cultures regarding the negative relationships between: (a) autonomy and external regulation, and (b) relatedness and external regulation. Compared with individualistic-oriented countries, we found stronger positive effect sizes in collectivistic-oriented countries for the associations between: (a) peer support and adaptive outcomes, (b) autonomy and competence, (c) introjected regulation and external regulation, and (d) introjected regulation and maladaptive outcomes. The analysis pertaining to introjected regulation and maladaptive outcomes revealed that introjected regulation was not associated with maladaptive outcomes for students from individualistic countries,

whereas there was a significant positive relationship between introjection and maladaptive outcomes ($r = .239$) in collectivistic countries.

Country. Country did not moderate any of the associations investigated.

Insert Table 3 here

Risk of Bias Across Studies

Egger's tests revealed non-significant results, which indicated low asymmetry and suggested low risk of publication bias across the studies. For example, studies that examined the association between perceived competence and external regulation had a non-significant Egger's test ($t = 0.8841$, $p = .381$; please contact authors for details on other test results).

Additional Analysis

Path Analysis. We used 66 of the meta-analyzed correlations from Table 1 to create an input matrix (Table 4) for path analyses. The illustrative model tested teacher's need support as predictors of students' outcomes in physical education, with students' needs satisfaction and motivation as mediators of this process. Given that moderators only influenced nine out of 66 possible associations, and these effects were not consistent across associations, we decided to test a single path model (i.e., we did not test separate models divided according to levels of the moderators).

Among the different types of support from the physical education teacher, autonomy support was found to be a stronger predictor of autonomy ($\beta = .50$), while competence and relatedness were strongly predicted by competence support ($\beta = .57$) and relatedness support ($\beta = .58$), respectively.

Direct paths from needs satisfaction to motivation variables were all significant ($p < .001$). Among the needs satisfaction constructs, competence was the strongest predictor of both autonomous motivation ($\beta = .23$) and amotivation ($\beta = -.34$). Autonomy was the strongest predictor of introjected regulation ($\beta = .39$) and relatedness was the strongest predictor of external regulation ($\beta = -.09$).

There was evidence of an indirect effect of competence support on adaptive outcomes (indirect effect, $\beta = .41$), but little evidence of an indirect effect on maladaptive outcomes (indirect effect, $\beta = -.15$). As seen in Table 5, the proportion of the total effect that was indirect (i.e., indirect effect/total effect) in these associations through the hypothesized mediators (needs satisfaction and motivation) was very low. The indirect proportion of overall effect for the association between competence support and adaptive outcomes was 54%. For competence support and maladaptive outcomes this proportion was 49%. On the other hand, there were substantial indirect effects between teacher relatedness support and adaptive outcomes ($\beta = .10$, 87% of total effect) and maladaptive outcomes ($\beta = -.16$, 44% of total effect).

Insert Table 4 here

Insert Figure 4 here

Insert Table 5 here

Discussion

Meta-Analyses and Path Analysis

Discussion of main findings. This review presents a meta-analytic synthesis of the evidence regarding the application of SDT in physical education. Overall, the patterns of correlations align with theoretical postulates (Deci & Ryan, 1985; Ryan & Deci, 2017; Vallerand, 1997). SDT proposes that social environments can affect students' perceptions of psychological needs satisfaction. The evidence supported this postulate, yet also revealed that teachers and peers likely have differential impact on these needs. Indeed, meta-analyzed correlations indicated that, compared with peers, perceived teacher support appears more beneficial for autonomy and competence, while perceived peer and teacher support were similarly associated with relatedness. The very uneven number of studies involving teachers and peers (see Table 4) could partially explain this finding. Another possibility would be that the teacher is in control, so it is not surprising that autonomy for physical education activities is primarily influenced by teachers. Also, feedback comes from the teachers mainly, not peers, hence the effect from teachers on competence (e.g., Cheon & Reeve, 2013; Koka, 2014; Zhang, Solmon, Kosma, Carson, & Gu, 2011). Compared with autonomy and competence, relatedness is perhaps most influenced by peers because they interact with their peers throughout the day, not just during classroom time.

The findings in this study largely supported the existence of a continuum of self-regulation motives in physical education. Students appear, however, to have some difficulty in differentiating between autonomous forms of motivation in physical education (i.e., intrinsic motivation, integrated

regulation, and identified regulation), as demonstrated by the strong inter-factor correlations. With regards to the different forms of motivation proposed by SDT, one has to consider, that intrinsic motivation and identified regulation can often not be empirically distinguished from each other. In addition, some adolescents may not differentiate intrinsic motivation (i.e., what they enjoy) and identified regulation (i.e., what they value) (Lonsdale, Sabiston, Taylor, & Ntoumanis, 2011). However, introjected regulation and external regulation, which are often combined into controlled motivation (Aelterman, Vansteenkiste, Soenens, & Haerens, 2016; De Meester et al., 2016; De Meyer et al., 2016; Gairns, Whipp, & Jackson, 2015), and amotivation, were all found to be distinct constructs. The simplex structure of different self-regulations has been tested in a recent meta-analysis by Howard et al. (2017), which showed results similar to ours across different domains, such as work, sport, exercise, education, and physical education. The proximity of autonomous forms of regulation, as well as the distance among introjected regulation, external regulation, and amotivation has also been confirmed in a meta-analysis in the health domain (Ng et al., 2012), and in other areas of education such mathematics (e.g., Brandenberger, Hagenauer, & Hascher, 2018; Lohbeck, 2018), science (e.g., Lavigne, Vallerand, & Miquelon, 2007; Salmi & Thuneberg, 2018), and physics (e.g., Byman, Lavonen, Juuti, & Meisalo, 2012).

Introjected regulation, a self-regulatory way of engaging in behaviors by feelings of internal pressure and obligation, correlated with other variables in ways predicted by the theory, in that its effects lay somewhere between the relatively positive effects of intrinsic motivation and identification, and the largely null or negative effects of external regulation and amotivation. Within SDT, introjection represents a “partial or incomplete” internalization that, on the positive side can foster behavioral compliance, as well as “certain forms of self-esteem, satisfaction, and feelings of pride about oneself” (Ryan & Deci, 2017, p. 185). Yet, because of its controlling elements it can also foster anxieties and self-criticism that negatively affect motivation, persistence and wellness. In this review, introjected regulation was associated with both adaptive and maladaptive outcomes in physical education. In particular, introjection was positively associated with need satisfaction, suggesting that this partial internalization is facilitated by support. Interesting too was that introjection was positively correlated with both teacher autonomy support and teacher control, suggesting that both elements may contribute to this type of motivation.

Positive and negative correlations have been found between introjected regulation and SDT constructs, as well as different types of outcomes. These variable patterns of relationships have been found in the exercise (Gillison, Osborn, Standage, & Skevington, 2009), education (Can, 2015), public health (Verloigne et al., 2011), work (Slemp, Kern, Patrick & Ryan, 2018) and sport (Pelletier, Fortier, Vallerand, & Brière, 2001) settings. Some research has found introjected regulation to be associated with both adaptive and maladaptive outcomes in other academic domains, such as mathematics (Brandenberger et al., 2018; Lohbeck, 2018) and science (Lavigne et al., 2007; Salmi & Thuneberg, 2018), for example. Introjected regulation can enhance behavioral outcomes, especially in the short term (e.g., promoting effort on a task). Yet, as a partial internalization, introjection may not sustain behavior over time. For instance, Pelletier et al. (2001) found positive correlations of introjection with sport persistence at baseline, but these effects disappeared over time, whereas the effects of autonomous motives on persistence remained positive over time. Because our review is based on cross-sectional data, it does not address the potential for such maladaptive long-term outcomes.

Moderator analysis revealed substantial heterogeneity in some of the associations investigated; some of this heterogeneity could be explained by study characteristics. Sex, for example, moderated three out of 66 associations in this study – autonomy and competence, introjected regulation and amotivation, and introjected regulation and adaptive outcomes. Unfortunately, there were a small number of studies in which data were analyzed separately for boys and girls (e.g., only 4 studies broke down by sex the relationship between autonomy and competence) precludes further exploration of this finding. Future physical education-based research should consider providing separate data on boys and girls, in order for sex differences to be investigated.

Age was found to be a moderator of the association between introjected regulation and maladaptive outcomes in one of 66 associations. Results suggested that introjected reasons, such as to avoid punishment from the teacher or to avoid a sense of guilt, lead to undesired outcomes in students aged 10-14, but not for older adolescents. Indeed, this correlation was seven times stronger for preadolescents ($r = .28$) than it was for adolescents ($r = .04$). These results suggest that preadolescents

and adolescents may not experience guilt/shame the same way. Research in the educational context examining academic motivation has shown a decrease in students' introjected regulation as a function of age (Gillet, Vallerand, & Lafrenière, 2012; Otis, Grouzet, & Pelletier, 2005). Ryan and Deci (2000b) pointed out that externally motivated behaviors (e.g., introjected regulated) are often performed in order to satisfy significant others (parents, teacher). Our finding could, therefore, support previous research indicating that preadolescents are more affected by significant other's influence (parents, teacher) than adolescents (Chan, Lonsdale, & Fung, 2012; Horn & Weiss, 1991; McKiddie & Maynard, 1997).

Lastly, the inclusion of Hofstede's classification of individualistic and collectivistic cultures provided insights to the SDT tenet of cross-cultural invariance. In individualistic cultures, individuals' needs are seen as more important than a group's needs. In the education context, it could therefore be argued that students from individualistic or collectivist countries could experience needs support from the teacher differently (Awang-Hashim, Thaliah, & Kaur, 2017). Yet in our review, culture was not found to moderate any relationship involving perceptions of teacher support. Thus, it appears that students from across cultures experience similar benefits from need supportive teaching. Also, filial piety feelings (e.g., endorsing parents' values) found in collectivistic-oriented countries could also explain why introjected regulation might be different for different cultures, as in collectivistic-oriented cultures individuals are likely to engage in behaviors because they think they should, and not because they want to (Hui, Sun, Chow, & Chu, 2011; Tam, 2016). In our review, the significant positive relationship found between introjected regulation and maladaptive outcomes indicated that introjected regulation likely has negative consequences for collectivistic students, but perhaps less so for individualistic cultures. Sources of these different effects warrant further study.

Overall Implications

With only a few exceptions discussed previously, the results of our meta-analysis align with the motivational processes proposed by SDT in the school physical education setting. Most of the effect sizes were moderate and in the expected direction. Autonomous motivation and amotivation are the types of motivation that have the strongest associations with students' outcomes in physical education. Autonomously motivated students are more likely to have more positive experiences in physical education, whereas amotivated students are more likely to report negative experiences. Teachers appeared to have greater influence on students' perceptions of autonomy and competence, whereas peers appear to have more impact on feelings of relatedness. Among the basic need satisfactions, competence satisfaction was most strongly associated with students' self-determined motivation, suggesting that a sense of efficacy in physical education is particularly associated with more willing participation. In sum, support from a physical education teacher appears to motivate students to experience adaptive outcomes through perceptions of autonomy and competence, while feelings of relatedness are more strongly associated with peer support.

In terms of applied implications, this review could guide educators in their selection of classroom strategies to employ in order to effectively motivate students and enhance student outcomes. We sought to identify what teacher and peer focused interventions should focus on in order to foster an environment where students' needs are supported. The effect of supportive teaching on autonomy and competence highlights that these two needs can be influenced by certain strategies adopted by the teacher. According to Reeve (2009), students will experience autonomy when they perceive an environment where they can perform tasks without feeling pressured, where the teacher welcomes students' thoughts, feelings and actions, rely on non-controlling language, and where exploratory rationale is given so the content is seen as meaningful to their lives (How, Whipp, Dimmock, & Jackson, 2013; Lonsdale et al., 2013; Perlman, 2011; Taylor & Ntoumanis, 2007). In addition, a number of strategies can be implemented in order to support student's need for competence, such as planning and organizing activities according to the students' physical skills level, making it clear what is expected, and praising and encouraging individual effort, instead of collective efforts (Almolda-Tomás et al., 2014; Taylor & Ntoumanis, 2007; Tessier et al., 2010).

We found good support for the process model suggested by Ryan and Deci (2000). The question is, thus, whether the variables at the beginning of this process model (i.e., teacher behaviors) are amenable to intervention. Su and Reeve's (2011) meta-analysis indicated that teachers' needs support increased following intervention ($d = .63$). To examine intervention effectiveness in studies from our review, we extracted 23 effect sizes from 16 intervention studies that attempted to modify teacher support. We found interventions to be effective at increasing teacher needs support ($d = .63$; p

< .001) This is a moderate to large effect size and suggests training interventions can enhance teacher behaviors.

Peers likely influence each other's sense of relatedness in physical education . Although the literature on how students can support each other's needs in physical education is limited – see Wallhead and Ntoumanis (2004) for an exception, there has been an increase in implementing peer-focused methods in other areas of education (e.g., Lee & Lim, 2012; Slavin, 1996; Thalluri, Flaherty, & Shepherd, 2014; Topping & Ehly, 2001, Nathan et al., 2017). Some of the strategies proposed by the different methods involve both same level and higher-level students tutoring (Thalluri et al., 2014; Topping & Bryce, 2004; Topping, Peter, Stephen, & Whale, 2004), one-to-one (i.e., mentoring) and group situations (e.g., Nixon & Topping, 2001), and cooperative learning (Slavin, 1990, 1996). Teachers can also influence peer relatedness by organizing activities in small groups, in order to make peer support more prominent. Indeed, simple strategies that are easy to be applied, such as modified and small-sided games are features of two pedagogical models – Teaching Games for Understanding (TGfU; Bunker & Thorpe, 1982; Leary, 2014), and Sport Education (Siedentop, 1998) – that have been shown to have positive impact on students' motivation. The main idea behind such strategies is the promotion of a supportive learning environment through social interactions among students. Perhaps having peer support as a formalized intervention component would also lead to the satisfaction of other students' needs in physical education, other than relatedness alone, in part by directing peer interactions toward activities consistent with physical education goals.

Strengths and Limitations

The key strength of this review is that it is first to meta-analyze the large body of SDT research within the physical education context. Apart from examining the strength and direction of the associations proposed by the theory in physical education, we used path analysis to test a full model of the motivational sequence (see Figure 2). The number of studies included, the number of effect sizes analyzed, and the total sample size are strengths of this review. This study, however, also presents the following limitations: The review is limited to peer-reviewed studies written in English, which could omit some important contributions published in other languages. Most of the studies in this review employed self-report measures, which can be a limitation due to such instruments measuring self-attributions and not objective needs or motivation. Recent advancements have been made in this area by measuring implicit motives (Lang, 2014; McClelland, Koestner, & Weinberger, 1989; Sheldon & Schuler, 2011) that are less subject to perceptions of social desirability (Boyle, 2015; Edwards, 1957; Miller et al., 2015). Also, we did not complete moderator analysis for all 319 relationships presented in Table 1. Instead, we investigated potential moderators on the 66 associations included in the path model we tested. Finally, we did not have matrix coverage to test our path model using longitudinal or experimental data.

Future Directions

This systematic review raises a number of opportunities for future research. Although there are many elements involved in supporting students' psychological needs, much of the existing evidence comes from the provision of autonomy support from the teacher (see Table 1). Relatively few SDT-based studies have investigated the impact of competence (i.e., structure) and relatedness (i.e., involvement; Sparks et al., 2017) support from the teacher in physical education settings, and more research is needed to understand how these teacher behaviors influence these student experiences. Our review also found a relative lack of objective measures of social support in the literature, and thus more research is needed to understand how observable teacher and peer behaviors influence motivational processes and outcomes. Also, we found that peer support has been rarely studied in physical education, and thus represents another promising area for future interventions.

Most research has focused on older children and adolescents. Additional research is needed with young children (<10 years of age) to better understand how the SDT model applies to physical education involving young children.

There is also a dearth of research on integrated regulation. While this form of regulation may not be relevant in younger students, older adolescents whose sense of self is more developed, are more likely to be able to express the extent to which their behavior is a good representation of their own personal values and beliefs (Deci et al., 1991). In these students, it may be important to investigate determinants and outcomes of integrated regulation in school physical education in order to understand how this form of motivation influences students' experiences.

Give the wide scope of our review and the large number of meta-analyzed correlations, we did not test for the moderating role that different operationalizations of SDT may play. Future researchers could investigate the influence of the different SDT measures when examining specific relationships outlined in the theory.

Finally, we found that behavioral and affective outcomes have been extensively studied in physical education, but little attention has been paid to cognitive outcomes. Future research should also focus on how self-determined behaviors influence cognitive variables, such as the use of learning strategies, metacognitive processes (i.e., knowledge about and regulation of one's cognition), and in-class concentration.

Conclusion

The overarching aim of this study was to synthesize results from studies underpinned by self-determination theory conducted in the school physical education context. Results of this meta-analytic review support SDT's theoretical postulates, suggesting that it provides a useful theoretical framework to understand motivational process in physical education, and a basis for effective interventions designed to improve in-class experiences as well as physical education learning outcomes.

References

*References marked with an asterisk indicate studies included in the systematic review.

- *Abarca-Sos, A., Bois, J. E., Zaragoza, J., Generelo, E., & Julian, J. A. (2013). Ecological correlates of physical activity in youth: Importance of parents, friends, physical education teachers and geographical localization. *International Journal of Sport Psychology*, 44(3), 215-233.
- Adie, J. W., Duda, J. L., & Ntoumanis, N. (2008). Autonomy support, basic need satisfaction and the optimal functioning of adult male and female sport participants: A test of basic needs theory. *Motivation and Emotion*, 32(3), 189-199. doi:10.1007/s11031-008-9095-z
- *Aelterman, N., Vansteenkiste, M., Van Keer, H., Van den Berghe, L., De Meyer, J., & Haerens, L. (2012). Students' objectively measured physical activity levels and engagement as a function of between-class and between-student differences in motivation toward physical education. *Journal of Sport and Exercise Psychology*, 34(4), 457-480.
- *Aelterman, N., Vansteenkiste, M., Soenens, B., & Haerens, L. (2016). A dimensional and person-centered perspective on controlled reasons for non-participation in physical education. *Psychology of Sport and Exercise*, 23, 142-154. doi:10.1016/j.psychsport.2015.12.001
- *Agbuga, B., Xiang, P., McBride, R. E., & Su, X. (2016). Student perceptions of instructional choices in middle school physical education. *Journal of Teaching in Physical Education*, 35(2), 138-148. doi:10.1123/jtpe.2015-0010
- *Almolda-Tomás, F. J., Sevil-Serrano, J., Julia'n-Clemente, J. A., Abarca-Sos, A., Aibar-Solana, A., & García-González, L. (2014). Application of teaching strategies for improving students' situational motivation in physical education. *Electronic Journal of Research in Educational Psychology*, 12(2), 391-418. doi:10.14204/ejrep.33.13148
- *Amado, D., Del Villar, F., Leo, F. M., Sánchez-Oliva, D., Sánchez-Miguel, P. A., & García-Calvo, T. (2014). Effect of a multi-dimensional intervention programme on the motivation of physical education students. *PLoS ONE*, 9(1). doi:10.1371/journal.pone.0085275
- *Amado, D., Del Villar, F., Sánchez-Miguel, P. A., Leo, F. M., & García-Calvo, T. (2016). Analysis of the Impact of Creative Technique on the Motivation of Physical Education Students in Dance Content: Gender Differences. *Journal of Creative Behavior*, 50(1), 64-79. doi:10.1002/jocb.69
- *Amorose, A. J. (2001). Intraindividual variability of self-evaluations in the physical domain: Prevalence, consequences, and antecedents. *Journal of Sport and Exercise Psychology*, 23(3), 222-244.
- Australian Curriculum, A. a. R. A. (2016). *The Health and Physical Education Curriculum v. 8.3 – F-10 Curriculum*. Retrieved from <https://www.australiancurriculum.edu.au/f-10-curriculum/health-and-physical-education/aims/>
- Awang-Hashim, R., Thaliah, R., & Kaur, A. (2017). A cultural insight into the development of teacher autonomy support scale: A self-determination theory perspective. *Journal for Multicultural Education*, 11(4), 287-305. doi:10.1108/JME-09-2016-0050

- *Back, K. H. (2015). The level of participation in and attitude towards school physical education and the relationship with physical self-concept of high school students. *Indian Journal of Science and Technology*, 8(24). doi:10.17485/ijst/2015/v8i24/80156
- *Baena-Extremuera, A., Gómez-López, M., & Mar Ortiz-Camacho, M. d. (2015). Predicting Satisfaction in Physical Education From Motivational Climate and Self-determined Motivation. *Journal of Teaching in Physical Education*, 34(2), 210-224.
- *Baena-Extremuera, A., Granero-Gallegos, A., Pérez-Quero, F. J., Bracho-Amador, C., & Sánchez-Fuentes, J. A. (2013). Motivation and motivational climate as predictors of perceived importance of physical education in Spain. *South African Journal for Research in Sport, Physical Education and Recreation*, 35(2), 1-13.
- *Baena-Extremuera, A., Granero-Gallegos, A., Ponce-de-León-Elizondo, A., Sanz-Arazuri, E., Valdemoros-San-Emeterio, M. Á., & Martínez-Molina, M. (2016). Psychological factors related to physical education classes as predictors of students' intention to partake in leisure-time physical activity. *Ciencia e Saude Coletiva*, 21(4), 1105-1112. doi:10.1590/1413-81232015214.0774201
- *Baena-Extremuera, A., Ruiz-Juan, F., & Granero-Gallegos, A. (2016). A cross-cultural analysis in predicting 2X2 achievement goals in physical education based on social goals, perceived locus of causality and causal attribution. *Studia Psychologica*, 58(1), 74-88.
- *Bagoien, T. E., Halvari, H., & Nesheim, H. (2010). Self-determined motivation in physical education and its links to motivation for leisure-time physical activity, physical activity, and well-being in general. *Percept Mot Skills*, 111(2), 407-432. doi:10.2466/06.10.11.13.14.pms.111.5.407-432
- *Barić, R., Vlašić, J., & Erpič, S. C. (2014). Goal orientation and intrinsic motivation for physical education: Does perceived competence matter? *Kinesiology*, 46(1), 117-126
- *Barkoukis, V., & Hagger, M. S. (2009). A Test of the Trans-Contextual Model of Motivation in Greek High School Pupils. *Journal of Sport Behavior*, 32(2), 152-174.
- *Barkoukis, V., & Hagger, M. S. (2013). The trans-contextual model: Perceived learning and performance motivational climates as analogues of perceived autonomy support. *European Journal of Psychology of Education*, 28(2), 353-372. doi:10.1007/s10212-012-0118-5
- *Barkoukis, V., Hagger, M. S., Lambropoulos, G., & Tsorbatzoudis, H. (2010). Extending the trans-contextual model in physical education and leisure-time contexts: Examining the role of basic psychological need satisfaction. *British Journal of Educational Psychology*, 80(4), 647-670. doi:10.1348/000709910X487023
- *Barkoukis, V., Koidou, E., Tsorbatzoudis, H., & Grouios, G. (2012). School and Classroom Goal Structures: Effects on Affective Responses in Physical Education. *Physical Educator*, 69(3), 211-227.
- *Barkoukis, V., Taylor, I., Chanal, J., & Ntoumanis, N. (2014). The relation between student motivation and student grades in physical education: A 3-year investigation. *Scandinavian Journal of Medicine and Science in Sports*, 24(5), e406-e414. doi:10.1111/sms.12174
- *Barkoukis, V., Tsorbatzoudis, H., Grouios, G., & Sideridis, G. (2008). The assessment of intrinsic and extrinsic motivation and amotivation: Validity and reliability of the Greek version of the Academic Motivation Scale. *Assessment in Education: Principles, Policy & Practice*, 15(1), 39-55. doi:10.1080/09695940701876128
- Bartholomew, K. J., Ntoumanis, N., Mouratidis, A., Katartzi, E., Thøgersen-Ntoumani, C., & Vlachopoulos, S. (2018). Beware of your teaching style: A school-year long investigation of controlling teaching and student motivational experiences. *Learning and Instruction*, 53, 50-63. doi:10.1016/j.learninstruc.2017.07.006
- *Beasley, E. K., & Garn, A. C. (2013). An investigation of adolescent girls' global self-concept, physical self-concept, identified regulation, and leisure-time physical activity in physical education. *Journal of Teaching in Physical Education*, 32(3), 237-252. doi:10.1016/j.jadohealth.2008.08.010
- *Beauchamp, M. R., Barling, J., & Morton, K. L. (2011). Transformational teaching and adolescent self-determined motivation, self-efficacy, and intentions to engage in leisure time physical activity: A randomised controlled pilot trial. *Applied Psychology: Health and Well-Being*, 3(2), 127-150. doi:10.1111/j.1758-0854.2011.01048.x

- Beddoes, Z., Prusak, K., Barney, D., & Wilkinson, C. (2016). Effects of Teacher-to-Student Relatedness on Adolescent Male Motivation in a Weight Training Class. *Physical Educator*, 73(3), 488-509.
- *Bekiari, A., Kokaridas, D., & Sakellariou, K. (2006). Associations of students' self-reports of their teachers' verbal aggression, intrinsic motivation, and perceptions of reasons for discipline in greek physical education classes. *Psychological Reports*, 98(2), 451-461. doi:10.2466/PRO.98.2.451-461
- Belmont, M., Skinner, E., Wellborn, J., & Connell, J. (1992). *Teacher as Social Context: A measure of student perceptions of teacher provision of involvement, structure and autonomy support*. Rochester, NY: University of Rochester.
- *Biddle, S., & Armstrong, N. (1992). Children's physical activity: An exploratory study of psychological correlates. *Social Science and Medicine*, 34(3), 325-331. doi:10.1016/0277-9536(92)90274-T
- *Biddle, S., Soos, I., & Chatzisarantis, N. (1999). Predicting physical activity intentions using goal perspectives and self-determination theory approaches. *European Psychologist*, 4(2), 83-89. doi:10.1027//1016-9040.4.4.83
- *Boiché, J. C. S., Sarrazin, P. G., Grouzet, F. M. E., Pelletier, L. G., & Chanal, J. P. (2008). Students' Motivational Profiles and Achievement Outcomes in Physical Education: A Self-Determination Perspective. *Journal of Educational Psychology*, 100(3), 688-701. doi:10.1037/0022-0663.100.3.68
- Borenstein, M. (2009). *Introduction to Meta-Analysis*. Chichester: Chichester : Wiley.
- Borenstein, M., & Higgins, J. (2013). Meta-Analysis and Subgroups. *Prevention Science*, 14(2), 134-143. doi:10.1007/s11121-013-0377-7
- *Bortoli, L., Bertollo, M., Filho, E., & Robazza, C. (2014). Do psychobiosocial states mediate the relationship between perceived motivational climate and individual motivation in youngsters? *Journal of Sports Sciences*, 32(6), 572-582. doi:10.1080/02640414.2013.843017
- Bowman, N. A. (2012). Effect Sizes and Statistical Methods for Meta-Analysis in Higher Education. *Research in Higher Education*, 53(3), 375-382. doi:10.1007/s11162-011-9232-5
- Boyle, G. J. (2015). *Measures of personality and social psychological constructs*: London : Academic Press.
- Brandenberger, C. C., Hagenauer, G., & Hascher, T. (2018). Promoting Students' Self-Determined Motivation in Maths: Results of a 1-Year Classroom Intervention. *European Journal of Psychology of Education*, 33(2), 295-317. doi:10.1007/s10212-017-0336-y
- *Bronikowski, M., Bronikowska, M., & Glapa, A. (2016). Do They Need Goals or Support? A Report from a Goal-Setting Intervention Using Physical Activity Monitors in Youth. *Int J Environ Res Public Health*, 13(9). doi:10.3390/ijerph13090914
- *Bryan, C. L., & Solmon, M. A. (2012). Student Motivation in Physical Education and Engagement in Physical Activity. *Journal of Sport Behavior*, 35(3), 267-285.
- Bunker, D., & Thorpe, R. (1982). A model for the teaching of games in secondary schools. *Bulletin of Physical Education*, 18(1), 5-8.
- Byman, R., Lavonen, J., Juuti, K., & Meisalo, V. (2012). Motivational orientations in physics learning: A self-determination theory approach. *Journal of Baltic Science Education*, 11(4), 379-392.
- *Cairney, J., Kwan, M. Y. W., Veldhuizen, S., Hay, J., Bray, S. R., & Faught, B. E. (2012). Gender, perceived competence and the enjoyment of physical education in children: A longitudinal examination. *International Journal of Behavioral Nutrition and Physical Activity*, 9. doi:10.1186/1479-5868-9-26
- Can, G. (2015). Turkish Version of the Academic Motivation Scale. *Psychological Reports*, 116(2), 388-408. doi:10.2466/14.08.PRO.116k24w5
- *Carroll, B., & Loumidis, J. (2001). Children's perceived competence and enjoyment in physical education and physical activity outside school. / La compétence perçue des élèves et le plaisir éprouvé en éducation physique et en activité physique en dehors de l'école. *European Physical Education Review*, 7(1), 24-43.

