Candidate Antecedents of Need Supportive and Need Thwarting Interpersonal Styles: A Systematic Review and Meta-Analysis

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Nikos Ntoumanis[1,2], Dennis Bengtsson[3], Jennie Hancox[4], Minttu Palsola[5], Chris Lonsdale[6], Eleanor Quested[7], Andreas Ivarsson[3,8]

1. Danish Centre for Motivation and Behaviour Science, IOB, University of Southern Denmark, Odense, Denmark.
2. School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Birmingham, UK
3. School of Health and Welfare, Halmstad University, Halmstad, Sweden.
4. School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough, United Kingdom.
5. Faculty of Social Sciences, Tampere University, Tampere, Finland
6. Institute for Positive Psychology and Education, Australian Catholic University, Sydney, Australia.
7. Physical Activity and Well-Being Research Group, enAble Institute, Curtin University, Perth, Australia
8. Department of Sport Science and Physical Education, University of Agder, Norway

Address for correspondence:

Prof. Nikos Ntoumanis

IOB, University of Southern Denmark

Campusvej 55, DK-5230 Odense M, Denmark

Email: nntoumanis@health.sdu.dk

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Abstract

In the self-determination theory (SDT; Ryan & Deci, 2017) literature, interpersonal styles by 'motivators' (e.g., parents, teachers, coaches) are purported to be key influences on the motivation and functioning of the "motivatees", the people with whom they interact (e.g., offspring, students, athletes). Hence, understanding the antecedents of these styles is important for both conceptual and applied reasons. Our objective in this review was to systematically synthesize the candidate antecedents of need supportive and need thwarting interpersonal styles. We analyzed 122 eligible studies, primarily cross-sectional, without any restrictions on life domains or research designs. Our systematic review identified 59 specific candidate antecedents, most of which we categorized into 13 general factors and 3 higher-order themes: socio-contextual, motivators' personal factors, and motivators' perceptions of motivatees' motivation and behavior. Our meta-analysis showed that adaptive motivation factors within motivators (primarily autonomous motivation and need satisfaction) were the strongest and most consistent predictors of their provision of overall need support to motivatees, as well need-specific support (autonomy, competence, and relatedness). In contrast, maladaptive motivation (primarily amotivation and need frustration) within motivators was the most consistent and moderately strong predictor of their overall need thwarting style (and need-specific thwarting styles) when interacting with motivatees. Our review presents an integrative classification system of candidate antecedents of interpersonal styles. These could act as moderators of intervention effectiveness by influencing the degree of intervention fidelity in trials targeting need-supportive styles, or they could serve as intervention targets in their own right.

Keywords: interpersonal styles, need supportive, need thwarting, communication, self-determined motivation

The expression “it's my way or the highway" is commonly used by motivators (e.g., parents, sport coaches, work supervisors) to indicate, in an unequivocal manner, that there is no room for alternatives to their thoughts, plans, or courses of action. Such a controlling style is in stark contrast with an “everyone has a voice” style that respects motivatees’ (e.g., children, athletes, workers) autonomy and input. Although there is a plethora of evidence from diverse theories of communication and leadership on the consequences of using such different styles on the recipients’ motivation, achievement, and well-being, comparatively less is known about the reasons why people employ these styles. In our review, we focus on the two interpersonal styles put forward by Ryan and Deci’s (2017) self-determination theory (SDT) and meta-analytically synthesize their candidate personal, interpersonal, and contextual antecedents. We cover studies from diverse literatures, such as parenting, education, healthcare, romantic relationships, and sport and exercise. Identifying candidate antecedents of these styles is important not only for conceptual reasons, but also because it can inform intervention programs (particularly for those antecedents that are more amenable to change) in schools, workplaces, households, etc., to better help teachers, work supervisors, parents, and others to fully embrace adaptive styles.

The history of studying interpersonal styles in the SDT literature is rich, but it has focused primarily on the consequences of adaptive and maladaptive styles. Within cognitive evaluation theory (one of SDT’s mini-theories), a distinction has been made between an autonomy supportive and a controlling style (e.g., Deci et al., 1981; Grolnick et al., 1997). Examples of autonomy support by individuals in position of authority or expertise include offering meaningful choice, articulating rationales for task engagement, acknowledging negative feelings for change, allowing opportunities in decision making, and trying to understand others’ perspective. In contrast, a controlling style is characterized by excessive personal control to impose opinions and behaviors on others, using intimidating behaviors

(e.g., threat of punishment or shame), and conditional regard (i.e., affection and approval of others only when they behaving according to one's expectations; see Bartholomew et al., 2009; Reeve, 2009). In subsequent years (e.g., Deci & Ryan, 2000), there has been a shift within the SDT literature from examining styles that support or thwart the psychological need for autonomy to styles that support or thwart all three basic psychological needs put forward by SDT theorists. Deci and Ryan distinguished between styles that support the needs for autonomy, competence, and relatedness, as well as styles that thwart each of these psychological needs. These six styles have been measured in the literature independently, often with different labels for similar constructs (e.g., 'structure' instead of competence support, and 'interpersonal involvement' instead of relatedness support), or have been collapsed into overall 'need supportive' and overall 'need thwarting' styles. More recently, classification systems of need supportive behaviors have been developed from Delphi studies conducted with motivation experts. For instance, Teixeira et al. (2020) identified 21 'motivation and behavior change techniques' that can be used by health professionals to support their clients' three psychological needs. Ahmadi et al. (2023) used a similar process to identify 57 'teacher motivational behaviors' that teachers can use in educational settings to support or thwart their students' three psychological needs (and consequently their self-determined motivation and associated behavioral, cognitive, and emotional outcomes).

There is much correlational evidence and, to a much lesser extent, experimental evidence, summarized via systematic reviews and meta-analyses, supporting the benefits of a need supportive style and the costs of a need thwarting style in terms of the recipients' psychological need satisfaction, self-determined motivation, psychological and physical well-being, and achievement (e.g., see reviews by Ntoumanis et al., 2021 in health settings, Slemp et al., 2018 in work contexts; Vasquez et al., 2015 in parenting). A review of all these reviews is presented in Ryan et al. (2022). This body of research is depicted by the green boxes and

arrows in Figure 1. Our review, summarizing the evidence shown by the blue boxes and arrows in the same figure, is the first comprehensive synthesis of interpersonal, intrapersonal, contextual, and demographic factors that have been conceptualized as determinants of interpersonal styles. We use the term candidate antecedents throughout the manuscript because, although these variables have been theorized as antecedents and be called as such (or "determinants"; Pelletier et al., 2002; Reeve et al., 2014; Roth & Weinstock, 2013), the vast majority of the empirical evidence on those comes from non-experimental studies. Although longitudinal studies provide evidence for temporal ordering, without randomization and control over confounds they cannot prove causality.

Grouping Candidate Antecedents of Interpersonal Styles

There has not been one overarching framework in the SDT literature to study the candidate antecedents of interpersonal style. Pelletier et al.'s (2002) work describing different types of pressures teachers face in schools has been one of the first studies of candidate antecedents of interpersonal style, and it has proven to be quite influential in the SDT literature with studies applying that work to other life domains (e.g., sport). Pelletier et al. identified three types of candidate antecedents: teachers' perceptions of 'pressure from above' (e.g., conforming to the school curriculum, school administration expectations, and other colleagues' teaching), 'pressure from below' (teachers' perceptions of low student self-determined motivation toward school), and teachers' low self-determined motivation to work ('pressure from within'). These authors reported that teachers' autonomy supportive behaviors were directly predicted by teachers' high self-determined motivation, and indirectly (in a positive manner) by teachers' perception of students' self-determined motivation as well as (in a negative manner) by teachers' perceptions of constraints they faced at work. A direct effects model with no mediation effects also showed good model fit.

Whilst our paper was written up, Howard et al. (in press) published a meta-analysis of need support and need thwarting in education settings, primarily (73%) of cross-sectional studies, looking at antecedents (the authors did not use the term "candidates") of need support only and consequences of both supportive and thwarting styles. Howard et al.'s list of antecedents included teacher and parent personality, motivation, and demographics variables. The strongest antecedents of need support that emerged from this review were autonomy causality orientation and parent need satisfaction. No antecedents of need thwarting were examined in this review. The most comprehensive review to date, in terms of number of candidate antecedent variables, diverse life domains, and both supportive and thwarting styles, was undertaken by Matosic et al. (2016). These authors systematically searched for such candidate antecedents in the education, parenting, sport, workplace, and health literatures and grouped a large number of those variables into three themes: contextual (which was further separated into socio-environmental factors and external pressure), perceptions of others' (motivatees') motivation and behavior, and personal factors (of motivators).

Socio-Contextual Factors

In addition to the aforementioned pressures that Pelletier et al. (2002) referred to as 'pressure from above' and 'pressure from below', Matosic et al. (2016) identified performance evaluations of oneself and of/by their 'subordinates' as external pressures that influence motivators to use more controlling strategies towards those they interact with. Another common external pressure measured in the literature is time constraints (e.g., Rocchi & Pelletier, 2017); perceptions of limited time can make a motivator more controlling by recommending solutions without offering the opportunity for discussion, criticizing mistakes, and avoiding asking questions. Financial and cultural pressures (e.g., Kwon & Wickrama, 2014) and factors related to social connection and support have also been examined as

candidate antecedents of interpersonal styles. For instance, a close athlete-coach relationship was a positive predictor of autonomy support and a negative predictor of coach control in a study by Kim et al. (2019).

Motivators' Perceptions of Motivatees' Motivation and Behavior

Some of the research measuring this type of candidate antecedent has been inspired by a 'behavioral confirmation' hypothesis put forward by Pelletier and Vallerand (1996). Participants acting as 'supervisors' in the lab experiments conducted by Pelletier and Vallerand were given descriptions of the 'subordinates' being either intrinsically or extrinsically motivated for the tasks at hand. Interestingly, supervisors were more likely to be autonomy supportive and less controlling (as rated by themselves, the subordinates, and by observers) when they interacted with presumed intrinsically motivated (vs. extrinsically motivated) subordinates. As a result, the subordinates in the intrinsic motivation condition developed stronger intrinsic task interest and exerted more effort during a free choice period. These results are intuitive, albeit paradoxical from a motivation standpoint, given that being controlling towards extrinsically motivated subordinates is likely to increase their extrinsic motivation even further (Reeve, 2009).

In addition to perceptions of motivatees' intrinsic and extrinsic motivation, perceptions of motivatees' positive and negative behaviors have also been identified as candidate antecedents of need support and thwarting. For instance, Van den Berghe et al. (2015) found that behavioral engagement by students in physical education classes was a positive predictor of need support provided by their teachers. As another example, Dumont et al. (2014) found that children's reading effort in Grade 5 was positively associated with parents' need support in Grade 7, whereas procrastination in Grade 5 was negatively related to such prospective parental support. This pattern of relations mirror those observed between

autonomous and controlled motivation with need support and thwarting. In fact, they reflect the same motivational paradox of being less need supportive to those who need it more, and could be perhaps explained by beliefs about interpersonal styles (see next section). Motivatees' abilities and achievements have also been tested as candidate antecedents of need support, particularly in the parenting and sport literature (e.g., Dumont et al., 2014, Iachini, 2013). Lastly, in addition to behavioral engagement, emotional engagement has been found to be a predictor of need support (e.g., van den Berghe et al., 2015). Hence, our review includes studies that assessed candidate antecedents of motivatees' positive and negative emotions. As an example, Tunkkari et al. (2021) showed that adolescents' positive emotions towards school predicted maternal autonomy support, whereas adolescents' negative emotions were predictors of less maternal autonomy support and more maternal control.

Motivators' Personal Factors

Personal factors, the third theme of candidate antecedents identified in Matosic et al. 's (2016) review, is the most widely explored group of such antecedents in the extant literature. As mentioned above, Pelletier et al. (2002) measured teachers' self-determined motivation to work as a candidate antecedent of their autonomy supportive style; the more self-determined teachers felt about their job, the more they reported being autonomy supportive toward their students. This finding has been replicated in various subsequent studies in education and elsewhere, and has been expanded to also include controlled motivation. For instance, Duprez et al. (2020) reported that work-related autonomous motivation in nurses was associated with them using a more need supportive style with their patients, whereas controlled motivation for work was associated with a more need thwarting style (which the authors called "demotivating/chaotic").

Other motivation-related variables from the SDT literature that have been tested as candidate antecedents of interpersonal styles include need satisfaction and frustration, autonomy and controlled causality orientations (i.e., predispositions to experience autonomy or feel controlled in one's life, respectively), and intrinsic and extrinsic goal aspirations (e.g., community contribution vs reputation). For instance, Costa et al. (2019) reported that fathers who experienced psychological need satisfaction in their lives were more need supportive towards their children, whereas those whose needs were frustrated were more controlling. Further, autonomy causality orientation (Martinek et al., 2020) and intrinsic goals (Jang, 2019) have been related to more need supportive style amongst teachers, whereas extrinsic goals (Jang, 2019) have been linked to more controlling teaching styles. Other, less frequently examined candidate motivational antecedents originating from other theories of motivation, include self-efficacy (e.g., Hagenauer & Hascher, 2018), obsessive and harmonious passion (Kim et al., 2019), mastery and performance goals (e.g., Mageau et al., 2016), and positive attitudes (Katz et al., 2011).

A number of studies in the extant literature have assessed various personal beliefs as candidate antecedents of interpersonal styles. These beliefs fall broadly into two categories: beliefs about these interpersonal styles and miscellaneous beliefs (positive or negative). Style-related beliefs have been extensively discussed by Reeve et al. (2014). These authors identified three types of such beliefs: how effective a style is, how widespread its use is within a particular context, and how easy it would be to implement. Reeve et al. reported that all three types of beliefs, measured with reference to both autonomy support and control, predicted the use of each of these two styles by teachers, with the strongest predictor being the effectiveness beliefs. Other studies have measured such beliefs, not just amongst teachers, but also amongst other professionals such as sport coaches (e.g., Matosic et al., 2020). There is also a miscellaneous list of other types of beliefs that have been assessed in past studies.