- *Cecchini Estrada, J. A., Gonzalez Gonzalez-Mesa, C., Mendez-Gimenez, A., & Fernandez-Rio, J. (2011). Achievement goals, social goals, and motivational regulations in physical education settings. *Psicothema*, 23(1), 51-57.
- Chan, D. K., Lonsdale, C., & Fung, H. H. (2012). Influences of coaches, parents, and peers on the motivational patterns of child and adolescent athletes. *Scandinavian Journal of Medicine & Science in Sports*, 22(4), 558-568. doi:10.1111/j.1600-0838.2010.01277.x
- *Chanal, J., & Guay, F. (2015). Are autonomous and controlled motivations school-subjects-specific? *PLoS ONE*, 10(8). doi:10.1371/journal.pone.0134660
- *Chang, Y.-K., Chen, S., Tu, K.-W., & Chi, L.-K. (2016). Effect of Autonomy Support on Self-Determined Motivation in Elementary Physical Education. *Journal of Sports Science & Medicine*, 15(3), 460-466.
- Charles, E. P. (2005). The Correction for Attenuation Due to Measurement Error: Clarifying Concepts and Creating Confidence Sets. *Psychological Methods*, 10(2), 206-226. doi:10.1037/1082-989X.10.2.206
- *Chatzipanteli, A., Digelidis, N., & Papaioannou, A. G. (2015). Self-Regulation, Motivation and Teaching Styles in Physical Education Classes: An Intervention Study. *Journal of Teaching in Physical Education*, 34(2), 333-344.
- *Chatzisarantis, N. L. D., Biddle, S. J. H., & Meek, G. A. (1997). A self-determination theory approach to the study of intentions and the intention-behaviour relationship in children's physical activity. *British Journal of Health Psychology*, 2(4), 343-360. doi:10.1111/j.2044-8287.1997.tb00548.x
- *Chatzisarantis, N. L. D., & Hagger, M. S. (2009). Effects of an intervention based on self-determination theory on self-reported leisure-time physical activity participation. *Psychology & Health*, 24(1), 29-48. doi:10.1080/08870440701809533*
- Chatzisarantis, N. L. D., Hagger, M. S., Biddle, S. J. H., Smith, B., & Wang, J. C. K. (2003). A Meta-Analysis of Perceived Locus of Causality in Exercise, Sport, and Physical Education Contexts. *Journal of Sport and Exercise Psychology*, 25(3), 284-306. doi:10.1123/jsep.25.3.284
- Chen, S., Chen, A., & Zhu, X. (2012). Are K-12 Learners Motivated in Physical Education? A Meta-Analysis. *Research Quarterly for Exercise and Sport*, 83(1), 36-48. doi:10.1080/02701367.2012.10599823
- *Chen, W. (2014). Psychological needs satisfaction, motivational regulations and physical activity intention among elementary school students. *Educational Psychology*, 34(4), 495-511. doi:10.1080/01443410.2013.822959
- *Chen, W., & Hypnar, A. J. (2015). Elementary School Students' Self-Determination in Physical Education and Attitudes Toward Physical Activity. *Journal of Teaching in Physical Education*, 34(2), 189-209
- *Cheon, S. H., & Reeve, J. (2013). Do the benefits from autonomy-supportive PE teacher training programs endure?: A one-year follow-up investigation. *Psychology of Sport and Exercise*, 14(4), 508-518. doi:10.1016/j.psychsport.2013.02.002
- *Cheon, S. H., & Reeve, J. (2015). A classroom-based intervention to help teachers decrease students' amotivation. *Contemporary Educational Psychology*, 40, 99-111. doi:10.1016/j.cedpsych.2014.06.004
- *Cheon, S. H., Reeve, J., & Moon, I. S. (2012). Experimentally based, longitudinally designed, teacher-focused Intervention to help physical education teachers be more autonomy supportive toward their students. *Journal of Sport and Exercise Psychology*, 34(3), 365-396.
- *Cheon, S. H., Reeve, J., & Song, Y.-G. (2016). A Teacher-Focused Intervention to Decrease PE Students' Amotivation by Increasing Need Satisfaction and Decreasing Need Frustration. *Journal of Sport & Exercise Psychology*, 38(3), 217-235.
- Cheung, M. W. L. (2014). Modeling Dependent Effect Sizes With Three-Level Meta-Analyses: A Structural Equation Modeling Approach. *Psychological Methods*, 19(2), 211-229. doi:10.1037/a0032968
- Cheung, M. W. L. (2015). metaSEM: An R package for meta-analysis using structural equation modeling. *Frontiers in Psychology*, 6, <xocs:firstpage xmlns:xocs=""/>. doi:10.3389/fpsyg.2015.00521

- *Cheval, B., Courvoisier, D. S., & Chanal, J. (2016). Developmental trajectories of physical activity during elementary school physical education. *Prev Med*, 87, 170-174. doi:10.1016/j.ypmed.2016.02.043
- Cohen, J. (1968). Weighted kappa: Nominal scale agreement provision for scaled disagreement or partial credit. *Psychological Bulletin*, 70(4), 213-220. doi:10.1037/h0026256
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed. ed.). Hillsdale, N.J.: L. Erlbaum Associates.
- *Cox, A., Duncanson, N., & McDavid, L. (2009). Peers and teachers as sources of relatedness perceptions, motivation, and affective responses in physical education. *Research Quarterly for Exercise and Sport*, 80(4), 765-773.
- *Cox, A., & Williams, L. (2008). The roles of perceived teacher support, motivational climate, and psychological need satisfaction in students' physical education motivation. *Journal of Sport and Exercise Psychology*, 30(2), 222-239.
- *Cox, A. E., Smith, A. L., & Williams, L. (2008). Change in Physical Education Motivation and Physical Activity Behavior during Middle School. *Journal of Adolescent Health*, 43(5), 506-513. doi:10.1016/j.jadohealth.2008.04.02
- *Cox, A. E., & Ullrich-French, S. (2010). The motivational relevance of peer and teacher relationship profiles in physical education. *Psychology of Sport and Exercise*, 11(5), 337-344. doi:10.1016/j.psychsport.2010.04.001
- *Cox, A. E., Ullrich-French, S., Madonia, J., & Witty, K. (2011). Social physique anxiety in physical education: Social contextual factors and links to motivation and behavior. *Psychology of Sport and Exercise*, 12(5), 555-562. doi:10.1016/j.psychsport.2011.05.001
- *Cox, A. E., Ullrich-French, S., & Sabiston, C. M. (2013). Using motivation regulations in a person-centered approach to examine the link between social physique anxiety in physical education and physical activity-related outcomes in adolescents. *Psychology of Sport and Exercise*, 14(4), 461-467. doi:10.1016/j.psychsport.2013.01.005
- *Cuevas, R., García-López, L. M., & Serra-Olivares, J. (2016). Sport education model and self-determination theory: An intervention in secondary school children. *Kinesiology*, 48(1), 30-38.
- *Cury, F., Biddle, S., Famose, J.-P., Goudas, M., Sarrazin, P., & Durand, M. (1996). Personal and situational factors influencing intrinsic interest of adolescent girls in school physical education: A structural equation modelling analysis. *Educational Psychology*, 16(3), 305-315. doi:10.1080/0144341960160307
- *Cury, F., Da Fonseca, D., Rufo, M., & Sarrazin, P. (2002). Perceptions of competence, implicit theory of ability, perception of motivational climate, and achievement goals: A test of trichotomous conceptualization of endorsement of achievement motivational in the physical education setting. *Percept Mot Skills*, 95(1), 233-244. doi:10.2466/PMS.95.4.233-244
- Dai, D. Y., Moon, S. M., & Feldhusen, J. F. (1998). Achievement motivation and gifted students: A social cognitive perspective. *Educational Psychologist*, 33(2-3), 45-63. doi:10.1080/00461520.1998.9653290
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and Education: The Self-Determination Perspective. *Educational Psychologist*, 26(3-4), 325-346. doi:10.1080/00461520.1991.9653137
- *De Meester, A., Maes, J., Stodden, D., Cardon, G., Goodway, J., Lenoir, M., & Haerens, L. (2016). Identifying profiles of actual and perceived motor competence among adolescents: associations with motivation, physical activity, and sports participation. *J Sports Sci*, 34(21), 2027-2037. doi:10.1080/02640414.2016.114960
- *De Meester, A., Maes, J., Stodden, D., Cardon, G., Goodway, J., Lenoir, M., & Haerens, L. (2016). Identifying profiles of actual and perceived motor competence among adolescents: associations with motivation, physical activity, and sports participation. *J Sports Sci*, 34(21), 2027-2037. doi:10.1080/02640414.2016.114960

- *De Meyer, J., Soenens, B., Vansteenkiste, M., Aelterman, N., Van Petegem, S., & Haerens, L. (2016). Do students with different motives for physical education respond differently to autonomy-supportive and controlling teaching? *Psychology of Sport & Exercise*, 22, 72-82.
- *De Meyer, J., Speleers, L., Tallir, I. B., Soenens, B., Vansteenkiste, M., Aelterman, N., . . . Haerens, L. (2014). Does observed controlling teaching behavior relate to students' motivation in physical education? *Journal of Educational Psychology*, 106(2), 541-554. doi:10.1037/a0034399
- *Digedlidis, 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. doi:10.1016/S1469-0292(02)00002-X
- Dowd, B. E., Greene, W. H., & Norton, E. C. (2014). Computation of standard errors. *Health services research*, 49(2), 731. doi:10.1111/1475-6773.12122
- *Dunn, J. C., & Dunn, J. G. H. (2006). Psychosocial determinants of physical education behavior in children with movement difficulties. *Adapted Physical Activity Quarterly*, 23(3), 293-309.
- *Dupont, J. P., Carlier, G., Gérard, P., & Delens, C. (2009). Teacher-student negotiations and its relation to physical education students' motivational processes: An approach based on self-determination theory. *European Physical Education Review*, 15(1), 21-46. doi:10.1177/1356336X09105210
- Edwards, A. L. (1957). *The social desirability variable in personality assessment and research*. New York, NY: Dryden Press.
- Ekelund, U., Luan, J., Sherar, L. B., & et al. (2012). Moderate to vigorous physical activity and sedentary time and cardiometabolic risk factors in children and adolescents. *JAMA*, 307(7), 704-712. doi:10.1001/jama.2012.156
- *Erdvik, I. B., Øverby, N. C., & Haugen, T. (2014). Students' self-determined motivation in physical education and intention to be physically active after graduation: The role of perceived competence and identity. *Journal of Physical Education and Sport*, 14(2), 232-241. doi:10.7752/jpes.2014.02035
- *Erturan-Ilker, G. (2014). Psychological well-being and motivation in a Turkish physical education context. *Educational Psychology in Practice*, 30(4), 365-379. doi:10.1080/02667363.2014.94937
- *Erwin, H. E., Stellino, M. B., Beets, M. W., Beighle, A., & Johnson, C. E. (2013). Physical education lesson content and teacher style and elementary students' motivation and physical activity levels. *Journal of Teaching in Physical Education*, 32(3), 321-334. doi:10.1249/01.MSS.0000155395.49960.31
- *Escartí, A., & Gutiérrez, M. (2001). Influence of the motivational climate in physical education on the intention to practice physical activity or sport. *European Journal of Sport Science*, 1(4), 1-12. doi:10.1080/17461390100071406
- Fairclough, S. (2003). Physical activity, perceived competence and enjoyment during high school physical education. *European Journal of Physical Education*, 8(1), 5-18.
- *Fairclough, S. J., McGrane, B., Sanders, G., Taylor, S., Owen, M., & Curry, W. (2016). A non-equivalent group pilot trial of a school-based physical activity and fitness intervention for 10-11 year old english children: born to move. *BMC Public Health*, 16(1), 861. doi:10.1186/s12889-016-3550-7
- *Fernandez-Rio, J., Méndez-Giménez, A., & Estrada, J. A. C. (2014). A cluster analysis on students' perceived motivational climate: Implications on psycho-social variables. *The Spanish Journal of Psychology*, 17.
- *Fernandez-Rio, J., Sanz, N., Fernandez-Cando, J., & Santos, L. (2015). Impact of a sustained Cooperative Learning intervention on student motivation. *Physical Education and Sport Pedagogy*, 1-17. doi:10.1080/17408989.2015.1123238
- *Ferrer-Caja, E., & Weiss, M. R. (2000). Predictors of intrinsic motivation among adolescent students in physical education. *Research Quarterly for Exercise and Sport*, 71(3), 267-279.
- *Ferriz, R., González-Cutre, D., Sicilia, Á., & Hagger, M. S. (2016). Predicting healthy and unhealthy behaviors through physical education: A self-determination theory-based longitudinal

- approach. *Scandinavian Journal of Medicine and Science in Sports*, 26(5), 579-592.
doi:10.1111/sms.12470
- *Fu, Y., Gao, Z., Hannon, J. C., Burns, R. D., & Brusseau, T. A., Jr. (2016). Effect of the SPARK program on physical activity, cardiorespiratory endurance, and motivation in middle-school students. *Journal of Physical Activity and Health*, 13(5), 534-542. doi:10.1123/jpah.2015-0351
- *Gairns, F., Whipp, P. R., & Jackson, B. (2015). Relational perceptions in high school physical education: teacher- and peer-related predictors of female students' motivation, behavioral engagement, and social anxiety. *Front Psychol*, 6, 850. doi:10.3389/fpsyg.2015.00850
- *Gao, Z. (2012). Motivated but not Active: The Dilemmas of Incorporating Interactive Dance Into Gym Class. *Journal of Physical Activity & Health*, 9(6), 794-800.
- *Gao, Z., Hannon, J. C., Newton, M., & Chaoqun, H. (2011). Effects of Curricular Activity on Students' Situational Motivation and Physical Activity Levels. *Research Quarterly for Exercise & Sport*, 82(3), 536-544.
- *García-Calvo, T., Sánchez-Oliva, D., Leo, F. M., Amado, D., & Pulido, J. J. (2016). Effects of an intervention programme with teachers on the development of positive behaviours in Spanish physical education classes. *Physical Education and Sport Pedagogy*, 21(6), 572-588. doi:10.1080/17408989.2015.1043256
- *Garn, A. C., McCaughy, N., Martin, J., Shen, B., & Fahlman, M. (2012). A Basic Needs Theory investigation of adolescents' physical self-concept and global self-esteem. *International Journal of Sport and Exercise Psychology*, 10(4), 314-328. doi:10.1080/1612197X.2012.705521
- Gillet, N., Vallerand, R., & Lafrenière, M.-A. (2012). Intrinsic and extrinsic school motivation as a function of age: the mediating role of autonomy support. *Soc Psychol Educ*, 15(1), 77-95. doi:10.1007/s11218-011-9170-2
- *Gillison, F. B., Standage, M., & Skevington, S. M. (2013). The effects of manipulating goal content and autonomy support climate on outcomes of a PE fitness class. *Psychology of Sport and Exercise*, 14(3), 342-352. doi:10.1016/j.psychsport.2012.11.011
- Gillison, F., Osborn, M., Standage, M., & Skevington, S. (2009). Exploring the experience of introjected regulation for exercise across gender in adolescence. *Psychology of Sport & Exercise*, 10(3), 309-319. doi:10.1016/j.psychsport.2008.10.004
- *Gómez-López, M., Baena-Extremuera, A., Granero-Gallegos, A., Castañón-Rubio, I., & Abalde, J. A. (2015). Self-determined, goal orientations and motivational climate in physical education. *Collegium Antropologicum*, 39(1), 33-41.
- *González-Cutre, D., Ferriz, R., Beltrán-Carrillo, V. J., Andrés-Fabra, J. A., Montero-Carretero, C., Cervelló, E., & Moreno-Murcia, J. A. (2014). Promotion of autonomy for participation in physical activity: A study based on the trans-contextual model of motivation. *Educational Psychology*, 34(3), 367-384. doi:10.1080/01443410.2013.817325
- *González-Cutre, D., Sicilia, Á., Beas-Jiménez, M., & Hagger, M. S. (2014). Broadening the trans-contextual model of motivation: A study with Spanish adolescents. *Scandinavian Journal of Medicine & Science in Sports*, 24(4), e306-e319.
- *González-Cutre, D., Sicilia, A., Moreno, J. A., & Fernández-Balboa, J. M. (2009). Dispositional flow in physical education: Relationships with motivational climate, social goals, and perceived competence. *Journal of Teaching in Physical Education*, 28(4), 422-440
- *González-Cutre, D., Sicilia, Á., Sierra, A. C., Ferriz, R., & Hagger, M. S. (2016). Understanding the need for novelty from the perspective of self-determination theory. *Personality and Individual Differences*, 102, 159-169. doi:10.1016/j.paid.2016.06.036
- *Goudas, M., & Biddle, S. (1994). Perceived motivational climate and intrinsic motivation in school physical education classes. *European Journal of Psychology of Education*, 9(3), 241-250. doi:10.1007/BF03172783
- *Goudas, M., Biddle, S., & Fox, K. (1994). Perceived locus of causality, goal orientations, and perceived competence in school physical education classes. *Br J Educ Psychol*, 64, Pt 3/.
- *Goudas, M., Dermizaki, I., & Bagiatas, K. (2000). Predictors of students' intrinsic motivation in school physical education. *European Journal of Psychology of Education*, 15(3), 271-280.

- *Goudas, M., Dermitzaki, I., & Bagiatis, K. (2001). Motivation in physical education is correlated with participation in sport after school. *Psychological Reports*, 88(2), 491-496.
- *Goudas, M., & Hassandra, M. (2006). Greek Students' Motives for Participation in Physical Education. *International Journal of Physical Education*, 43(2), 85-89
- *Granero-Gallegos, A., Baena-Extremera, A., Perez-Quero, F. J., Ortiz-Camacho, M. M., & Bracho-Amador, C. (2012). Analysis of motivational profiles of satisfaction and importance of physical education in high school adolescents. *J Sports Sci Med*, 11(4), 614-623.
- *Gråstén, A., Jaakkola, T., Liukkonen, J., Watt, A., & Yli-Piipari, S. (2012). Prediction of enjoyment in school physical education. *Journal of Sports Science and Medicine*, 11(2), 260-269.
- *Gutiérrez, M., Ruiz, L.-M., & López, E. (2010). Perceptions of motivational climate and teachers' strategies to sustain discipline as predictors of intrinsic motivation in physical education. *The Spanish Journal of Psychology*, 13(2), 597-608. doi:10.1017/S1138741600002274
- *Haerens, L., Aelterman, N., Vansteenkiste, M., Soenens, B., & Van Petegem, S. (2015). Do perceived autonomy-supportive and controlling teaching relate to physical education students' motivational experiences through unique pathways? Distinguishing between the bright and dark side of motivation. *Psychology of Sport and Exercise*, 16(P3), 26-36. doi:10.1016/j.psychsport.2014.08.013
- *Hagger, M. S., Barkoukis, V., Chatzisarantis, N. L. D., John Wang, C. K., & Baranowski, J. (2005). Perceived autonomy support in physical education and leisure-time physical activity: A cross-cultural evaluation of the trans-contextual model. *Journal of Educational Psychology*, 97(3), 376-390. doi:10.1037/0022-0663.97.3.376
- *Hagger, M., Chatzisarantis, N. L. D., Hein, V., Soós, I., Karsai, I., Lintunen, T., & Leemans, S. (2009). Teacher, peer and parent autonomy support in physical education and leisure-time physical activity: A trans-contextual model of motivation in four nations. *Psychology and Health*, 24(6), 689-711. doi:10.1080/08870440801956192
- *Hagger, M. S., Culverhouse, T., Chatzisarantis, N. L. D., & Biddle, S. J. H. (2003). The Processes by Which Perceived Autonomy Support in Physical Education Promotes Leisure-Time Physical Activity Intentions and Behavior: A Trans-Contextual Model. *Journal of Educational Psychology*, 95(4), 784-795. doi:10.1037/0022-0663.95.4.784
- *Halvari, H., Skjesol, K., & Bagoien, T. E. (2011). Motivational climates, achievement goals, and physical education outcomes: A longitudinal test of achievement goal theory. *Scandinavian Journal of Educational Research*, 55(1), 79-104. doi:10.1080/00313831.2011.539855
- *Hein, V., & Caune, A. (2014). Relationships between perceived teacher's autonomy support, effort and physical self-esteem. *Kinesiology*, 46(2), 218-226.
- *Hein, V., & Hagger, M. S. (2007). Global self-esteem, goal achievement orientations, and self-determined behavioural regulations in a physical education setting. *Journal of Sports Sciences*, 25(2), 149-159. doi:10.1080/02640410600598315
- *Hein, V., Koka, A., & Hagger, M. S. (2015). Relationships between perceived teachers' controlling behaviour, psychological need thwarting, anger and bullying behaviour in high-school students. *J Adolesc*, 42, 103-114. doi:10.1016/j.adolescence.2015.04.003
- *Hein, V., Muur, M., & Koka, A. (2004). Intention to be physically active after school graduation and its relationship to three types of intrinsic motivation. / L'intention d'etre physiquement actif apres la periode scolaire obligatoire et ses relations avec trois types de motivation intrinseque. *European Physical Education Review*, 10(1), 5-19.
- *Hilland, T. A., Stratton, G., Vinson, D., & Fairclough, S. (2009). The physical education predisposition scale: Preliminary development and validation. *Journal of Sports Sciences*, 27(14), 1555-1563. doi:10.1080/02640410903147513
- Hofstede, G. (2001). *Culture consequences: International differences in work-related values* (2nd ed.). Thousand Oaks, CA: Sage.
- Horn, T. S., & Weiss, M. R. (1991). A Developmental Analysis of Children's Self-Ability Judgments in the Physical Domain. *Pediatric Exercise Science*, 3(4), 310-326. doi:10.1123/pes.3.4.310
- *How, Y. M., Whipp, P., Dimmock, J., & Jackson, B. (2013). The Effects of Choice on Autonomous Motivation, Perceived Autonomy Support, and Physical Activity Levels in High School Physical Education. *Journal of Teaching in Physical Education*, 32(2), 131-148.

- Howard, J. L., Gagné, M., & Bureau, J. S. (2017). Testing a Continuum Structure of Self-Determined Motivation: A Meta-Analysis. *Psychological Bulletin*. doi:10.1037/bul0000125
- *Howle, T. C., Whipp, P. R., Gairns, F., Thornton, A. L., Rebar, A. L., & Jackson, B. (2016). Construct validity evidence for a measure of peer athletic reputation (PAthR) in high school physical education. *Psychology of Sport and Exercise*, 24, 9-17. doi:10.1016/j.psychsport.2015.12.006
- Hunter, J. E., & Schmidt, F. L. (2004). Methods of Meta-analysis: Correcting Error and Bias in Research Findings, 2nd ed.(Brief Article)(Book Review) (Vol. 19, pp. 91).
- *Jaakkola, T., John Wang, C. K., Soini, M., & Liukkonen, J. (2015). Students' perceptions of motivational climate and enjoyment in finnish physical education: A latent profile analysis. *Journal of Sports Science and Medicine*, 14(3), 477-483.
- *Jaakkola, T., & Liukkonen, J. (2006). Changes in students' self-determined motivation and goal orientation as a result of motivational climate intervention within high school physical education classes. *International Journal of Sport and Exercise Psychology*, 4(3), 302-324.
- *Jaakkola, T., Liukkonen, J., Laakso, T., & Ommundsen, Y. (2008). The relationship between situational and contextual self-determined motivation and physical activity intensity as measured by heart rates during ninth grade students' physical education classes. *European Physical Education Review*, 14(1), 13-31. doi:10.1177/1356336X0708570
- *Jaakkola, T., Sääkslahti, A., Yli-Piipari, S., Manninen, M., Watt, A., & Liukkonen, J. (2013). Student motivation associated with fitness testing in the physical education context. *Journal of Teaching in Physical Education*, 32(3), 270-286. doi:10.1080/1740898070134578
- *Jaakkola, T., Washington, T., & Yli-Piipari, S. (2013). The association between motivation in school physical education and self-reported physical activity during Finnish junior high school: A self-determination theory approach. *European Physical Education Review*, 19(1), 127-141. doi:10.1177/1356336X12465514
- *Jaakkola, T., Yli-Piipari, S., Barkoukis, V., & Liukkonen, J. (2015). Relationships among perceived motivational climate, motivational regulations, enjoyment, and PA participation among Finnish physical education students. *International Journal of Sport and Exercise Psychology*. doi:10.1080/1612197X.2015.1100209
- *Jaakkola, T., Yli-Piipari, S., Watt, A., & Liukkonen, J. (2016). Perceived physical competence towards physical activity, and motivation and enjoyment in physical education as longitudinal predictors of adolescents' self-reported physical activity. *Journal of Science & Medicine in Sport*, 19(9), 750-754.
- *Jackson, B., Whipp, P. R., Chua, K. L., Dimmock, J. A., & Hagger, M. S. (2013). Students' tripartite efficacy beliefs in high school physical education: within- and cross-domain relations with motivational processes and leisure-time physical activity. *J Sport Exerc Psychol*, 35(1), 72-84.
- *Jackson-Kersey, R., & Spray, C. (2013). Amotivation in physical education: Relationships with physical self-concept and teacher ratings of attainment. *European Physical Education Review*, 19(3), 289-301. doi:10.1177/1356336X13495625
- *Jackson-Kersey, R., & Spray, C. (2016). The effect of perceived psychological need support on amotivation in physical education. *European Physical Education Review*, 22(1), 99-112. doi:10.1177/1356336X1559134
- Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction*, 43, 27-38.
- *Johnson, T. G., Prusak, K. A., Pennington, T., & Wilkinson, C. (2011). The effects of the type of skill test, choice, and gender on the situational motivation of physical education students. *Journal of Teaching in Physical Education*, 30(3), 281-295.
- *Kalaja, S., Jaakkola, T., Liukkonen, J., & Watt, A. (2010). Fundamental movement skills and motivational factors influencing engagement in physical activity. *Percept Mot Skills*, 111(1), 115-128. doi:10.2466/06.10.25.PMS.111.4.115-12
- *Kalaja, S., Jaakkola, T., Watt, A., Liukkonen, J., & Ommundsen, Y. (2009). The associations between seventh grade Finnish students' motivational climate, perceived competence, self-

- determined motivation, and fundamental movement skills. *European Physical Education Review*, 15(3), 315-335.
- *Karagiannidis, Y., Barkoukis, V., Gourgoulis, V., Kosta, G., & Antoniou, P. (2015). The role of motivation and metacognition on the development of cognitive and affective responses in physical education lessons: A self-determination approach. *Motricidade*, 11(1), 135-150.
- *Khalkhali, V., & Golestaneh, S. M. (2011). Examining the impact of teacher motivational style and competition result on students' subjective vitality and happiness in physical education. *Procedia Soc. Behav. Sci.*, 15, 2989-2995. doi:10.1016/j.sbspro.2011.04.228
- *Koka, A. (2010). The effect of age on relationships between perceived teaching behaviors, basic psychological needs and self-determined motivation in Physical Education. *Acta Kinesiologiae Universitatis Tartuensis*, 15, 23-34.
- *Koka, A. (2013a). The effect of teacher and peers need support on students' motivation in physical education and its relationship to leisure time physical activity. *Acta Kinesiologiae Universitatis Tartuensis*, 19, 48-62.
- *Koka, A. (2013b). The relationships between perceived teaching behaviors and motivation in physical education: a one-year longitudinal study. *Scandinavian Journal of Educational Research*, 57(1), 33-53. doi:10.1080/00313831.2011.621213
- *Koka, A. (2014). The relative roles of teachers and peers on students' motivation in physical education and its relationship to self-esteem and Health-Related Quality of Life. *International Journal of Sport Psychology*, 45(3). doi:10.7352/IJSP
- *Koka, A., & Hagger, M. S. (2010). Perceived teaching behaviors and self-determined motivation in physical education: A test of self-determination theory. *Research Quarterly for Exercise and Sport*, 81(1), 74-86.
- *Koka, A., & Hein, V. (2003a). The impact of sports participation after school on intrinsic motivation and perceived learning environment in secondary school physical education. *Kinesiology*, 35(1), 5-13.
- *Koka, A., & Hein, V. (2003b). Perceptions of teacher's feedback and learning environment as predictors of intrinsic motivation in physical education. *Psychology of Sport and Exercise*, 4(4), 333-346. doi:10.1016/S1469-0292(02)00012-2
- *Koka, A., & Hein, V. (2005). The effect of perceived teacher feedback on intrinsic motivation in physical education. *International Journal of Sport Psychology*, 36(2), 91-106.
- *Koka, A., & Hein, V. (2006). Perceptions of teachers' general and informational feedback and intrinsic motivation in physical education: Two-year effects. *Percept Mot Skills*, 103(2), 321-332. doi:10.2466/PMS.103.2.321-332
- Lang, J. W. B. (2014). A dynamic Thurstonian item response theory of motive expression in the picture story exercise: Solving the internal consistency paradox of the PSE. *Psychological Review*, 121(3), 481-500. doi:10.1037/a0037011
- Lavigne, G., Vallerand, R., & Miquelon, P. (2007). A motivational model of persistence in science education: A self-determination theory approach. *Eur J Psychol Educ*, 22(3), 351-369. doi:10.1007/BF03173432
- Leary, N. (2014). Learning Informally to Use Teaching Games for Understanding: The Experiences of a Recently Qualified Teacher. *European Physical Education Review*, 20(3), 367-384. doi:10.1177/1356336X14534359
- Lee, H.-J., & Lim, C. (2012). Peer Evaluation in Blended Team Project-Based Learning: What Do Students Find Important? *Journal of Educational Technology & Society*, 15(4), 214.
- *Lee, O., Kim, Y., & Kim, B. J. (2012). Relations of perception of responsibility to intrinsic motivation and physical activity among Korean middle school students. *Percept Mot Skills*, 115(3), 944-952. doi:10.2466/06.10.25.PMS.115.6.944-952
- *Leptokaridou, E. T., Vlachopoulos, S. P., & Papaioannou, A. G. (2014). Experimental longitudinal test of the influence of autonomy-supportive teaching on motivation for participation in elementary school physical education. *Educational Psychology*. doi:10.1080/01443410.2014.950195
- *Leptokaridou, E. T., Vlachopoulos, S. P., & Papaioannou, A. G. (2015). Associations of autonomy, competence, and relatedness with enjoyment and effort in elementary school physical

- education: The mediating role of self-determined motivation. *Hellenic Journal of Psychology*, 12(2), 105-128.
- *Li, W., Wright, P. M., Rukavina, P. B., & Pickering, M. (2008). Measuring Students' Perceptions of Personal and Social Responsibility and the Relationship to Intrinsic Motivation in Urban Physical Education. *Journal of Teaching in Physical Education*, 27(2), 167-178
- Lindahl, J., Stenling, A., Lindwall, M., & Colliander, C. (2015). Trends and knowledge base in sport and exercise psychology research: a bibliometric review study. *International Review of Sport and Exercise Psychology*, 1-24. doi:10.1080/1750984X.2015.1019540
- Litalien, D., Morin, A. J. S., Gagné, M., Vallerand, R. J., Losier, G. F., & Ryan, R. M. (2017). Evidence of a continuum structure of academic self-determination: A two-study test using a bifactor-ESEM representation of academic motivation. *Contemporary Educational Psychology*, 51, 67-82. doi:10.1016/j.cedpsych.2017.06.010
- *Liu, J. D., & Chung, P.-k. (2015). Development and Initial Validation of the Chinese Version of Psychological Needs Thwarting Scale in Physical Education. *Journal of Teaching in Physical Education*, 34(3), 402-423.
- *Liu, J. D., & Chung, P. K. (2014). Development and initial validation of the psychological needs satisfaction scale in physical education. *Measurement in Physical Education and Exercise Science*, 18(2), 101-122. doi:10.1080/1091367X.2013.872106
- *Liukkonen, J., Barkoukis, V., Watt, A., & Jaakkola, T. (2010). Motivational climate and students' emotional experiences and effort in physical education. *Journal of Educational Research*, 103(5), 295-308. doi:10.1080/0022067090338304
- *Lodewyk, K. R., & Pybus, C. M. (2013). Investigating factors in the retention of students in high school physical education. *Journal of Teaching in Physical Education*, 32(1), 61-77. doi:10.1016/j.ypmed.2007.02.012
- Lohbeck, A. (2018). Self-concept and self-determination theory: math self-concept, motivation, and grades in elementary school children. *Early Child Development and Care*, 188(8), 1031-1044. doi:10.1080/03004430.2016.1241778
- *Lonsdale, C., Rosenkranz, R. R., Sanders, T., Peralta, L. R., Bennie, A., Jackson, B., . . . Lubans, D. R. (2013). A cluster randomized controlled trial of strategies to increase adolescents' physical activity and motivation in physical education: Results of the Motivating Active Learning in Physical Education (MALP) trial. *Prev Med*, 57(5), 696-702. doi:10.1016/j.ypmed.2013.09.003
- Lonsdale, C. C., Sabiston, C. M., Taylor, I. M., & Ntoumanis, N. (2011). Measuring student motivation for physical education: examining the psychometric properties of the Perceived Locus of Causality Questionnaire and the Situational Motivation Scale. 12(3). doi:10.1016/j.psychsport.2010.11.003
- *Lonsdale, C., Sabiston, C. M., Raedeke, T. D., Ha, A. S. C., & Sum, R. K. W. (2009). Self-determined motivation and students' physical activity during structured physical education lessons and free choice periods. *Prev Med*, 48(1), 69-73. doi:10.1016/j.ypmed.2008.09.013
- *Mandigo, J. L., Holt, N., Anderson, A., & Sheppard, J. (2008). Children's motivational experiences following autonomy-supportive games lessons. *European Physical Education Review*, 14(3), 407-425. doi:10.1177/1356336X08095673
- *Marmeleira, J. F. F., Aldeias, N. M. C., & Medeira da Graça, P. M. S. (2012). Physical activity levels in Portuguese high school physical education. *European Physical Education Review*, 18(2), 191-204. doi:10.1177/1356336X12440022
- *Mayorga-Vega, D., & Viciania, J. (2014). Adolescents' physical activity in physical education, school recess, and extra-curricular sport by motivational profiles. *Percept Mot Skills*, 118(3), 663-679. doi:10.2466/06.10.PMS.118k26w0
- *Mazyari, M., Kashef, M. M., Sayed Ameri, M. H., & Araghi, M. (2012). Students' amotivation in physical education activities and teachers' social support. *World Applied Sciences Journal*, 20(11), 1570-1573. doi:10.5829/idosi.wasj.2012.20.11.1716
- *McDavid, L., Cox, A. E., & Amorose, A. J. (2012). The relative roles of physical education teachers and parents in adolescents' leisure-time physical activity motivation and behavior. *Psychology of Sport and Exercise*, 13(2), 99-107. doi:http://dx.doi.org/10.1016/j.psychsport.2011.10.00

- *McDavid, L., Cox, A. E., & McDonough, M. H. (2014). Need fulfillment and motivation in physical education predict trajectories of change in leisure-time physical activity in early adolescence. *Psychology of Sport and Exercise*, 15(5), 471-480. doi:10.1016/j.psychsport.2014.04.006
- McHugh, M. L. (2012). Interrater reliability: the kappa statistic. *Biochemia Medica*, 22(3), 276-282.
- McKiddie, B., & Maynard, I. W. (1997). Perceived competence of schoolchildren in physical education. *Journal of Teaching in Physical Education*, 16(3), 324-339. doi:10.1123/jtpe.16.3.324
- *Méndez-Giménez, A., Cecchini-Estrada, J. A., & Fernandez-Rio, J. (2014). Motivational profiles and achievement goal dominance in physical education. *The Spanish Journal of Psychology*, 17, E36. doi:10.1017/sjp.2014.37
- *Méndez-Giménez, A., Fernández-Río, J., Cecchini-Estrada, J.-A., & 'Arcy, L. D. (2015). Dominant achievement goals and different profiles among secondary students. *Estudios de Psicología*, 36(2), 266-293. doi:10.1080/02109395.2014.922256
- *Meng, H. Y., & Keng, J. W. C. (2016). The effectiveness of an Autonomy-Supportive Teaching Structure in Physical Education. *RICYDE. Revista Internacional de Ciencias del Deporte*, 12(43), 5-28.
- *Mitchell, S. A. (1996). Relationships between perceived learning environment and intrinsic motivation in middle school physical education. *Journal of Teaching in Physical Education*, 15(3), 369-383.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of internal medicine*, 151(4), 264.
- *Moreno, J. A., González-Cutre, D., Martín-Albo, J., & Cervelló, E. (2010). Motivation and performance in physical education: An experimental test. *Journal of Sports Science and Medicine*, 9(1), 79-85.
- *Moreno-Murcia, J. A., Coll, D. G.-C., & Pérez, L. M. R. (2009). Self-determined motivation and physical education importance. *Human Movement*, 10(1), 5-11.
- *Moreno-Murcia, J. A., Gimeno, E. C. C., Hernández, E. H., Belando Pedreño, N., & Rodríguez Marín, J. J. (2013). Motivational profiles in physical education and their relation to the Theory of Planned Behavior. *Journal of Sports Science and Medicine*, 12(3), 551-558.
- *Moreno-Murcia, J. A., Huescar, E., & Cervello, E. (2012). Prediction of adolescents doing physical activity after completing secondary education. *Span J Psychol*, 15(1), 90-100.
- *Moreno-Murcia, J. A., & Huéscar Hernández, E. (2013). The importance of supporting adolescents' autonomy in promoting physical-sport exercise. *The Spanish Journal of Psychology*, 16.
- *Moreno-Murcia, J. A., & Sánchez-Latorre, F. (2016). The effects of autonomy support in physical education classes. *RICYDE. Revista Internacional de Ciencias del Deporte*, 12(43), 79-89.
- *Mouratidis, A., Barkoukis, V., & Tsozbatzoudis, C. (2015). The relation between balanced need satisfaction and adolescents' motivation in physical education. *European Physical Education Review*, 21(4), 421-431. doi:10.1177/1356336X15577222
- *Mouratidis, A., Vansteenkiste, M., Lens, W., & Sideridis, G. (2008). The motivating role of positive feedback in sport and physical education: Evidence for a motivational model. *Journal of Sport and Exercise Psychology*, 30(2), 240-258.
- *Mouratidis, A. A., Vansteenkiste, M., Sideridis, G., & Lens, W. (2011). Vitality and interest-enjoyment as a function of class-to-class variation in need-supportive teaching and pupils' autonomous motivation. *Journal of Educational Psychology*, 103(2), 353-366. doi:10.1037/a0022773
- Nathan, N., Sutherland, R., Beauchamp, M. R., Cohen, K., Hulteen, R. M., Babic, M., . . . Lubans, D. R. (2017). Feasibility and efficacy of the Great Leaders Active StudentS (GLASS) program on children's physical activity and object control skill competency: A non-randomised trial. *Journal of Science and Medicine in Sport*, 20(12), 1081-1086. doi:10.1016/j.jsams.2017.04.016
- Ng, J., Y. 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. doi:10.1177/1745691612447309

- Nixon, J. G., & Topping, K. J. (2001). Emergent Writing: The impact of structured peer interaction. *Educational Psychology, 21*(1), 41-58. doi:10.1080/01443410123268
- Ntoumanis, N., & Standage, M. (2009). Motivation in physical education classes. *School Field, 7*(2), 194-202. doi:10.1177/1477878509104324
- Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *British Journal of Educational Psychology, 71*(2), 225-242.
- *Ntoumanis, N. (2002). Motivational clusters in a sample of British physical education classes. *Psychology of Sport and Exercise, 3*(3), 177-194. doi:10.1016/S1469-0292(01)00020-6
- *Ntoumanis, N. (2005). A prospective study of participation in optional school physical education using a self-determination theory framework. *Journal of Educational Psychology, 97*(3), 444-453. doi:10.1037/0022-0663.97.3.444
- *Ntoumanis, N., Barkoukis, V., & Thøgersen-Ntoumani, C. (2009). Developmental Trajectories of Motivation in Physical Education: Course, Demographic Differences, and Antecedents. *Journal of Educational Psychology, 101*(3), 717-728. doi:10.1037/a0014696
- *Ntoumanis, N., Taylor, I. M., & Standage, M. (2010). Testing a model of antecedents and consequences of defensive pessimism and self-handicapping in school physical education. *Journal of Sports Sciences, 28*(14), 1515-1525. doi:10.1080/02640414.2010.511650
- *Ntovolis, Y., Barkoukis, V., Michelinakis, E., & Tsorbatzoudis, H. (2015). An Application of the Trans-Contextual Model of Motivation in Elementary School Physical Education. *Physical Educator, 72*, 123-141.
- *Ommundsen, Y., & Kvalø, S. E. (2007). Autonomy--Mastery, supportive or performance focused? Different teachers behaviours and pupils' outcomes in physical education. *Scandinavian Journal of Educational Research, 51*(4), 385-413. doi:10.1080/00313830701485551
- Otis, N., Grouzet, F. M. E., & Pelletier, L. G. (2005). Latent Motivational Change in an Academic Setting: A 3-Year Longitudinal Study. *Journal of Educational Psychology, 97*(2), 170-183. doi:10.1037/0022-0663.97.2.170
- *Owen, K. B., Astell-Burt, T., & Lonsdale, C. (2013). The relationship between self-determined motivation and physical activity in adolescent boys. *Journal of Adolescent Health, 53*(3), 420-422. doi:10.1016/j.jadohealth.2013.05.007
- Owen, K. B., Parker, P. D., Van Zanden, B., MacMillan, F., Astell-Burt, T., & Lonsdale, C. (2016). Physical Activity and School Engagement in Youth: A Systematic Review and Meta-Analysis. *Educational Psychologist, 51*(2), 129-145. doi:10.1080/00461520.2016.1151793
- *Pan, C.-Y., Tsai, C.-L., Chu, C.-H., & Hsieh, K.-W. (2011). Physical activity and self-determined motivation of adolescents with and without autism spectrum disorders in inclusive physical education. *Research in Autism Spectrum Disorders, 5*(2), 733-741. doi:10.1016/j.rasd.2010.08.007
- *Papacharisis, V., & Goudas, M. (2003). Perceptions about exercise and intrinsic motivation of students attending a health-related physical education program. *Percept Mot Skills, 97*(3 I), 689-696.
- *Papacharisis, V., Simou, K., & Goudas, M. (2003). The relationship between intrinsic motivation and intention towards exercise. *Journal of Human Movement Studies, 45*(4), 377-386.
- *Papaioannou, A. (1995). Differential perceptual and motivational patterns when different goals are adopted. *Journal of Sport & Exercise Psychology, 17*(1), 18-34.
- *Papaioannou, A., Bebetos, E., Theodorakis, Y., Christodoulidis, T., & Kouli, O. (2006). Causal relationships of sport and exercise involvement with goal orientations, perceived competence and intrinsic motivation in physical education: A longitudinal study. *Journal of Sports Sciences, 24*(4), 367-382. doi:10.1080/02640410400022060
- *Pardo, B. M., Bengoechea, E. G., Clemente, J. A. J., & Lanaspa, E. G. (2016). Motivational Outcomes and Predictors of Moderate-to-Vigorous Physical Activity and Sedentary Time for Adolescents in the Sigüe La Huella Intervention. *International Journal of Behavioral Medicine, 23*(2), 135-142. doi:10.1007/s12529-015-9528-5
- *Pardo, B. M., Bengoechea, E. G., Solana, A. A., Clemente, J. A. J., García-González, L., Martín-Albo, J., & Tenorio, S. E. (2015). Factors associated with compliance with physical activity recommendations among adolescents in Huesca. *Revista de Psicología del Deporte, 24*(1), 147-154.

- *Parish, L. E., & Treasure, D. C. (2003). Physical activity and situational motivation in physical education: Influence of the motivational climate and perceived ability. *Research Quarterly for Exercise and Sport*, 74(2), 173-182.
- *Patience, M. A., Kilpatrick, M. W., Sun, H., Flory, S. B., & Watterson, T. A. (2013). Sports game play: A comparison of moderate to vigorous physical activities in adolescents. *Journal of School Health*, 83(11), 818-823. doi:10.1111/josh.12099
- Pelletier, L., Fortier, M., Vallerand, R., & Brière, N. (2001). Associations Among Perceived Autonomy Support, Forms of Self-Regulation, and Persistence: A Prospective Study. *Motivation and Emotion*, 25(4), 279-306. doi:10.1023/A:1014805132406
- Perlman, D. (2011). The influence of an autonomy-supportive intervention on preservice teacher instruction: A self-determined perspective. *Australian Journal of Teacher Education*, 36(11), 73-79.
- *Perlman, D. (2010). Change in affect and needs satisfaction for amotivated students within the Sport Education Model. *Journal of Teaching in Physical Education*, 29(4), 433-445.
- Perlman, D. (2011a). Examination of Self-Determination within the Sport Education Model. *Asia-Pacific Journal of Health, Sport & Physical Education*, 2(1), 79-92.
- *Perlman, D. (2011b). The influence of an autonomy-supportive intervention on preservice teacher instruction: A self-determined perspective. *Australian Journal of Teacher Education*, 36(11), 73-79.
- *Perlman, D. (2012). The influence of the Sport Education Model on amotivated students' in-class physical activity. *European Physical Education Review*, 18(3), 335-345. doi:10.1177/1356336X12450795
- *Perlman, D. (2013a). The influence of the social context on students in-class physical activity. *Journal of Teaching in Physical Education*, 32(1), 46-60. doi:10.1080/08870440701809533
- *Perlman, D. (2013b). Manipulation of the Self-Determined Learning Environment on Student Motivation and Affect Within Secondary Physical Education. *Physical Educator*, 70(4), 413-428.
- *Perlman, D. (2015). Help motivate the amotivated by being a supportive teacher. *Physical Education and Sport Pedagogy*, 20(2), 204-214. doi:10.1080/17408989.2013.868876
- Peterson, R. A., & Brown, S. P. (2005). On the Use of Beta Coefficients in Meta-Analysis. *Journal of Applied Psychology*, 90(1), 175-181. doi:10.1037/0021-9010.90.1.175
- *Pihu, M., Hein, V., Koka, A., & Hagger, M. S. (2008). How students' perceptions of teachers' autonomy-supportive behaviours affect physical activity behaviour: An application of the trans-contextual model. *European Journal of Sport Science*, 8(4), 193-204. doi:10.1080/17461390802067679
- *Powell, E., Woodfield, L. A., & Nevill, A. M. (2016). Increasing physical activity levels in primary school physical education: The SHARP Principles Model. *Prev Med Rep*, 3, 7-13. doi:10.1016/j.pmedr.2015.11.007
- *Prusak, K. A., Treasure, D. C., Darst, P. W., & Pangrazi, R. P. (2004). The Effects of Choice on the Motivation of Adolescent Girls in Physical Education. *Journal of Teaching in Physical Education*, 23(1), 19-29.
- *Rachele, J. N., Jaakkola, T., Washington, T. L., Cuddihy, T. F., & McPhail, S. M. (2015). Adolescent self-reported physical activity and autonomy: A case for con-strained and structured environments? *Journal of Sports Science and Medicine*, 14(3), 568-573.
- *Radel, R., Fournier, M., De Bressy, V., & D'Arripe-Longueville, F. (2014). You're too much for me: Contagion of motivation depends on perceiver-model distance. *Motivation and Emotion*. doi:10.1007/s11031-014-9451-0
- *Radel, R., Sarrazin, P., Legrain, P., & Wild, T. C. (2010). Social Contagion of Motivation Between Teacher and Student: Analyzing Underlying Processes. *Journal of Educational Psychology*, 102(3), 577-587. doi:10.1037/a0019051
- Reeve, J. (2009). Why Teachers Adopt a Controlling Motivating Style Toward Students and How They Can Become More Autonomy Supportive. *Educational Psychologist*, 44(3), 159-175. doi:10.1080/00461520903028990
- Rosenthal, R. (1994). Parametric measures of effect size. In H. Cooper & L. Hedges (Eds.), *The handbook of research synthesis* (pp. 213-244). New York: Russell Sage Foundation.

- Rosenzweig, E. Q., & Wigfield, A. (2016). STEM Motivation Interventions for Adolescents: A Promising Start, but Further to Go. *Educational Psychologist*, 1-18. doi:10.1080/00461520.2016.1154792
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48(2).
- *Ruiz-González, L., Videra, A., & Moreno-Murcia, J. A. (2015). Predictive power of task orientation, general self-efficacy and self-determined motivation on fun and boredom. *Motriz. Revista de Educacao Fisica*, 21(4), 361-369. doi:10.1590/S1980-65742015000400004
- *Rutten, C., Boen, F., & Seghers, J. (2012). How school social and physical environments relate to autonomous motivation in physical education: The mediating role of need satisfaction. *Journal of Teaching in Physical Education*, 31(3), 216-230.
- *Rutten, C., Boen, F., Vissers, N., & Seghers, J. (2015). Changes in children's autonomous motivation toward physical education during transition from elementary to secondary school: A self-determination perspective. *Journal of Teaching in Physical Education*, 34(3), 442-460. doi:10.1123/jtpe.2013-022
- Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, 25(1), 54-67. doi:10.1006/ceps.1999.1020
- Ryan, R. M., & Deci, E. L. (2000b). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist*, 55(1), 68-78. doi:10.1037/0003-066X.55.1.68
- Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory : basic psychological needs in motivation, development, and wellness*: New York : The Guilford Press.
- *Säfvenbom, R., Haugen, T., & Bulie, M. (2014). Attitudes toward and motivation for PE. Who collects the benefits of the subject? *Physical Education and Sport Pedagogy*. doi:10.1080/17408989.2014.892063
- Salmi, H., & Thuneberg, H. (2018). The role of self-determination in informal and formal science learning contexts. *Learning Environments Research*, 1-21. doi:10.1007/s10984-018-9266-0
- *Sanchez-Oliva, D., Sanchez-Miguel, P. A., Leo, F. M., Kinnafock, F.-E., & Garcia-Calvo, T. s. (2014). Physical Education Lessons and Physical Activity Intentions Within Spanish Secondary Schools: A Self-Determination Perspective. *Journal of Teaching in Physical Education*, 33(2), 232-249.
- *Sarrazin, P. G., Tessier, D. P., Pelletier, L. G., Trouilloud, D. O., & Chanal, J. P. (2006). The Effects of teachers' expectations about students' motivation on teachers's autonomy-supportive and controlling behaviors. *International Journal of Sport & Exercise Psychology*, 4(3), 283-301.
- *Sas-Nowosielski, K. (2008). Participation of youth in physical education from the perspective of self-determination theory. *Human Movement*, 9(2), 134-141. doi:10.2478/v10038-008-0019-2
- Schunk, D. H. (1991). Self-Efficacy and Academic Motivation. *Educational Psychologist*, 26(3-4), 207-231. doi:10.1080/00461520.1991.9653133
- *Scrabis-Fletcher, K., Rasmussen, J., & Silverman, S. (2016). The relationship of practice, attitude, and perception of competence in middle school physical education. *Journal of Teaching in Physical Education*, 35(3), 241-250. doi:10.1123/jtpe.2015-0129
- *Sevil, J., Abós, Á., Aibar, A., Julián, J. A., & García-González, L. (2016). Gender and corporal expression activity in physical education: Effect of an intervention on students' motivational processes. *European Physical Education Review*, 22(3), 372-389. doi:10.1177/1356336X15613463
- Sheldon, K. M., & Schöler, J. (2011). Wanting, Having, and Needing: Integrating Motive Disposition Theory and Self-Determination Theory. *Journal of Personality and Social Psychology*, 101(5), 1106-1123. doi:10.1037/a0024952
- *Shen, B. (2010). How can perceived autonomy support influence enrollment in elective physical education? a prospective study. *Research Quarterly for Exercise and Sport*, 81(4), 456-465.
- *Shen, B. (2014). Outside-school physical activity participation and motivation in physical education. *British Journal of Educational Psychology*, 84(1), 40-57. doi:10.1111/bjep.1200

- *Shen, B. (2015). Gender Differences in the Relationship Between Teacher Autonomy Support and Amotivation in Physical Education. *Sex Roles*, 72(3-4), 163-172. doi:10.1007/s11199-015-0448-2
- *Shen, B., Li, W., Sun, H., & Rukavina, P. B. (2010). The Influence of inadequate teacher-to-student social support on amotivation of physical education students. *Journal of Teaching in Physical Education*, 29(4), 417-432.
- *Shen, B., McCaughtry, N., & Martin, J. (2008a). The Influence of Domain Specificity on Motivation in Physical Education. *Research Quarterly for Exercise & Sport*, 79(3), 333-343.
- *Shen, B., McCaughtry, N., & Martin, J. (2008b). Urban adolescents' exercise intentions and behaviors: An exploratory study of a trans-contextual model. *Contemporary Educational Psychology*, 33(4), 841-858. doi:http://dx.doi.org/10.1016/j.cedpsych.2007.09.002
- *Shen, B., McCaughtry, N., Martin, J., & Fahlman, M. (2009). Effects of teacher autonomy support and students' autonomous motivation on learning in physical education. *Research Quarterly for Exercise and Sport*, 80(1), 44-53.
- *Shen, B., McCaughtry, N., Martin, J., Garn, A., Kulik, N., & Fahlman, M. (2015). The relationship between teacher burnout and student motivation. *Br J Educ Psychol*, 85(4), 519-532. doi:10.1111/bjep.12089
- *Shen, B., McCaughtry, N., Martin, J. J., Fahlman, M., & Garn, A. C. (2012). Urban high-school girls' sense of relatedness and their engagement in physical education. *Journal of Teaching in Physical Education*, 31(3), 231-245.
- *Shen, B., Wingert, R. K., Li, W., Sun, H., & Rukavina, P. B. (2010). An amotivation model in physical education. *Journal of Teaching in Physical Education*, 29(1), 72-84.
- *Sieber, V., Schüler, J., & Wegner, M. (2016). The effects of autonomy support on salivary alpha-amylase: The role of individual differences. *Psychoneuroendocrinology*, 74, 173-178. doi:10.1016/j.psychoneu.2016.09.003
- Siedentop, D. (1998). What is Sport Education and How Does it Work? *Journal of Physical Education, Recreation & Dance*, 69(4), 18-20. doi:10.1080/07303084.1998.10605528
- Slavin, R. E. (1990). *Cooperative learning : theory, research, and practice*. Englewood Cliffs, NJ: Prentice Hall.
- Slavin, R. E. (1996). Research on Cooperative Learning and Achievement: What We Know, What We Need to Know (Vol. 21, pp. 43-69).
- Slemp, G., Kern, M. L., Patrick, K. J. & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion*.
https://doi.org/10.1007/s11031-018-9698-y
- *Slingerland, M., Haerens, L., Cardon, G., & Borghouts, L. (2014). Differences in perceived competence and physical activity levels during single-gender modified basketball game play in middle school physical education. *European Physical Education Review*, 20(1), 20-35. doi:10.1177/1356336X1349600
- *Smith, L., Harvey, S., Savory, L., Fairclough, S., Kozub, S., & Kerr, C. (2015). Physical activity levels and motivational responses of boys and girls: A comparison of direct instruction and tactical games models of games teaching in physical education. *European Physical Education Review*, 21(1), 93-113. doi:10.1177/1356336X14555293
- *Song, K. H., & Kim, S. Y. (2016). Verification of mediated effect of athletic ability beliefs in the relations between learning environments perceived in the physical education (PE) class and task persistence. *Indian Journal of Science and Technology*, 9(41). doi:10.17485/ijst/2016/v9i41/103933
- *Sparks, C., Dimmock, J., Lonsdale, C., & Jackson, B. (2016). Modeling indicators and outcomes of students' perceived teacher relatedness support in high school physical education. *Psychology of Sport and Exercise*, 26, 71-82. doi:10.1016/j.psychsport.2016.06.004
- Sparks, C., Lonsdale, C., Dimmock, J., & Jackson, B. (2017). An Intervention to Improve Teachers' Interpersonally Involving Instructional Practices in High School Physical Education: Implications for Student Relatedness Support and In-Class Experiences. *Journal of Sport and Exercise Psychology*, 39(2), 120-133. doi:10.1123/jsep.2016-0198
- Spittaels, H., Van Cauwenberghe, E., Verbestel, V., De Meester, F., Van Dyck, D., Verloigne, M., . . . De Bourdeaudhuij, I. (2012). Objectively measured sedentary time and physical activity time

- across the lifespan: a cross-sectional study in four age groups. *International Journal of Behavioral Nutrition and Physical Activity*, 9(1), 149. doi:10.1186/1479-5868-9-149
- *Spittle, M., & Byrne, K. (2009). The influence of sport education on student motivation in physical education. *Physical Education and Sport Pedagogy*, 14(3), 253-266. doi:10.1080/17408980801995239
- Spray, C. M., & Wang, C. K. J. (2001). Goal orientations, self-determination and pupils' discipline in physical education. *Journal of Sports Sciences*, 19(12), 903-913. doi:10.1080/02640410131710841
- *Sproule, J., Wang, C. K. J., Morgan, K., McNeill, M., & McMorris, T. (2007). Effects of motivational climate in Singaporean physical education lessons on intrinsic motivation and physical activity intention. *Personality and Individual Differences*, 43(5), 1037-1049. doi:10.1016/j.paid.2007.02.01
- *Standage, M., Duda, J. L., & Ntoumanis, N. (2003a). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology*, 95(1), 97-110. doi:10.1037//0022-0663.95.1.9
- *Standage, M., Duda, J. L., & Ntoumanis, N. (2003b). Predicting motivational regulations in physical education: The interplay between dispositional goal orientations, motivational climate and perceived competence. *Journal of Sports Sciences*, 21(8), 631-647. doi:10.1080/0264041031000101962
- *Standage, M., Duda, J. L., & Ntoumanis, N. (2005). A test of self-determination theory in school physical education. *British Journal of Educational Psychology*, 75(3), 411-433. doi:10.1348/000709904X22359
- *Standage, M., Duda, J. L., & Ntoumanis, N. (2006). Students' motivational processes and their relationship to teacher ratings in school physical education: A self-determination theory approach. *Research Quarterly for Exercise and Sport*, 77(1), 100-110.
- *Standage, M., & Gillison, F. (2007). Students' motivational responses toward school physical education and their relationship to general self-esteem and health-related quality of life. *Psychology of Sport and Exercise*, 8(5), 704-721. doi:10.1016/j.psychsport.2006.12.004
- *Standage, M., Gillison, F. B., Ntoumanis, N., & Treasure, D. C. (2012). Predicting students' physical activity and health-related well-being: A prospective cross-domain investigation of motivation across school physical education and exercise settings. *Journal of Sport and Exercise Psychology*, 34(1), 37-60.
- *Standage, M., & Treasure, D. C. (2002). Relationship among achievement goal orientations and multidimensional situational motivation in physical education. *British Journal of Educational Psychology*, 72(1), 87-103. doi:10.1348/000709902158784
- *Stephan, Y., Caudroit, J., Boiché, J., & Sarrazin, P. (2010). Predictors of situational disengagement in the academic setting: The contribution of grades, perceived competence, and academic motivation. *British Journal of Educational Psychology*, 81(3), 441-455. doi:10.1348/000709910X522285
- *Stormoen, S., Urke, H. B., Tjomsland, H. E., Wold, B., & Diseth, Å. (2016). High school physical education: What contributes to the experience of flow? *European Physical Education Review*, 22(3), 355-371. doi:10.1177/1356336X15612023
- *Sun, H., & Chen, A. (2010). An examination of sixth graders' self-determined motivation and learning in physical education. *Journal of Teaching in Physical Education*, 29(3), 262-277
- *Taylor, I. M., & Lonsdale, C. (2010). Cultural differences in the relationships among autonomy support, psychological need satisfaction, subjective vitality, and effort in british and chinese physical education. *Journal of Sport and Exercise Psychology*, 32(5), 655-673
- *Taylor, I. M., & Ntoumanis, N. (2007). Teacher Motivational Strategies and Student Self-Determination in Physical Education. *Journal of Educational Psychology*, 99(4), 747-760. doi:10.1037/0022-0663.99.4.74
- *Taylor, I. M., Ntoumanis, N., Standage, M., & Spray, C. M. (2010). Motivational predictors of physical education students' effort, exercise intentions, and leisure-time physical activity: A multilevel linear growth analysis. *Journal of Sport and Exercise Psychology*, 32(1), 99-120

- *Taylor, I. M., Spray, C. M., & Pearson, N. (2014). The influence of the physical education environment on children's well-being and physical activity across the transition from primary to secondary school. *Journal of Sport and Exercise Psychology*, 36(6), 574-583. doi:10.1123/jsep.2014-0038
- *Telford, R. M., Telford, R. D., Olive, L. S., Cochrane, T., & Davey, R. (2016). Why Are Girls Less Physically Active than Boys? Findings from the LOOK Longitudinal Study. *PLoS ONE*, 11(3), e0150041. doi:10.1371/journal.pone.0150041
- *Tessier, D., Sarrazin, P., & Ntoumanis, N. (2010). The effect of an intervention to improve newly qualified teachers' interpersonal style, students motivation and psychological need satisfaction in sport-based physical education. *Contemporary Educational Psychology*, 35(4), 242-253. doi:10.1016/j.cedpsych.2010.05.005
- Thalluri, J., Flaherty, J. A., & Shepherd, P. L. (2014). Classmate Peer- Coaching: A Study Buddy Support Scheme. *Journal of Peer Learning*, 7, 92-104.
- Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2015). *Research methods in physical activity* (Seventh edition.. ed.): Champaign, IL : Human Kinetics.
- Tod, D., & Edwards, C. (2015). A meta-analysis of the drive for muscularity's relationships with exercise behaviour, disordered eating, supplement consumption, and exercise dependence. *International Review of Sport and Exercise Psychology*, 8(1), 185-203. doi:10.1080/1750984X.2015.1052089
- Topping, K. J., & Bryce, A. (2004). Cross-Age Peer Tutoring of Reading and Thinking: Influence on thinking skills. *Educational Psychology*, 24(5), 595-621. doi:10.1080/0144341042000262935
- Topping, K. J., & Ehly, S. W. (2001). Peer Assisted Learning: A Framework for Consultation. *Journal of Educational and Psychological Consultation*, 12(2), 113-132. doi:10.1207/S1532768XJEPC1202_03
- Topping, K. J., Peter, C., Stephen, P., & Whale, M. (2004). Cross-age peer tutoring of science in the primary school: influence on scientific language and thinking. *Educational Psychology*, 24(1), 57-75. doi:10.1080/0144341032000146449
- *Trouilloud, D., Sarrazin, P., Bressoux, P., & Bois, J. (2006). Relation between teachers' early expectations and students' later perceived competence in physical education classes: Autonomy-supportive climate as a moderator. *Journal of Educational Psychology*, 98(1), 75-86. doi:10.1037/0022-0663.98.1.75
- Turner, J. C., & Patrick, H. (2008). How Does Motivation Develop and Why Does It Change? Reframing Motivation Research. *Educational Psychologist*, 43(3), 119-131. doi:10.1080/00461520802178441
- *Ullrich-French, S., & Cox, A. (2009). Using cluster analysis to examine the combinations of motivation regulations of physical education students. *Journal of Sport and Exercise Psychology*, 31(3), 358-379.
- *Ullrich-French, S., & Cox, A. E. (2014). Normative and intraindividual changes in physical education motivation across the transition to middle school: A multilevel growth analysis. *Sport, Exercise, and Performance Psychology*, 3(2), 132-147. doi:10.1037/spy0000005
- *Ullrich-French, S., Cox, A. E., & Cooper, B. R. (2016). Examining combinations of social physique anxiety and motivation regulations using latent profile analysis.
- Vallerand, R. J. (1997). Toward A Hierarchical Model of Intrinsic and Extrinsic Motivation. In P. Z. Mark (Ed.), *Advances in Experimental Social Psychology* (Vol. Volume 29, pp. 271-360): Academic Press.
- *van Aart, I., Hartman, E., Elferink-Gemser, M., Mombarg, R., & Visscher, C. (2015). Relations among basic psychological needs, PE-motivation and fundamental movement skills in 9-12-year-old boys and girls in Physical Education. *Physical Education and Sport Pedagogy*, 1-20. doi:10.1080/17408989.2015.1112776
- Van den Berghe, L., Vansteenkiste, M., Cardon, G., Kirk, D., & Haerens, L. (2014). Research on self-determination in physical education: key findings and proposals for future research. *Physical Education and Sport Pedagogy*, 19(1), 97-121. doi:10.1080/17408989.2012.732563
- *Van den Berghe, L., Cardon, G., Tallir, I., Kirk, D., & Haerens, L. (2016). Dynamics of need-supportive and need-thwarting teaching behavior: the bidirectional relationship with student