These are beliefs about religion (e.g., literal vs symbolic interpretations of religious texts; Duriez et al., 2009), knowledge and learning (e.g., epistemological beliefs about knowledge; Üztemur et al., 2020), motivation (e.g., whether teachers think that student autonomous motivation is desirable; Katz et al., 2015), high or low personal responsibility for others (e.g., Lauermann et al., 2021), as well as entity vs incremental views of intelligence (Vermote et al., 2021).

Internal pressures have also been widely studied, reflecting a wide array of internal demands, such as high aspirations that parents had about their children (e.g., Yotodying & Wild, 2016) or when coaches used their athletes' performance as a basis to evaluate their own success and competence (Iachini, 2013). Such internal pressures have been associated with providing less need support and being more need thwarting towards others. Other candidate antecedents that have been studied in the extant literature represent diverse social or emotional functioning factors, such as emotional intelligence, well-being and ill-being, and social competence. For instance, parents with high emotional intelligence (Costa et al., 2018), teachers who reported more joy and less fear (Hagenauer & Hascher, 2018), and parents who had better conflict management skills (e.g., Egeli et al., 2016) were more likely to be need supportive and/or less need thwarting. Lastly, various negative personality traits, such as narcissism and authoritarianism, have been shown to be candidate antecedents of a need thwarting style (Matosic et al., 2016; Reeve et al., 2018).

Research Objectives

The objective of our review was to systematically synthesize the various candidate antecedents of the need supportive and need thwarting interpersonal styles described in the SDT literature, irrespective of the research design used. Moreover, through a series of meta-analyses, we aimed to statistically quantify the magnitude and heterogeneity of the relations

between each of these candidate antecedent factors and the different interpersonal styles, as well as to assess the primary literature in terms of study quality, publication bias, and statistical power. Given the large number of candidate antecedent variables that have been tested in primary studies, we offer only broad hypotheses. Specifically, we expected to identify three categories of candidate antecedents reflecting contextual factors, personal factors of motivators, and perceptions by motivators of motivatees' motivation and behavior. We hypothesized that need support would be predicted by factors reflecting social support, adaptive motivation (e.g., autonomous motivation to teach), and positive perceptions of motivatees (e.g., teacher perceptions of students' effort). In contrast, we expected need thwarting to be predicted by pressure from others (e.g., colleagues) or time constraints, maladaptive motivation factors (e.g., controlled motivation to teach), and negative perceptions of motivatees (e.g., teacher perceptions of students' being amotivated).

To explain heterogeneity in the effect sizes, we studied the possible moderating effects of a number of variables. These were 1) life domain (e.g., education, parenting), 2) country where the study was conducted, 3) instruments used to assess interpersonal style (e.g., observations, self-reports, other reports), 4) study design, and 5) study quality. Our primary interest was on the first moderator; exploring whether some variables are stronger/weaker candidate antecedents or have the same predictive effects across different life domains has important implications for the invariance of the tested mechanisms. Nevertheless, there is no prior research upon which to guide us into specific hypotheses regarding this moderator. The other four moderators are exploratory in nature.

Method

Literature Search Strategy

We did electronic searches from the earliest reported date up until May 28, 2024, using the databases Medline, PsychINFO, Web of Science, and Scopus. We also inspected

reference lists of related previous systematic reviews and meta-analyses found in the electronic search. The search string was created from a composition of three separate groups of terms focusing on: antecedents (Group 1: antecedent* OR determinant* OR predictor* OR "context* factor*" OR "social* factor*" OR "personal* factor*" OR belief* OR "causality orientation" OR pressure OR "pressure from above" OR "pressure from within" OR "pressure from below"); interpersonal style (Group 2: controlling* OR "autonomy support*" OR "need support*" OR "relatedness support*" OR "competence support*" OR "autonomy thwarting*" OR "relatedness thwarting*" OR "competence thwarting*" OR "teach* style" OR "motivat* style" OR "parent* style" OR "coach* style" OR "interpersonal style*" OR structure OR involvement OR "need thwarting" OR "behav*" OR "chaos" OR "rejection", and theory (Group 3: "self-determination" OR self-determination). Each clustered group was combined with the operator "AND" for the production of the final search in each database. Where possible, search strings were organized into relevant subject headings. The search results are presented in a PRISMA flow diagram (Figure 2). We searched for published papers, dissertations, and pre-prints.

Criteria and Screening Process

The Rayyan web application (https://rayyan.qrci.org; Ouzzani et al., 2016) was used to manage retrieved records from the literature search, including titles, abstracts, citations, and full texts. Initially, studies were included if they: (1) quantitatively measured a candidate antecedent of any need supportive or need thwarting interpersonal styles described by SDT (Ryan & Deci, 2017); (2) included participants who used such a style (e.g., coaches, teachers, parents, managers, spouses) irrespective of their demographic characteristics such as gender or age; (3) provided sufficient information to compute effect sizes, or this information was available by contacting the authors directly. Subsequently, studies were excluded if one or more of the following criteria were not met: (1) SDT was not cited as a theoretical framework

underpinning the research presented in the study; (2) the study did not explicitly label any variables as antecedents of interpersonal styles; (3) the full text was unavailable via our institutional access or through direct correspondence with the author (i.e., 2 email requests/reminders, separated by 2 weeks); (4) the information required to compute effect sizes was not sufficiently detailed or available in the full text document or via direct requests made to the corresponding author (i.e., 2 email requests, separated by 2 weeks). Following screening, we had to exclude several experimental studies that trained motivators to be need supportive or thwarting, because the antecedent variable that was manipulated was not measured (e.g., evaluative pressure in Grolnick et al., 2007) or it was not clear from the intervention which antecedent was targeted. All excluded studies, including those that were eligible but the authors did not respond to our request for data, are listed in our Supplementary Table S1.

One author (DB) independently assessed titles and abstracts of the articles identified in the search, followed by double screening of the same articles by a second author (JH). A calculation of inter-rater reliability was performed through the Cohen's kappa coefficient (Cohen 1960), resulting in 98% agreement and a kappa value of 0.76. In the second step, the full text of studies considered eligible for the review were retrieved and assessed independently by the same two authors. Discussion was used to resolve any disagreements, or by consulting a third author (NN) if consensus could not be reached. After the screening of full-text articles, data about study design, country, participant characteristics, study domain, candidate antecedents tested, instruments used to assess interpersonal style, and key findings, were extracted by two of the authors (DB & MP) and entered to an Excel spreadsheet (see Supplementary Table S2 for key information of each included study, and our OSF page for the spreadsheets). Consensus was used to resolve any disagreements, or by consulting a third

author (NN) if consensus could not be reached. Through this process, we were able to include 122 studies in our meta-analysis.

Grouping Process of Candidate Antecedents

Given that different terms have been used in the SDT literature to describe similar SDT constructs, the following decisions were made, based on two of the authors' (NN and EQ) extensive knowledge of the theory and the most recent SDT book by Ryan and Deci (2017): 'structure' was combined with 'competence support'; 'interpersonal involvement/warmth' with 'relatedness support'; 'chaos' with 'competence thwarting'; 'rejection' with 'relatedness thwarting and 'controlling style' with 'autonomy thwarting'. Hence, the following six specific styles were assessed in our review: autonomy support, autonomy thwarting, competence support, competence thwarting, relatedness support, and relatedness thwarting. Further, the two general styles of overall need support and overall need thwarting were also assessed.

The coding of the candidate antecedents into specific and general factors was decided by the same two authors (NN, EQ). Disagreements were resolved via discussion. Specific factors were created by combining similar variables (e.g., emotional regulation and emotional intelligence; different types of positive emotions). General factors were created by combining somewhat similar specific factors. Specific factors that were too distinctive to be combined with other specific factors but had been assessed in several studies were also included as general factors (using the same label). For instance, the specific factor 'internal pressures,' assessed in eight studies, was notably distinct from other personal factors and was not grouped with any of them. Instead, it was retained as a standalone general factor under the same label. Some specific factors were also too distinctive and were assessed in one study only; these specific factors were not grouped into general ones. The last group of variables we included in our review were demographics, namely age, education level, gender,

socioeconomic status, and the age and gender of the motivatees. For studies in education only, we also included teacher experience. Given that none of these have been systematically examined in the extant literature (they were often treated as control variables in the statistical analyses of the primary studies), their inclusion in our review was for exploratory reasons only.

Quality Assessment of Studies

All included studies were assessed using the Mixed Methods Assessment Tool (MMAT; Hong et al., 2018), instead of Q-SSP and RoBANS checklists originally outlined in our protocol. This deviation was due to concerns regarding numerous items of the Q-SSP (e.g., items referring to reporting of various pieces of information may disadvantage studies published in journals with strict word limits; items for pre-registration disadvantage older studies included in our review before the establishment of the Open Science movement). In addition, our pre-registered protocol did not include a quality assessment tool for non-randomized studies. After discussing these issues, the authors chose the MMAT for quality assessment as completion of quality assessment via this tool is not affected by the aforementioned concerns. MMAT also allows the appraisal of a variety of study designs, including all those that met our eligibility criteria (i.e., quantitative descriptive studies, randomized controlled trials, non-randomized studies). The reliability and content validity of this tool has been previously supported (Hong et al., 2019; Pace et al., 2012). Two authors (JH & MP) independently appraised the quality of all retained studies. Cohen's kappa (Cohen, 1960) indicated moderate agreement between the reviewers (k=0.426, p<.001). Disagreements were resolved through discussion and where necessary a third author (DB) was consulted. See Supplementary Table S3 for the methodological quality ratings of each included study.

Transparency and Openness

We followed the PRISMA-P checklist when preparing the protocol, and we used the PRISMA 2020 checklist (see our Supplementary Material) to inform the reporting of our findings (PRISMA; Page et al., 2021). The pre-registered protocol, the meta-analytic data and analysis code are available at https://osf.io/yp849/?view_only=49abcb8bf79749a0a09e092923456dd9 .

Data Analysis

Pearson's correlation coefficients were used as the effect size for this meta-analysis. These coefficients were extracted from the primary studies or were obtained upon request from corresponding authors. We used the built-in functions of Comprehensive Meta-Analysis (CMA; Borenstein, 2022) software (version 4) to obtain standard errors, which in combination with the correlation coefficients, were required to conduct the meta-analysis. Because the included studies varied in design and the number of effect sizes relevant for the research questions for this study, we applied three-level meta-analytical models with cluster-robust variance estimation (Fernández-Castilla et al., 2021; Pustejovsky & Tipton, 2022). In the three-level models, random effects for study (Level 2) and effect size (Level 1) represent the estimates of between-study ($\tau 2$) and within-study ($\tau 2$) heterogeneity variance, respectively. To ensure comparability, we extracted only baseline correlations from experimentally designed studies. There were too few studies (3 quasi-experimental and 1 RCT) to perform a separate meta-analysis on those studies. For longitudinal studies, we used all available correlations between candidate antecedents and styles at all time points. We performed separate analyses using correlation coefficients from longitudinal studies only. In these analyses we included only prospective associations between candidate antecedents and interpersonal styles; if there were several time points, we included all prospective associations across all available time points.

We used the R package *metafor* in combination with the *clubSandwich* package to estimate robust variance (Pustejovsky, 2021). We carried out separate analyses for different combinations of candidate antecedents and interpersonal styles. More specifically, in the Results section we present the results of how general candidate antecedent factors and demographics were associated with general and specific interpersonal styles. In the supplementary material (Supplementary Tables S4 and S5) we also present the results pertaining to how specific candidate antecedent factors and demographics were associated with general and specific interpersonal styles. We report the results for overall effect sizes that contained information from at least two unique studies that were combined when they were 'sufficiently similar' (Ryan; Cochrane Consumers and Communication Group, 2016). Funder and Ozer (2019) reviewed the psychological literature and suggested benchmarks of r = .05, .10, .20, and .30 for very small, small, medium, and large effect sizes, respectively. We used these benchmarks in our Discussion.

After performing the overall meta-analyses, we ran moderator analyses using models containing one moderator at a time to test for potential moderator effects. All these analyses were confined to models which had the highest number of unique samples, that is, models in which general candidate antecedent factors were associated with general interpersonal styles. Moderators tested were study design, study quality, country, life domain, and instrument used to assess interpersonal style. Egger's regression tests were performed to test for potential publication bias. These tests were also undertaken using the three-level model with cluster-robust variance estimation. Power-enhanced funnel plots, using *metaviz* in R, were plotted to illustrate potential publication bias in relation to the studies statistical power (Kossmeier et al., 2020). Before plotting the funnel plots, r values were transformed into z values. For all analyses we used a significant level of $\alpha = 0.05$. Effect sizes are presented as correlation coefficients combined with 95% confidence intervals.

Results

Study Selection

The search resulted in 5821 studies; 1566 duplicates were identified and removed at this stage. A total of 4255 studies were screened for eligibility, 164 of those underwent full-text screening, and 122 studies were included in the final synthesis and meta-analysis. The full process is illustrated in Figure 2.

Description of Included Studies

Most included studies used a cross-sectional design (n = 92). Moreover, 25 studies were longitudinal, three used a quasi-experimental design, and one a randomized controlled trial design. One study used a combination of cross-sectional and longitudinal designs. The education domain was the most common, with 48 studies, while parenting (n = 42) and sport (n = 21) were the other two most frequently reported domains. Only a few studies focused on exercise (n = 6), healthcare (n = 3), or home (n = 2) environments. One study was situated in both the parenting and education domains. For 119 of the included studies, interpersonal styles were self-reported by motivators, for example, a parent or a teacher. Reports by motivatees (e.g., children) were also included in 50 studies. Only five of the included studies obtained third-party observations.