- engagement and disengagement in the beginning of a lesson. *Physical Education and Sport Pedagogy*, 21(6), 653-670. doi:10.1080/17408989.2015.111500
- *Van den Berghe, L., Tallir, I. B., Cardon, G., Aelterman, N., & Haerens, L. (2015). Student (dis)engagement and need-supportive teaching behavior: a multi-informant and multilevel approach. *J Sport Exerc Psychol*, 37(4), 353-366. doi:10.1123/jsep.2014-0150
- Verloigne, M., De Bourdeaudhuij, I., Tanghe, A., Hondt, E., Theuwis, L., Vansteenkiste, M., & Deforche, B. (2011). Self-determined motivation towards physical activity in adolescents treated for obesity: an observational study. *The International Journal of Behavioral Nutrition and Physical Activity*, 8, 97-97. doi:10.1186/1479-5868-8-97
- *Vierling, K. K., Standage, M., & Treasure, D. C. (2007). Predicting attitudes and physical activity in an "at-risk" minority youth sample: A test of self-determination theory. *Psychology of Sport and Exercise*, 8(5), 795-817. doi:http://dx.doi.org/10.1016/j.psychsport.2006.12.006
- *Viira, R., & Koka, A. (2012). Participation in afterschool sport: Relationship to perceived need support, need satisfaction, and motivation in physical education. *Kinesiology*, 44(2), 199-208.
- Viswesvaran, C., & Ones, D. (1995). Theory testing: Combining psychometric meta-analysis and structural equations modeling. *Personnel Psychology*, 48(4), 865.
- *Vlachopoulos, S. P. (2012). The role of self-determination theory variables in predicting middle school students' subjective vitality in physical education. *Hellenic Journal of Psychology*, 9(2), 179-204.
- *Vlachopoulos, S. P., Katartzi, E. S., & Kontou, M. G. (2011). The basic psychological needs in physical education scale. *Journal of Teaching in Physical Education*, 30(3), 263-280.
- *Vlachopoulos, S. P., Katartzi, E. S., & Kontou, M. G. (2013). Fitting multidimensional amotivation into the self-determination theory nomological network: Application in school physical education. *Measurement in Physical Education and Exercise Science*, 17(1), 40-61. doi:10.1080/1091367X.2013.741366
- *Vlachopoulos, S. P., Katartzi, E. S., Kontou, M. G., Moustaka, F. C., & Goudas, M. (2011). The revised perceived locus of causality in physical education scale: Psychometric evaluation among youth. *Psychology of Sport and Exercise*, 12(6), 583-592. doi:10.1016/j.psychsport.2011.07.003
- Von Elm, E., Altman, D. G., Egger, M., Pocock, S. J., Gøtzsche, P. C., & Vandenbroucke, J. P. (2014). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: Guidelines for reporting observational studies. *International Journal of Surgery*, 12(12), 1495-1499. doi:10.1016/j.ijssu.2014.07.013
- *Vlachopoulos, S. P., Katartzi, E. S., & Kontou, M. G. (2013). Fitting multidimensional amotivation into the self-determination theory nomological network: Application in school physical education. *Measurement in Physical Education and Exercise Science*, 17(1), 40-61. doi:10.1080/1091367X.2013.741366
- *Wallhead, T., Garn, A. C., Vidoni, C., & Youngberg, C. (2013). Game play participation of amotivated students during sport education. *Journal of Teaching in Physical Education*, 32(2), 149-165. doi:10.1080/1357332960010102
- *Wallhead, T. L., Garn, A. C., & Vidoni, C. (2013). Sport Education and social goals in physical education: relationships with enjoyment, relatedness, and leisure-time physical activity. *Physical Education and Sport Pedagogy*, 18(4), 427-441. doi:10.1080/17408989.2012.690377
- *Wallhead, T. L., Garn, A. C., & Vidoni, C. (2014). Effect of a sport education program on motivation for physical education and leisure-time physical activity. *Research Quarterly for Exercise and Sport*, 85(4), 478-487. doi:10.1080/02701367.2014.961051
- *Wallhead, T. L., & Ntoumanis, N. (2004). Effects of a Sport Education Intervention on Students' Motivational Responses in Physical Education. *Journal of Teaching in Physical Education*, 23(1), 4-18
- *Wang, C. K. J., Chatzisarantis, N. L. D., Spray, C. M., & Biddle, S. J. H. (2002). Achievement goal profiles in school physical education: Differences in self-determination, sport ability beliefs, and physical activity. *British Journal of Educational Psychology*, 72(3), 433-445. doi:10.1348/000709902320634401

- *Wang, C. K. J., Liu, W. C., Sun, Y., Lim, B. S. C., & Chatzisarantis, N. L. D. (2010). Chinese students' motivation in physical activity: Goal profile analysis using Nicholl's achievement goal theory. *International Journal of Sport and Exercise Psychology*, 8(3), 284-301. doi:10.1080/1612197X.2010.9671954
- *Wang, J. C. K., & Liu, W. C. (2007). Promoting enjoyment in girls' physical education: The impact of goals, beliefs, and self-determination. *European Physical Education Review*, 13(2), 145-164. doi:10.1177/1356336X07076875
- *Ward, J., Wilkinson, C., Graser, S. V., & Prusak, K. A. (2008). Effects of choice on student motivation and physical activity behavior in physical education. *Journal of Teaching in Physical Education*, 27(3), 385-398
- *Whipp, P. R., Jackson, B., Dimmock, J. A., & Soh, J. (2015). The effects of formalized and trained non-reciprocal peer teaching on psychosocial, behavioral, pedagogical, and motor learning outcomes in physical education. *Frontiers in Psychology*, 6.
- White, R. L., Babic, M. J., Parker, P. D., Lubans, D. R., Astell-Burt, T., & Lonsdale, C. (2017). Domain-Specific Physical Activity and Mental Health: A Meta-analysis. *American Journal of Preventive Medicine*. doi:10.1016/j.amepre.2016.12.008
- *Wilson, A. J., Liu, Y., Keith, S. E., Wilson, A. H., Kermer, L. E., Zumbo, B. D., & Beauchamp, M. R. (2012). Transformational teaching and child psychological needs satisfaction, motivation, and engagement in elementary school physical education. *Sport, Exercise, and Performance Psychology*, 1(4), 215-230. doi:10.1037/a002863
- *Xiang, P., Chen, S., & Gao, Z. (2013). Instructional Choices and Student Engagement in Physical Education. *Asian Journal of Exercise & Sports Science*, 10(1), 90-97.
- *Yli-Piipari, S., John Wang, C. K., & Liukkonen, J. (2012). Examining the Growth Trajectories of Physical Education Students' Motivation, Enjoyment, and Physical Activity: A Person-Oriented Approach. *Journal of Applied Sport Psychology*, 24(4), 401-417. doi:10.1080/10413200.2012.67709
- *Yli-Piipari, S., Leskinen, E., Jaakkola, T., & Liukkonen, J. (2012). Predictive role of physical education motivation: The developmental trajectories of physical activity during grades 7-9. *Research Quarterly for Exercise and Sport*, 83(4), 560-569. doi:10.5641/027013612804582650
- *Yli-Piipari, S., Watt, A., Jaakkola, T., Liukkonen, J., & Nurmi, J. E. (2009). Relationships between physical education students' motivational profiles, enjoyment, state anxiety, and self-reported physical activity. *Journal of Sports Science and Medicine*, 8(3), 327-336
- *Yoo, J. (2015). Perceived autonomy support and behavioral engagement in physical education: A conditional process model of positive emotion and autonomous motivation. *Percept Mot Skills*, 120(3), 731-746. doi:10.2466/06.PMS.120v20x8
- Yu, C., Li, X., & Zhang, W. (2015). Predicting Adolescent Problematic Online Game Use from Teacher Autonomy Support, Basic Psychological Needs Satisfaction, and School Engagement: A 2-Year Longitudinal Study. *Cyberpsychology, Behavior, and Social Networking*, 18(4), 228-233. doi:10.1089/cyber.2014.0385
- *Zahariadis, P. N., Tsorbatzoudis, H., & Grouios, G. (2005). The sport motivation scale for children: Preliminary analysis in physical education classes. *Percept Mot Skills*, 101(1), 43-54.
- *Zhang, T. (2009). Relations among school students' self-determined motivation, perceived enjoyment, effort, and physical activity behaviors. *Percept Mot Skills*, 109(3), 783-790. doi:10.2466/PMS.109.3.783-79
- *Zhang, T., Solmon, M. A., & Gu, X. (2012). The role of teachers' support in predicting students' motivation and achievement outcomes in physical education. *Journal of Teaching in Physical Education*, 31(4), 329-343. doi:10.1080/1041320049043793
- *Zhang, T., Solmon, M. A., Kosma, M., Carson, R. L., & Gu, X. (2011). Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education*, 30(1), 51-68
- *Zhao, Q., & Li, W. (2016). Measuring Perceptions of Teachers' Caring Behaviors and Their Relationship to Motivational Responses in Physical Education Among Middle School Students. *Physical Educator*, 73(3), 510-529.

- 1791 *Zourbanos, N., Papaioannou, A., Argyropoulou, E., & Hatzigeorgiadis, A. (2014). Achievement
1792 goals and self-talk in physical education: The moderating role of perceived competence.
1793 *Motivation and Emotion*, 38(2), 235-251. doi:10.1007/s11031-013-9378-x

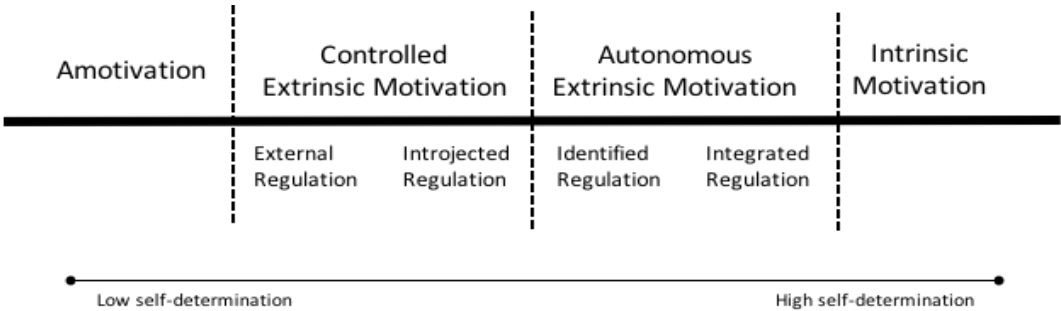


Figure 1. The Self-determination continuum

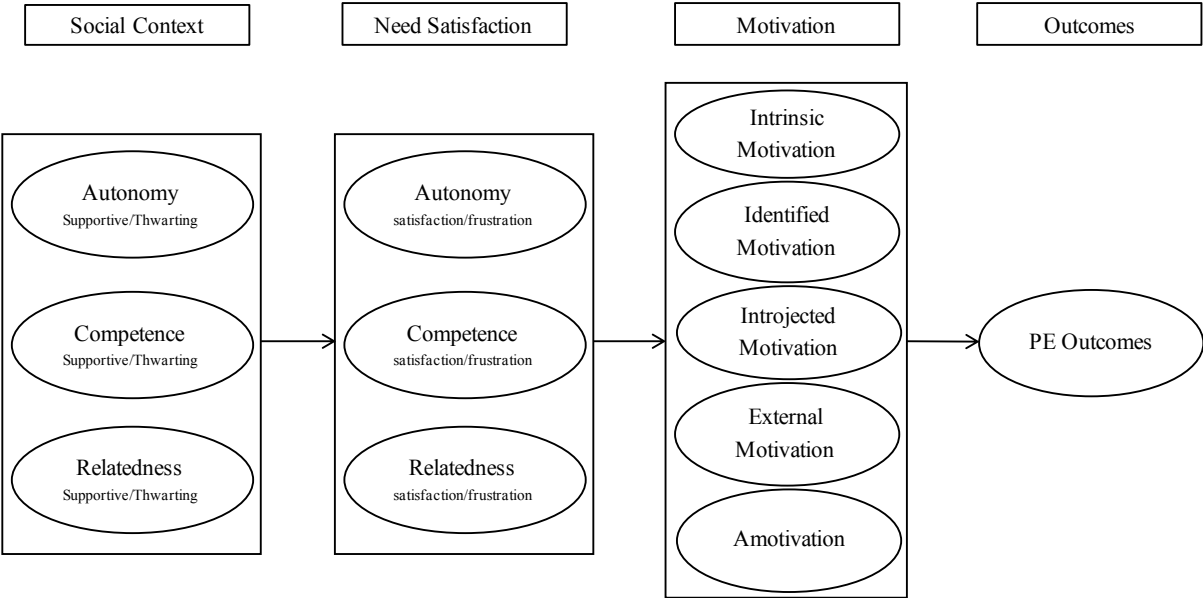


Figure 2. Model of motivational sequence in the context of school physical education, adapted from Vallerand (1997)

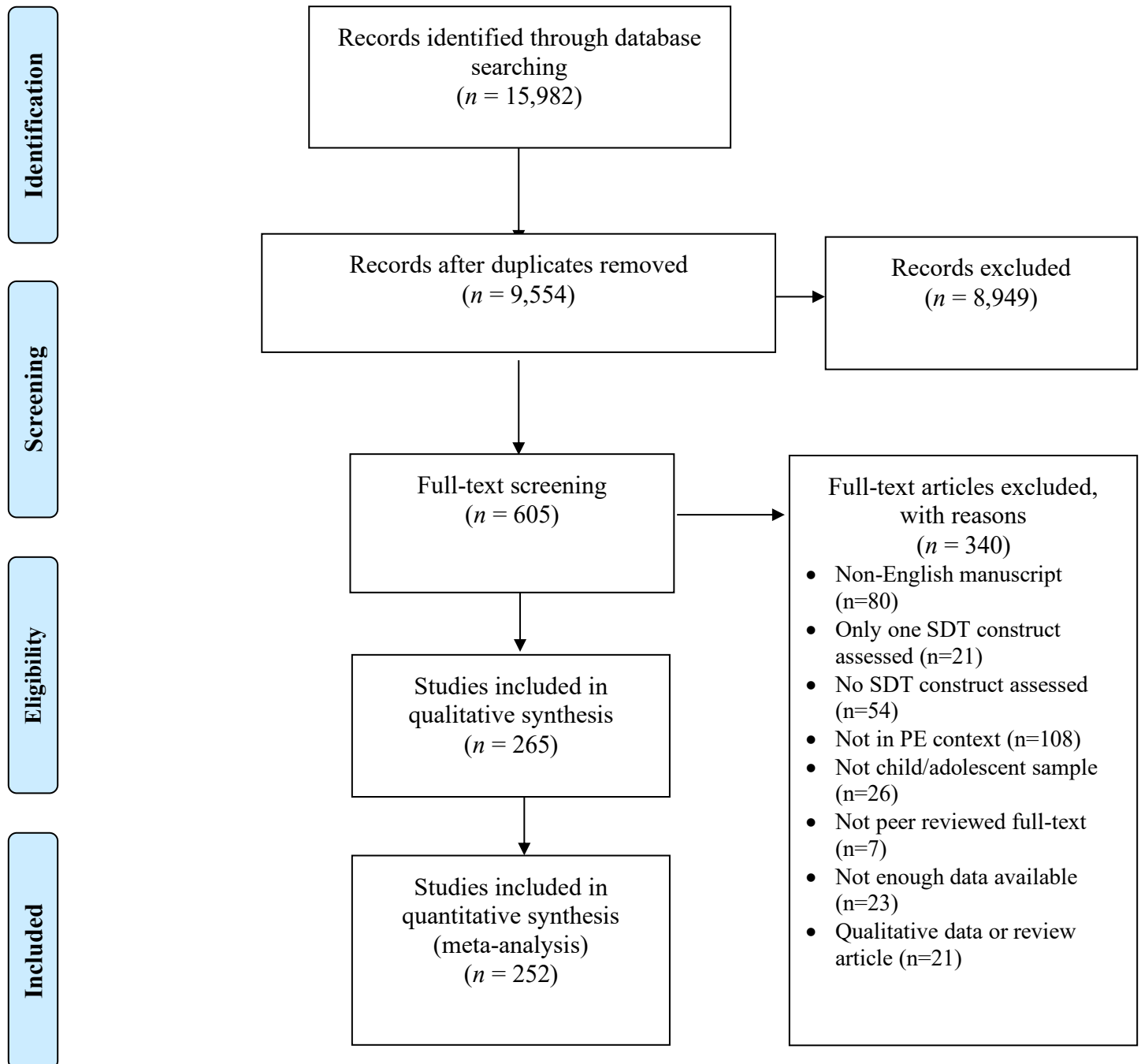


Figure 3. Flow diagram of literature search results

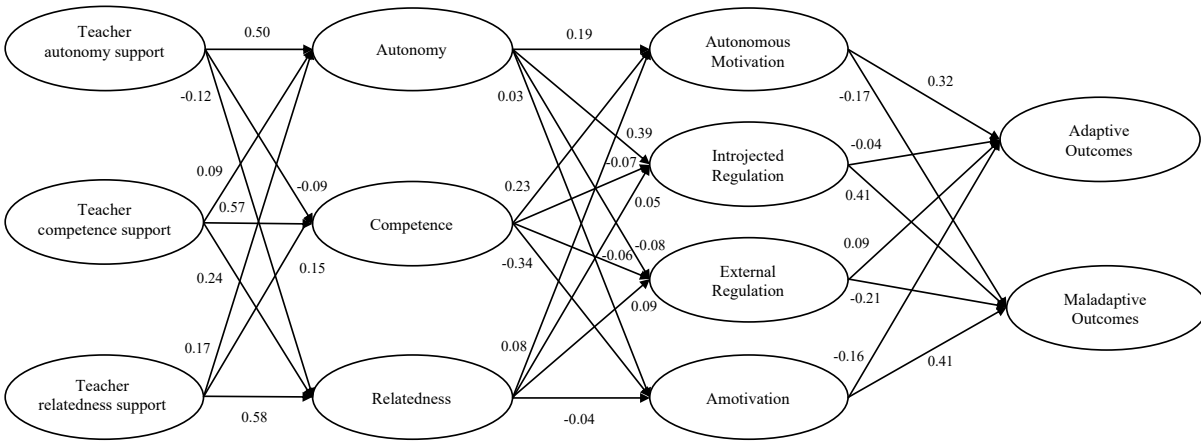


Figure 4. Motivational sequence as proposed by SDT applied to physical education
(harmonic mean of the sample sizes, N = 18,947)

Note. All paths are significantly different from zero, $p < 0.001$.

Table 1

Meta-Analyzed Correlations Involving Teacher Support, Peer Support, Needs Satisfaction, Motivation, and Student Outcomes in the Physical Education Context

	Teacher Autonomy Support	Teacher Competence Support	Teacher Relatedness Support	Teacher Controlling Behavior	Teachers' Relative Need Support	Peer Support	Autonomy	Competence	Relatedness	Total Needs Satisfaction	Total Needs Frustration
Teacher Competence Support	.76(12)										
Teacher Relatedness Support	.82(14)	.79(12)									
Teacher Controlling Behavior	-.19(1)	(0)	(0)								
Teachers' Relative Need Support	.76(16)	.76(12)	.80(15)	-.40(2)							
Peer Support	.42(2)	.45(1)	.44(2)	(0)	.41(6)						
Autonomy	.70(29)	.60(7)	.65(9)	.16(2)	.61(47)	.39(4)					
Competence	.46(30)	.62(6)	.52(9)	.45(4)	.37(52)	.27(4)	.65(54)				
Relatedness	.53(27)	.61(6)	.67(12)	-.08(2)	.49(47)	.69(5)	.60(51)	.58(50)			
Total Needs Satisfaction	.57(36)	.61(7)	.62(14)	.37(5)	.48(63)	.51(5)	(0)	(0)			
Total Needs Frustration	-.16(2)	(0)	(0)	.80(2)	-.55(3)	(0)	(0)	(0)			
Intrinsic Motivation	.52(25)	.62(6)	.53(13)	.25(3)	.46(49)	.29(1)	.61(33)	.62(53)	.55(34)	.59(55)	-.45(1)
Integrated Regulation	(0)	(0)	(0)	(0)	(0)	(0)	.66(1)	.78(2)	.30(1)	.66(2)	(0)
Identified Regulation	.49(18)	.61(4)	.51(10)	-.19(1)	.48(33)	.41(1)	.54(27)	.60(38)	.52(30)	.56(40)	-.39(1)
Introjected Regulation	.20(17)	.32(4)	.24(10)	.28(1)	.19(28)	.32(1)	.35(28)	.27(39)	.27(30)	.29(41)	-.07(1)
External Regulation	-.11(18)	-.08(4)	-.15(9)	.41(1)	-.07(34)	.25(1)	-.13(29)	-.10(41)	-.07(32)	-.10(43)	-.13(1)
Amotivation	-.25(26)	-.35(7)	-.28(11)	.37(2)	-.24(39)	-.12(1)	-.29(26)	-.42(32)	-.30(28)	-.32(39)	.32(3)
Autonomous Motivation	.50(37)	.63(6)	.53(13)	.12(4)	.47(64)	.34(2)	.57(42)	.60(66)	.51(45)	.56(73)	-.13(3)
Controlled Motivation	.04(22)	.12(4)	.07(10)	.36(2)	.05(40)	.29(1)	.08(32)	.07(46)	.09(36)	.09(52)	.08(3)
Self-determination Index	.17(45)	.13(8)	.17(18)	.17(8)	.21(90)	.23(4)	.31(55)	.32(80)	.27(59)	.33(94)	-.10(3)
Outcomes within PE	.36(44)	.33(8)	.29(15)	.20(9)	.33(73)	.21(2)	.48(38)	.53(83)	.45(41)	.52(96)	.48(6)
Outcomes outside PE	.25(20)	.34(2)	.22(5)	(0)	.25(25)	.36(3)	.34(20)	.47(38)	.35(21)	.41(40)	(0)
Affective Outcomes	.45(40)	.23(5)	.27(12)	.38(5)	.34(60)	.42(3)	.48(38)	.56(70)	.47(42)	.54(78)	.48(3)
Behavioral Outcomes	.29(44)	.43(8)	.29(13)	.04(7)	.29(70)	.26(4)	.33(34)	.48(70)	.35(34)	.45(83)	.47(4)
Cognitive Outcomes	.28(31)	.30(6)	.26(10)	(0)	.26(36)	.55(1)	.40(19)	.50(34)	.39(19)	.46(36)	.41(1)
Adaptive Outcomes	.37(56)	.38(9)	.38(18)	-.27(7)	.39(89)	.33(5)	.44(50)	.52(105)	.43(53)	.51(117)	-.37(4)
Maladaptive Outcomes	-.25(13)	-.26(3)	-.14(9)	.45(3)	-.26(25)	-.35(1)	-.26(16)	-.27(31)	-.32(19)	-.26(37)	.53(5)
Outcomes (overall)	.33(58)	.34(9)	.33(18)	.20(9)	.31(92)	.31(5)	.43(50)	.51(107)	.41(53)	.49(120)	.48(6)
Total studies (k)	68	13	26	13	121	5	85	152	87	167	6

Table 1
Continued

	Intrinsic Motivation	Integrated Regulation	Identified Regulation	Introjected Regulation	External Regulation	Amotivation	Autonomous Motivation	Controlled Motivation	Self- determination Index
Integrated Regulation	.88(4)								
Identified Regulation	.88(65)	.84(4)							
Introjected Regulation	.48(57)	.65(4)	.62(57)						
External Regulation	-.08(69)	.19(4)	-.02(64)	.56(56)					
Amotivation	-.47(57)	-.02(4)	-.38(52)	.05(44)	.58(52)				
Autonomous Motivation	.89(49)	.84(4)	.85(22)	.56(58)	-.03(69)	-.43(62)			
Controlled Motivation	.30(51)	.45(4)	.67(45)	.58(37)	.52(21)	.37(59)	.25(83)		
Outcomes in PE	.47(69)	-.54(1)	.42(47)	.24(39)	-.02(52)	-.20(58)	.44(83)	.09(62)	.47(107)
Outcomes out of PE	.42(31)	.48(1)	.38(22)	.25(18)	-.03(24)	-.26(20)	.42(43)	.10(27)	.38(54)
Affective Outcomes	.43(54)	-.25(2)	.35(38)	.22(34)	.04(44)	-.11(43)	.40(70)	.12(49)	.48(88)
Behavioral Outcomes	.48(52)	.59(1)	.40(40)	.21(34)	-.08(42)	-.27(40)	.44(68)	.05(49)	.39(93)
Cognitive Outcomes	.49(31)	.47(1)	.52(24)	.28(22)	-.05(23)	-.34(25)	.50(44)	.11(28)	.43(55)
Adaptive Outcomes	.57(84)	.48(1)	.53(60)	.26(51)	-.07(65)	-.37(63)	.54(105)	.06(75)	.44(139)
Maladaptive Outcomes	-.26(31)	-.54(1)	-.23(25)	.13(22)	.25(29)	.45(30)	-.25(38)	.20(35)	.37(45)
Outcomes (overall)	.54(86)	.50(2)	.50(61)	.29(52)	.27(66)	.40(67)	.51(108)	.27(77)	.43(142)
<i>Total studies (k)</i>	145	4	103	92	118	112	108	77	108

Note. Each data point represents the meta-analyzed correlation, with the number of studies (*k*) listed in parentheses. A (0) shows an absence of studies

examining that particular relationship. The last row shows the total number of studies per construct. Composite measures displayed in the table are: Teachers' Relative Need Support (Autonomy Support, Competence Support, Relatedness Support, and Controlling Behavior [multiplied by -1]). Total Needs Satisfaction (Autonomy, Competence, and Relatedness). Autonomous motivation (Intrinsic Motivation, Integrated Regulation, and Identified Regulation). Controlled motivation (Introjected Regulation and External Regulation). Self-determination Index (SDI) was calculated using the formula: $SDI = 2(\text{Intrinsic Motivation}) + 1(\text{average of Integrated Regulation and Identified Regulation}) - 1(\text{average of Introjected Regulation and External Regulation}) - 2(\text{Amotivation})$.

Table 2

Comparison of Meta-Analyzed Relationships from Cross-Sectional and Experimental Studies

Cross-sectional				Experimental			
Relationship	Coef. (<i>r</i>)	Lower 95% CI	Upper 95% CI	Relationship	Coef. (<i>r</i>)	Lower 95% CI	Upper 95% CI
Need support – need support	NA	NA	NA	Intervention – need support	.53	0.34	0.68
Need support – need satisfaction	NA	NA	NA	Intervention – need satisfaction	.33	0.16	0.48
Need support – Autonomy	.61	0.51	0.69	Intervention – Autonomy	.51	0.38	0.61
Need support – Competence	.37	0.28	0.44	Intervention – Competence	.31	-0.07	0.61
Need support – Relatedness	.49	0.42	0.56	Intervention – Relatedness	.21	0.07	0.26
Need support – Autonomous Motivation	.47	0.42	0.51	Intervention – Autonomous Motivation	.26	0.16	0.34
Need support – Introjected Regulation	.19	0.12	0.26	Intervention – Introjected Regulation	.20	0.05	0.34
Need support – External Regulation	-.07	-0.18	0.05	Intervention – External Regulation	.19	-0.05	0.21
Need support – Amotivation	-.24	-0.29	-0.18	Intervention – Amotivation	.08	-0.01	0.16
Need support – Adaptive Outcomes	.39	0.34	0.43	Intervention – Adaptive Outcomes	.33	0.20	0.45
Need support – Maladaptive Outcomes	-.26	-0.32	-0.20	Intervention – Maladaptive Outcomes	-.25	-0.38	-0.12

Table 3

Summary of Significant Moderation Effects

	<i>k</i>	#ES	Sample size		Coefficient (<i>r</i>)	Lower 95% CI	Upper 95% CI	<i>R</i> ² ₂	<i>R</i> ² ₃	<i>F</i> ² ₂	<i>F</i> ² ₃	<i>Q</i> statistic
			Total	Harmonic Mean								
Autonomy – Competence Culture (<i>p</i> <.001)	54	66	32833	271	.65	0.58	0.71	0.00	0.22	0.08	0.91	5854.978
Individualistic	32	39	17894	281	.54	0.44	0.63			0.04	0.94	
Collectivistic	21	26	14224	285	.78	0.70	0.84			0.15	0.84	
Sex (<i>p</i> <.001)								0.57	0.01			
Both	50	59	29969	295	.67	0.60	0.73			0.03	0.96	
Male	4	4	1482	191	.28	-0.03	0.54			0.48	0.48	
Female	3	3	1382	275	.38	0.26	0.50			0.40	0.40	
Autonomy – External Regulation Culture (<i>p</i> =.012)	29	36	14082	220	-.13	-0.23	-0.03	0.06	0.21	0.13	0.84	912.3109
Individualistic	18	23	9294	260	-.22	-0.32	-0.12			0.19	0.76	
Collectivistic	11	13	4788	164	.03	-0.13	0.18			0.09	0.86	
Relatedness – External Regulation Culture (<i>p</i> =.037)	32	39	15192	223	-.07	-0.14	0.00	0.01	0.11	0.00	0.94	592.9022
Individualistic	19	24	8928	250	-.14	-0.22	-0.05			0.14	0.79	
Collectivistic	13	15	6264	190	.02	-0.11	0.14			0.00	0.94	
Introjected Regulation – External Regulation Culture (<i>p</i> =.035)	56	66	26196	228	.56	0.48	0.63	0.00	0.51	0.84	0.14	3777.35
Individualistic	35	43	15788	224	.49	0.38	0.59			0.93	0.06	
Collectivistic	21	23	10408	235	.66	0.55	0.74			0.71	0.27	
Introjected Regulation – Amotivation Sex (<i>p</i> <.001)	44	65	26437	255	.05	-0.03	0.14	0.00	0.08	0.40	0.58	1817.888
Both	43	64	26337	247	.06	-0.02	0.15			0.41	0.56	
Male	1	1	100	100	-.39	0.54	-0.21			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Introjected Regulation – Adaptive Outcomes Sex (<i>p</i> =.017)	51	125	49964	253	.26	0.18	0.31	0.00	0.24	0.37	0.59	2966.77
Both	49	121	49321	262	.25	0.19	0.31			0.43	0.53	
Male	1	3	300	100	.66	0.58	0.72			0.16	0.00	
Female	1	1	343	343	-.21	-0.31	-0.10			0.50	0.50	

Introjected Regulation – Maladaptive Outcomes	22	31	11837	212	.13	0.01	0.24			0.69	0.28	1033.303
Culture ($p=.049$)								0.00	0.62			
Individualistic	14	19	6853	273	.05	-0.06	0.17			0.96	0.00	
Collectivistic	8	12	4984	156	.24	0.02	0.44			0.20	0.78	
Age ($p=.035$)								0.00	0.71			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	8	13	6663	215	.28	0.11	0.43			0.98	0.00	
Adolescents	14	18	5174	210	.04	-0.09	0.16			0.32	0.62	

Note. k = number of studies, #ES = number of effect sizes, r = population effect size, R^2_2 and R^2_3 = proportion of variance explained by the moderator variable at Level 2 (within study) and Level 3 (between study), respectively. I^2_2 and I^2_3 = proportion of variability in effect sizes at Level 2 and 3, respectively.