Systematic Review

We used the model in the Matosic et al. (2016) review as a guide for the groupings, but we added another hierarchical level (i.e., the differentiation between general and specific factors) to better capture the breadth and depth of new candidate antecedents that have been identified in studies published since that review.

Within the theme of ‘socio-contextual factors’, we identified two general factors, external pressure, and social connection/support, and seven specific factors. For the theme ‘motivators’ perceptions of motivatees’ motivation and behavior’, we identified two general

factors, positive perceptions of motivatees, and negative perceptions of motivatees, which reflected seven specific factors. Three other specific factors were too unique to be combined. The vast majority of studies within this theme measured perceptions as opposed to actual behaviors, hence the label. Figure 3 shows the general and specific factors for these two themes as well as the number of effect sizes for each factor.

Most candidate antecedents, both general and specific, we found were within the 'motivators' personal factors' theme. Specifically, the following nine general factors pertaining to motivators were identified: adaptive motivation, maladaptive motivation, style related beliefs, other beliefs (positive), other beliefs (negative), internal pressures, positive social or emotional functioning, negative social or emotional functioning, and negative personality factors. These general factors represented 31 specific factors. Moreover, we identified 11 more specific factors within the ''motivators' personal factors' theme that were not further grouped into general factors (see *Methods* for the rationale). The labels 'adaptive', 'maladaptive', 'positive', and 'negative' were based on the authors' understanding of the nature of each factor labeled as such, and the factor's general pattern of relations (in the broad psychological literature) with positive or negative behavioral, affective, or cognitive functioning. Figure 4 shows the general and specific factors for this large theme, as well as the number of effect sizes for each factor.

For the demographics factors, the number of effects sizes were as follows: motivators' gender (56), motivators' age (33), motivatees' gender (34), motivatees' age (28), socio-economic status (31), education level (52), and teaching experience (for school studies; 43).

Meta-Analysis

Associations Between General Candidate Antecedent Factors and Need Support

Results for all candidate antecedents are presented in Table 1. A total of 108 (k = 943) studies included data for the relations between general candidate antecedent factors and overall need

support. Adaptive motivation, other (i.e., non-style related) positive beliefs, positive perceptions of motivatees' motivation and behavior, positive social or emotional functioning, as well as social connection/support had positive and statistically significant associations with overall need support. On the other hand, maladaptive motivation, negative perceptions of motivators' motivation and behavior, and negative social or emotional functioning had negative, statistically significant associations with overall need support. None of the other variables had any statistically significant association with overall need support. The between-study heterogeneity was $\tau^2_{\text{between-study}} = 0.03$, and the within-study heterogeneity $\tau^2_{\text{within-study}} = 0.01$.

We also calculated effect sizes between general candidate antecedent factors and each specific need support factor. With respect to autonomy support, there were 92 studies, including 581 effect sizes. Adaptive motivation, other (i.e., non-style related) positive beliefs, positive perceptions of motivators' motivation and behavior, positive social or emotional functioning, as well as social connection/support all had statistically significant relations with autonomy support. Also, the results showed negative associations between autonomy support and maladaptive motivation as well as negative social or emotional functioning. For competence support ($n = 34$, $k = 211$) the results showed positive associations with adaptive motivation and style-related beliefs, negative associations with maladaptive motivation, as well as a negative association with socio-economic status. Lastly, for relatedness support ($n = 12$, $k = 71$), adaptive as well as maladaptive motivation had, statistically significant, associations with this interpersonal style. No other statistically significant relations were found between the general candidate antecedents and the specific need support outcomes. The between-studies heterogeny ranged between .01 to .03, while the within study heterogeneity was close to zero for all three specific interpersonal styles.

Associations Between General Candidate Antecedent Factors and Need Thwarting

Results for all candidate antecedents are presented in Table 2. For the associations between general factors and overall need thwarting, 66 studies, containing a total of 554 effect sizes, were included. The results showed that external pressure, internal pressure, maladaptive motivation, negative perceptions of motivators' motivation and behavior, negative social or emotional functioning, and negative personality factors had positive associations with overall need thwarting. Negative associations with overall need thwarting were found for adaptive motivation, other (i.e., non-style related) positive beliefs, positive perceptions of motivators' motivation and behavior, and positive social or emotional functioning. There were no other statistically significant results between general factors and overall need thwarting. The between-study heterogeneity was $\tau^2_{\text{between-study}} = 0.03$, and the within-study heterogeneity $\tau^2_{\text{within-study}} = 0.00$.

We also calculated effect sizes between general candidate antecedent factors and each specific need thwarting factor. For autonomy thwarting ($n = 60$, $k = 370$) there were positive associations with external pressures, internal pressures, maladaptive motivation, negative perceptions of motivators' motivation and behavior, negative personality, and negative social and emotional functioning. Positive social or emotional functioning, positive perceptions of motivators' motivation and behavior, as well as adaptive motivation both had negative associations with autonomy thwarting. Competence thwarting ($n = 18$, $k = 134$) had a positive, statistically significant, association with maladaptive motivation as well as other (i.e., non-style related) negative beliefs, and a negative association with adaptive motivation, and positive beliefs (other). Relatedness thwarting ($n = 4$, $k = 22$) had no statistically significant associations with any of the general factors. The between studies heterogeny ranged between .02 to .05, while the within study heterogeneity was close to zero for all three specific needs.

Associations Between Demographics and Overall Need Support/Overall Need Thwarting

There were no significant associations between demographics (i.e., age, education level, experience (for teachers only), age or gender of motivators and motivatees, socioeconomic status) and overall need support or overall need thwarting. For all estimates, see Tables 1 and 2.

Analyses Using Longitudinal Studies Only

Given the smaller number of longitudinal studies, we only conducted analyses with the general candidate antecedent factors predicting need supportive and need thwarting styles. Additional analyses using the specific candidate antecedent factors were not viable due to the low number of studies and effect sizes per specific candidate antecedent category. Of the 25 longitudinal studies (k = 102), we used 23 which provided data on the relations between general candidate antecedents (other than demographics) and overall need support. The between-study heterogeneity was τ2 between-study = 0.04, and the within-study heterogeneity τ2 within-study = 0.00. Notably, motivators' adaptive motivation, positive social or emotional functioning, and social connection/support had significant positive prospective associations with overall need support (Table 3). In contrast, motivators' maladaptive motivation demonstrated a significant negative association over time with need support. Thirteen longitudinal studies (k = 40) examined the temporal relations between general candidate antecedents and overall need thwarting. The between-study heterogeneity was $\tau^2_{\text{between-study}} = 0.03$, and the within-study heterogeneity was $\tau^2_{\text{within-study}} = 0.00$. Maladaptive motivation and motivators' negative perceptions of motivatees' motivation and behavior were positively and prospectively associated with need thwarting. In contrast, motivators' positive perceptions of motivatees' motivation and behavior were negatively and prospectively associated with need thwarting (Table 4).

Moderator Analyses

To account for factors that could influence the magnitude of the effect sizes reported, five separate moderator analyses were conducted. We limited this analysis to the effect sizes associated with overall need support and overall need thwarting because there were more studies available for those effect sizes than for the six specific interpersonal styles. For the moderators of study design, country, life domain, and instrument used to assess interpersonal style, pairwise comparisons between all categories/conditions were performed (categories with fewer than two studies were omitted from the analyses). The results showed, for need support, a statistically significant moderation effect for design. More specifically, cross-sectional studies had, on average, larger effects than longitudinal designs. No other statistically significant differences between the different categories were found for either of the four moderators. Quality scores were treated as a continuous variable and a regression analysis was, therefore, performed. There was no statistically significant relationship between study quality score and the magnitude of the effect size. To sum up, just one of the proposed moderators had any statistically significant relation with the magnitude of the effect size for general need support. For general need thwarting none of the proposed moderators had any effect. These results are reported on the OSF page.

Publication Bias

The results from the Egger's regression type test showed a statistically significant, negative, relation between overall effect size estimate and precision for overall need support ($\beta_0 =$ -0.99, SE = 0.84, t = -3.60, p = 0.008). For overall need thwarting there was also a negative statistically significant relation between effect estimate and precision (β_0 = -0.94, SE = 0.62, , p = 0.01). Power-enhanced funnel plots for the two types of studies are presented in Figures 5 and 6. These plots showed a median power of 14.8% for the need thwarting studies and 24.5% for the need satisfaction studies. Inspecting the power plots showed no systematic pattern between statistical power and the magnitude of the effect sizes.

Quality Assessment

Critical appraisal of studies revealed 90% of studies met at least 3 of 5 MMAT criteria. Twenty studies (16%) were rated as high-quality, meeting all 5 quality criteria. The majority of studies met 3 (48 studies, 39%) or 4 (43 studies, 35%) of the quality criteria. A minority of studies met only 1 (4 studies, 3%) or 2 (8 studies, 7%) of these criteria. Ninety-six percent (n=117) of studies were categorized as quantitative descriptive for the purposes of the MMAT assessment. For these studies, clear and detailed reporting of the target population and of the sample (such as respective sizes and inclusion and exclusion criteria) were often missing, thus it was not possible to determine whether the sample was representative of the target population (MMAT criteria 2). Not clearly detailing whether the risk of non-response bias was low (MMAT criteria 4) was another common limitation of studies.

Discussion

Our systematic review showed the richness and diversity of candidate antecedent factors that have been examined in the extant literature. Our initial coding identified 59 specific candidate antecedents that were of psychosocial nature, as well as several demographic variables, of which we analyzed seven. The psychosocial factors represented an initial level of aggregation from a much larger pool of very specific factors (e.g., '*motivatees' positive emotions* aggregated all positive emotional/affective items). To make sense of these 59 specific factors, we initially classified them into the 3-level model proposed by Matosic et al. (2016). However, we felt the need to add another level of hierarchy within this classification, to provide a more manageable and concise grouping, useful for descriptive reasons and for facilitating the meta-analytic evaluation of the literature. Hence, within each of the three broad themes we grouped specific factors into more general ones (Figures 3-4). We also added demographic characteristics of motivators and motivatees, which were overlooked by Matosic et al. (2016). In brief, our proposed model (Figure 7) has three broad

themes/categories: socio-contextual (2 general factors identified in our review as well as unclassified specific factors), motivators' perceptions of motivatees' motivation and behavior (2 general factors identified in our review as well as motivatees' demographic characteristics), and motivators' personal factors (9 general factors, unclassified specific factors, and motivators' demographic characteristics).

Motivators' personal factors have been, by far, the most explored candidate antecedents of need supportive and need thwarting interpersonal styles. We identified 42 specific factors tapping both adaptive and maladaptive motivational variables, various types of beliefs, internal pressures, social and emotional functioning, personality, as well as a few demographic factors such as gender, age, education level, and socio-economic background. Some of the motivational factors were from the SDT literature (e.g., autonomous and controlled motivation) and were framed by Pelletier et al.'s (2002) work. Other motivational factors were drawn from motivational theories and models (e.g., dualistic model of passion, Vallerand, 2010; self-efficacy, Bandura, 1997) which do not explicitly discuss interpersonal styles. It was not always clear from reading these studies whether the purpose was to allow cross-fertilization of theories or whether it was perceived that non-SDT motivational variables could offer additional predictive capability to that of SDT variables.

Beliefs, both in relation to interpersonal styles and other factors (e.g., religion, knowledge, and learning) have also been studied as candidate antecedents, reflecting the influence of cultural values. The former type of beliefs is based on the initial work by Reeve et al. (2014) on how easy to use, effective, and widespread within a setting a particular interpersonal style is perceived to be. Additional beliefs such as about one's perceived responsibility for others, as well as the nature of intelligence and motivation, can potentially determine whether someone is likely to be need supportive or need thwarting; such beliefs should be included in a more comprehensive representation of individuals' belief system.

Other general personal factors we identified were related to various internal pressures (which were not motivation-related, such as shame for having a disabled child; Yotyodying & Wild, 2016), positive and negative social and emotional functioning (e.g., well-being, emotional intelligence), as well as negative personality factors (e.g., narcissism). These factors illustrate both the potentially dynamic (e.g., fluctuations in emotional states) and trait aspects of motivators' personal factors.

Socio-contextual factors is the second broad theme of candidate antecedent variables we identified (Figure 7). Two general factors emerged in this theme, in addition to some very specific and idiosyncratic specific factors. The two general factors were external pressures and social connection/support. External pressures align with and extend what Pelletier et al. (2002) described as 'pressure from above'. This general factor captures pressures from supervisors, school curricula, colleagues, as well as time and resource constraints. Such pressures can increase the likelihood of using need thwarting strategies to achieve required outcomes (Reeve, 2009). In contrast, perceptions of closeness and support by others (e.g., colleagues, students) are likely to foster a need supportive style, possibly via increasing need satisfaction and autonomous motivation (Rocchi & Pelletier, 2016).

The third component of our model refers to motivators' perceptions of motivatees, primarily perceptions of the latter's motivation and behavior, as well as of their demographic characteristics. As in the 'behavioral confirmation' study by Pelletier and Vallerand (1996), motivators' perceptions of motivatees' autonomous and controlled motivation emerged as candidate antecedents of need support and need thwarting, respectively. Extending this initial work, we found that perceptions of motivatees' emotional states, abilities, and behaviors (e.g., effort, procrastination; Dumont et al., 2014) have also been tested as candidate antecedents of interpersonal styles.