Table 4

Correlation Matrix for the Path Analysis

	1	2	3	4	5	6	7	8	9	10	11	12
1.Autonomy support	-	12	14	29	30	27	37	17	18	26	56	13
2.Competence support	.76	-	12	7	6	6	6	4	4	7	8	3
3.Relatedness support	.82	.79	-	9	9	12	13	10	9	11	18	9
4.Autonomy	.70	.60	.65	-	54	51	42	28	29	26	50	16
5.Competence	.46	.62	.52	.65	-	50	66	39	41	32	105	31
6.Relatedness	.53	.61	.67	.60	.58	-	45	30	32	28	53	19
7.Autonomous Motivations	.50	.63	.53	.57	.60	.51	-	58	69	62	105	38
8.Introjected Regulation	.20	.32	.24	.35	.27	.27	.56	-	56	44	51	22
9. External Regulation	-.11	-.08	-.15	-.13	-.10	-.07	-.03	.56	-	52	65	29
10.Amotivation	-.25	-.35	-.28	-.29	-.43	-.30	-.43	.05	.58	-	63	30
11.Adaptive Outcomes	.37	.40	.38	.44	.52	.43	.54	.26	-.07	-.37	-	53
12.Maladaptive Outcomes	-.25	-.26	-.14	-.26	-.27	-.32	-.25	.13	.25	.45	-.21	-

Note. Lower diagonal = meta-analyzed correlations. Upper diagonal = corresponding number of studies.

Path Analysis Direct and Indirect Effects

	Direct effect			Indirect Effect		
	Estimate	SE	p value	Estimate	SE	p value
Adaptive outcomes						
Autonomous motivation	.32	.011	.000			
Introjected regulation	-.04	.011	.000			
External regulation	.09	.010	.000			
Amotivation	-.16	.009	.000			
Autonomy	.01	.012	.324			
Competence	.26	.010	.000			
Relatedness	.10	.009	.000			
Teacher autonomy support	.14	.014	.000	.13	.014	.000
Teacher competence support	-.19	.012	.000	.41	.013	.000
Teacher relatedness support	.02	.014	.267	.10	.013	.000
Maladaptive outcomes						
Autonomous motivation	-.17	.011	.000			
Introjected regulation	.41	.012	.000			
External regulation	-.21	.011	.000			
Amotivation	.41	.010	.000			
Autonomy	-.17	.012	.000			
Competence	.10	.010	.000			
Relatedness	-.32	.009	.000			
Teacher autonomy support	-.23	.014	.000	-.08	.014	.000
Teacher competence support	-.16	.013	.000	-.15	.013	.000
Teacher relatedness support	.53	.014	.000	.16	.015	.000
Autonomous motivation						
Autonomy	.19	.010	.000			
Competence	.23	.009	.000			
Relatedness	.08	.009	.000			
Teacher autonomy support	-.04	.012	.002			
Teacher competence support	.39	.011	.000			
Teacher relatedness support	-.05	.012	.000			
Introjected regulation						
Autonomy	.39	.012	.000			
Competence	-.07	.011	.000			
Relatedness	.05	.011	.000			
Teacher autonomy support	-.31	.015	.000			
Teacher competence support	.36	.014	.000			
Teacher relatedness support	-.04	.015	.015			
External regulation						
Autonomy	-.08	.013	.000			
Competence	-.06	.012	.000			
Relatedness	.09	.012	.000			
Teacher autonomy support	.06	.016	.000			
Teacher competence support	.13	.015	.000			
Teacher relatedness support	-.28	.017	.000			
Amotivation						
Autonomy	.03	.012	.009			
Competence	-.34	.011	.000			
Relatedness	-.04	.011	.000			
Teacher autonomy support	.02	.015	.295			
Teacher competence support	-.16	.014	.000			
Teacher relatedness support	.02	.015	.209			
Autonomy						
Teacher autonomy support	.50	.010	.000			
Teacher competence support	.09	.010	.000			
Teacher relatedness support	.17	.011	.000			
Competence						
Teacher autonomy support	-.09	.011	.000			
Teacher competence support	.57	.011	.000			
Teacher relatedness support	.15	.012	.000			
Relatedness						
Teacher autonomy support	-.12	.011	.000			
Teacher competence support	.24	.010	.000			
Teacher relatedness support	.58	.011	.000			

Online Supplements for:

Self-Determination Theory Applied to Physical Education: A Systematic Review and Meta-Analysis

These online supplements are to be posted on the journal website and hot-linked to the manuscript. If the journal does not offer this possibility, these materials can alternatively be posted on one of our personal websites or an open science framework website (we will adjust the in-text reference upon acceptance).

We developed these materials to provide additional technical information and to keep the main manuscript from becoming needlessly long. We would, however, be happy to have some of these materials brought back into the main manuscript, or included as published appendices if the editor deems it useful.

Meta-analyzed correlations involving teacher support, peer support, needs satisfaction, behavioral regulations, and student outcomes in the physical education context.

	k	#ES	Sample size		Coefficient (r)	Lower 95% CI	Upper 95% CI	I ² ₂	I ² ₃	Q statistic
			Total	Harmonic Mean						
<i>Teacher autonomy support and social context constructs</i>										
Teacher autonomy support – Teacher competence support	12	13	6313	313	.757	0.62	0.85	0.75	0.03	1181.203
Teacher autonomy support – Teacher relatedness support	14	14	10487	327	.817	0.69	0.90	0.46	0.46	2362.787
Teacher autonomy support – Teacher controlling behavior	1	1	499	499	-.188	-0.27	-0.10	0.46	0.46	0
Teacher autonomy support – Teacher's relative support	16	28	17299	324	.756	0.63	0.85	0.46	0.46	4182.156
Teacher autonomy support – Peer support	2	4	2347	562	.422	NA	NA	0.70	0.00	26.28821
<i>Teacher autonomy support and psychological needs</i>										
Teacher autonomy support – Autonomy	29	34	15919	227	.704	0.61	0.78	0.09	0.90	2458.197
Teacher autonomy support – Competence	30	35	15897	227	.458	0.38	0.53	0.00	0.96	695.8443
Teacher autonomy support – Relatedness	27	32	15524	256	.533	0.46	0.60	0.01	0.97	1011.23
Teacher autonomy support – Total needs satisfaction	36	105	50343	241	.568	0.49	0.64	0.50	0.49	7117.522
Teacher autonomy support – Total needs frustration	2	2	1516	670	-.160	-0.37	-0.07	0.47	0.47	36.27193
<i>Teacher autonomy support and motivation</i>										
Teacher autonomy support – Intrinsic Motivation	25	31	13625	234	.523	0.47	0.58	0.40	0.53	414.7777
Teacher autonomy support – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Teacher autonomy support – Identified Regulation	18	22	9625	242	.490	0.41	0.56	0.27	0.68	353.0336
Teacher autonomy support – Introjected Regulation	17	21	8336	231	.199	0.12	0.28	0.15	0.77	192.1669
Teacher autonomy support – External Regulation	18	22	9625	242	-.109	-0.22	0.00	0.40	0.56	825.4535
Teacher autonomy support – Amotivation	26	60	25164	266	-.247	-0.32	-0.18	0.27	0.67	1085.847
Teacher autonomy support – Autonomous motivation	37	68	28697	242	.501	0.45	0.55	0.16	0.78	1194.218
Teacher autonomy support – Controlled motivation	22	46	19367	243	.040	-0.12	0.20	0.97	0.00	1578.95
Teacher autonomy support – Self-determination Index	54	201	83475	242	.191	0.12	0.26	0.91	0.08	15580.0
<i>Teacher autonomy support and student outcomes</i>										
Teacher autonomy support – Affective outcomes	40	91	42318	218	.445	0.36	0.52	0.49	0.50	6426.868
Teacher autonomy support – Behavioral outcomes	44	84	25774	197	.294	0.25	0.38	0.43	0.52	1929.396
Teacher autonomy support – Cognitive outcomes	31	87	26856	170	.283	0.22	0.35	0.72	0.22	1624.485
Teacher autonomy support – In PE outcomes	44	105	51449	245	.359	0.26	0.45	0.44	0.55	7557.209
Teacher autonomy support – Out of PE outcomes	20	136	34005	157	.250	0.18	0.31	0.80	0.14	2073.121
Teacher autonomy support – Adaptive outcomes	56	241	87478	201	.374	0.32	0.44	0.42	0.55	8205.038
Teacher autonomy support – Maladaptive outcomes	13	21	7470	136	-.250	-0.36	-0.14	0.04	0.90	109.8943
Teacher autonomy support – Outcomes (overall)	58	262	94948	193	.326	0.26	0.39	0.46	0.52	10349.31
<i>Teacher competence support and social context constructs</i>										
Teacher competence support – Teacher relatedness support	12	12	5749	302	.792	0.67	0.87	0.46	0.46	1499.346
Teacher competence support – Teacher's relative support	12	13	6313	313	.757	0.62	0.85	0.5	0.03	1818.203
Teacher competence support – Peer support	1	3	1947	649	.449	0.33	0.55	0.72	0.00	30.14666
<i>Teacher competence support and psychological needs</i>										
Teacher competence support – Autonomy	7	7	4391	422	.601	0.49	0.69	0.48	0.48	137.3371
Teacher competence support – Competence	6	6	4144	478	.616	0.50	0.71	0.48	0.48	135.0711
Teacher competence support – Relatedness	6	6	4144	478	.608	0.50	0.69	0.48	0.48	118.0848
Teacher competence support – Total needs satisfaction	7	19	12679	456	.608	0.53	0.68	0.58	0.38	390.968

Teacher competence support – Total needs frustration	0	0	-	-	-	-	-	-	-	-
<i>Teacher competence support and motivation</i>										
Teacher competence support – Intrinsic Motivation	6	6	4144	478	.623	0.55	0.68	0.45	0.45	58.67413
Teacher competence support – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Teacher competence support – Identified Regulation	4	4	2166	473	.608	0.50	0.70	0.46	0.46	55.04766
Teacher competence support – Introjected Regulation	4	4	2166	473	.317	0.19	0.43	0.45	0.45	49.37274
Teacher competence support – External Regulation	4	4	2166	473	-.080	-0.28	0.12	0.48	0.48	104.8497
Teacher competence support – Amotivation	7	14	6932	298	-.351	-0.44	-0.26	0.23	0.68	186.2875
Teacher competence support – Autonomous motivation	6	10	6310	476	.627	0.55	0.69	0.00	0.97	117.4986
Teacher competence support – Controlled motivation	4	8	4332	473	.123	-0.06	0.30	0.97	0.00	344.9873
Teacher competence support – Self-determination Index	8	33	18361	383	.133	-0.09	0.34	0.83	0.16	4613.904
<i>Teacher competence support and student outcomes</i>										
Teacher competence support – Affective outcomes	5	7	6333	466	.229	-0.34	0.71	0.99	0.00	1448.152
Teacher competence support – Behavioral outcomes	8	8	2811	306	.430	0.33	0.56	0.45	0.45	99.27441
Teacher competence support – Cognitive outcomes	6	8	4088	354	.304	0.18	0.42	0.91	0.00	109.4845
Teacher competence support – In PE outcomes	8	20	10826	349	.329	0.19	0.45	0.98	0.00	1643.388
Teacher competence support – Out of PE outcomes	2	2	2120	683	.342	.015	0.51	0.47	0.47	30.5602
Teacher competence support – Adaptive outcomes	8	19	10282	342	.397	0.30	0.48	0.71	0.24	549.1612
Teacher competence support – Maladaptive outcomes	3	3	2422	481	-.260	-0.41	-0.10	0.46	0.46	41.82589
Teacher competence support – Outcomes (overall)	9	23	13232	361	.335	0.22	0.45	0.98	0.00	1679.876
<i>Teacher relatedness support and social context constructs</i>										
Teacher relatedness support – Teacher's relative support	15	26	16236	315	.795	0.69	0.87	0.57	0.34	4248.902
Teacher relatedness support – Peer support	2	4	2321	548	.438	0.40	0.48	0.32	0.00	5.817272
<i>Teacher relatedness support and psychological needs</i>										
Teacher relatedness support – Autonomy	9	9	4994	384	.646	0.51	0.75	0.49	0.49	307.4592
Teacher relatedness support – Competence	9	9	5736	441	.522	0.37	0.65	0.49	0.49	320.7369
Teacher relatedness support – Relatedness	12	14	6767	328	.670	0.56	0.76	0.59	0.39	483.5638
Teacher relatedness support – Total needs satisfaction	14	32	17497	370	.620	0.54	0.69	0.98	0.00	1275.265
Teacher relatedness support – Total needs frustration	0	0	-	-	-	-	-	-	-	-
<i>Teacher relatedness support and motivation</i>										
Teacher relatedness support – Intrinsic Motivation	13	13	8786	366	.531	0.43	0.62	0.49	0.49	449.2365
Teacher relatedness support – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Teacher relatedness support – Identified Regulation	10	10	4640	323	.514	0.44	0.58	0.45	0.45	72.42099
Teacher relatedness support – Introjected Regulation	10	11	4806	298	.242	0.15	0.33	0.90	0.00	141.2983
Teacher relatedness support – External Regulation	9	10	4557	303	-.153	-0.31	0.01	0.00	0.96	309.8564
Teacher relatedness support – Amotivation	11	27	10549	258	-.281	-0.38	-0.17	0.16	0.78	414.1287
Teacher relatedness support – Autonomous motivation	13	24	13592	331	.527	0.44	0.60	0.05	0.90	534.4104
Teacher relatedness support – Controlled motivation	10	21	9363	300	.074	-0.05	0.20	0.97	0.00	860.793
Teacher relatedness support – Self-determination Index	18	76	35097	290	.165	0.06	0.27	0.91	0.08	6581.58
<i>Teacher relatedness support and student outcomes</i>										
Teacher relatedness support – Affective outcomes	12	22	15724	371	.270	0.13	0.40	0.99	0.00	1919.459
Teacher relatedness support – Behavioral outcomes	13	16	5313	360	.293	0.18	0.40	0.94	0.14	195.0896
Teacher relatedness support – Cognitive outcomes	10	15	9327	405	.261	0.15	0.37	0.97	0.00	669.5587
Teacher relatedness support – In PE outcomes	15	41	22063	322	.288	0.31	0.42	0.98	0.00	2247.577
Teacher relatedness support – Out of PE outcomes	5	10	7766	433	.220	0.07	0.36	0.98	0.00	581.6534
Teacher relatedness support – Adaptive outcomes	18	41	23960	339	.383	0.32	0.44	0.96	0.00	1118.155
Teacher relatedness support – Maladaptive outcomes	9	12	6404	324	-.137	-0.25	-0.02	0.43	0.51	209.515
Teacher relatedness support – Outcomes (overall)	18	53	2120	336	.327	0.19	0.35	0.98	0.00	2941.327
Teacher controlling behavior – Teacher's relative support	2	2	1999	749	-.399	-0.63	-0.10	0.45	0.45	78.83368

<i>Teacher controlling behavior and psychological needs</i>										
Teacher controlling behavior – Autonomy	2	2	127	60	.159	0.18	0.33	-	-	0
Teacher controlling behavior – Competence	4	4	1693	111	.450	-0.09	0.78	0.50	0.50	165.488
Teacher controlling behavior – Relatedness	2	2	127	60	-.077	-0.25	0.10	0.00	0.00	0
Teacher controlling behavior – Total needs satisfaction	5	9	2446	86	.370	-0.09	0.70	0.05	0.94	792.4133
Teacher controlling behavior – Total needs frustration	2	5	2907	578	.796	0.78	0.81	0.98	0.00	216.2175
<i>Teacher controlling behavior and motivation</i>										
Teacher controlling behavior – Intrinsic Motivation	3	4	3416	848	.245	-0.16	0.58	0.06	0.93	497.3077
Teacher controlling behavior – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Teacher controlling behavior – Identified Regulation	1	2	1850	925	-.188	-0.23	-0.14	0.0	0.00	1.6596
Teacher controlling behavior – Introjected Regulation	1	2	1850	925	.282	0.08	0.46	0.95	0.00	41.8999
Teacher controlling behavior – External Regulation	1	2	1850	925	.409	0.19	0.59	0.96	0.00	56.47248
Teacher controlling behavior – Amotivation	2	3	2349	720	.374	0.31	0.44	0.81	0.00	16.53106
Teacher controlling behavior – Autonomous motivation	4	7	5765	788	.123	-0.25	0.46	0.03	0.97	638.3512
Teacher controlling behavior – Controlled motivation	2	5	4199	790	.356	0.23	0.47	0.95	0.00	118.334
Teacher controlling behavior – Self-determination Index	8	20	13108	279	.173	0.06	0.28	0.98	0.00	1284.442
<i>Teacher controlling behavior and student outcomes</i>										
Teacher controlling behavior – Affective outcomes	5	9	4263	220	.377	-0.10	0.71	0.04	0.95	1068.469
Teacher controlling behavior – Behavioral outcomes	7	15	8809	300	.039	-0.25	0.32	0.55	0.44	1713.516
Teacher controlling behavior – Cognitive outcomes	0	0	-	-	-	-	-	-	-	-
Teacher controlling behavior – In PE outcomes	9	24	13072	264	.198	-0.15	0.50	0.22	0.78	2784.0.51
Teacher controlling behavior – Out of PE outcomes	0	0	-	-	-	-	-	-	-	-
Teacher controlling behavior – Adaptive outcomes	7	14	6257	187	-.274	-0.60	0.13	0.23	0.76	1641.606
Teacher controlling behavior – Maladaptive outcomes	3	10	6815	627	.448	0.24	0.62	0.17	0.80	140.4947
Teacher controlling behavior – Outcomes (overall)	9	24	13072	264	.198	-0.15	0.50	0.22	0.78	2784.051
Teacher's relative support – Peer support	6	14	7731	364	.410	0.34	0.48	0.92	0.00	167.8989
<i>Teacher's relative support and psychological needs</i>										
Teacher's relative support – Autonomy	47	71	33650	214	.607	0.51	0.69	0.46	0.53	6731.532
Teacher's relative support – Competence	52	76	38527	227	.367	0.28	0.44	0.65	0.33	6177.197
Teacher's relative support – Relatedness	47	70	33593	222	.493	0.42	0.56	0.09	0.89	2667.486
Teacher's relative support – Total needs satisfaction	63	225	111129	226	.483	0.41	0.55	0.53	0.46	19841.71
Teacher's relative support – Total needs frustration	3	7	4423	602	-.546	-0.82	-0.06	0.27	0.72	1230.108
<i>Teacher's relative support and motivation</i>										
Teacher's relative support – Intrinsic Motivation	49	89	46107	281	.459	0.40	0.51	0.70	0.28	4851.444
Teacher's relative support – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Teacher's relative support – Identified Regulation	33	47	21876	257	.479	0.42	0.53	0.24	0.71	902.7806
Teacher's relative support – Introjected Regulation	28	43	19633	255	.190	0.12	0.26	0.15	0.79	944.1823
Teacher's relative support – External Regulation	34	49	22546	256	-.065	-0.18	0.05	0.16	0.82	2959.581
Teacher's relative support – Amotivation	39	113	48409	261	-.235	-0.29	-0.18	0.22	0.72	1917.356
Teacher's relative support – Autonomous motivation	64	157	77645	272	.467	0.42	0.51	0.48	0.49	6508.219
Teacher's relative support – Controlled motivation	40	97	44414	261	.049	0.02	0.12	0.83	0.15	5100.291
Teacher's relative support – Self-determination Index	90	411	186595	255	.206	0.15	0.26	0.86	0.13	36659.61
<i>Teacher's relative support and student outcomes</i>										
Teacher's relative support – Affective outcomes	60	157	79243	230	.340	0.25	0.42	0.46	0.53	13854.71
Teacher's relative support – Behavioral outcomes	70	155	62733	213	.291	0.23	0.35	0.54	0.44	7220.462
Teacher's relative support – Cognitive outcomes	36	122	47622	206	.264	0.21	0.32	0.64	0.31	2746.72
Teacher's relative support – In PE outcomes	73	252	131160	250	.332	0.26	0.40	0.52	0.47	21201
Teacher's relative support – Out of PE	25	153	45429	167	.253	0.20	0.31	0.82	0.13	2793.535
Teacher's relative support – Adaptive outcomes	89	382	161496	216	.389	0.34	0.43	0.44	0.54	12754.95

Teacher's relative support – Enjoyment	22	28	21540	182	.442	0.33	0.54	0.08	0.90	1112.061
Teacher's relative support – Intentions	18	28	13199	218	.229	0.17	0.29	0.03	0.85	379.3334
Teacher's relative support – Leisure-time physical activity	19	26	7622	189	.214	0.16	0.27	0.82	0.00	149.0411
Teacher's relative support – Maladaptive outcomes	25	52	28102	222	-.260	-0.32	-0.20	0.42	0.53	972.9953
Teacher's relative support – Boredom	6	10	7381	237	-.211	-0.35	-0.07	0.43	0.53	332.3978
Teacher's relative support – Negative affect	1	3	906	302	-.261	-0.32	-0.20	0.00	0.00	0.976733
Teacher's relative support – Pressure	0	0	-	-	-	-	-	-	-	-
Teacher's relative support – Outcomes (overall)	92	434	189598	217	.310	0.26	0.36	0.53	0.46	24493.09
<i>Peer support and psychological needs</i>										
Peer support – Autonomy	4	6	3398	537	.389	0.23	0.52	0.00	0.94	64.7373
Peer support – Competence	4	6	3398	537	.272	0.19	0.35	0.32	0.47	23.76874
Peer support – Relatedness	5	7	37772	505	.691	0.43	0.84	0.24	0.74	625.8202
Peer support – Total needs satisfaction	5	20	10942	514	.505	0.37	0.62	0.99	0.00	1567.282
Peer support – Total needs frustration	0	0	-	-	-	-	-	-	-	-
<i>Peers support and motivation</i>										
Peer support – Intrinsic Motivation	1	3	1947	649	.288	0.21	0.36	0.73	0.00	11.15426
Peer support – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Peer support – Identified Regulation	1	3	1947	649	.408	0.33	0.48	0.74	0.00	11.67106
Peer support – Introjected Regulation	1	3	1947	649	.322	0.26	0.38	0.48	0.00	5.727865
Peer support – External Regulation	1	3	1947	649	.251	0.21	0.29	0.00	0.00	0.3014666
Peer support – Amotivation	1	3	1947	649	-.123	-0.17	-0.08	0.00	0.00	1.205866
Peer support – Autonomous motivation	2	7	4550	650	.343	0.28	0.40	0.84	0.00	42.61461
Peer support – Controlled motivation	1	6	3894	649	.287	0.25	0.33	0.49	0.00	11.7249
Peer support – Self-determination Index	4	18	11186	607	.232	0.15	0.31	0.95	0.00	388.687
<i>Peer support and student outcomes</i>										
Peer support – Affective outcomes	3	10	3907	390	.417	0.10	0.66	0.58	0.40	620.8108
Peer support – Behavioral outcomes	4	8	2734	177	.257	0.11	0.39	0.01	0.86	80.27364
Peer support – Cognitive outcomes	1	3	1200	400	.551	0.51	0.59	0.00	0.00	2.1438
Peer support – In PE outcomes	2	6	1626	145	.214	-0.04	0.44	0.96	0.00	210.435
Peer support – Out of PE outcomes	3	12	5030	411	.362	0.05	0.61	0.36	0.61	349.2231
Peer support – Adaptive outcomes	5	20	7467	265	.334	0.15	0.50	0.44	0.52	533.7074
Peer support – Maladaptive outcomes	1	1	374	374	-.345	-0.43	-0.25	0.50	0.50	0
Peer support – Outcomes (overall)	5	21	7841	268	.313	0.11	0.49	0.56	0.41	786.5199
Autonomy – Competence	54	66	32833	285	.651	0.58	0.71	0.08	0.91	5864.978
Autonomy – Relatedness	51	62	30482	280	.596	0.54	0.65	0.60	0.38	2941.103
<i>Autonomy and motivation</i>										
Autonomy – Intrinsic Motivation	33	45	19637	246	.608	0.55	0.66	0.15	0.81	1433.764
Autonomy – Integrated Regulation	1	1	1035	1035	.658	0.62	0.69	0.50	0.50	0
Autonomy – Identified Regulation	27	34	13493	216	.539	0.47	0.60	0.09	0.87	964.3973
Autonomy – Introjected Regulation	28	35	12779	213	.346	0.26	0.42	0.22	0.73	809.4907
Autonomy – External Regulation	29	36	14082	220	-.131	-0.23	-0.03	0.13	0.84	912.3109
Autonomy – Amotivation	26	44	20058	288	-.288	-0.36	-0.20	0.34	0.62	1317.835
Autonomy – Autonomous motivation	42	91	39530	237	.565	0.52	0.61	0.19	0.77	2817.283
Autonomy – Controlled motivation	32	74	27572	215	.080	-0.01	0.17	0.98	0.00	3681.837
Autonomy – Self-determination Index	55	229	96239	242	.310	0.24	0.38	0.93	0.06	23141.9
<i>Autonomy and student outcomes</i>										
Autonomy – Affective outcomes	38	84	39478	263	.480	0.41	0.54	0.53	0.45	4452.615
Autonomy – Behavioral outcomes	34	64	22696	234	.329	0.27	0.39	0.26	0.68	882.8606
Autonomy – Cognitive outcomes	19	31	13093	297	.403	0.32	0.48	0.29	0.67	761.9699

Autonomy – In PE outcomes	38	96	41210	230	.478	0.42	0.53	0.56	0.42	4336.056
Autonomy – Out of PE outcomes	20	59	23389	273	.343	0.27	0.42	0.28	0.66	1074.389
Autonomy – Adaptive outcomes	50	157	64659	262	.439	0.35	0.49	0.27	0.71	7060.165
Autonomy – Enjoyment	13	14	5569	188	.626	0.55	0.69	0.01	0.93	328.5677
Autonomy – Intentions	13	13	5972	250	.412	0.32	0.50	0.47	0.47	255.796
Autonomy – Leisure-time physical activity	12	18	5451	216	.269	0.19	0.35	0.92	0.00	223.6504
Autonomy – Maladaptive outcomes	16	22	10608	226	-.262	-0.35	-0.17	0.56	0.40	597.3015
Autonomy – Boredom	6	6	3060	156	-.279	-0.47	-0.05	0.48	0.48	270.1471
Autonomy – Negative affect	4	4	1528	237	-.449	-0.49	-0.40	0.00	0.00	3.705079
Autonomy – Pressure	1	1	507	507	-	-	-	-	-	-
Autonomy – Outcomes (overall)	50	179	75267	257	.427	0.37	0.48	0.41	0.55	7081.651
Competence – Relatedness	50	62	29643	267	.584	0.54	0.62	0.41	0.55	1346.914
<i>Competence and motivation</i>										
Competence – Intrinsic Motivation	53	77	34717	278	.624	0.57	0.67	0.06	0.92	3999.749
Competence – Integrated Regulation	2	2	1155	215	.779	0.40	0.93	0.49	0.49	83.23875
Competence – Identified Regulation	38	46	19222	231	.600	0.53	0.67	0.05	0.93	2288.444
Competence – Introjected Regulation	39	46	18374	232	.272	0.19	0.34	0.11	0.85	1279.321
Competence – External Regulation	41	51	20863	237	-.104	-0.19	-0.01	0.21	0.76	1792.998
Competence – Amotivation	32	51	22444	276	-.426	-0.48	-0.35	0.40	0.55	1184.763
Competence – Autonomous motivation	66	140	61432	257	.597	0.55	0.64	0.16	0.81	7119.12
Competence – Controlled motivation	46	101	40225	232	.074	0.04	0.11	0.98	0.00	4985.708
Competence – Self-determination Index	82	319	138789	257	.320	0.26	0.38	0.95	0.04	41306.2
<i>Competence and student outcomes</i>										
Competence – Affective outcomes	70	151	79474	263	.560	0.51	0.60	0.77	0.21	10439.31
Competence – Behavioral outcomes	70	148	70641	269	.484	0.43	0.54	0.30	0.67	5327.355
Competence – Cognitive outcomes	34	62	32244	264	.498	0.43	0.56	0.70	0.27	2384.242
Competence – In PE outcomes	83	217	102554	234	.534	0.49	0.59	0.62	0.36	12750.56
Competence – Out of PE outcomes	38	103	58725	316	.465	0.41	0.52	0.59	0.39	4202.792
Competence – Adaptive outcomes	105	314	160710	278	.524	0.48	0.57	0.44	0.54	19172.39
Competence – Enjoyment	34	40	21363	202	.649	0.59	0.70	0.18	0.80	1557.954
Competence – Intentions	22	27	16422	289	.548	0.48	0.61	0.24	0.73	607.9957
Competence – Leisure-time physical activity	23	36	19452	302	.402	0.32	0.48	0.42	0.55	889.1627
Competence – Maladaptive outcomes	31	47	21649	204	-.274	-0.39	-0.15	0.69	0.30	3092.718
Competence – Boredom	7	7	3818	176	-.389	-0.66	-0.04	0.50	0.50	787.484
Competence – Negative affect	4	4	1528	237	-.397	-0.50	-0.28	0.33	0.33	30.48893
Competence – Pressure	8	8	4757	183	-.418	-0.68	-0.06	0.50	0.50	832.3137
Competence – Outcomes (overall)	107	361	182359	266	.513	0.47	0.55	0.55	0.43	19171.54
<i>Relatedness and motivation</i>										
Relatedness – Intrinsic Motivation	34	45	19739	245	.546	0.49	0.60	0.00	0.96	1200.911
Relatedness – Integrated Regulation	1	1	1035	1035	.300	0.24	0.36	0.50	0.50	0
Relatedness – Identified Regulation	30	37	14603	220	.513	0.46	0.57	0.06	0.88	710.084
Relatedness – Introjected Regulation	30	37	13598	215	.269	0.19	0.35	0.23	0.72	669.4537
Relatedness – External Regulation	32	39	15192	223	-.074	-0.14	0.00	0.00	0.94	592.9022
Relatedness – Amotivation	28	46	20974	290	-.297	-0.36	-0.23	0.17	0.77	593.4189
Relatedness – Autonomous motivation	45	97	41515	237	.511	0.46	0.56	0.06	0.89	2223.138
Relatedness – Controlled motivation	36	80	29875	218	.086	0.02	0.15	0.97	0.00	2360.506
Relatedness – Self-determination Index	59	244	101301	243	.271	0.21	0.33	0.88	0.10	17701.42
<i>Relatedness and student outcomes</i>										
Relatedness – Affective outcomes	42	96	43558	268	.470	0.42	0.51	0.70	0.26	3069.381