Meta-Analysis

Which are the strongest candidate antecedents of overall need support? The brief answer is that motivators' adaptive motivation factors were the strongest and most consistent predictor of overall need support, as well as each of the three specific types of need support. Looking at the specific candidate antecedent factors in Supplementary Table S4, those adaptive motivation factors were primarily motivators' autonomous motivation, autonomy causality orientation, intrinsic goals, and need satisfaction. In other words, motivators' (parents, teachers, sport coaches, etc.) who report high quality motivation, pursue intrinsic goals, and feel that their needs are satisfied, are likely to be need supportive when interacting with motivatees. Hence, one important take-home message from our review is that to foster need supportive styles in social agents, one good way to start is to examine how the wider social context (communities, schools, sport organizations, etc.) can support these agents, or how they can support themselves (e.g., via psychological need crafting, Napier et al., 2024), to experience psychological need satisfaction and autonomous striving.

The longer answer to the aforementioned question is that social connection/support, motivators' adaptive motivation factors, and positive social/emotional functioning had the strongest effect sizes, all close to .30, which is considered a large effect size in psychological research (Funder & Ozer, 2019). These three factors, alongside motivators' maladaptive motivational factors, were the only significant predictors of overall need support in the separate analyses of the much smaller sample of longitudinal studies only. Positive perceptions of motivatees' motivation and behavior, positive beliefs (non-style related), and negative social/emotional functioning had medium effect sizes (the last one was negative in direction). Maladaptive motivation of motivators and negative perceptions of motivatees' motivation and behavior had negative effect sizes, but these effects were small. It is also worth noting that style-related beliefs and negative personality factors had a medium and large (negative) effect size, respectively, but the confidence interval of these effect sizes

contained zero, and hence they were not significant. Fewer significant effect sizes were found when examining each type of need support individually, due to the smaller number of studies and, hence, the wider confidence intervals.

The second important question that our meta-analysis addressed was which are the strongest candidate antecedents of need thwarting? Again, the quick answer is that the most consistent and moderately strong predictor of overall need thwarting and need-specific thwarting was motivators' maladaptive motivation. This factor, alongside motivators' positive and negative perceptions of motivatees' motivation and behavior, were the only significant predictors of overall need thwarting in the separate analyses of the much smaller sample of longitudinal studies only. Looking at Supplementary Table S5, those maladaptive motivation factors were primarily amotivation and need frustration. In other words, when motivators reported lack of motivation and frustration of their basic psychological needs, they were likely to be need thwarting when interacting with motivatees, and such effects were medium to large. Examining the effect sizes in more detail, negative perceptions of motivatees' motivation and behavior, negative social/emotional functioning, negative personality factors, and maladaptive motivation had medium to large effect sizes with overall need thwarting. External and internal pressures, adaptive motivation factors, positive beliefs (non-style related), and positive social/emotional functioning had small or small to medium effect sizes (negative in direction, apart from external and internal pressures which had positive effect sizes).

Overall, the results of the meta-analysis indicate the vast majority of the general factors identified in our systematic review had at least one significant effect size with overall or need-specific need support and need thwarting. Adaptive and maladaptive personal motivational factors within motivators were the most consistent and strongest candidate antecedents of need support and need thwarting styles, respectively.

Regarding demographic variables, their effect sizes could either not be calculated due to very small number of samples, or when they were estimated, their strength was small and non-significant. Some large effect sizes were noted for competence need support, but these were based on a small number of unique samples with broad confidence intervals that encompassed zero. Do demographic variables such as age, gender, socio-economic status, (both of motivators and motivatees) matter in terms of the extent to which motivators are need supportive or need thwarting? Based on our evidence and that of Howard et al. (in press), the answer is "probably no", however, we recommend caution before conclusions are drawn. Individual participant data meta-analysis (i.e., aggregating raw data from each primary study; Riley et al., 2010) would have been stronger analysis (if we had access to the raw data) to provide stronger answers to this question. In our meta-analysis, we had to use descriptive sample-level statistics provided by the primary studies for those demographic variables, so our testing of those variables was somewhat 'crude'.

Limitations and Future Research Directions

We undertook our review using the latest advances in conducting and reporting meta-analyses. For instance, we applied three-level meta-analytical models with cluster-robust variance estimation to account for the dependency created by extracting multiple effect sizes for multiple outcomes from the same sample. Study selection, data extraction, and data quality coding were double-coded. Power-enhanced funnel plots were used to estimate power in primary studies and calculate publication bias. Nevertheless, there are certain limitations in the conclusions from our work which readers need to be mindful of. One limitation has to do with the number of unique samples, which varied considerably depending on the candidate antecedent variable under examination. As mentioned earlier, some effect sizes had fairly wide confidence intervals because they were based on a small number of unique samples.

The lack of significant moderator effects for most of the tested moderators is also likely to be due to the same problem.

In the main text, we reported the effect sizes for the following combinations: general candidate antecedent factors-general interpersonal styles, and general candidate antecedents-specific styles. Some readers may be interested in specific candidate antecedents, and hence we report the effect sizes for specific candidate antecedent-general styles in supplementary tables, because most of them are based on too few unique samples. We do not report any effect sizes for specific candidate antecedents-specific styles because their total count would be more than 300. We chose to focus the presentation of our results on general candidate antecedent factors not just for statistical reasons, but also because we believe that the grouping of candidate antecedents into general factors provides a more parsimonious representation of the literature which can be helpful for future research. This approach aligns with other integrative reviews of diverse literatures (e.g., in their review of behavioral change interventions, Albarracín et al., 2024, classified all individual level variables into eight factors).

A noteworthy finding from our meta-analysis is that the quality of the included studies was acceptable (judged against benchmarks for the type of design they represented) and did not moderate the obtained effect sizes. The most frequent problem identified in our quality scoring was the lack of reporting of certain important information, which authors in this field should make a note of in the future. However, most primary studies were cross-sectional (about 75%) and only a handful used an experimental or quasi-experimental design (although we did find more such studies which, unfortunately did not measure the targeted antecedents or did not explicitly state that they targeted these antecedents). Hence, there is a clear need to raise the overall quality standards of studies conducted within this field by using stronger designs, not just by doing better cross-sectional studies. Moving forward, it is

important for the extant literature to have a more rigorous evidence base for all three criteria needed for establishing causation; not just covariation and temporal precedence, but also elimination of alternative explanations via experimental manipulation (Shadish et al., 2002).

Future primary studies should also use more rigorous power estimation procedures; although we did not find any strong evidence of publication bias (in so far as there was no association between the size of the effects and the power of the studies), the power-enhanced funnel plots indicated that most primary studies were underpowered. Our review also found very few studies in the health domain and no studies in the workplace; clearly it would be informative for theory and practice to study the antecedents of need support and need thwarting of health professionals and work supervisors. Another recommendation to researchers stemming from our review is to move beyond self-reports and include independent observations of interpersonal styles. This will potentially address social desirability effects and common method variance, and could also provide interesting insights into discrepancies in perceptions of the same style by different sources (e.g., teachers and student perceptions of teachers' styles; Taylor & Ntoumanis, 2007). The influence of cultural factors could be more explicitly assessed, moving beyond personal beliefs (e.g., about styles, religion, knowledge) that assess cultural influence in an indirect manner.

Referring to Figure 1, our review identified several notable gaps in the evidence. First, there is a lack of research testing how motivators' perceptions of motivatees' intrinsic and extrinsic goals influence the interpersonal styles adopted. Second, no studies have examined how the various categories of candidate antecedents are interrelated (see the next section for suggestions). Additionally, the literature lacks longitudinal designs incorporating 'feedback loops.' For example, teachers' psychological need satisfaction may predict how need supportive they are toward their students. Over time, this support could, in turn, enhance teachers' own need satisfaction through changes in students' autonomous motivation and

psychological need satisfaction, as reported by both students and teachers. Theories beyond SDT could be consulted for further inspiration in terms of feedback loops and reciprocal processes. For instance, research based on the Leader–Member Exchange theory suggests that employees who have higher-quality relationships with their leaders are more likely to engage in discretionary behaviors that benefit the leader and the organization (Ilies, et al., 2007).

Our review has focused on candidate antecedents of need supportive and need thwarting interpersonal styles, as described in the SDT literature. Recently, a third type of interpersonal styles has been proposed: a need indifferent one (Bhvasar et al., 2019; Huyghebaert-Zouaghi et al., 2023; Ntoumanis, 2023). For instance, need indifferent supervisors are those who neglect their employees' psychological needs by being disorganized, distant, and disinterested. As the SDT literature on need indifferent behaviors grows, it would be useful to map the unique and shared candidate antecedents between need indifferent and need supportive and need thwarting styles.

Final Reflections

Our integrative model in Figure 7 is by no means definitive; in fact, as the meta-analytic results showed, some candidate antecedent variables had much stronger effect sizes than others. It might be, though, premature to dismiss certain potential candidate antecedent variables on the basis of our meta-analysis alone, as some of the effect sizes were based on a rather small number of studies/unique samples. Further research will provide more evidence regarding the magnitude and heterogeneity of the effects, and such new evidence will help refine the model by adding or deleting factors at different levels of the hierarchy. Such evidence can potentially identify which candidate antecedents might be more important predictors of interpersonal styles in different life domains and offer stronger evidence for potential moderator effects. Additional candidate antecedent variables within existing

categories could also be explored. For example, while most current research has focused on narcissism as a negative personality factor, other traits from the Dark Triad—namely Machiavellianism and psychopathy (Paulhus & Williams, 2002)—remain underexamined.

Further, new candidate antecedent variables could be tested, and the model could be expanded if necessary; for instance, researchers could study the literature on antecedents of transformational (e.g., values, traits; Sun et al., 2017) and charismatic leadership (e.g., Big Five traits, cognitive ability; Banks et al., 2017) for inspiration. Interactions between the different components of the model could also be explored. For instance, motivators' perceptions of motivatees' motivation and behavior could be related to beliefs about the efficacy of different interpersonal styles. In other words, the motivational paradox mentioned in the introduction of a motivator being less need supportive to those who lack self-determined motivation could stem from the belief that in such situations an effective solution would be to apply pressure or threats. Also, the finding that external pressures were unrelated—rather than negatively related—to the use of need-supportive strategies may be explained by beliefs about the efficacy of these strategies, which could buffer the impact of such pressures.

With the aforementioned caveats in mind, we advocate that our integrative model can serve as an initial reference point for more coherent and coordinated research efforts. The extant literature is too diverse and unfocused, and the choice of candidate antecedent variables seems sometimes to be based on authors' personal preferences. Our model could foster a more systematic and coordinated approach to research on this topic by considering different levels and types of candidate antecedent factors. The model could help researchers to understand the plethora of factors that can influence the degree to which individuals adopt (or are willing to adopt) need supportive style (and/or use less need thwarting). Hence, these

variables could be potential moderator variables of intervention effectiveness by affecting the degree of intervention fidelity in trials targeting need supportive styles.

Another important reason to have a coherent framework of candidate antecedent factors is that it can help researchers to identify, where applicable and feasible, antecedents that could serve as potential intervention targets in themselves (e.g., by tackling maladaptive beliefs about motivation or increasing motivators' autonomous motivation and need satisfaction), or antecedents that could be used as signal points to tailor interventions (e.g., by navigating and working with external constraints for change in order to develop more context-acceptable interventions). Antecedent variables that are not easily amenable to change (e.g., negative personality factors) should be considered as control variables. In terms of intervention work, such variables could potentially predict and distinguish between volunteer participants and non-participants in training programs that offer to train them in being need supportive. Interpersonal styles do not develop in a vacuum; understanding the antecedents of such styles offers exciting possibilities for both conceptual and applied work to more efficiently foster need supportive schools, homes, sport/fitness environments, health care, and other important life domains.

References of studies included in the meta-analysis, even when cited in this manuscript, are listed in a supplementary file with an asterisk.

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Table 1

Effect Sizes and 95% Confidence Intervals of the Associations between General Candidate Antecedent Factors, Demographics, and Need Supportive Styles

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need support	18 (60)	-.03	-.11, .06
	Autonomy	16 (42)	-.01	-.11, .08
	Competence	5 (10)	-.12	-.25, .00
	Relatedness	3 (6)	-.06	-.22, .10
Social connection/ support#	Overall Need support	16 (37)	.32*	.16, .46
	Autonomy	12 (20)	.28*	.10, .45
	Competence	4 (7)	.44	-.09, .78
	Relatedness	2 (3)	.40	-.98, .1.00
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Positive perceptions	Overall Need support	22 (95)	.18*	.10, .26
	Autonomy	19 (67)	.17*	.08, .26
	Competence	6 (12)	.15	-.04, .33
	Relatedness	3 (8)	.23	-.15, .55
Negative perceptions	Overall Need support	16 (38)	-.10*	-.19, -.01
	Autonomy	11 (26)	-.13*	-.24, -.02
	Competence	4 (6)	-.05	-.18, .09
	Relatedness	2 (1)	NA	
Motivators' Personal Factors				
Adaptive motivation#	Overall Need support	69 (320)	.27*	.23, .30
	Autonomy	61 (192)	.24*	.19, .32
	Competence	23 (74)	.26*	.17, .34
	Relatedness	9 (30)	.28*	.16, .39
Maladaptive motivation#	Overall Need support	46 (185)	-.10*	-.14, -.05
	Autonomy	39 (98)	-.09*	-.24, -.02
	Competence	18 (57)	-.11*	-.17, -.04
	Relatedness	7 (16)	-.20*	-.32, -.07
Style-related beliefs	Overall Need support	4 (30)	.18	-.11, .45
	Autonomy	4 (17)	.24	-.11, .53
	Competence	3 (13)	.10*	.01, .19
	Relatedness	0	NA	
Other beliefs (positive)	Overall Need support	14 (33)	.22*	.17, .27
	Autonomy	12 (19)	.20*	.13, .27
	Competence	4 (8)	.21	-.05, .45
	Relatedness	1 (2)	NA	
Other beliefs (negative)	Overall Need support	8 (35)	-.02	-.18, .15

	Autonomy	8 (27)	-.06	-.26, .13
	Competence	3 (5)	.03	-.20, .25
	Relatedness	1 (2)	NA	
Internal pressures	Overall Need support	7 (9)	-.07	-.18, .05
	Autonomy	3 (4)	-.10	-.37, .18
	Competence	3 (4)	-.09	-.52, .38
	Relatedness	0	NA	
Positive social or emotional functioning #	Overall Need support	17 (53)	.30*	.15, .43
	Autonomy	15 (37)	.30*	.20, .40
	Competence	3 (8)	.09	-.55, .66
	Relatedness	1 (1)	NA	
Negative social or emotional functioning	Overall Need support	17(38)	-.17*	-.30, -.04
	Autonomy	14 (27)	-.21*	-.37, -.04
	Competence	5 (7)	-.07	-.19, .06
	Relatedness	1 (2)	NA	
Negative personality factors	Overall Need support	3 (5)	-.28	-.76, .41
	Autonomy	3 (5)	-.28	-.77, .43
	Competence	0	NA	
	Relatedness	0	NA	
Demographics				
Motivators' Age	Overall Need support	14 (23)	.06	-.01, .13
	Autonomy	11 (11)	-.03	-.21, .17
	Competence	6 (7)	.46	-.12, .80
	Relatedness	3 (3)	NA	
Education level	Overall Need support	16 (35)	-.03	-.10, .05
	Autonomy	15 (23)	.01	-.10, .09
	Competence	6 (9)	-.09	-.26, .09
	Relatedness	2 (3)	-.10	-.53, 36
Teaching Experience	Overall Need support	12 (27)	-.02	-.09, .06
	Autonomy	10 (16)	.05	-.13, .23
	Competence	7 (8)	-.08	-.24, .09
	Relatedness	2 (2)	.17	-.22, .51
Motivators' Gender	Overall Need support	17 (36)	-.09	-.20, .03
	Autonomy	14 (18)	-.05	-.16, .07
	Competence	8 (11)	-.20	-.42, .05
	Relatedness	4 (5)	-.15	-.24, 29
Socioeconomic status	Overall Need support	7 (18)	-.12	-.25, .28
	Autonomy	6 (8)	.09	-.28, .11
	Competence	5 (6)	-.19*	-.35, -.01
	Relatedness	2 (3)	.03	-.41, .51
Motivatees' gender	Overall Need support	14 (23)	-.06	-.14, .03
	Autonomy	12 (19)	-.02	-.13, .08
	Competence	2 (2)	-.27	-.30, 13
	Relatedness	0	NA	

Motivatees' age	Overall Need support	12 (19)	-.04	-.13, .06
	Autonomy	11 (16)	.01	-.11, .12
	Competence	2 (2)	-.12	-.66, .50
	Relatedness	0	NA	
Summary Statistics		108 (943)	$\tau^2_{\text{between-study}} = 0.03$, $\tau^2_{\text{within-study}} = 0.01$	

Note: *n* = Number of studies; *k* = Number of effects sizes; CI = Confidence Interval; NA = Not Available; * = $p<.05$. # A similar significant effect was also found in a separate analysis of prospective studies only (see Table 3). We recoded gender where needed across studies so that in our analysis 1=males and 2=females for all studies. Educational level and socio-economic status were measured in diverse ways across studies, but in all of them higher values correspond to more desirable levels of these two variables.

Table 2

Effect Sizes and 95% Confidence Intervals of the Associations between General Candidate Antecedent Factors, Demographics, and Need Thwarting Styles

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need Thwarting	14 (30)	.16*	.10, .22
	Autonomy	12 (22)	.17*	.09, .25
	Competence	3 (5)	.16	-.08, .39
	Relatedness	1 (1)	NA	
Social connection/support	Overall Need Thwarting	3 (19)	-.14	-.56, .34
	Autonomy	2 (14)	-.18	-.63, .36
	Competence	1 (2)	NA	
	Relatedness	1 (2)	NA	
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Positive perceptions #	Overall Need Thwarting	14 (33)	-.20*	-.35, -.04
	Autonomy	13 (29)	-.18*	-.35, -.01
	Competence	3 (3)	-.29	-.89, .66
	Relatedness	1 (1)	NA	
Negative perceptions #	Overall Need Thwarting	11 (28)	.25*	.16, .33
	Autonomy	9 (24)	.26*	.16, .36
	Competence	2 (3)	.12	-.09, .45
	Relatedness	0	NA	
Motivators' Personal Factors				
Adaptive motivation	Overall Need Thwarting	43 (172)	-.08*	-.12, -.04
	Autonomy	37 (104)	-.07*	-.12, -.01
	Competence	16 (50)	-.08*	-.13, -.03
	Relatedness	4 (10)	-.09	-.33, .16
Maladaptive motivation #	Overall Need Thwarting	40 (159)	.21*	.18, .25
	Autonomy	35 (91)	.22*	.17, .26
	Competence	15 (50)	.19*	.14, .25
	Relatedness	4 (10)	.19	-.09, .44
Style-related beliefs	Overall Need Thwarting	3 (13)	.35	-.06, .65
	Autonomy	3 (9)	.37	-.05, .67
	Competence	1 (4)	NA	
	Relatedness	0	NA	
Other beliefs (positive)	Overall Need Thwarting	7 (17)	-.10*	-.18, -.01
	Autonomy	7 (12)	-.08	-.17, .02
	Competence	2 (5)	-.13*	-.21, -.04
	Relatedness	0	NA	
Other beliefs (negative)	Overall Need Thwarting	4 (10)	.22	-.04, .46
	Autonomy	3 (5)	.20	-.48, .73
	Competence	2 (3)	.20*	.05, .34
	Relatedness	0	NA	
Internal pressures	Overall Need Thwarting	7 (8)	.14*	.05, .22

	Autonomy	5 (6)	.16*	.10, .23
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Positive social or emotional functioning	Overall Need Thwarting	13 (34)	-.15*	-.26, -.04
	Autonomy	11 (29)	-.13*	-.25, -.01
	Competence	4 (6)	-.28	-.99, .96
	Relatedness	1 (1)	NA	
Negative social or emotional functioning	Overall Need Thwarting	12 (22)	.23*	.10, .35
	Autonomy	10 (16)	.24*	.05, .41
	Competence	2 (3)	.20	-.09, .46
	Relatedness	0	NA	
Negative personality factors	Overall Need Thwarting	4 (9)	.27*	.21, 33
	Autonomy	4 (9)	.27*	.20, .34
	Competence	0	NA	
	Relatedness	0	NA	
Demographics				
Motivators' Age	Overall Need Thwarting	7 (10)	.01	-.07, .09
	Autonomy	6 (7)	.03	-.25, .31
	Competence	1 (1)	NA	
	Relatedness	1 (1)	NA	
Education level	Overall Need Thwarting	10 (17)	-.01	-.06, .08
	Autonomy	10 (13)	-.02	-.07, .10
	Competence	3 (4)	NA	
	Relatedness	0	NA	
Teaching Experience	Overall Need Thwarting	8 (16)	-.01	-.11, .09
	Autonomy	8 (10)	-.01	-.12, .11
	Competence	4 (5)	.02	-.17, .21
	Relatedness	1 (1)	NA	
Motivators' Gender	Overall Need Thwarting	10 (20)	.03	-.10, .15
	Autonomy	9 (14)	.02	-.14, .17
	Competence	3 (4)	.02	-.20, 24
	Relatedness	1 (1)	NA	
Socioeconomic status	Overall Need Thwarting	7 (13)	-.04	-.16, .09
	Autonomy	7 (10)	-.04	-.16, .08
	Competence	2 (3)	.41	-.34, .41
	Relatedness	0	NA	
Motivatees' gender	Overall Need Thwarting	7 (11)	-.06	-.26, .15
	Autonomy	7 (9)	-.11	-.30, .09
	Competence	2 (2)	.15	-61, .77
	Relatedness	0	NA	
Motivatees' age	Overall Need Thwarting	6 (9)	-.01	-.08, .06
	Autonomy	6 (7)	-.02	-.11, .07
	Competence	2 (2)	.06	-.71, 77
	Relatedness	0	NA	
Summary Statistics		66 (554)	$\tau^2_{\text{between-study}} = 0.03$, $\tau^2_{\text{within-study}} = 0.00$	

Note: *n* = Number of studies; *k* = Number of effects sizes; CI = Confidence Interval; NA = Not Available; * = $p < .05$. # A similar significant effect was also found in a separate analysis of prospective studies only (see Table 4). We recoded gender where needed across studies so that in our analysis 1=males and 2=females for all studies. Educational level and socio-economic status were measured in diverse ways across studies, but in all of them higher values correspond to more desirable levels of these two variables.

Table 3

Effect Sizes and 95% Confidence Intervals of the Associations between General Candidate Antecedent Factors and Need Supportive Styles (Longitudinal Studies only)

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need support	3 (8)	-.08	-.33, .17
Social connection/support	Overall Need support	2 (2)	.24*	.01, .44
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Positive perceptions	Overall Need support	6 (22)	.15	-.08, .37
Negative perceptions	Overall Need support	3 (11)	-.06	-.29, .17
Motivators' Personal Factors				
Adaptive motivation	Overall Need support	10 (15)	.29*	.19, .38
Maladaptive motivation	Overall Need support	8 (10)	-.15*	-.19, -.11
Style-related beliefs	Overall Need support	2 (19)	.08	-.45, .57
Other beliefs (positive)	Overall Need support	1 (1)	NA	NA
Other beliefs (negative)	Overall Need support	NA	NA	NA
Internal pressures	Overall Need support	NA	NA	NA
Positive social emotional functioning	Overall Need support	4 (6)	.35*	.07, .57
Negative social or emotional functioning	Overall Need support	4 (7)	-.09	-.40, .23
Negative personality factors	Overall Need support	1 (2)	NA	NA
Summary Statistics		23 (102)	$\tau^2_{\text{between-study}} = 0.04$, $\tau^2_{\text{within-study}} = 0.00$	

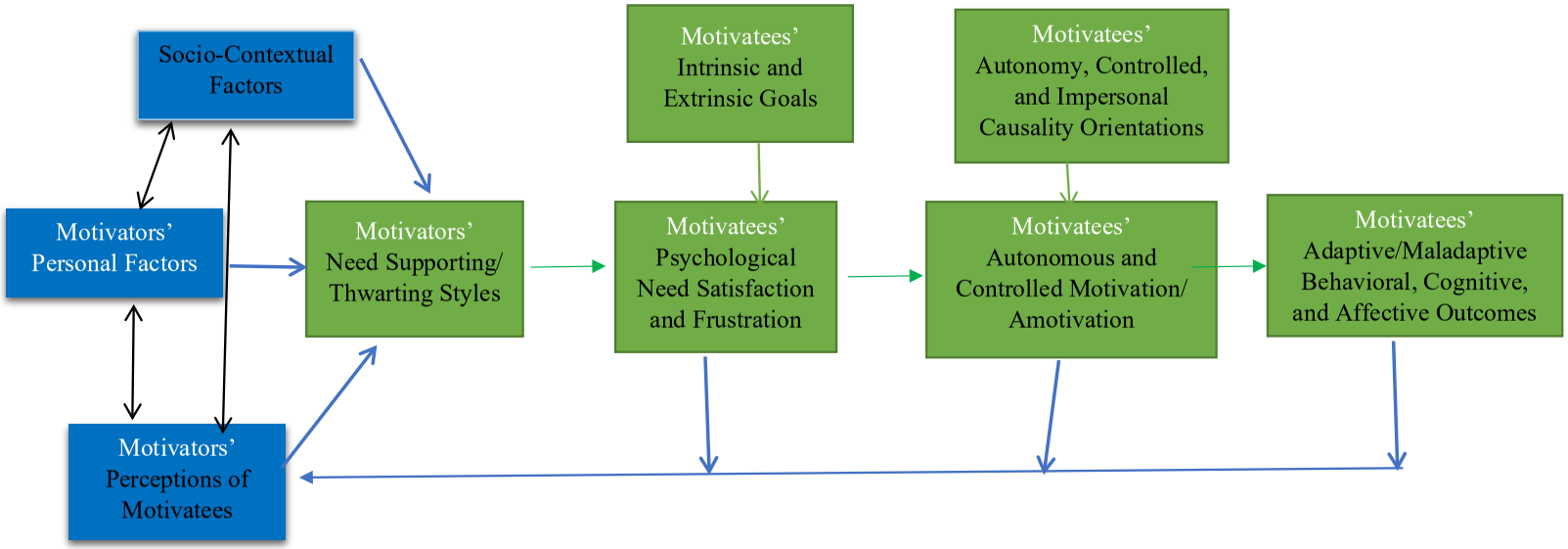
Table 4

Effect Sizes and 95% Confidence Intervals of the Associations between General Candidate Antecedent Factors and Need Thwarting Styles (Longitudinal Studies only)

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need thwarting	NA	NA	NA
Social connection/support	Overall Need thwarting	NA	NA	NA
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Positive perceptions	Overall Need thwarting	4 (11)	-.16*	-.26, -.05
Negative perceptions	Overall Need thwarting	4 (10)	.30*	.25, .35
Motivators' Personal Factors				
Adaptive motivation	Overall Need thwarting	5 (7)	-.10	-.26 .08
Maladaptive motivation	Overall Need thwarting	5 (5)	.27*	.09, .43
Style-related beliefs	Overall Need thwarting	NA	NA	NA
Other beliefs (positive)	Overall Need thwarting	NA	NA	NA
Other beliefs (negative)	Overall Need thwarting	NA	NA	NA
Internal pressures	Overall Need thwarting	1 (1)	NA	NA
Positive social emotional functioning	Overall Need thwarting	2 (4)	.24	-.66, .86
Negative social or emotional functioning	Overall Need thwarting	NA	NA	NA
Negative personality factors	Overall Need thwarting	1 (2)	NA	NA
Summary Statistics		13 (40)	τ^2 between-study = 0.03, τ^2 within-study = 0.00	

Figure 1

Integrating Three Classes of Candidate Antecedents of Interpersonal Styles into the "SDT Sequence"



Note: The green boxes and arrows represent a simplified version of the sequence specified within the SDT literature from interpersonal styles of motivators (e.g., teachers) to motivatees' (e.g., students') behavioral, cognitive, and affective responses. Additional arrows (from motivatees' psychological needs to motivatees' outcomes) have been omitted for presentation simplicity purposes. Our review focuses on the blue boxes and arrows; we expect the three classes of candidate antecedents to be correlated (black arrows), although we have not tested such correlations in our review. For more details regarding the content of the blue boxes, see Figures 3-4 and Figure 7.