Relatedness – Behavioral outcomes	34	66	22454	227	.348	0.28	0.41	0.22	0.73	1337.632
Relatedness – Cognitive outcomes	19	31	13088	297	.387	0.30	0.46	0.17	0.77	603.6847
Relatedness – In PE outcomes	41	109	44974	231	.454	0.41	0.50	0.65	0.32	3341.281
Relatedness – Out of PE outcomes	21	60	23932	277	.348	0.28	0.42	0.38	0.56	1178.01
Relatedness – Adaptive outcomes	53	167	67415	262	.426	0.38	0.47	0.39	0.57	4849.132
Relatedness – Enjoyment	14	15	6149	202	.601	0.51	0.68	0.00	0.96	334.3802
Relatedness – Intentions	12	12	5886	296	.428	0.33	0.51	0.47	0.47	191.2753
Relatedness – Leisure-time physical activity	12	18	5722	226	.292	0.25	0.33	0.89	0.00	171.9011
Relatedness – Maladaptive outcomes	19	26	11685	224	-.318	-0.40	-0.24	0.41	0.54	565.2307
Relatedness – Boredom	5	5	2974	186	-.313	-0.45	0.16	0.46	0.46	113.3976
Relatedness – Negative affect	3	3	965	199	-.359	-0.41	-0.30	0.00	0.00	0.1413272
Relatedness – Pressure	1	1	507	507	-	-	-	-	-	-
Relatedness – Outcomes (overall)	53	193	79100	256	.414	0.37	0.46	0.49	0.47	5610.566
<i>Total needs satisfaction and motivation</i>										
Total needs satisfaction – Intrinsic Motivation	55	165	74785	270	.590	0.55	0.63	0.64	0.33	7079.43
Total needs satisfaction – Integrated Regulation	2	4	3225	356	.661	0.36	0.84	0.99	0.00	722.1565
Total needs satisfaction – Identified Regulation	40	115	48010	235	.561	0.52	0.61	0.66	0.31	4303.047
Total needs satisfaction – Introjected Regulation	41	116	45443	232	.288	0.22	0.35	0.20	0.76	2807.712
Total needs satisfaction – External Regulation	43	124	50829	239	-.101	-0.17	-0.02	0.18	0.79	3430.258
Total needs satisfaction – Amotivation	39	144	68087	306	-.315	-0.39	-0.23	0.24	0.74	5813.696
Total needs satisfaction – Autonomous motivation	73	329	147092	257	.562	0.53	0.60	0.59	0.39	13804.29
Total needs satisfaction – Controlled motivation	52	254	100800	234	.086	0.03	0.14	0.85	0.13	11465.61
Total needs satisfaction – Self-determination Index	94	793	348958	263	.330	0.28	0.38	0.89	0.10	89060.33
<i>Total needs satisfaction and student outcomes</i>										
Total needs satisfaction – Affective outcomes	78	332	165567	277	.537	0.49	0.58	0.60	0.38	20040.8
Total needs satisfaction – Behavioral outcomes	83	295	122822	249	.450	0.40	0.50	0.33	0.65	11700.11
Total needs satisfaction – Cognitive outcomes	36	126	62091	302	.461	0.41	0.51	0.57	0.40	4333.795
Total needs satisfaction – In PE outcomes	96	432	199157	243	.516	0.48	0.55	0.61	0.37	25055.88
Total needs satisfaction – Out of PE outcomes	40	228	108065	294	.407	0.36	0.46	0.57	0.39	7259.37
Total needs satisfaction – Adaptive outcomes	117	657	304399	276	.508	0.47	0.55	0.38	0.60	34950.67
Total needs satisfaction – Maladaptive outcomes	37	96	46081	230	-.262	-0.34	-0.18	0.54	0.44	4340.113
Total needs satisfaction – Outcomes (overall)	120	753	350480	269	.488	0.45	0.52	0.51	0.47	38140.38
<i>Total needs frustration and motivation</i>										
Total needs frustration – Intrinsic Motivation	1	3	258	86	-.449	-0.54	-0.34	0.00	0.00	1.150933
Total needs frustration – Integrated Regulation	0	0	-	-	-	-	-	-	-	-
Total needs frustration – Identified Regulation	1	3	258	86	-.388	-0.49	-0.28	0.00	0.00	-
Total needs frustration – Introjected Regulation	1	3	258	86	-.067	-0.19	0.06	0.00	0.00	0.171533
Total needs frustration – External Regulation	1	3	258	86	-.129	-0.25	-0.01	0.00	0.00	1.0126
Total needs frustration – Amotivation	3	5	1503	128	.319	0.01	0.57	0.00	0.94	77.74608
Total needs frustration – Autonomous motivation	3	8	1761	108	-.132	-0.37	0.12	0.00	0.89	83.35051
Total needs frustration – Controlled motivation	3	8	1761	108	.077	-0.04	0.20	0.00	0.69	26.79871
Total needs frustration – Self-determination Index	3	24	5283	108	-.100	NA	NA	0.97	0.00	420.3911
<i>Total needs frustration and student outcomes</i>										
Total needs frustration – Affective outcomes	3	15	5622	175	.484	0.43	0.54	0.87	0.00	133.2277
Total needs frustration – Behavioral outcomes	4	5	2758	459	.469	0.27	0.63	0.40	0.56	132.0665
Total needs frustration – Cognitive outcomes	1	3	258	86	.411	0.25	0.55	0.56	0.00	6.778333
Total needs frustration – In PE outcomes	6	23	8638	175	.481	0.42	0.54	0.91	0.00	273.5089
Total needs frustration – Out of PE outcomes	0	0	-	-	-	-	-	-	-	-
Total needs frustration – Adaptive outcomes	4	12	4105	148	-.371	-0.53	-0.18	0.85	0.12	465.0063

Total needs frustration – Maladaptive outcomes	5	11	4533	218	.531	0.42	0.63	0.61	0.33	170.7178
Total needs frustration – Outcomes (overall)	6	23	8638	175	.481	0.42	0.54	0.91	0.00	273.5089
<i>Intrinsic motivation and motivation</i>										
Intrinsic Motivation – Integrated Regulation	4	4	2019	239	.882	0.66	0.96	0.46	0.46	1017.219
Intrinsic Motivation – Identified Regulation	65	92	37946	232	.883	0.85	0.91	0.41	0.51	11366.15
Intrinsic Motivation – Introjected Regulation	57	80	31742	232	.479	0.36	0.58	0.38	0.53	11886.43
Intrinsic Motivation – External Regulation	69	96	41349	236	-.078	-0.19	0.04	0.12	0.70	14732.91
Intrinsic Motivation – Amotivation	57	95	42268	254	-.474	-0.56	-0.38	0.16	0.68	5130.822
Intrinsic Motivation – Autonomous motivation	49	103	43358	272	.885	0.85	0.91	0.53	0.39	13429.76
Intrinsic Motivation – Controlled motivation	51	131	55404	253	.299	0.16	0.42	0.57	0.33	27591.48
<i>Intrinsic motivation and student outcomes</i>										
Intrinsic Motivation – Affective outcomes	54	112	58885	271	.429	0.32	0.52	0.94	0.05	21708.38
Intrinsic Motivation – Behavioral outcomes	52	84	30667	204	.480	0.38	0.58	0.26	0.73	7555.852
Intrinsic Motivation – Cognitive outcomes	31	79	43415	384	.490	0.42	0.56	0.71	0.27	4519.694
Intrinsic Motivation – In PE outcomes	69	173	83679	253	.472	0.39	0.54	0.89	0.11	29654.8
Intrinsic Motivation – Out of PE outcomes	31	88	42885	284	.416	0.35	0.48	0.74	0.24	3490.895
Intrinsic Motivation – Adaptive outcomes	84	229	111861	275	.571	0.52	0.62	0.46	0.53	17111.82
Intrinsic Motivation – Enjoyment	22	27	11838	252	.774	0.70	0.83	0.12	0.87	1974.567
Intrinsic Motivation – Intentions	19	28	16015	308	.550	0.48	0.61	0.09	0.86	406.508
Intrinsic Motivation – Leisure-time physical activity	18	24	9541	200	.356	0.31	0.40	0.84	0.00	120.2721
Intrinsic Motivation – Maladaptive outcomes	31	46	21106	233	-.255	-0.38	-0.12	0.60	0.39	3073.88
Intrinsic Motivation – Boredom	9	9	5858	204	-.426	-.069	-0.07	0.50	0.50	810.1588
Intrinsic Motivation – Negative affect	3	3	787	189	-.434	-0.66	-0.14	0.47	0.47	40.06195
Intrinsic Motivation – Pressure	2	2	892	438	-.185	-0.41	0.06	0.46	0.46	26.61928
Intrinsic Motivation – Outcomes (overall)	86	275	132967	267	.542	0.49	0.59	0.54	0.45	20764.74
<i>Integrated regulation and motivation</i>										
Integrated Regulation – Identified Regulation	4	4	2019	239	.840	0.69	0.92	0.46	0.46	283.9688
Integrated Regulation – Introjected Regulation	4	4	2019	239	.651	0.36	0.83	0.46	0.46	141.6663
Integrated Regulation – External Regulation	4	4	2019	239	.188	-0.28	0.58	0.46	0.46	422.3235
Integrated Regulation – Amotivation	4	4	2019	239	-.022	-0.46	0.43	0.46	0.46	409.1117
Integrated Regulation – Autonomous motivation	4	4	2019	239	.840	0.69	0.92	0.46	0.46	283.9688
Integrated Regulation – Controlled motivation	4	8	4038	239	.448	0.11	0.69	0.76	0.00	1387.851
<i>Integrated regulation and student outcomes</i>										
Integrated Regulation – Affective outcomes	2	3	938	166	-.247	-0.18	0.13	0.99	0.00	234.1365
Integrated Regulation – Behavioral outcomes	1	1	698	698	.590	-	-	-	-	-
Integrated Regulation – Cognitive outcomes	1	2	1396	698	.474	0.43	0.51	0.00	0.00	0.31275
Integrated Regulation – In PE outcomes	1	2	240	120	-.544	-0.12	-0.06	0.95	0.00	37.44
Integrated Regulation – Out of PE outcomes	1	4	2792	698	.476	0.34	0.49	0.44	0.00	7.141125
Integrated Regulation – Adaptive outcomes	1	4	2792	698	.476	0.44	0.51	0.44	0.00	7.141125
Integrated Regulation – Enjoyment	0	0	-	-	-	-	-	-	-	-
Integrated Regulation – Intentions	1	1	698	698	-	-	-	-	-	-
Integrated Regulation – Leisure-time physical activity	0	0	-	-	-	-	-	-	-	-
Integrated Regulation – Maladaptive outcomes	1	2	240	120	-.544	-0.82	-0.06	0.95	0.00	37.44
Integrated Regulation – Boredom	0	0	-	-	-	-	-	-	-	-
Integrated Regulation – Negative affect	0	0	-	-	-	-	-	-	-	-
Integrated Regulation – Pressure	0	0	-	-	-	-	-	-	-	-
Integrated Regulation – Outcomes (overall)	2	6	3032	268	.497	0.36	0.61	0.95	0.00	46.42784
<i>Identified regulation and motivation</i>										

Identified Regulation – Introjected Regulation	57	66	26114	219	.621	0.50	0.72	0.06	0.73	14300.94
Identified Regulation – External Regulation	64	76	31058	215	-.022	-0.15	0.11	0.18	0.67	8632.913
Identified Regulation – Amotivation	52	75	31120	234	-.383	-0.50	-0.25	0.09	0.72	8843.167
Identified Regulation – Autonomous motivation	22	26	9675	191	.854	0.79	0.90	0.18	0.67	2702.405
Identified Regulation – Controlled motivation	45	94	38650	230	.670	0.26	0.52	0.73	0.07	26777.84
<i>Identified regulation and student outcomes</i>										
Identified Regulation – Affective outcomes	38	69	31074	237	.352	0.21	0.45	0.99	0.00	8510.556
Identified Regulation – Behavioral outcomes	40	60	21550	198	.403	0.31	0.53	0.33	0.66	3050.027
Identified Regulation – Cognitive outcomes	24	52	24852	316	.522	0.39	0.63	0.67	0.32	5114.727
Identified Regulation – In PE outcomes	47	108	45333	227	.420	0.32	0.51	0.99	0.01	14352.04
Identified Regulation – Out of PE outcomes	22	60	26292	242	.382	0.30	0.46	0.92	0.05	2483.569
Identified Regulation – Adaptive outcomes	60	147	64175	245	.525	0.47	0.59	0.55	0.44	9512.899
Identified Regulation – Enjoyment	16	16	5019	193	.653	0.56	0.73	0.48	0.48	412.91
Identified Regulation – Intentions	13	14	6198	203	.570	0.51	0.63	0.00	0.91	118.1467
Identified Regulation – Leisure-time physical activity	14	19	7338	182	.336	0.27	0.40	0.89	0.00	126.3854
Identified Regulation – Maladaptive outcomes	25	34	13301	215	-.233	-0.36	-0.11	0.50	0.48	1801.857
Identified Regulation – Boredom	7	7	2164	163	-.566	-0.69	-0.42	0.47	0.47	176.0817
Identified Regulation – Negative affect	2	2	402	150	-.461	-0.60	-0.30	0.31	0.31	5.339189
Identified Regulation – Pressure	1	1	507	507	-	-	-	-	-	-
Identified Regulation – Outcomes (overall)	61	180	77476	238	.501	0.45	0.55	0.58	0.40	9667.51
<i>Introjected regulation and motivation</i>										
Introjected Regulation – External Regulation	56	66	26196	228	.560	0.48	0.63	0.84	0.14	3777.35
Introjected Regulation – Amotivation	44	65	26437	255	.053	-0.03	0.14	0.40	0.58	1817.888
Introjected Regulation – Autonomous motivation	58	152	60837	234	.564	0.47	0.65	0.31	0.68	26889.27
Introjected Regulation – Controlled motivation	37	44	17200	229	.576	0.47	0.68	0.68	0.16	3204.795
<i>Introjected regulation and student outcomes</i>										
Introjected Regulation – Affective outcomes	34	61	23019	226	.220	0.15	0.29	0.97	0.00	1714.272
Introjected Regulation – Behavioral outcomes	34	48	17693	221	.214	0.14	0.27	0.58	0.36	837.2092
Introjected Regulation – Cognitive outcomes	22	47	21089	307	.275	0.20	0.34	0.97	0.00	1387.55
Introjected Regulation – In PE outcomes	39	92	35551	227	.238	0.18	0.29	0.97	0.00	2531.136
Introjected Regulation – Out of PE outcomes	18	54	21181	252	.253	0.18	0.33	0.87	0.09	1375.673
Introjected Regulation – Adaptive outcomes	51	125	49964	253	.256	0.18	0.31	0.37	0.59	2966.77
Introjected Regulation – Enjoyment	15	15	4624	193	.350	0.18	0.50	0.49	0.49	477.1424
Introjected Regulation – Intentions	12	13	3861	186	.302	0.16	0.43	0.33	0.62	221.3374
Introjected Regulation – Leisure-time physical activity	10	15	4698	194	.209	0.08	0.33	0.06	0.86	179.2521
Introjected Regulation – Maladaptive outcomes	22	31	11837	212	.129	0.01	0.24	0.69	0.28	1033.303
Introjected Regulation – Boredom	7	7	2164	163	.002	-0.18	0.22	0.48	0.48	161.4044
Introjected Regulation – Negative affect	2	2	402	150	-.107	-0.45	0.26	0.45	0.45	21.35675
Introjected Regulation – Pressure	1	1	507	507	-	-	-	-	-	-
Introjected Regulation – Outcomes (overall)	52	156	61801	243	.291	0.26	0.33	0.77	0.16	2318.506
<i>External regulation and motivation</i>										
External Regulation – Amotivation	52	81	35238	250	.576	0.50	0.65	0.23	0.76	5116.771
External Regulation – Autonomous motivation	69	177	75060	235	-.025	-0.14	0.09	0.15	0.85	23818.91
External Regulation – Controlled motivation	21	24	9184	194	.522	0.41	0.62	0.75	0.00	581.1321
<i>External regulation and student outcomes</i>										
External Regulation – Affective outcomes	44	83	39522	258	.040	-0.04	0.13	0.88	0.11	6484.886
External Regulation – Behavioral outcomes	42	63	22760	201	-.079	-0.16	-0.02	0.26	0.69	1172.345
External Regulation – Cognitive outcomes	23	50	24257	317	-.054	-0.17	0.06	0.54	0.39	2567.219
External Regulation – In PE outcomes	52	122	53737	241	-.018	-0.09	0.05	0.87	0.11	8473.384

External Regulation – Out of PE outcomes	24	63	27589	245	-.028	-0.12	0.07	0.59	0.38	1997.2
External Regulation – Adaptive outcomes	65	157	69410	251	-.073	-0.15	0.01	0.13	0.85	8237.723
External Regulation – Enjoyment	19	20	6980	217	-.127	-0.30	0.06	0.00	0.98	1245.393
External Regulation – Intentions	13	14	6198	203	-.152	-0.27	-0.03	0.10	0.85	284.8654
External Regulation – Leisure-time physical activity	15	21	8250	190	-.035	-0.14	0.07	0.00	0.93	283.5236
External Regulation – Maladaptive outcomes	29	39	17129	231	.251	0.17	0.33	0.62	0.34	1443.061
External Regulation – Boredom	9	9	4924	201	.236	-0.01	0.45	0.49	0.49	786.2404
External Regulation – Negative affect	3	3	787	189	.294	0.06	0.50	0.45	0.45	35.63957
External Regulation – Pressure	2	2	892	438	.264	0.18	0.35	0.23	0.23	3.672374
External Regulation – Outcomes (overall)	66	196	86539	247	.269	0.24	0.31	0.49	0.45	3374.201
<i>Amotivation and motivation</i>										
Amotivation – Autonomous motivation	62	179	77805	256	-.434	-0.52	-0.34	0.29	0.70	14807.1
Amotivation – Controlled motivation	59	148	62203	242	.367	0.30	0.43	0.76	0.00	11987.65
<i>Amotivation and student outcomes</i>										
Amotivation – Affective outcomes	43	107	57361	296	-.106	-0.22	0.02	0.89	0.10	15704.09
Amotivation – Behavioral outcomes	40	72	30835	241	-.272	-0.37	-0.17	0.76	0.22	5411.252
Amotivation – Cognitive outcomes	25	54	26277	298	-.344	-0.43	-0.25	0.79	0.19	2754.312
Amotivation – In PE outcomes	58	188	91124	278	-.201	-0.28	-0.11	0.87	0.12	23338.78
Amotivation – Out of PE outcomes	20	33	17703	244	-.264	-0.37	-0.15	0.82	0.16	1449.627
Amotivation – Adaptive outcomes	63	187	91785	280	-.369	-0.42	-0.31	0.62	0.36	7598.631
Amotivation – Enjoyment	14	14	5575	183	-.519	-0.63	0.38	0.49	0.49	622.9599
Amotivation – Intentions	14	18	10381	251	-.425	-0.52	-0.31	0.41	0.57	661.2996
Amotivation – Leisure-time physical activity	10	10	4826	186	-.279	-0.35	-0.21	0.41	0.41	39.61912
Amotivation – Maladaptive outcomes	30	46	22688	266	.450	0.34	0.55	0.27	0.71	2211.101
Amotivation – Boredom	11	11	7374	236	.630	0.52	0.72	0.49	0.49	609.5242
Amotivation – Negative affect	3	3	787	189	.570	0.38	0.72	0.46	0.46	21.86706
Amotivation – Pressure	3	3	1195	381	.406	0.29	0.51	0.40	0.40	15.30845
Amotivation – Outcomes (overall)	67	233	114473	277	.400	0.35	0.44	0.56	0.42	8207.346
Autonomous motivation – Controlled motivation	83	345	140467	228	.254	0.16	0.35	0.57	0.33	69505.48
<i>Autonomous motivation and student outcomes</i>										
Autonomous motivation – Affective outcomes	70	220	102856	255	.400	0.30	0.48	0.75	0.24	33913.89
Autonomous motivation – Behavioral outcomes	68	188	64361	204	.438	0.35	0.53	0.18	0.80	14815.22
Autonomous motivation – Cognitive outcomes	44	166	79943	320	.502	0.44	0.56	0.59	0.40	10202.63
Autonomous motivation – In PE outcomes	83	826	147716	246	.440	0.36	0.51	0.77	0.22	51382.88
Autonomous motivation – Out of PE outcomes	43	215	85344	243	.416	0.36	0.47	0.69	0.27	6805.421
Autonomous motivation – Adaptive outcomes	105	480	207584	254	.540	0.50	0.58	0.44	0.54	31860.15
Autonomous motivation – Enjoyment	24	46	18083	232	.733	0.66	0.79	0.38	0.60	2566.034
Autonomous motivation – Intentions	28	54	26636	259	.511	0.45	0.57	0.03	0.93	779.6465
Autonomous motivation – Leisure-time physical activity	26	54	19538	197	.337	0.29	0.39	0.27	0.61	327.7702
Autonomous motivation – Maladaptive outcomes	38	94	39576	229	-.253	-0.35	-0.15	0.46	0.52	5162.495
Autonomous motivation – Boredom	10	17	8652	192	-.494	-0.65	-0.29	0.80	0.19	1057.537
Autonomous motivation – Negative affect	3	5	1189	171	-.410	-0.61	-0.16	0.00	0.92	48.73911
Autonomous motivation – Pressure	2	3	1399	459	-.169	-0.36	0.04	0.13	0.78	27.45168
Autonomous motivation – Outcomes (overall)	108	573	247160	249	.513	0.47	0.55	0.50	0.48	35849.44
<i>Controlled motivation and student outcomes</i>										
Controlled motivation – Affective outcomes	49	154	67122	250	.116	0.06	0.17	0.98	0.00	9021.281
Controlled motivation – Behavioral outcomes	49	125	44831	210	.045	-0.01	0.09	0.96	0.00	2992.218
Controlled motivation – Cognitive outcomes	28	101	47530	316	.111	0.03	0.19	0.86	0.12	5035.653
Controlled motivation – In PE outcomes	62	239	99503	240	.088	0.04	0.13	0.94	0.04	12945.75

Controlled motivation – Out of PE outcomes	27	119	49421	249	.100	0.03	0.17	0.86	0.11	4045.843
Controlled motivation – Adaptive outcomes	75	302	126476	252	.064	0.00	0.12	0.66	0.32	14174.08
Controlled motivation – Enjoyment	20	36	12234	210	.098	0.05	0.24	0.97	0.02	2323.391
Controlled motivation – Intentions	15	28	10689	199	.072	-0.04	0.18	0.97	0.00	1013.077
Controlled motivation – Leisure-time physical activity	17	38	13599	196	.064	-0.01	0.14	0.94	0.00	574.8757
Controlled motivation – Maladaptive outcomes	35	78	33007	234	.198	0.13	0.27	0.75	0.22	2740.874
Controlled motivation – Boredom	10	17	7718	190	.130	-0.05	0.30	0.98	0.00	958.1592
Controlled motivation – Negative affect	3	5	1189	171	.136	-0.13	0.39	0.95	0.00	80.83133
Controlled motivation – Pressure	2	3	1399	459	.248	0.20	0.30	0.35	0.00	4.60743
Controlled motivation – Outcomes (overall)	77	380	159483	248	.272	0.25	0.30	0.78	0.15	6027.292
<i>Self-determination Index and student outcomes</i>										
Self-determination Index – Affective outcomes	88	527	245454	261	.481	0.44	0.52	0.75	0.24	30046.44
Self-determination Index – Behavioral outcomes	93	469	168998	206	.390	0.34	0.44	0.42	0.55	20000.56
Self-determination Index – Cognitive outcomes	55	350	166640	295	.431	0.39	0.47	0.71	0.26	14320.47
Self-determination Index – In PE outcomes	107	828	360971	245	.469	0.43	0.50	0.68	0.30	49706.11
Self-determination Index – Out of PE outcomes	54	435	183276	231	.376	0.33	0.42	0.67	0.29	11601.55
Self-determination Index – Adaptive outcomes	139	1120	482168	247	.444	0.41	0.47	0.68	0.30	57605.89
Self-determination Index – Enjoyment	31	108	39984	220	.771	0.70	0.83	0.99	0.00	29320.68
Self-determination Index – Intentions	15	28	10689	199	.271	0.21	0.34	0.92	0.00	333.9236
Self-determination Index – Leisure-time physical activity	17	38	13599	196	.185	0.14	0.23	0.85	0.00	224.612
Self-determination Index – Maladaptive outcomes	45	226	98924	238	.369	0.31	0.42	0.65	0.32	7113.6
Self-determination Index – Boredom	10	17	7718	190	.315	0.24	0.39	0.79	0.13	171.5209
Self-determination Index – Negative affect	3	5	1189	171	.279	0.13	0.42	0.87	0.00	43.0516
Self-determination Index – Pressure	2	3	1399	459	.248	0.20	0.30	0.35	0.00	4.60743
Self-determination Index – Outcomes (overall)	142	1346	581092	245	.431	0.40	0.46	0.68	0.30	65455.3
<i>Between student outcomes</i>										
Adaptive outcomes – Maladaptive outcomes	53	231	109262	302	-.212	-0.33	-0.09	0.43	0.56	22247.34

Self-Determination Theory in Physical Education

Moderation Analysis on Each Association Included in the Model.

	k	#ES	Sample size		Coefficient (r)	Lower 95% CI	Upper 95% CI	R ² _2	R ² _3	I ² _2	I ² _3	Q statistic
			Total	Harmonic Mean								
Teacher's autonomy support – Teacher's competence support	12	13	6313	313	.757	0.62	0.85			0.75	0.03	1181.203
Culture								0.02	0.00			
Individualistic	9	10	4185	319	.762	0.60	0.86			0.95	0.04	
Collectivistic	3	3	2128	296	.742	0.38	0.91			0.49	0.49	
Country								0.00	1.00			
UK	3	3	892	254	.741	0.39	0.91			0.49	0.49	
USA	5	6	2644	334	.729	0.50	0.86			0.99	0.00	
Sex								0.14	1.00			
Both	11	12	6151	340	.732	0.58	0.83			0.99	0.00	
Male	1	1	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	1.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	8	8	4276	301	.856	0.78	0.90			0.49	0.49	
Adolescents	4	5	2037	336	.478	0.24	0.62			0.97	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	12	13	6313	313	.757	0.62	0.85			0.75	0.03	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Teacher's relatedness support	14	14	10487	327	.817	0.69	0.90			0.46	0.46	2362.787
Culture								0.03	0.03			
Individualistic	11	11	8358	336	0.832	0.67	0.92			0.50	0.50	
Collectivistic	3	3	2129	296	0.757	0.70	0.80			0.35	0.35	
Country								0.17	0.17			
UK	3	3	892	254	.819	0.52	0.94			0.49	0.49	
USA	4	4	1512	277	.906	0.67	0.98			0.50	0.50	
Sex								0.10	0.10			
Both	13	13	10325	354	0.799	0.66	0.87			0.50	0.50	
Male	1	1	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.20	0.20			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	10	10	5185	320	.863	0.74	0.93			0.50	0.50	
Adolescents	4	4	5302	345	.631	0.48	0.75			0.48	0.48	
Risk of Bias								0.00	0.00			
Low Risk of Bias	14	14	10487	327	.817	0.69	0.90			0.46	0.46	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support– Autonomy	29	34	15919	227	.704	0.61	0.78			0.09	0.90	2458.197
Culture								0.01	0.00			
Individualistic	17	18	6994	193	.704	0.54	0.82			0.09	0.91	
Collectivistic	11	15	8210	274	.702	0.60	0.78			0.21	0.77	
Country								0.01	0.00			
UK	2	2	-	-	-	-	-			-	-	

USA	0	0	-	-	-	-	-	-	-	-	-	-
Sex												
Both	28	33	15868	254	.711	0.61	0.78	0.01	0.03	0.09	0.90	
Male	1	1	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.20	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	16	19	9263	286	.697	0.61	0.77			0.18	0.80	
Adolescents	15	15	6656	180	.715	0.54	0.83			0.50	0.50	
Risk of Bias								0.00	0.00			
Low Risk of Bias	29	34	15919	227	.704	0.61	0.78			0.09	0.90	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Competence	30	35	15897	227	.458	0.38	0.53			0.00	0.96	695.8443
Culture								0.38	0.05			
Individualistic	19	20	7218	196	.419	0.31	0.52			0.04	0.93	
Collectivistic	10	14	7964	276	.511	0.43	0.59			0.00	0.94	
Country								0.07	0.03			
UK	7	7	2782	205	.400	0.36	0.40			0.11	0.11	
USA	2	2	1070	92	.317	-0.29	0.74			0.47	0.47	
Sex								0.38	0.00			
Both	29	34	15846	253	.452	0.38	0.52			0.00	0.97	
Male	1	1	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.32	0.04			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	17	20	9691	291	.413	0.32	0.50			0.00	0.95	
Adolescents	15	15	6206	176	.507	0.40	0.60			0.48	0.48	
Risk of Bias								0.38	0.00			
Low Risk of Bias	30	35	15897	227	.458	0.38	0.53			0.00	0.96	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Relatedness	27	32	15524	256	.533	0.46	0.60			0.01	0.97	1011.23
Culture								0.00	0.09			
Individualistic	16	17	6845	233	.529	0.43	0.62			0.01	0.95	
Collectivistic	10	14	7964	276	.511	0.38	0.63			0.01	0.97	
Country								0.00	0.04			
UK	5	5	2431	446	.606	0.54	0.67			0.43	0.43	
USA	3	3	1323	116	.527	0.39	0.64			0.40	0.40	
Sex								0.01	0.00			
Both	27	32	15524	256	.533	0.46	0.60			0.01	0.97	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.03	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	17	20	9840	294	.507	0.41	0.60			0.02	0.95	
Adolescents	12	12	5684	210	.554	0.44	0.65			0.49	0.49	
Risk of Bias								0.00	0.00			
Low Risk of Bias	27	32	15524	256	.533	0.46	0.60			0.01	0.97	
High Risk of Bias	0	0	-	-	-	-	-			-	-	

Teacher's autonomy support – Autonomous	37	68	28697	242	.501	0.45	0.55			0.16	0.78	1194.218
Motivation												
Culture								0.01	0.01			
Individualistic	21	37	15595	312	.525	0.47	0.58			0.07	0.85	
Collectivistic	16	31	13102	191	.480	0.39	0.56			0.21	0.74	
Country								0.00	0.02			
UK	6	13	5392	327	.509	0.44	0.57			0.33	0.51	
USA	4	6	3773	455	.467	0.27	0.63			0.02	0.95	
Sex								0.00	0.00			
Both	36	66	26477	234	.506	0.46	0.55			0.16	0.78	
Male	0	0	-	-	-	-	-			-	-	
Female	1	2	-	-	-	-	-			-	-	
Age								0.11	0.03			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	24	45	20464	231	.485	0.42	0.55			0.09	0.86	
Adolescents	16	23	8233	268	.554	0.51	0.60			0.29	0.57	
Risk of Bias								0.00	0.00			
Low Risk of Bias	37	68	28697	242	.501	0.45	0.55			0.16	0.78	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Introjected Regulation	17	21	8336	231	.199	0.12	0.28			0.15	0.77	192.1669
Culture								0.00	0.07			
Individualistic	10	10	4504	398	.233	0.11	0.35			0.47	0.47	
Collectivistic	7	11	3832	167	.169	0.11	0.23			0.76	0.00	
Country								0.00	0.12			
UK	5	5	2431	446	.278	0.18	0.38			0.43	0.43	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	17	21	8336	231	.199	0.12	0.28			0.15	0.77	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								1.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	13	15	5821	198	.184	0.07	0.29			0.00	0.94	
Adolescents	6	6	2515	391	.249	0.21	0.29			0.09	0.09	
Risk of Bias								0.00	0.00			
Low Risk of Bias	17	21	8336	231	.199	0.12	0.28			0.15	0.77	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – External Regulation	18	22	9625	242	-.109	-0.22	0.00			0.40	0.56	825.4535
Culture								0.00	0.03			
Individualistic	11	11	5793	441	-.107	-0.26	0.05			0.49	0.49	
Collectivistic	7	11	3832	167	-.177	-0.25	0.22			0.11	0.88	
Country								0.14	0.60			
UK	4	4	2103	490	-.317	-0.41	-0.22			0.42	0.42	
USA	2	2	1617	696	.223	-0.22	0.59			0.49	0.49	
Sex								0.00	1.00			
Both	17	21	8515	234	-.173	-0.28	-0.06			0.91	0.01	
Male	0	0	-	-	-	-	-			-	-	
Female	1	1	-	-	-	-	-			-	-	
Age								0.62	0.00			

Children	0	0	-	-	-	-	-	-	-	-	-	
Preadolescents	14	16	7110	212	-.085	-0.22	0.05			0.19	0.78	
Adolescents	6	6	2515	391	-.229	-0.35	-0.10			0.45	0.45	
Risk of Bias								0.00	0.00			
Low Risk of Bias	18	22	9625	242	-.109	-0.22	0.00			0.40	0.56	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Amotivation	26	60	25164	266	-.247	-0.32	-0.18			0.27	0.67	1085.847
Culture								0.06	0.12			
Individualistic	16	30	10929	255	-.308	-0.38	-0.23			0.33	0.59	
Collectivistic	10	30	14235	279	-.144	-0.27	-0.01			0.24	0.72	
Country								0.00	0.09			
UK	6	10	3241	238	-.318	-0.41	-0.22			0.89	0.00	
USA	4	14	5217	241	-.662	-0.24	-0.12			0.79	0.00	
Sex								0.18	0.00			
Both	23	46	21908	316	-.245	-0.33	-0.16			0.22	0.73	
Male	2	9	1518	168	-.190	-0.635	-0.02			0.23	0.53	
Female	2	5	1738	190	-.300	NA	NA			0.57	0.00	
Age								0.02	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	18	36	16030	257	-.242	-0.33	-0.15			0.28	0.67	
Adolescents	10	24	9134	282	-.274	-0.37	-0.17			0.27	0.65	
Risk of Bias								0.00	0.00			
Low Risk of Bias	26	60	25164	266	-.247	-0.32	-0.18			0.27	0.67	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's autonomy support – Adaptive Outcomes	56	241	87478	201	.374	0.32	0.44			0.42	0.55	8205.038
Culture								0.01	0.02			
Individualistic	36	166	55080	231	.312	0.27	0.36			0.83	0.12	
Collectivistic	19	71	30724	153	.478	0.34	0.59			0.14	0.85	
Country								0.00	0.00			
UK	9	87	23918	188	.232	0.20	0.26			0.75	0.01	
USA	9	24	9609	304	.326	0.21	0.43			0.80	0.16	
Sex								0.00	0.01			
Both	51	229	85420	208	.372	0.31	0.43			0.46	0.51	
Male	4	7	1073	99	.491	0.07	0.71			0.28	0.70	
Female	3	5	985	169	.413	0.08	0.66			0.97	0.00	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	33	133	48476	190	.391	0.31	0.47			0.22	0.75	
Adolescents	28	108	39002	516	.378	0.29	0.46			0.62	0.36	
Risk of Bias								0.01	0.21			
Low Risk of Bias	55	239	87268	202	.368	0.31	0.42			0.49	0.48	
High Risk of Bias	1	2	-	-	-	-	-			-	-	
Teacher's autonomy support – Maladaptive Outcomes	13	21	7470	136	-.250	-0.36	-0.14			0.04	0.90	109.8943
Culture								0.00	0.01			
Individualistic	9	14	4899	272	-.254	-0.41	-0.08			0.03	0.93	
Collectivistic	4	7	2571	68	-.266	-0.34	-0.19			0.49	0.00	
Country								0.00	0.00			
UK	2	4	1910	476	-.218	-0.27	-0.16			0.46	0.00	
USA	0	0	-	-	-	-	-			-	-	

Sex								0.00	0.00			
Both	13	21	7470	136	-.250	-0.36	-0.14			0.04	0.90	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.02			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	7	14	5305	115	-.208	-0.27	-0.15			0.39	0.22	
Adolescents	6	7	2165	215	-.309	-0.53	-0.05			0.01	0.96	
Risk of Bias								0.00	0.00			
Low Risk of Bias	13	21	7470	136	-.250	-0.36	-0.14			0.04	0.90	
High Risk of Bias	-	-	-	-	-	-	-			-	-	
Teacher's competence support – Teacher's relatedness support	12	12	5749	302	.792	0.67	0.87			0.46	0.46	1499.346
Culture								0.00	0.00			
Individualistic	9	9	3619	304	.788	0.63	0.89			0.50	0.50	
Collectivistic	3	3	2130	297	.804	0.60	0.91			0.49	0.49	
Country								0.16	0.16			
UK	3	3	892	254	.644	0.43	0.79			0.48	0.48	
USA	5	5	2078	308	.805	0.57	0.92			0.50	0.50	
Sex								0.00	0.00			
Both	11	11	5587	328	.792	0.65	0.88			0.50	0.50	
Male	1	1	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	8	8	4278	301	.877	0.83	0.91			0.48	0.48	
Adolescents	4	4	1471	305	.471	0.26	0.64			0.48	0.48	
Risk of Bias								0.00	0.00			
Low Risk of Bias	12	12	5749	302	.792	0.67	0.87			0.46	0.46	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support– Autonomy	7	7	4391	422	.601	0.49	0.69			0.48	0.48	137.3371
Culture								0.00	0.00			
Individualistic	5	5	2452	418	.595	0.44	0.72			0.48	0.48	
Collectivistic	2	2	1939	431	.625	0.60	0.65			0.00	0.00	
Country								0.58	0.58			
UK	2	2	730	354	.420	0.17	0.62			0.46	0.46	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	7	7	4391	422	.601	0.49	0.69			0.48	0.48	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.57	0.57			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	5	5	3661	457	.658	0.60	0.71			0.44	0.44	
Adolescents	2	2	730	354	.420	0.17	0.62			0.46	0.46	
Risk of Bias								0.00	0.00			
Low Risk of Bias	7	7	4391	422	.601	0.49	0.69			0.48	0.48	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Competence	6	6	4144	478	.616	0.50	0.71			0.48	0.48	135.0711

Culture								0.05	0.05			
Individualistic	5	5	2452	418	.603	0.46	0.72			0.48	0.48	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	2	2	1215	554	.421	0.35	0.48			0.24	0.24	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	6	6	4144	478	.616	0.50	0.71			0.48	0.48	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.01	0.01			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	4	4	3414	580	.623	0.54	0.70			0.4	0.46	
Adolescents	2	2	730	354	.600	0.25	0.81			0.49	0.49	
Risk of Bias								0.00	0.00			
Low Risk of Bias	6	6	4144	478	.616	0.50	0.71			0.48	0.48	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Relatedness	6	6	4144	478	.608	0.50	0.69			0.48	0.48	118.0848
Culture								0.03	0.03			
Individualistic	5	5	2452	418	.600	0.47	0.70			0.47	0.47	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	2	2	1215	554	.596	0.36	0.76			0.48	0.48	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	6	6	4144	478	.608	0.50	0.69			0.48	0.48	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	4	4	3414	580	.613	0.50	0.70			0.47	0.47	
Adolescents	2	2	730	354	.600	0.35	0.77			0.47	0.47	
Risk of Bias								0.00	0.00			
Low Risk of Bias	6	6	4144	478	.608	0.50	0.69			0.48	0.48	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Autonomous	6	10	6310	476	.627	0.55	0.69			0.00	0.97	117.4986
Motivation								0.24	0.07			
Culture												
Individualistic	5	9	4618	441	.623	0.49	0.73			0.00	0.95	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.78	0.00			
UK	2	4	2430	555	.507	0.46	0.55			0.00	0.44	
USA	1	1	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	6	10	6310	476	.627	0.55	0.69			0.00	0.97	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.73	0.20			
Children	0	0	-	-	-	-	-			-	-	

Preadolescents	4	6	4850	618	.651	0.58	0.71			0.00	0.89	
Adolescents	2	4	1460	354	.572	.42	0.69			0.00	0.88	
Risk of Bias								0.00	0.00			
Low Risk of Bias	6	10	6310	476	.627	0.55	0.69			0.00	0.97	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Introjected Regulation	4	4	2166	473	.317	0.19	0.43			0.45	0.45	49.37274
Culture								0.00	0.03			
Individualistic	4	4	2166	473	.317	0.19	0.43			0.45	0.45	
Collectivistic	0	0	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	2	2	1215	554	.209	0.16	0.25			0.00	0.00	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	4	4	2166	473	.317	0.19	0.43			0.45	0.45	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	2	2	1436	711	.353	0.12	0.55			0.48	0.48	
Adolescents	2	2	730	354	.272	0.21	0.33			0.00	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	4	4	2166	473	.317	0.19	0.43			0.45	0.45	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – External Regulation	4	4	2166	473	-.080	-0.28	0.12			0.48	0.48	104.8497
Culture								0.0	0.00			
Individualistic	4	4	2166	473	-.080	-0.28	0.12			0.48	0.48	
Collectivistic	0	0	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	2	2	1215	554	-.112	-0.41	0.20			0.48	0.48	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	4	4	2166	473	-.080	-0.28	0.12			0.48	0.48	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.02	0.02			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	2	2	1436	711	-.105	-0.41	0.22			0.48	0.48	
Adolescents	2	2	730	354	-.052	-0.29	0.96			0.44	0.44	
Risk of Bias								0.00	0.00			
Low Risk of Bias	4	4	2166	473	-.080	-0.28	0.12			0.48	0.48	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Amotivation	7	14	6932	298	-.351	-0.44	-0.26			0.23	0.68	186.2875
Culture								0.20	0.66			
Individualistic	6	13	5240	280	-.385	-0.46	-0.31			0.34	0.47	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.00	1.00			
UK	3	7	2025	203	-.396	-0.46	-0.33			0.78	0.00	
USA	1	4	2264	566	-.294	-0.33	-0.26			0.00	0.00	

Sex								0.00	0.02			
Both	6	9	6122	558	-.350	-0.46	-0.23			0.00	0.94	
Male	1	5	810	162	-.368	-0.46	-0.26			0.64	0.00	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.15			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	4	8	3938	233	-.373	-0.47	-0.26			0.92	0.00	
Adolescents	3	6	2994	472	-.304	-0.33	-0.28			0.00	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	7	14	6932	298	-.351	-0.44	-0.26			0.23	0.68	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Adaptive Outcomes	8	19	10282	342	.397	0.30	0.48			0.71	0.24	549.1612
Culture								0.00	0.59			
Individualistic	5	12	4272	331	.352	0.23	0.44			0.91	0.00	
Collectivistic	3	7	6010	362	.468	0.31	0.60			0.47	0.49	
Country								0.01	0.18			
UK	1	2	856	428	.341	0.14	0.52			0.90	0.00	
USA	3	7	2510	323	.371	0.23	0.49			0.92	0.00	
Sex								0.00	0.00			
Both	8	19	10282	342	.397	0.30	0.48			0.71	0.24	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.04	0.82			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	4	11	7213	346	.467	0.35	0.57			0.70	0.25	
Adolescents	4	8	3069	337	.304	0.20	0.40			0.89	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	8	19	10282	342	.397	0.30	0.48			0.71	0.24	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's competence support – Maladaptive Outcomes	3	3	2422	481	-.260	-0.41	-0.10			0.46	0.46	41.82589
Culture								0.68	0.68			
Individualistic	2	2	730	354	-.335	-0.48	-0.17			0.41	0.41	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	1	1	-	-	-	-	-			-	-	
USA	0	0	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	3	3	2422	481	-.260	-0.41	-0.10			0.46	0.46	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.68	0.68			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	1	11	-	-	-	-	-			-	-	
Adolescents	2	2	730	354	-.335	-0.48	-0.17			0.41	0.41	
Risk of Bias								0.00	0.00			
Low Risk of Bias	6	6	4144	478	.608	0.50	0.69			0.48	0.48	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support– Autonomy	9	9	4994	384	.646	0.51	0.75			0.49	0.49	307.4592

Culture								0.14	0.14			
Individualistic	7	7	3054	372	.609	0.44	0.74			0.49	0.49	
Collectivistic	2	2	1940	433	.751	0.63	0.84			0.46	0.46	
Country								0.07	0.07			
UK	2	2	730	351	.550	0.19	0.78			0.49	0.49	
USA	1	1	-	-	-	-	-			-	-	
Sex								0.00	0.00			
Both	9	9	4994	384	.646	0.51	0.75			0.49	0.49	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.07	0.07			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	7	7	4264	394	.670	0.53	0.78			0.49	0.49	
Adolescents	2	2	730	351	.550	0.19	0.78			0.49	0.49	
Risk of Bias								0.00	0.00			
Low Risk of Bias	9	9	4994	384	.646	0.51	0.75			0.49	0.49	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Competence	9	9	5736	441	.522	0.37	0.65			0.49	0.49	320.7369
Culture								0.02	0.02			
Individualistic	7	7	3054	372	.504	0.31	0.66			0.49	0.49	
Collectivistic	2	2	2682	1249	.579	0.43	0.70			0.48	0.48	
Country								0.00	0.00			
UK	2	2	1215	554	.485	0.45	0.52			0.00	0.00	
USA	2	2	602	292	.189	0.11	0.27			0.00	0.00	
Sex								0.00	0.00			
Both	9	9	5736	441	.522	0.37	0.65			0.49	0.49	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.16	0.16			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	7	7	5006	474	.474	0.31	0.61			0.49	0.49	
Adolescents	2	2	730	354	.666	0.35	0.85			0.49	0.49	
Risk of Bias								0.00	0.00			
Low Risk of Bias	9	9	5736	441	.522	0.37	0.65			0.49	0.49	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Relatedness	12	14	6767	328	.670	0.56	0.76			0.59	0.39	483.5638
Culture								0.00	0.00			
Individualistic	11	12	4701	305	.667	0.55	0.76			0.00	0.97	
Collectivistic	1	2	-	-	-	-	-			-	-	
Country								0.00	0.05			
UK	2	2	1215	554	.732	0.60	0.82			0.47	0.47	
USA	3	4	952	199	.689	0.35	0.87			0.00	0.98	
Sex								0.00	0.00			
Both	11	12	6019	322	.681	0.57	0.77			0.00	0.98	
Male	0	0	-	-	-	-	-			-	-	
Female	1	2	374	374	.647	0.40	0.81			0.96	0.00	
Age								0.00	0.29			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	9	9	5371	437	.716	0.62	0.79			0.49	0.49	

Adolescents	3	5	1022	207	.477	0.28	0.64			0.00	0.91	
Risk of Bias								0.00	0.00			
Low Risk of Bias	12	14	6767	328	.670	0.56	0.76			0.59	0.39	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Autonomous	13	24	13592	331	.527	0.44	0.60			0.05	0.90	534.4104
Motivation												
Culture								0.01	0.10			
Individualistic	9	18	7254	293	.556	0.47	0.64			0.10	0.84	
Collectivistic	4	6	6338	540	.453	0.27	0.60			0.00	0.98	
Country								0.00	0.00			
UK	2	4	2430	554	.526	0.49	0.56			0.05	0.00	
USA	4	8	1782	195	.524	0.32	0.68			0.18	0.75	
Sex								0.00	0.00			
Both	13	24	13592	331	.527	0.44	0.60			0.05	0.90	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	10	18	11840	379	.525	0.41	0.62			0.08	0.90	
Adolescents	3	6	1752	240	.538	0.51	0.57			0.00	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	13	24	13592	331	.527	0.44	0.60			0.05	0.90	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Introjected	10	11	4806	298	.242	0.15	0.33			0.90	0.00	141.2983
Regulation												
Culture								0.46	0.00			
Individualistic	8	9	3567	282	.286	0.20	0.37			0.84	0.00	
Collectivistic	2	2	-	-	-	-	-			-	-	
Country								0.00	0.00			
UK	2	2	-	-	-	-	-			0.00	0.00	
USA	3	4	831	184	.243	0.12	0.36			0.76	0.00	
Sex								0.00	0.00			
Both	10	11	4806	298	.242	0.15	0.33			0.90	0.00	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.08	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	7	8	3930	357	.216	0.10	0.33			0.92	0.00	
Adolescents	3	3	876	240	.289	0.21	0.37			0.02	0.02	
Risk of Bias								0.00	0.00			
Low Risk of Bias	10	11	4806	298	.242	0.15	0.33			0.90	0.00	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – External Regulation	9	10	4557	303	-.153	-0.31	0.01			0.00	0.96	309.8564
Culture								0.00	0.07			
Individualistic	8	9	3567	282	-.129	-0.30	0.05			0.00	0.96	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.00	0.30			
UK	2	2	1215	554	-.390	-0.49	-0.29			0.38	0.38	
USA	3	4	831	184	-.108	-0.41	0.22			0.00	0.94	

Sex								0.00	0.00			
Both	9	10	4557	303	-.153	-0.31	0.01			0.00	0.96	
Male	0	0	-	-	-	-	-			-	-	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	6	7	3681	342	-.147	-0.37	0.09			0.00	0.98	
Adolescents	3	3	876	240	-.172	-0.30	-0.04			0.36	0.36	
Risk of Bias								0.00	0.00			
Low Risk of Bias	9	10	4557	303	-.153	-0.31	0.01			0.00	0.96	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Amotivation	11	27	10549	258	-.281	-0.38	-0.17			0.16	0.78	414.1287
Culture								0.08	0.15			
Individualistic	9	21	6952	230	-.312	-0.42	-0.20			0.21	0.71	
Collectivistic	2	6	3597	437	-.123	-0.29	0.06			0.08	0.82	
Country								0.00	0.30			
UK	0	0	1215	554	-.390	-0.49	-0.29			0.38	0.38	
USA	3	4	831	184	-.108	-0.41	0.22			0.00	0.94	
Sex								0.00	0.06			
Both	10	22	9739	297	-.279	-0.39	-0.16			0.12	0.82	
Male	1	5	810	162	-.308	-0.39	-0.22			0.49	0.00	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	6	15	5504	208	-.281	-0.45	-0.09			0.21	0.74	
Adolescents	5	12	5045	367	-.262	-0.33	-0.19			0.26	0.36	
Risk of Bias								0.02	0.00			
Low Risk of Bias	11	27	10549	258	-.281	-0.38	-0.17			0.16	0.78	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Adaptive Outcomes	18	41	23960	339	.383	0.32	0.44			0.96	0.00	1118.155
Culture								0.00	0.00			
Individualistic	14	33	17164	361	.390	0.33	0.45			0.95	0.00	
Collectivistic	4	8	6796	390	.349	0.16	0.51			0.28	0.92	
Country								0.00	0.00	0		
UK	1	2	856	428	.384	0.16	0.57			0.92	0.00	
USA	7	15	4385	252	.375	0.28	0.46			0.91	0.00	
Sex								0.00	0.00			
Both	17	37	22464	336	.396	0.34	0.45			0.95	0.00	
Male	0	0	-	-	-	-	-			-	-	
Female	1	4	1496	374	.345	0.16	0.51			0.93	0.00	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	12	31	16348	345	.397	0.33	0.46			0.95	0.00	
Adolescents	6	10	7612	323	.375	0.27	0.47			0.93	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	18	41	23960	339	.383	0.32	0.44			0.96	0.00	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Teacher's relatedness support – Maladaptive Outcomes	9	12	6404	324	-.137	-0.25	-0.02			0.43	0.51	209.515

Culture								0.20	0.00			
Individualistic	8	11	4712	302	-.130	-0.27	-0.08			0.86	0.00	
Collectivistic	1	1	-	-	-	-	-			-	-	
Country								0.04	0.00			
UK	1	1	-	-	-	-	-			-	-	
USA	3	4	952	199	-.174	-0.24	-0.10			0.18	0.00	
Sex								0.00	0.00			
Both	8	11	6030	320	-.160	-0.26	-0.05			0.90	0.00	
Male	0	0	-	-	-	-	-			-	-	
Female	1	1	-	-	-	-	-			-	-	
Age								0.47	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	6	8	5382	453	-.107	-0.18	-0.04			0.80	0.00	
Adolescents	3	4	1022	207	-.284	-0.43	-0.12			0.81	0.00	
Risk of Bias								0.00	0.00			
Low Risk of Bias	9	12	6404	324	-.137	-0.25	-0.02			0.43	0.51	
High Risk of Bias	0	0	-	-	-	-	-			-	-	
Autonomy – Competence	54	66	32833	284	.651	0.58	0.71			0.08	0.91	5864.978
Culture* (p<0.001)								0.00	0.22			
Individualistic	32	39	17894	281	.543	0.44	0.63			0.04	0.94	
Collectivistic	21	26	14224	285	.779	0.70	0.84			0.15	0.84	
Country								0.00	0.11			
UK	3	3	1393	325	.533	0.29	0.71			0.48	0.48	
USA	11	17	7326	250	.485	0.29	0.64			0.03	0.95	
Sex* (p<0.001)								0.57	0.01			
Both	50	59	29969	295	.669	0.60	0.73			0.03	0.96	
Male	4	4	1482	191	.279	-0.03	0.54			0.48	0.48	
Female	3	3	1382	275	.383	0.26	0.50			0.40	0.40	
Age								0.00	0.00			
Children	1	1	1073	1073	.422	0.37	0.47			0.50	0.50	
Preadolescents	29	38	18253	261	.591	0.50	0.67			0.05	0.93	
Adolescents	26	27	13507	317	.719	0.62	0.80			0.37	0.62	
Risk of Bias								0.00	0.02			
Low Risk of Bias	53	65	32540	285	.656	0.58	0.72			0.08	0.91	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – Relatedness	51	62	30482	280	.596	0.53	0.65			0.60	0.37	2941.103
Culture								0.00	0.00			
Individualistic	30	37	16357	277	.565	0.49	0.63			0.76	0.21	
Collectivistic	21	26	14224	285	.779	0.70	0.84			0.15	0.84	
Country								0.07	0.00			
UK	8	8	3624	371	.683	0.57	0.77			0.48	0.48	
USA	11	17	5365	221	.567	0.43	0.67			0.88	0.08	
Sex								0.00	100.0			
Both	549	59	30106	300	.605	0.55	0.66			0.89	0.09	
Male	2	3	376	122	.506	NA	NA			0.93	0.00	
Female	1	2	276	138	.296	-0.12	0.62			0.92	0.00	
Age								0.00	0.00			
Children	1	1	1073	1073	.635	0.60	0.67			0.50	0.50	
Preadolescents	29	40	17353	241	.583	0.51	0.65			0.82	0.15	

Adolescents	23	23	12332	332	.611	0.51	0.69			0.49	0.49	
Risk of Bias								0.01	0.02			
Low Risk of Bias	50	63	30465	271	.600	0.54	0.65			0.77	0.21	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – Autonomous Motivation	33	80	34165	235	.565	0.50	0.63			0.13	0.84	2696.958
Culture								0.00	0.03			
Individualistic	18	46	18988	262	.536	0.45	0.62			0.19	0.78	
Collectivistic	15	34	15177	186	.599	0.49	0.69			0.09	0.89	
Country								0.00	0.02			
UK	6	11	4890	359	.610	0.45	0.73			0.08	0.89	
USA	7	22	6290	187	.538	0.42	0.64			0.21	0.70	
Sex								0.00	0.00			
Both	31	76	33151	240	.564	0.49	0.63			0.12	0.85	
Male	2	3	607	134	.534	0.48	0.59			0.00	0.28	
Female	1	1	400	400	-	-	-			-	-	
Age								0.00	0.00			
Children	1	2	2146	1073	.414	0.38	0.45			0.00	0.00	
Preadolescents	15	40	13542	200	.647	0.59	0.70			0.23	0.69	
Adolescents	18	38	18477	273	.503	0.38	0.61			0.14	0.84	
Risk of Bias								0.00	0.01			
Low Risk of Bias	32	78	33579	233	.569	0.50	0.63			0.13	0.84	
High Risk of Bias	1	2	586	293	.450	0.36	0.53			0.39	0.00	
Autonomy – Introjected Regulation	28	35	12779	213	.346	0.26	0.42			0.22	0.73	809.4907
Culture								0.01	0.01			
Individualistic	17	22	7991	248	.325	0.22	0.42			0.00	0.95	
Collectivistic	11	13	4788	152	.359	0.19	0.51			0.42	0.54	
Country								0.00	0.02			
UK	6	6	2609	356	.397	0.32	0.47			0.41	0.41	
USA	7	12	3442	193	.337	0.15	0.50			0.00	0.95	
Sex								0.00	0.01			
Both	27	34	12679	221	.342	0.25	0.43			0.22	0.74	
Male	1	1	100	100	.446	0.27	0.59			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								100.0	0.00			
Children	2	2	1364	458	.545	0.13	0.78			0.49	0.49	
Preadolescents	14	20	6110	198	.307	0.22	0.39			0.00	0.88	
Adolescents	13	13	5305	221	.352	0.20	0.48			0.49	0.49	
Risk of Bias								0.00	0.17			
Low Risk of Bias	27	34	12486	212	.361	0.28	0.44			0.25	0.71	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – External Regulation	29	36	14082	220	-.131	-0.23	-0.03			0.13	0.84	912.3109
Culture								0.06	0.21			
Individualistic	18	23	9294	260	-.222	-0.32	-0.12			0.19	0.76	
Collectivistic	11	13	4788	164	.027	-0.13	0.18			0.09	0.86	
Country								0.06	0.19			
UK	5	5	2281	362	-.351	-0.43	-0.26			0.40	0.40	
USA	7	12	3442	193	-.173	-0.37	0.04			0.13	0.83	
Sex								0.00	0.03			
Both	28	35	13982	227	-.139	-0.24	-0.04			0.13	0.84	

Male	1	1	100	100	.110	-0.09	0.30			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.45	0.00			
Children	2	2	1364	458	-.047	-0.27	0.18			0.46	0.46	
Preadolescents	13	19	5782	194	-.224	-0.36	-0.08			0.11	0.84	
Adolescents	15	15	6936	244	-.077	-0.21	0.06			0.48	0.48	
Risk of Bias								0.00	0.00			
Low Risk of Bias	28	35	13789	218	-.130	-0.23	-0.03			0.12	0.84	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – Amotivation	26	44	20058	288	-.288	-0.36	-0.20			0.34	0.62	1317.835
Culture								0.02	0.01			
Individualistic	14	14	7042	375	-.319	-0.43	-0.20			0.48	0.48	
Collectivistic	12	30	13016	261	-.252	-0.37	-0.13			0.35	0.61	
Country								0.01	0.04			
UK	6	6	2609	356	-.351	-0.53	-0.15			0.48	0.48	
USA	2	2	1364	458	-.246	-0.65	0.26			0.49	0.49	
Sex								0.00	0.00			
Both	25	43	19958	302	-.287	-0.37	-0.20			0.33	0.63	
Male	1	1	100	100	-.310	-0.48	-0.12			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.40	0.00			
Children	2	2	1364	458	-.246	-0.65	0.26			0.49	0.49	
Preadolescents	11	24	10954	314	-.288	-0.42	-0.14			0.13	0.84	
Adolescents	14	18	7740	250	-.312	-0.41	-0.21			0.47	0.47	
Risk of Bias								0.00	0.01			
Low Risk of Bias	25	43	19765	288	-.292	-0.38	-0.20			0.33	0.63	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – Adaptive Outcomes	48	154	63924	268	.439	0.38	0.50			0.32	0.65	6549.014
Culture								0.00	0.07			
Individualistic	27	86	31418	284	.348	0.28	0.41			0.50	0.45	
Collectivistic	19	64	30262	243	.555	0.46	0.64			0.26	0.71	
Country								0.00	0.09			
UK	7	25	10282	356	.319	0.17	0.45			0.32	0.63	
USA	9	29	11335	274	.403	0.32	0.48			0.79	0.16	
Sex								0.00	0.00			
Both	45	143	61982	288	.452	0.39	0.51			0.33	0.64	
Male	3	7	1121	129	.348	0.12	0.54			0.02	0.85	
Female	2	4	821	165	.229	NA	NA			0.65	0.00	
Age								0.00	0.00			
Children	1	1	1073	1073	.422	0.37	0.47			0.50	0.50	
Preadolescents	24	80	30623	256	.464	0.36	0.55			0.21	0.76	
Adolescents	25	73	32228	280	.455	0.39	0.52			0.51	0.46	
Risk of Bias								0.00	0.01			
Low Risk of Bias	47	153	63631	268	.445	0.38	0.50			0.32	0.65	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomy – Maladaptive Outcomes	14	20	9959	238	-.262	-0.31	-0.13			0.67	0.28	500.6509
Culture								0.00	0.09			
Individualistic	7	9	3438	359	-.192	-0.31	-0.06			0.90	0.00	
Collectivistic	7	11	6521	187	-.249	-0.40	-0.09			0.22	0.74	

Country								0.22	0.30			
UK	2	4	1910	476	.155	0.09	0.21			0.72	0.00	
USA	3	3	933	391	.212	0.13	0.29			0.21	0.21	
Sex								0.00	0.10			
Both	13	19	9859	257	-.218	-0.31	-0.12			0.67	0.28	
Male	1	1	100	100	-.354	-0.52	-0.17			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.04	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	6	9	4480	173	-.192	-0.36	-0.02			0.97	0.00	
Adolescents	8	11	5479	345	-.250	-0.34	-0.15			0.41	0.50	
Risk of Bias								0.00	0.07			
Low Risk of Bias	13	19	9666	236	-.220	-0.31	-0.12			0.66	0.28	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Competence – Relatedness	50	60	29367	274	.584	0.54	0.62			0.44	0.52	1346.914
Culture								0.00	0.00			
Individualistic	30	36	16324	273	.524	0.48	0.57			0.94	0.00	
Collectivistic	19	23	12328	269	.661	0.60	0.71			0.24	0.72	
Country								0.18	0.00			
UK	5	5	2502	380	.645	0.54	0.73			0.47	0.47	
USA	13	18	6429	233	.515	0.45	0.58			0.92	0.00	
Sex								0.06	0.00			
Both	48	57	28991	293	.587	0.54	0.63			0.48	0.49	
Male	2	2	238	116	.542	0.44	0.63			0.00	0.00	
Female	1	1	138	138	-	-	-			-	-	
Age								0.00	0.00			
Children	1	1	1073	1073	-	-	-			-	-	
Preadolescents	27	35	16204	249	.554	0.50	0.60			0.77	0.18	
Adolescents	24	24	12090	311	.620	0.56	0.68			0.48	0.48	
Risk of Bias								0.00	0.01			
Low Risk of Bias	49	59	29074	274	.587	0.55	0.63			0.43	0.63	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Competence – Autonomous Motivation	52	123	54922	266	.597	0.56	0.66			0.15	0.83	6858.848
Culture								0.00	0.00			
Individualistic	27	65	27247	269	.630	0.56	0.69			0.18	0.80	
Collectivistic	24	56	26861	186	.595	0.50	0.68			0.12	0.86	
Country								0.00	0.03			
UK	8	17	7850	376	.673	0.59	0.75			0.04	0.92	
USA	7	21	6069	186	.521	0.42	0.61			0.32	0.57	
Sex								0.00	0.00			
Both	47	113	51842	270	.617	0.56	0.67			0.15	0.83	
Male	4	5	1297	173	.553	0.36	0.70			0.25	0.68	
Female	4	5	1783	340	.479	0.35	0.59			0.00	0.89	
Age								0.00	0.00			
Children	2	3	2662	789	.454	0.13	0.69			0.07	0.91	
Preadolescents	30	72	28372	242	.588	0.53	0.64			0.19	0.77	
Adolescents	21	48	23888	299	.655	0.55	0.74			0.14	0.85	
Risk of Bias								0.00	0.02			
Low Risk of Bias	51	121	54336	266	.608	0.55	0.66			0.15	0.83	