Figure 2

A PRISMA Flowchart of Study Selection and Inclusion/Exclusion

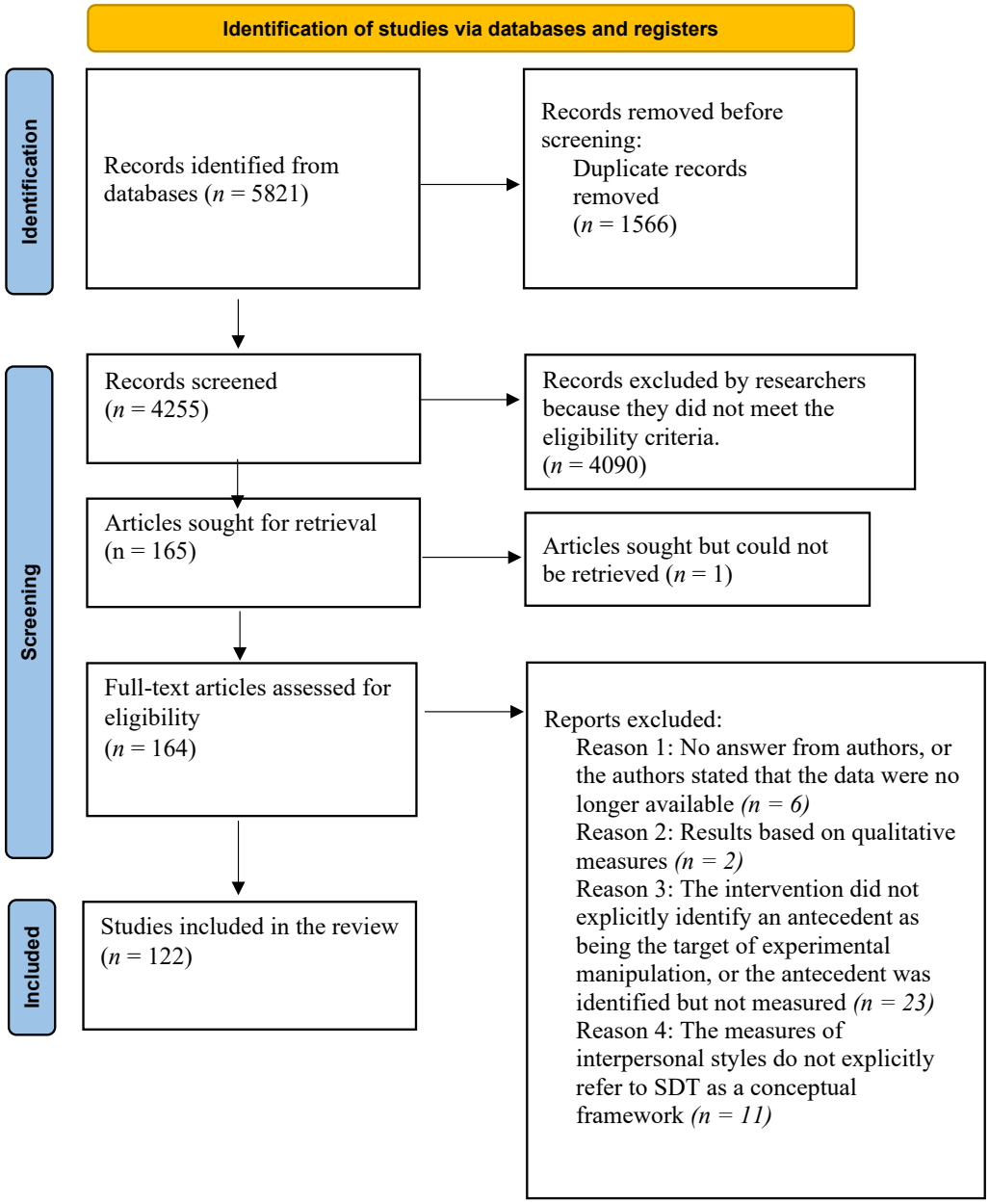
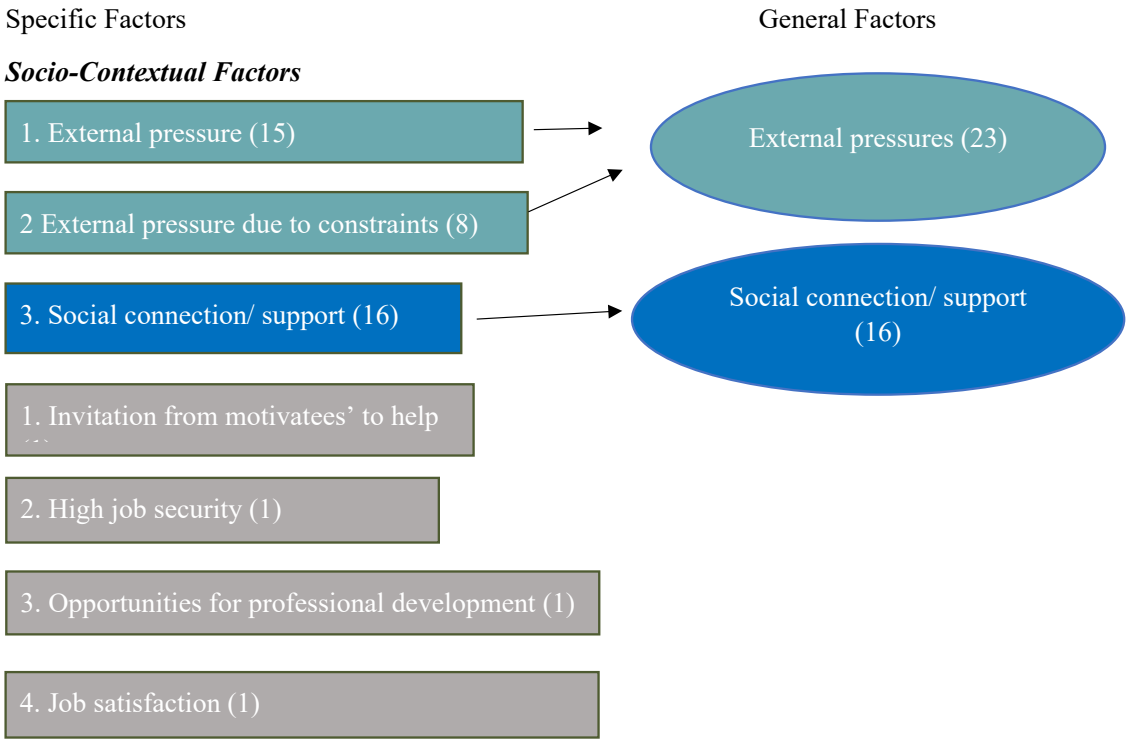
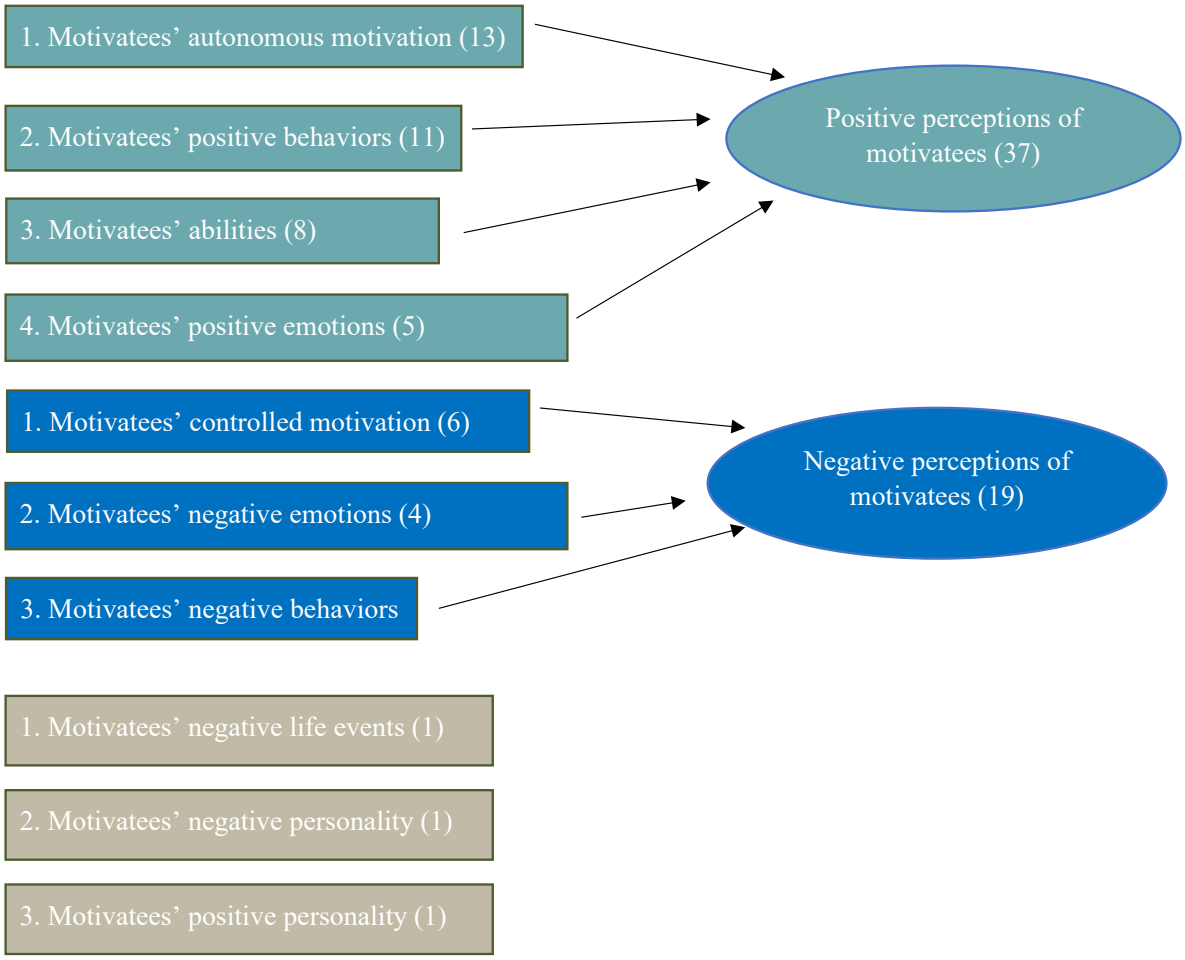


Figure 3

Classification of Candidate Antecedents into Specific and General Factors Within Each of the Broad Themes of Socio-Contextual Factors and Motivators' Perceptions of Motivatees' Motivation and Behavior



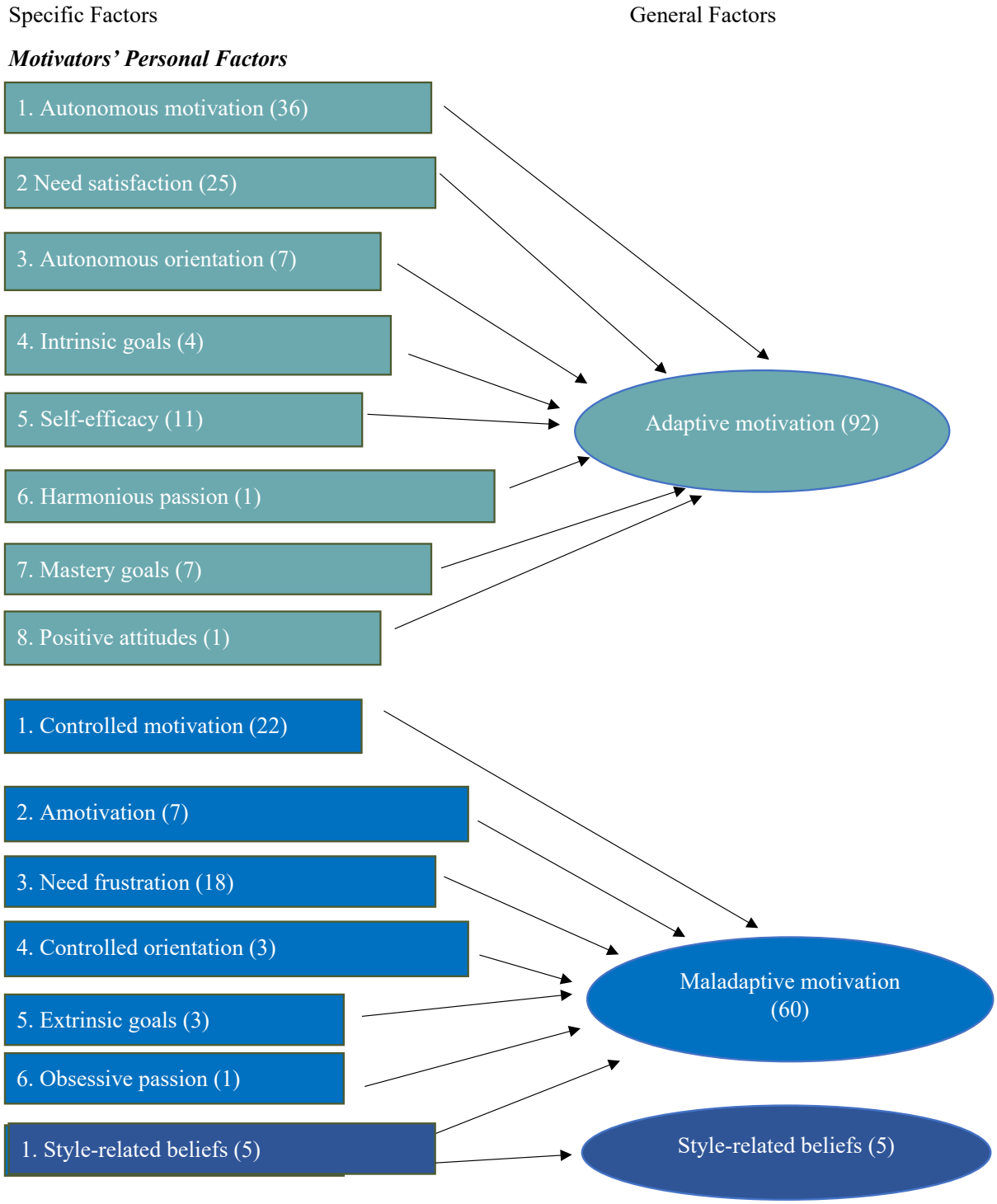
Motivators' Perceptions of Motivatees' Motivation and Behavior

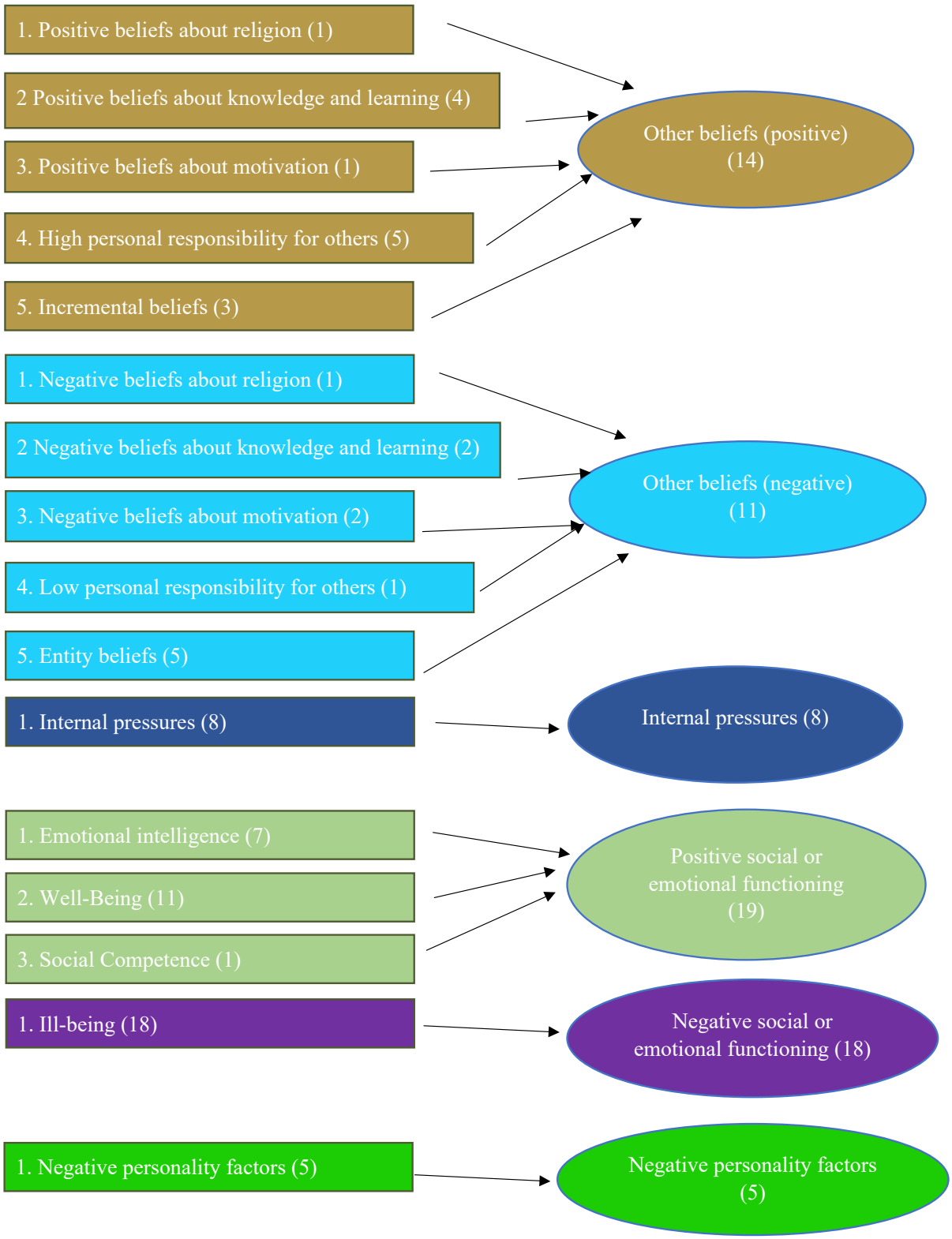


Note: The brackets show the number of effect sizes for each factor. Specific factors that were too distinctive to be combined with other specific factors but had been assessed in several studies were also included as general factors (using the same label). Some specific factors were also too distinctive and were assessed in one study only; these specific factors were not grouped into general ones and in the figure there are no arrows emanating from them.

Figure 4

Classification of Candidate Antecedents into Specific and General Factors Within Each of the Broad Theme of Motivators' Personal Factors

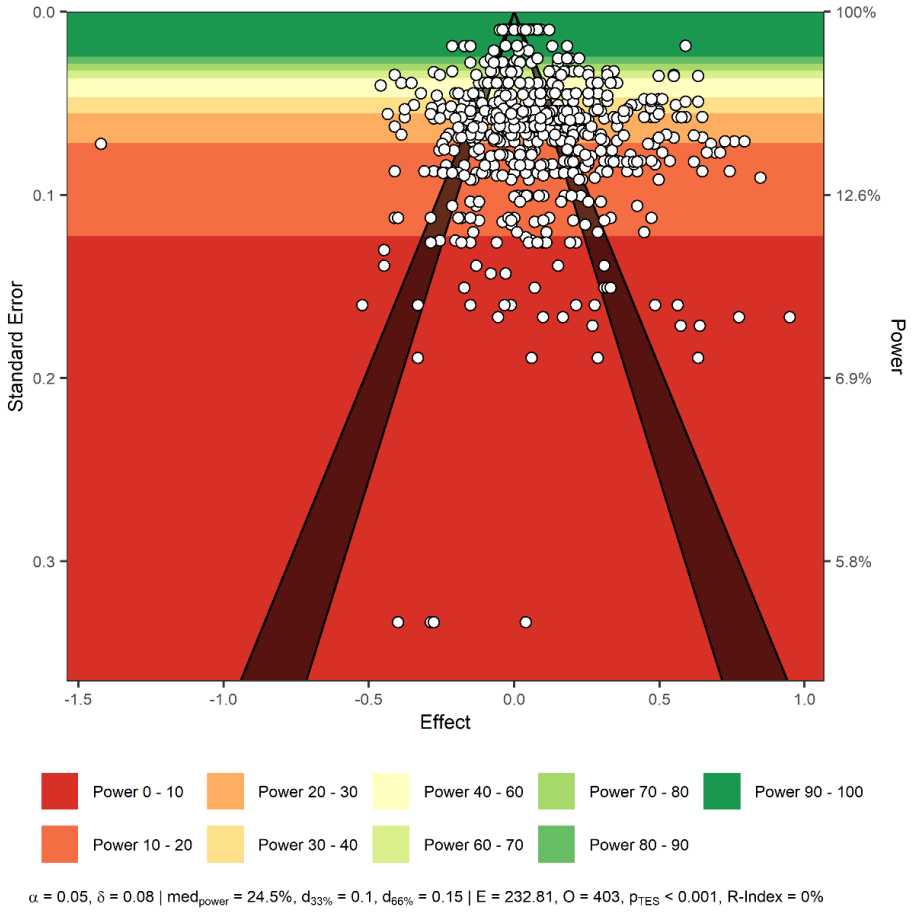



1. Positive beliefs about religion (1)
2 Positive beliefs about knowledge and learning (4)
3. Positive beliefs about motivation (1)
4. High personal responsibility for others (5)
5. Incremental beliefs (3)
Other beliefs (positive) (14)
1. Negative beliefs about religion (1)
2 Negative beliefs about knowledge and learning (2)
3. Negative beliefs about motivation (2)
4. Low personal responsibility for others (1)
5. Entity beliefs (5)
Other beliefs (negative) (11)
1. Internal pressures (8)
Internal pressures (8)
1. Emotional intelligence (7)
2. Well-Being (11)
3. Social Competence (1)
Positive social or emotional functioning (19)
1. Ill-being (18)
Negative social or emotional functioning (18)
1. Negative personality factors (5)
Negative personality factors (5)

Note: The brackets show the number of effect sizes for each factor. Specific factors that were too distinctive to be combined with other specific factors but had been assessed in several studies were also included as general factors (using the same label). Some specific factors were also too distinctive and were assessed in one study only; these specific factors were not grouped into general ones and in the figure there are no arrows emanating from them.

Figure 5

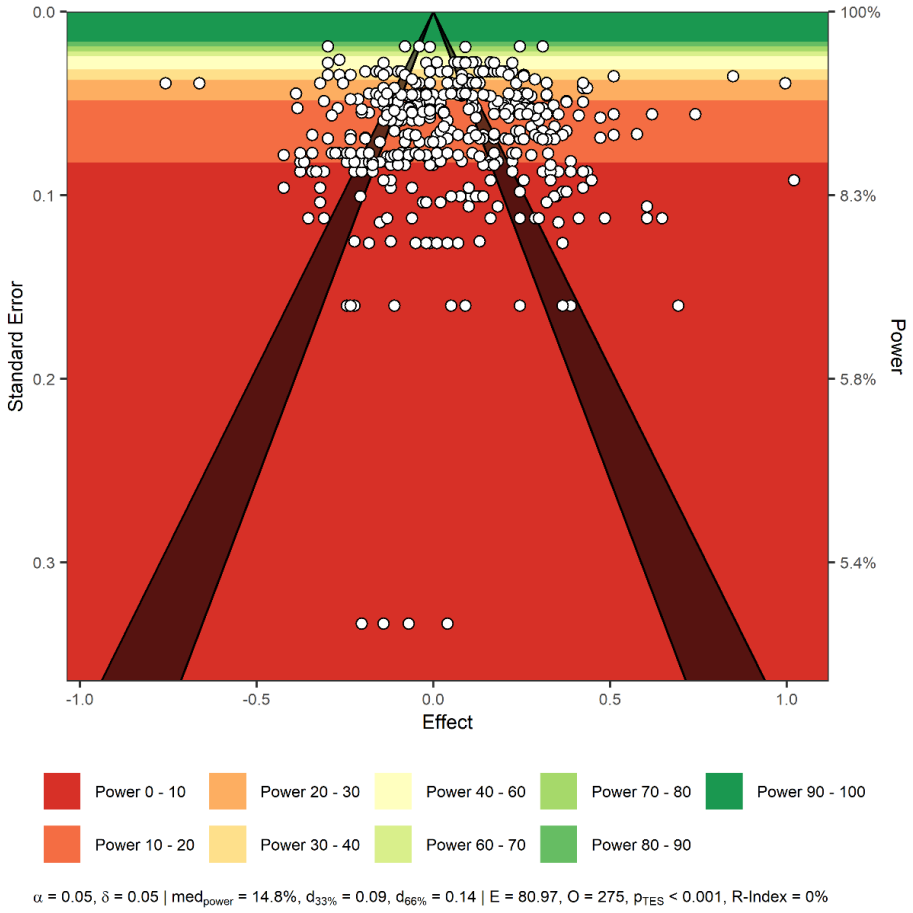
Power-Enhanced Funnel Plots for Need Support