High Risk of Bias	1	2	586	293	.776	0.74	0.81			0.00	0.00	
Competence – Introjected Regulation	38	45	18288	241	.277	0.20	0.35			0.11	0.85	1273.223
Culture								0.00	0.00			
Individualistic	20	25	9162	246	.281	0.17	0.39			0.14	0.83	
Collectivistic	18	20	9126	234	.274	0.16	0.38			0.07	0.89	
Country								0.00	0.09			
UK	8	8	3761	379	.372	0.31	0.43			0.38	0.38	
USA	6	11	3205	190	.338	0.17	0.49			0.19	0.74	
Sex								0.00	0.06			
Both	36	43	17845	247	.279	0.20	0.36			0.11	0.86	
Male	1	1	100	100	.485	0.32	0.62			0.50	0.50	
Female	1	1	343	343	.000	-0.11	0.11			0.50	0.50	
Age								0.41	0.00			
Children	2	2	1364	458	.497	0.21	0.71			0.49	0.49	
Preadolescents	22	28	10298	228	.255	0.17	0.33			0.15	0.79	
Adolescents	15	15	6626	251	.276	0.13	0.41			0.49	0.49	
Risk of Bias								0.00	0.12			
Low Risk of Bias	37	44	17995	240	.290	0.21	0.36			0.12	0.84	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Competence – External Regulation	40	50	20777	245	-.108	-0.20	-0.02			0.21	0.76	1788.883
Culture								0.02	0.02			
Individualistic	22	29	11517	261	-.156	-0.26	-0.05			0.08	0.89	
Collectivistic	18	21	9260	226	-.055	-0.20	0.10			0.49	0.49	
Country								0.00	0.11			
UK	6	6	3105	400	-.292	-0.38	-0.20			0.43	0.43	
USA	6	11	3205	190	-.149	-0.25	-0.04			0.02	0.79	
Sex								0.00	0.06			
Both	36	44	18954	247	-.112	-0.21	-0.03			0.26	0.71	
Male	3	3	790	183	.211	0.03	0.38			0.41	0.41	
Female	3	3	1033	321	-.013	-0.44	0.42			0.49	0.49	
Age								0.45	0.00			
Children	2	2	1364	548	-.042	-0.26	0.18			0.46	0.46	
Preadolescents	22	31	11156	226	-.071	-0.19	0.05			0.12	0.84	
Adolescents	17	17	8257	272	-.182	-0.32	-0.03			0.49	0.49	
Risk of Bias								0.00	0.01			
Low Risk of Bias	39	49	20484	244	-.104	-0.20	-0.01			0.21	0.77	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Competence – Amotivation	31	50	22358	289	-.418	-0.48	-0.35			0.42	0.54	1171.727
Culture								0.00	0.18			
Individualistic	16	16	7490	328	-.466	-0.54	-0.38			0.47	0.47	
Collectivistic	15	34	14868	273	-.368	-0.46	-0.27			0.41	0.54	
Country								0.08	0.00			
UK	8	8	3761	379	-.530	-0.58	-0.47			0.41	0.41	
USA	2	2	1364	458	-.167	-0.40	0.01			0.47	0.47	
Sex								0.00	0.04			
Both	30	49	22258	300	-.413	-0.48	-0.35			0.42	0.54	
Male	1	1	100	100	-.565	-0.69	-0.39			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.76	0.00			

Children	2	2	1364	458	-.167	-0.40	0.09			0.47	0.47	
Preadolescents	16	30	13220	299	-.375	-0.46	-0.28			0.14	0.82	
Adolescents	14	18	7774	262	-.503	-0.57	-0.43			0.03	0.90	
Risk of Bias								0.00	0.04			
Low Risk of Bias	30	49	22065	288	-.414	-0.48	-0.35			0.41	0.54	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Competence – Adaptive Outcomes	103	311	159975	282	.525	0.48	0.57			0.44	0.55	19165.75
Culture								0.00	0.00			
Individualistic	59	169	77351	266	.497	0.43	0.56			0.35	0.63	
Collectivistic	42	138	80380	300	.545	0.48	0.61			0.57	0.41	
Country								0.00	0.00			
UK	14	41	14829	201	.555	0.42	0.67			0.36	0.62	
USA	12	43	19357	299	.502	0.37	0.61			0.33	0.65	
Sex								0.00	0.00			
Both	93	276	138724	294	.532	0.48	0.58			0.45	0.53	
Male	9	18	10254	190	.471	0.34	0.59			0.30	0.68	
Female	10	17	10997	246	.413	0.29	0.52			0.26	0.71	
Age								0.00	0.00			
Children	3	4	5671	261	.591	NA	NA			0.54	0.00	
Preadolescents	64	189	88575	273	.503	0.44	0.57			0.32	0.66	
Adolescents	40	118	65729	298	.560	0.50	0.62			0.64	0.34	
Risk of Bias								0.00	0.00			
Low Risk of Bias	99	301	154452	284	.528	0.48	0.57			0.42	0.57	
High Risk of Bias	4	10	5523	234	.468	0.30	0.61			0.98	0.00	
Competence – Maladaptive Outcomes	29	45	21000	208	-.255	-0.38	-0.13			0.69	0.30	2974.374
Culture								0.05	0.00			
Individualistic	13	19	8101	253	-.342	-0.49	-0.17			0.51	0.47	
Collectivistic	16	26	12899	184	-.194	-0.38	0.00			0.68	0.31	
Country								0.05	0.05			
UK	3	7	3512	499	-.394	-0.71	0.05			0.32	0.67	
USA	2	2	635	303	-.590	-0.64	-0.54			0.00	0.00	
Sex								0.00	0.00			
Both	27	43	20218	210	-.251	-0.38	-0.11			0.68	0.30	
Male	2	2	782	174	-.331	-0.62	0.03			0.46	0.46	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	1	1	74	74	.319	0.10	0.51			0.50	0.50	
Preadolescents	14	21	10503	204	-.249	-0.39	-0.10			0.74	0.24	
Adolescents	16	23	10423	230	-.269	-0.46	-0.06			0.85	0.14	
Risk of Bias								0.00	0.45			
Low Risk of Bias	26	40	19424	221	-.309	-0.41	-0.17			0.85	0.14	
High Risk of Bias	3	5	1576	140	-.031	-0.40	0.34			0.02	0.94	
Relatedness – Autonomous Motivation	33	81	35205	246	.511	0.48	0.59			0.06	0.89	1990.033
Culture								0.00	0.09			
Individualistic	18	47	18062	253	.575	0.50	0.64			0.05	0.90	
Collectivistic	15	34	17143	236	.483	0.40	0.56			0.09	0.86	
Country								0.00	0.00			
UK	6	11	4890	359	.623	0.51	0.71			0.03	0.92	
USA	9	24	6507	180	.587	0.50	0.66			0.15	0.75	

Sex								0.00	0.00			
Both	32	79	35005	255	.535	0.48	0.59			0.06	0.90	
Male	1	2	200	100	.561	0.46	0.65			0.00	0.00	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	1	2	2146	1073	.561	0.53	0.59			0.00	0.00	
Preadolescents	17	44	15470	211	.586	0.51	0.65			0.07	0.88	
Adolescents	16	35	17589	293	.467	0.40	0.53			0.07	0.86	
Risk of Bias								0.00	0.00			
Low Risk of Bias	32	79	34619	245	.535	0.48	0.59			0.06	0.90	
High Risk of Bias	1	2	586	293	.561	0.50	0.62			0.00	0.00	
Relatedness – Introjected Regulation	29	36	13512	225	.269	0.19	0.35			0.23	0.72	669.4537
Culture								0.00	0.03			
Individualistic	18	23	8416	245	.293	0.18	0.40			0.28	0.67	
Collectivistic	11	13	5096	196	.245	0.12	0.37			0.14	0.80	
Country								0.00	0.00			
UK	6	6	2609	356	.398	0.30	0.49			0.44	0.44	
USA	6	11	3060	179	.368	0.21	0.51			0.39	0.53	
Sex								0.00	0.02			
Both	28	35	13412	233	.269	0.18	0.35			0.23	0.73	
Male	1	1	100	100	.446	0.27	0.59			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	1	1	1073	1073	.336	0.28	0.39			0.50	0.50	
Preadolescents	16	22	7074	209	.291	0.19	0.39			0.29	0.65	
Adolescents	13	13	5365	241	.240	0.10	0.37			0.48	0.48	
Risk of Bias								0.08	0.30			
Low Risk of Bias	28	35	13219	223	.269	0.22	0.36			0.27	0.67	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Relatedness – External Regulation	31	38	15106	233	-.078	-0.15	0.00			0.00	0.94	590.1877
Culture								0.01	0.11			
Individualistic	19	24	8928	250	-.135	-0.22	-0.05			0.14	0.79	
Collectivistic	12	14	6178	210	.016	-0.11	0.14			0.00	0.95	
Country								0.00	0.09			
UK	5	5	2281	363	-.240	-0.29	-0.19			0.20	0.20	
USA	7	12	3351	185	-.163	-0.29	-0.03			0.14	0.75	
Sex								0.01	0.04			
Both	30	37	15006	241	-.085	-0.16	-0.01			0.00	0.94	
Male	1	1	100	100	-.168	-0.03	0.35			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	2	2	1364	458	.083	-0.06	0.22			0.39	0.39	
Preadolescents	15	21	6746	205	-.118	-0.22	-0.01			0.03	0.89	
Adolescents	15	15	6996	264	-.071	-0.18	0.04			0.48	0.48	
Risk of Bias								0.00	0.03			
Low Risk of Bias	30	37	14813	231	-.071	-0.14	0.01			0.00	0.94	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Relatedness – Amotivation	28	46	20974	290	-.297	-0.36	-0.23			0.17	0.77	593.4189
Culture								0.00	0.01			

Individualistic	14	14	6482	351	-.314	-0.40	-0.23			0.47	0.47	
Collectivistic	14	32	14492	270	-.279	-0.37	-0.18			0.15	0.79	
Country								0.00	0.17			
UK	6	6	2609	356	-.388	-0.49	-0.28			0.45	0.45	
USA	3	3	1510	267	-.162	-0.35	0.03			0.45	0.45	
Sex								0.00	0.00			
Both	27	45	20874	303	-.296	-0.36	-0.23			0.16	0.78	
Male	1	1	100	100	-.319	-0.49	-0.13			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.00	0.00			
Children	2	2	1364	458	-.215	-0.44	0.04			0.47	0.47	
Preadolescents	13	26	11918	322	-.281	-0.38	-0.18			0.21	0.73	
Adolescents	14	18	7692	245	-.323	-0.40	-0.24			0.00	0.90	
Risk of Bias								0.00	0.09			
Low Risk of Bias	27	45	20681	290	-.288	-0.35	-0.22			0.17	0.77	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Relatedness – Adaptive Outcomes	53	167	67415	262	.426	0.38	0.47			0.39	0.57	4849.132
Culture								0.01	0.19			
Individualistic	31	100	35598	284	.391	0.33	0.45			0.52	0.44	
Collectivistic	22	67	30387	230	.448	0.38	0.51			0.32	0.63	
Country								0.00	0.03			
UK	7	25	10282	356	.480	0.28	0.64			0.19	0.79	
USA	14	41	13016	253	.455	0.37	0.53			0.70	0.26	
Sex								0.00	0.00			
Both	50	154	64791	278	.433	0.38	0.48			0.40	0.56	
Male	2	6	714	116	.253	-0.10	0.55			0.25	0.65	
Female	2	7	1910	216	.249	0.01	0.47			0.51	0.42	
Age								0.00	0.00			
Children	1	1	1073	1073	.558	0.52	0.60			0.50	0.50	
Preadolescents	27	86	33690	265	.389	0.31	0.46			0.35	0.61	
Adolescents	27	80	32652	256	.461	0.40	0.52			0.50	0.46	
Risk of Bias								0.00	0.00			
Low Risk of Bias	52	166	67122	262	.427	0.38	0.48			0.39	0.58	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Relatedness – Maladaptive Outcomes	20	26	11685	224	-.318	-0.40	-0.24			0.21	0.54	565.2307
Culture								0.00	0.00			
Individualistic	10	13	4515	296	-.292	-0.39	-0.19			0.81	0.10	
Collectivistic	10	13	7170	180	-.340	-0.46	-0.20			0.00	0.96	
Country								0.00	0.04			
UK	2	4	1910	476	-.173	NA	NA			0.94	0.00	
USA	5	6	1636	230	-.340	-0.46	-0.21			0.88	0.00	
Sex								0.00	0.03			
Both	17	24	11211	232	-.312	-0.40	-0.22			0.41	0.54	
Male	1	1	100	100	-.380	-0.54	-0.20			0.50	0.50	
Female	1	1	374	374	-.388	-0.47	-0.30			0.50	0.50	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	9	12	5828	204	-.321	-0.42	-0.21			0.47	0.46	
Adolescents	10	14	5857	245	-.314	-0.43	-0.19			0.39	0.56	

Risk of Bias								0.01	0.00			
Low Risk of Bias	18	25	11392	222	-.322	-0.40	-0.24			0.40	0.54	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Autonomous Motivation – Introjected Regulation	58	152	60837	237	.565	0.47	0.65			0.31	0.68	26889.27
Culture								0.00	0.00			
Individualistic	37	96	34206	225	.588	0.48	0.68			0.18	0.81	
Collectivistic	21	56	26631	259	.529	0.31	0.69			0.40	0.59	
Country								0.00	0.06			
UK	12	27	12036	263	.640	0.58	0.70			0.55	0.40	
USA	10	33	8572	188	.692	0.60	0.77			0.41	0.55	
Sex								0.00	0.03			
Both	56	148	59951	240	.569	0.47	0.66			0.32	0.68	
Male	1	2	200	100	.714	0.64	0.78			0.00	0.00	
Female	1	2	686	343	.000	-0.17	0.17			0.80	0.00	
Age								0.01	0.00			
Children	1	2	2146	1073	.530	0.40	0.64			0.94	0.00	
Preadolescents	34	94	34676	223	.571	0.44	0.68			0.21	0.78	
Adolescents	24	56	24015	256	.557	0.39	0.69			0.46	0.53	
Risk of Bias								0.00	0.10			
Low Risk of Bias	57	150	60251	236	.575	0.48	0.66			0.32	0.67	
High Risk of Bias	1	2	586	293	-.240	-0.34	-0.14			0.39	0.00	
Autonomous Motivation – External Regulation	69	177	75060	235	-.025	-0.14	0.09			0.15	0.85	23818.91
Culture								0.00	0.04			
Individualistic	43	112	43405	229	-.096	-0.23	0.04			0.16	0.83	
Collectivistic	24	59	30879	271	.102	-0.12	0.32			0.12	0.87	
Country								0.00	0.07			
UK	10	22	10396	251	-.317	-0.44	-0.18			0.50	0.48	
USA	12	37	9976	195	-.010	-0.15	0.13			0.34	0.61	
Sex								0.00	0.00			
Both	64	165	72306	242	-.042	-0.16	0.08			0.15	0.84	
Male	3	4	890	151	.444	0.14	0.67			0.00	0.94	
Female	4	8	1864	178	.224	-0.39	0.70			0.16	0.83	
Age								0.01	0.00			
Children	1	2	2146	1073	.235	0.17	0.30			0.62	0.00	
Preadolescents	39	108	37889	211	-.024	-0.18	0.13			0.18	0.81	
Adolescents	30	67	35025	278	-.051	-0.23	0.13			0.08	0.91	
Risk of Bias								0.00	0.01			
Low Risk of Bias	68	175	74474	234	-.020	-0.14	0.10			0.15	0.85	
High Risk of Bias	1	2	586	293	-.384	-0.46	-0.31			0.18	0.00	
Autonomous Motivation – Amotivation	62	179	77805	256	-.434	-0.52	-0.34			0.29	0.70	14807.1
Culture								0.00	0.05			
Individualistic	38	89	36603	239	-.448	-0.56	-0.31			0.39	0.60	
Collectivistic	22	84	40426	301	-.420	-0.53	-0.30			0.20	0.78	
Country								0.00	0.11			
UK	12	27	12036	262	-.585	-0.76	-0.32			0.55	0.45	
USA	6	15	5224	222	-.185	-0.41	0.07			0.18	0.79	
Sex								0.00	0.01			
Both	60	173	77117	268	-.435	-0.52	-0.34			0.29	0.70	
Male	1	2	200	100	-.582	-0.67	-0.48			0.00	0.00	

Female	1	4	488	122	-.219	-0.31	-0.12			0.19	0.00	
Age								0.00	0.00			
Children	1	2	2146	1073	-.245	-0.59	0.17			0.00	0.00	
Preadolescents	33	108	41204	241	-.367	-0.49	-0.23			0.36	0.63	
Adolescents	29	69	34455	277	-.520	-0.63	-0.40			0.11	0.88	
Risk of Bias								0.00	0.01			
Low Risk of Bias	60	176	76868	256	-.429	-0.52	-0.33			0.29	0.70	
High Risk of Bias	2	3	937	310	-.605	-0.69	-0.51			0.26	0.44	
Autonomous Motivation – Adaptive Outcomes	105	480	207584	254	.540	0.50	0.58			0.44	0.54	31860.15
Culture								0.00	0.06			
Individualistic	63	277	103304	249	.515	0.45	0.57			0.44	0.55	
Collectivistic	40	191	102206	271	.587	0.52	0.65			0.48	0.51	
Country								0.00	0.01			
UK	12	64	27230	269	.543	0.40	0.66			0.54	0.44	
USA	17	65	18066	227	.492	0.38	0.59			0.38	0.58	
Sex								0.00	0.00			
Both	93	441	192195	269	.548	0.50	0.59			0.46	0.53	
Male	9	20	6597	113	.427	0.20	0.61			0.40	0.57	
Female	10	19	8882	244	.434	0.19	0.63			0.41	0.57	
Age								0.00	0.00			
Children	3	5	3469	545	.541	0.40	0.66			0.94	0.03	
Preadolescents	55	234	92511	244	.519	0.45	0.58			0.45	0.54	
Adolescents	50	241	111604	261	.570	0.51	0.62			0.43	0.55	
Risk of Bias								0.00	0.00			
Low Risk of Bias	103	477	205943	253	.541	0.49	0.58			0.44	0.54	
High Risk of Bias	2	3	1641	386	.457	0.03	0.74			0.00	0.98	
Autonomous Motivation – Maladaptive Outcomes	38	94	39576	229	-.253	-0.35	-0.15			0.46	0.52	5162.495
Culture								0.00	0.06			
Individualistic	24	60	19900	247	-.289	-0.41	-0.16			0.44	0.54	
Collectivistic	14	34	19676	204	-.181	-0.34	-0.01			0.55	0.44	
Country								0.02	0.23			
UK	4	12	6576	509	-.589	-0.79	-0.29			0.44	0.55	
USA	7	20	4510	198	-.263	-0.44	-0.06			0.68	0.29	
Sex								0.00	0.20			
Both	35	87	38358	240	-.220	-0.32	-0.12			0.40	0.59	
Male	2	4	532	125	-.659	-0.82	-0.39			0.95	0.00	
Female	2	3	686	194	-.573	-0.85	-0.06			0.98	0.00	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	15	42	21325	241	-.182	-0.33	-0.02			0.56	0.42	
Adolescents	23	52	18251	221	-.297	-0.42	-0.16			0.38	0.60	
Risk of Bias								0.00	0.03			
Low Risk of Bias	37	92	38990	228	-.244	-0.35	-0.14			0.46	0.52	
High Risk of Bias	1	2	586	293	-.523	-0.60	-0.44			0.46	0.00	
Introjected Regulation – External Regulation	56	66	26196	228	.560	0.48	0.63			0.84	0.14	3777.35
Culture								0.00	0.51			
Individualistic	35	43	15788	224	.494	0.38	0.59			0.93	0.06	
Collectivistic	21	23	10408	235	.655	0.55	0.74			0.71	0.27	
Country								0.09	0.50			

UK	10	11	5198	251	.315	0.24	0.39			0.86	0.00	
USA	10	16	4213	189	.483	0.25	0.66			0.97	0.01	
Sex								0.00	0.00			
Both	54	64	25753	231	.563	0.48	0.64			0.84	0.15	
Male	1	1	100	100	.217	0.02	0.40			0.50	0.50	
Female	1	1	343	343	.623	0.55	0.68			0.50	0.50	
Age								0.00	0.00			
Children	1	1	1073	1073	.834	0.81	0.85			0.50	0.50	
Preadolescents	32	41	14858	212	.492	0.39	0.59			0.93	0.05	
Adolescents	24	24	10625	252	.627	0.51	0.72			0.49	0.49	
Risk of Bias								0.01	0.13			
Low Risk of Bias	55	65	25903	227	.552	0.47	0.62			0.85	0.13	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Introjected Regulation – Amotivation	44	65	26437	255	.053	-0.03	0.14			0.40	0.58	1817.888
Culture								0.00	0.04			
Individualistic	28	31	12354	238	.009	-0.10	0.12			0.81	0.16	
Collectivistic	16	34	14083	273	.127	-0.03	0.27			0.20	0.78	
Country								0.00	0.22			
UK	12	13	5854	261	-.052	-0.16	0.06			0.00	0.94	
USA	4	5	1837	214	.284	0.08	0.47			0.98	0.00	
Sex*(p<0.001)								0.00	0.08			
Both	43	64	26337	261	.063	-0.02	0.15			0.41	0.56	
Male	1	1	100	100	-.388	0.54	-0.21			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.07	0.02			
Children	1	1	1073	1073	.537	0.49	0.58			0.50	0.50	
Preadolescents	26	42	16369	255	.011	-0.09	0.11			0.33	0.64	
Adolescents	18	22	8995	246	.084	-0.05	0.22			0.14	0.83	
Risk of Bias								0.00	0.08			
Low Risk of Bias	43	64	26144	254	.044	-0.04	0.13			0.41	0.56	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Introjected Regulation – Adaptive Outcomes	51	125	49964	253	.256	0.18	0.31			0.37	0.59	2966.77
Culture								0.00	0.05			
Individualistic	29	73	27793	280	.294	0.22	0.36			0.60	0.36	
Collectivistic	22	52	22171	222	.200	0.08	0.31			0.11	0.87	
Country								0.00	0.20			
UK	10	28	12972	311	.274	NA	NA			0.95	0.00	
USA	9	23	6680	225	.413	0.29	0.53			0.48	0.47	
Sex* (p=0.017)								0.00	0.24			
Both	49	121	49321	262	.254	0.19	0.31			0.43	0.53	
Male	1	3	300	100	.657	0.58	0.72			0.16	0.00	
Female	1	1	343	343	-.207	-0.31	-0.10			0.50	0.50	
Age								0.05	0.00			
Children	2	2	1364	458	.405	0.09	0.65			0.48	0.48	
Preadolescents	29	70	28145	254	.206	0.13	0.28			0.56	0.40	
Adolescents	22	53	20455	247	.316	0.21	0.41			0.18	0.79	
Risk of Bias								0.01	0.11			
Low Risk of Bias	50	124	49671	253	.265	0.20	0.33			0.39	0.57	
High Risk of Bias	1	1	293	-	-	-	-			-	-	

Introjected Regulation – Maladaptive Outcomes	22	31	11837	212	.129	0.01	0.24			0.69	0.28	1033.303
Culture								0.00	0.62			
Individualistic	14	19	6853	273	.054	-0.06	0.17			0.96	0.00	
Collectivistic	8	12	4984	156	.239	0.02	0.44			0.20	0.78	
Country								0.11	0.19			
UK	4	6	3288	509	-.004	-0.46	0.39			0.99	0.00	
USA	4	5	1274	217	.105	0.03	0.18			0.40	0.00	
Sex								0.05	0.21			
Both	21	30	11737	220	.149	0.04	0.26			0.72	0.25	
Male	1	1	100	100	-.371	-0.53	-0.19			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age* ($p=0.035$)								0.00	0.71			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	8	13	6663	215	.276	0.11	0.43			0.98	0.00	
Adolescents	14	18	5174	210	.036	-0.09	0.16			0.32	0.62	
Risk of Bias								0.00	0.00			
Low Risk of Bias	21	30	11544	210	.129	0.01	0.25			0.69	0.29	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
External Regulation – Amotivation	52	81	35238	250	.576	0.50	0.65			0.23	0.76	5116.771
Culture								0.00	0.03			
Individualistic	31	37	15634	228	.593	0.50	0.67			0.21	0.77	
Collectivistic	19	41	19216	296	.564	0.41	0.69			0.20	0.79	
Country								0.00	0.01			
UK	10	11	5198	251	.585	0.43	0.71			0.00	0.98	
USA	6	7	2539	230	.629	0.50	0.73			0.00	0.94	
Sex								0.00	0.07			
Both	50	78	34894	262	.588	0.51	0.66			0.24	0.75	
Male	1	1	100	100	.254	0.54	0.43			0.50	0.50	
Female	1	2	244	122	.168	0.03	0.30			0.16	0.00	
Age								0.00	0.00			
Children	1	1	1073	1073	.711	0.68	0.74			0.50	0.50	
Preadolescents	28	52	18869	235	.571	0.46	0.66			0.24	0.74	
Adolescents	24	28	15296	276	.579	0.46	0.68			0.25	0.74	
Risk of Bias								0.00	0.00			
Low Risk of Bias	51	80	34945	250	.578	0.50	0.65			0.23	0.76	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
External Regulation – Adaptive Outcomes	65	157	69410	251	-.073	-0.15	0.01			0.13	0.85	8237.723
Culture								0.00	0.04			
Individualistic	38	91	37649	266	-.120	-0.20	-0.04			0.18	0.79	
Collectivistic	26	61	31041	247	-.002	-0.16	0.15			0.11	0.88	
Country								0.00	0.07			
UK	9	27	12644	310	-.241	-0.32	-0.16			0.37	0.53	
USA	12	27	7668	227	-.132	-0.23	-0.03			0.11	0.78	
Sex								0.00	0.00			
Both	60	147	67265	269	-.073	-0.15	0.01			0.14	0.84	
Male	4	7	1112	101	.089	-0.13	0.30			0.00	0.85	
Female	3	3	1033	321	-.054	-0.57	0.50			0.49	0.49	
Age								0.03	0.00			
Children	2	2	1364	458	-.138	-0.39	0.13			0.47	0.47	

Preadolescents	34	84	32199	244	-.113	-0.21	-0.02			0.12	0.85	
Adolescents	31	71	35847	258	-.048	-0.18	0.08			0.13	0.86	
Risk of Bias								0.00	0.01			
Low Risk of Bias	64	156	69117	251	-.069	-0.15	0.01			0.13	0.85	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
External Regulation – Maladaptive Outcomes	29	39	17129	231	.251	0.17	0.33			0.62	0.34	1443.061
Culture								0.13	0.00			
Individualistic	17	22	7533	262	.290	0.21	0.37			0.29	0.62	
Collectivistic	12	17	9596	201	.220	0.01	0.41			0.98	0.00	
Country								0.08	0.11			
UK	4	6	3288	509	.408	0.27	0.53			0.60	0.32	
USA	6	7	1787	224	.200	0.14	0.25			0.30	0.00	
Sex								0.00	0.01			
Both	28	38	17029	240	.254	0.17	0.33			0.61	0.35	
Male	1	1	100	100	.149	-0.45	0.34			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.27	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	10	15	7176	218	.299	0.20	0.40			0.95	0.00	
Adolescents	19	24	9953	241	.231	0.11	0.35			0.00	0.97	
Risk of Bias								0.00	0.00			
Low Risk of Bias	28	38	16836	230	.250	0.17	0.33			0.60	0.36	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Amotivation – Adaptive Outcomes	63	187	91785	280	-.369	-0.42	-0.31			0.62	0.36	7598.631
Culture								0.00	0.06			
Individualistic	37	110	48501	291	-.394	-0.45	-0.34			0.79	0.18	
Collectivistic	25	72	42564	282	-.345	-0.44	-0.24			0.49	0.50	
Country								0.01	0.01			
UK	11	44	21132	362	-.403	-0.51	-0.28			0.93	0.04	
USA	10	38	13176	259	-.302	-0.43	-0.16			0.43	0.53	
Sex								0.00	0.00			
Both	60	173	88025	311	-.364	-0.42	-0.31			0.59	0.38	
Male	4	10	3132	116	-.480	-0.67	-0.23			0.91	0.00	
Female	1	4	628	157	-.300	-0.37	-0.23			0.00	0.00	
Age								0.05	0.00			
Children	2	2	1364	458	-.240	-0.52	0.09			0.48	0.48	
Preadolescents	29	92	44776	303	-.327	-0.39	-0.26			0.97	0.00	
Adolescents	34	93	45645	258	-.427	-0.50	-0.34			0.36	0.62	
Risk of Bias								0.00	0.01			
Low Risk of Bias	62	186	91492	280	-.366	-0.42	-0.31			0.62	0.36	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Amotivation – Maladaptive Outcomes	30	46	22688	266	.450	0.34	0.55			0.27	0.71	2211.101
Culture								0.01	0.06			
Individualistic	17	30	12801	322	.389	0.23	0.53			0.22	0.77	
Collectivistic	13	16	9887	201	.519	0.40	0.63			0.57	0.41	
Country								0.05	0.37			
UK	5	14	7368	509	.591	0.41	0.73			0.42	0.53	
USA	3	4	805	182	-.087	-0.52	0.38			0.00	0.97	
Sex								0.00	0.08			

Both	29	45	22588	276	.438	0.33	0.53			0.28	0.70	
Male	1	1	100	100	.757	0.66	0.83			0.50	0.50	
Female	0	0	-	-	-	-	-			-	-	
Age								0.09	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescent	10	22	12041	286	.380	0.13	0.59			0.18	0.81	
Adolescents	20	24	10647	250	.481	0.38	0.58			0.35	0.62	
Risk of Bias								0.00	0.00			
Low Risk of Bias	29	45	22395	266	.450	0.34	0.55			0.26	0.72	
High Risk of Bias	1	1	293	293	-	-	-			-	-	
Adaptive Outcomes – Maladaptive Outcomes	53	231	109262	302	-.212	-0.33	-0.09			0.43	0.56	22247.34
Culture								0.01	0.00			
Individualistic	28	121	52673	352	-.173	-0.35	0.01			0.26	0.73	
Collectivistic	25	110	56589	261	-.236	-0.40	-0.06			0.56	0.43	
Sex								0.00	0.00			
Both	49	219	106140	313	-.202	-0.33	-0.07			0.42	0.57	
Male	3	6	1314	138	-.388	-0.67	-0.01			0.63	0.32	
Female	2	6	1808	255	-.290	-0.37	-0.21			0.73	0.00	
Age								0.00	0.00			
Children	0	0	-	-	-	-	-			-	-	
Preadolescents	26	126	61254	325	-.191	-0.32	-0.06			0.46	0.53	
Adolescents	27	105	48008	278	-.230	-0.42	-0.02			0.43	0.56	
Risk of Bias								0.00	0.00			
Low Risk of Bias	51	226	105069	298	-.212	-0.33	-0.09			0.43	0.56	
High Risk of Bias	2	5	4193	665	-.269	-0.64	-0.20			0.02	0.97	

Link to study characteristics excel file

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