Note: the horizontal axis displays z values

Figure 6

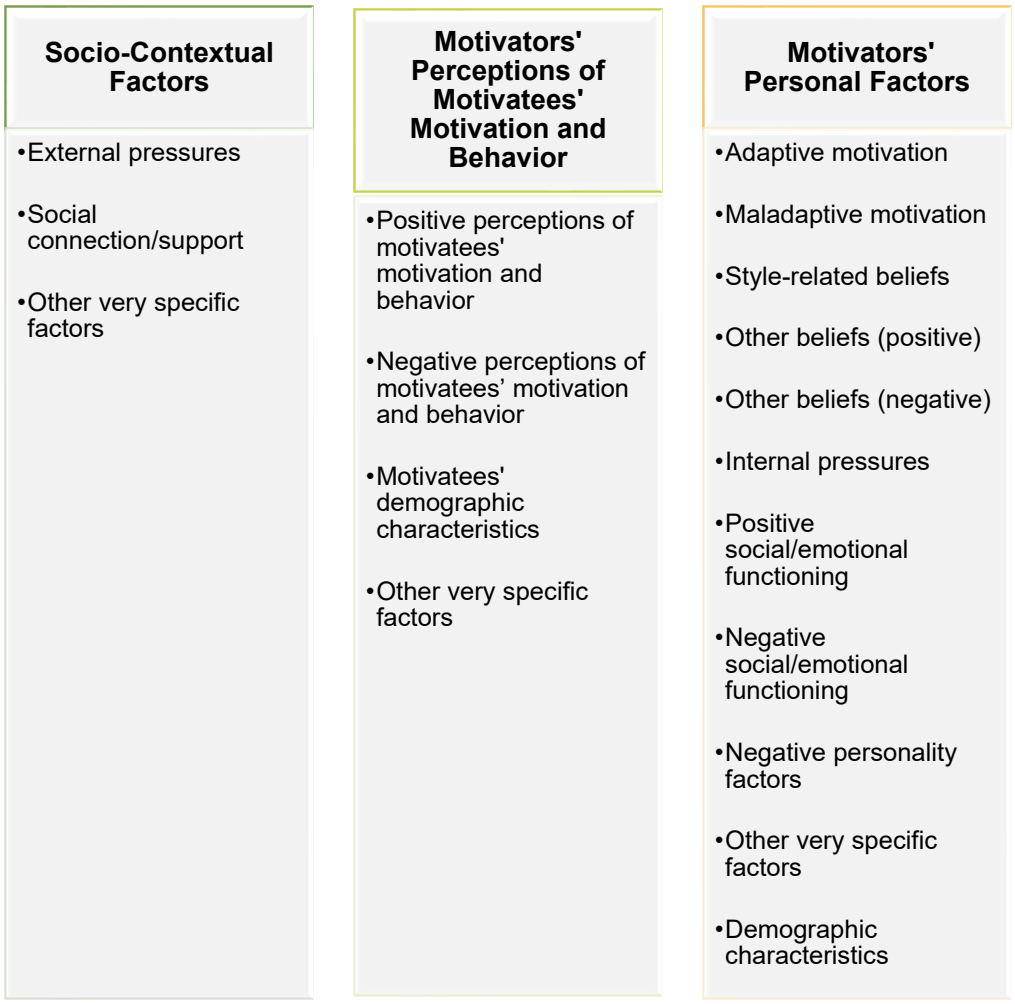
Power-Enhanced Funnel Plot for Need Thwarting



Note: the horizontal axis displays z values

Figure 7

An Integrative Classification System of Candidate Antecedents of Need Supportive and Need Thwarting Interpersonal Styles



Supplementary Table S1

Excluded Studies and the Reasons for Exclusion

Authors	Reason for exclusion
De Clercq et al., 2022	*Supplementary data requested, no answers were received*
Wise & Erbahar 2021	*Supplementary data requested, no answers were received*
Landry et al., 2008 (study 2)	*Authors responded to say that the data were no longer available*
Robertsson & Jones, 2013	*Authors responded but they declined to provide the data*
Vanderfaeillie et al., 2020	*Authors responded and indicated that they would send us the data but they did not*
Hilkenmeier et al., 2017	*Full-text requested, no answers were received*

Authors	Reason for exclusion
Carrol & Allen, 2021	*Results based on qualitative measures*
Sathasivam et al., 2019	*Results based on qualitative measures*
Brenning, Robichaud et al., 2020	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Cheon et al., 2014	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Cheon et al., 2015	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Cheon et al., 2016	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Cheon et al., 2018	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Grolnick et al., 2002	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Grolnick et al., 2007	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Harvey et al., 2016	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
He et al., 2023	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*

Kirkpatrick et al., 2020	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Mauras et al., 2013	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Ntoumanis et al., 2017	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Ntoumanis et al., 2018	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Pelletier & Vallerand, 1996	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Ravindran et al., 2020	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Reeve & Cheon, 2016	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Robichaud et al., 2019	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Robichaud et al., 2020	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Tafvelin et al., 2021	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Ulstad et al., 2018	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Wuyts, Vansteenkiste et al., 2017	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Tessier et al., 2010	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Yong et al., 2019	*Intervention was antecedent per se and did not include antecedents for interpersonal behavior as conceptualized by SDT prior to intervention*
Armour et al., 2018	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Carbonneau et al., 2023	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Franco et al., 2021	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Hollman et al., 2016	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Kandali, 2017	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*

Kanat-Maymon et al., 2020	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Mageau et al., 2016	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Muenks et al., 2015	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Smit et al., 2021	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Spitx et al., 2021	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Wuytz & Chen et al., 2015	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*
Wuytz & Vansteenkiste et al., 2015	*The measures of interpersonal styles do not explicitly refer to SDT as a conceptual framework*

Supplementary Table S2

Key Characteristics of Included Studies

Authors	Design	Country	Sample (n)	Role of participants	Domain	Antecedents tested	Interpersonal style assessed	Instrument measuring interpersonal style	Key findings
Aelterman et al. (2014)	Experimental (RCT)	Belgium	39 & 669	PE teacher & student	Education	Style-related beliefs	Need supportive interpersonal style Autonomy support Competence support	Teacher report: Own adapted scale based on beliefs of need supportive behaviors. Student report: Teacher as Social Context Questionnaire (TASCQ; Belmont et al., 1988) Observer report: Based on observation scheme from Haerens et al. (2013)	Teacher-reported structure increased for teachers in the intervention group from pretest to posttest, whereas it remained unchanged for teachers in the control group. Change in effectiveness and feasibility beliefs regarding autonomy support were most strongly associated with change in teacher-reported autonomy support, whereas change in beliefs regarding structure were most strongly related to the teacher-reported dimension of structure
Aelterman et al. (2016)	Experimental (non-randomized)	Belgium	80	PE teacher	Education	Style-related beliefs Age Experience Need satisfaction	Need supportive interpersonal style Autonomy support Competence support	List of autonomy supportive and structuring teaching strategies from Aelterman et al. (2014).	Psychological need satisfaction experienced during training related to change in beliefs regarding autonomy support and structure. Teachers' intentions related to a change in self-reported in-class application of structure.

Ahn et al., 2022	Longitudinal	Canada	642	Child	Parenting	Others' autonomous motivation Others' controlled motivation Others' abilities	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Child report: Perceived Parental Autonomy Support Scale (P-PASS; Mageau et al., 2015)	The findings show significant positive bi-directional associations between the youth's autonomous motivation and parental need support.
Andreadakis et al. (2020)	Cross-sectional	Canada	181 & 181	Parent & child	Parenting	Age Gender Internal pressures Others' age Others' positive behavior Others' negative emotions Subordinates' gender others' positive emotions	Need supportive interpersonal style Autonomy support	List of autonomy supportive practices by Andreadakis et al. (2018)	Negative affectivity and effortful control were indirectly related to parent autonomy support via stress. Effortful control was directly associated with parent autonomy support.
André et al., 2023	Cross-sectional	France	52 & 1040	Teacher & student	Education	Gender Teaching experience Others' positive behaviors	Need supportive interpersonal style Autonomy support Competence	Observer report: Based on observational SDT-based instrument used in previous educational studies	The teachers' perception of classes' engagement positively predicted their provision of autonomy support, competence support and relatedness

							support Relatedness support	(e.g., Jang et al., 2010)	support. The results also show that the relation between teachers' perception of class engagement and students' autonomous motivation was mediated by the teachers' autonomy support and competence support.
Ascigil et al., 2019	Longitudinal	N/A	41	Spouses & individuals with pain	Parenting	Well-being	Need supportive interpersonal style Autonomy support	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)	Life satisfaction was positively related to daily provision of autonomy support by the spouses.
Balk et al. (2019)	Longitudinal (one-week daily diary study)	The Netherlands & Australia	31 & 96	Coach & athlete	Sport	age gender Ill-being Well-being	Need supportive interpersonal style Autonomy support	Athlete report: Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)	Coach emotional detachment was positively related to positive affect which in turn was positively related to work engagement which was related to athletes' perception of coach autonomy support.
Benckwitz et al., 2023	Longitudinal	Germany	335 & 112	Student & Parent Student & Teacher	Parenting Education	Others' positive behaviors Others' negative behaviors Others' gender Educational level	Need supportive interpersonal style Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Student report: Scale on parental homework involvement developed by (Dumont et al., 2014) to measure both parents' and teachers' interpersonal styles.	Child procrastination was negatively associated with parental structure and responsiveness. Student mean grades were positively associated with teacher responsiveness.

Bennett et al., 2017	Cross-sectional	United Kingdom	429	Teacher & Teaching assistants	Education	Autonomous motivation Controlled motivation Constraints Need satisfaction Others' controlled motivation Others' autonomous motivation	Need supportive interpersonal style Autonomy support	Autonomy supportive subscale (TASCASS) in the Teacher as Social Context Scale (TASC; Wellborn et al., 1992; Skinner and Belmont, 1993)	The findings suggest that increased teacher perceived competence predicts autonomy supportive behavior.
Behzadina et al., 2021	Cross-sectional	Iran	328	Students	Education	Others' autonomous orientation Others' controlled orientation	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Student report: Interpersonal Behaviors Questionnaire (IBQ; Rocchi et al., 2017)	The students' autonomous causality orientations were positively associated with their perception of the teachers' need-supportive style, and their controlled causality orientation with a need-thwarting teaching style.
Berger & Girardet, 2021	Cross-sectional	Switzerland	154	Teacher	Education	Autonomous motivation Controlled motivation personal responsibility for others	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting	Vignettes based on Problems in School Questionnaire (Deci et al., 1981).	Social utility value as motivation was positively related to both autonomy support and control. Intrinsic value was positively related to quality of teaching which in turn was positively related to autonomy support and structure, and negatively to control and chaos.

							Competence thwarting		
Berger et al., 2017	Cross-sectional	Switzerland	102	Teacher	Education	Autonomous motivation Controlled motivation Gender Teaching experience	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Problems in School Questionnaire (Deci et al., 1981; Pelletier et al., 2002) revised from Berger et al. (2015)	Factors such as fallback career, subject interest and social utility value were positive predictors of chaos and controlling style. Subject interest, opportunity, teaching experiences were common positive predictors of structure and autonomy supportive style
Brenning & Soenens, 2017	Longitudinal	Belgium	214	Parent (mother)	Parenting	Need satisfaction Need frustration Ill-being Emotional Intelligence	Need supportive interpersonal style Autonomy support	Perceptions of Parents Scale (Grolnick, Ryan & Deci, 1991)	Postnatal relationship-specific need satisfaction predicted autonomy support, The link between maternal need frustration and autonomy support was nonsignificant
Brenning, Soenens et al., 2020	Longitudinal	Belgium	150	Parent (mother)	Parenting	Others' negative emotions Negative or emotional functioning	Need thwarting interpersonal style Autonomy thwarting	Psychological Control-Scale – Youth Self Report (PCS-YSR; Barber, 1996)	The results elucidate that mothers' perceived parenting history predicts mothers' self-reported use of psychological control mediated by their maladaptive emotional regulation and dysregulation.
Burel et al., 2020	Cross-lagged	France	12	PE Teacher	Education	Well-being Gender Age experience	Need thwarting interpersonal style Autonomy thwarting	Multi-dimensional Motivational Climate Observation	At the within level, subjective pleasant feelings predicted positively the relatedness-supportive dimension of the

							Need supportive interpersonal style Relatedness support,	System (MMCOS; Smith et al. 2015) further developed by Langdon et al. (2017)	motivating style, and negatively the controlling dimension. At the between level, the controlling dimension of the motivating style was positively related to the pleasant subjective feelings while the relatedness-thwarting dimension was negatively related to them.
Cadima et al., 2019	Longitudinal	Portugal	47 head teachers & 208	Teacher & student	Education	Others' age Others' abilities Subordinates' gender Educational level Others' positive behavior Social connection/support	Need supportive interpersonal style Autonomy support	Teacher as Social Context Questionnaire (TASC; Belmont et al., 1992)	Children who started the preschool year with higher levels of vocabulary tended to receive higher levels of autonomy support from their teachers.
Cañabate et al., 2021	Experimental	Spain	101 & 128	Teacher & student	Education	Autonomous Motivation	Need supportive interpersonal style Autonomy support Competence support Relatedness support	Teacher as a Social Context Questionnaire (TASC-Q)	Preservice teachers' motivation was positively related to teachers providing : autonomy support, structure, and involvement
Costa et al., 2018	Cross-sectional	N/A	152 families	Parent & child	Parenting	Emotional intelligence	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Perceived Parental Autonomy Support Scale (P-PASS; Mageau et al., 2015)	Paternal and maternal trait EI were positively associated with paternal and maternal autonomy support and negatively with psychological control

Costa et al., 2019 (Study 1)	Cross-sectional	Italy	203 (married couples)	Parent	Parenting	Need frustration Need satisfaction	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Psychological control scale (PCS; Barber, 1996) Perceptions of Parent Scale (POPS; Robbins, 1994)	Parents need satisfaction and need frustration each predicted for autonomy support and psychological control respectively.
Costa et al., 2019 (Study 2)	Cross-sectional	Italy	135 families)	Parent & Child	Parenting	Need frustration Need satisfaction	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Psychological control scale (PCS; Barber, 1996) Perceptions of Parent Scale (POPS; Robbins, 1994)	The intergenerational association between parents' and their adolescents' need frustration were partially mediated by parental autonomy support and psychological control.
De Clerck et al., 2022	Cross-sectional	Belgium	210	Board leader, Coach, Athlete	Sport	Social connection/support	Need supportive interpersonal style Autonomy support Competence support	Situations-in-Sport Questionnaire (Delrue et al., 2019)	The leaders' interpersonal styles (autonomy and competence support) were positively associated with the coaches' motivating styles.

Desimpelaere et al., 2023	Cross-sectional	Belgium	506	Parent	Parenting	Ill-being Gender Age SES Number of children Number of young children	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Perception of Parents Scale (POPS; Grolnick et al., 1991); Child Report of Parent Inventory (Schaefer, 1965); Parent as Social Context Questionnaire (PASCQ; Skinner et al., 1986); Psychological Control Scale (PCS; Barber, 1996)	Parenting stress was positively associated with less autonomy support and responsive parenting via parental burnout.Parental control was predicted by parenting stress via parental burnout.
Dettmers et al., 2019	Cross-sectional	Germany	309	Parent	Parenting	Social connection/support	Need supportive interpersonal style Autonomy support Competence support	Instrument by Katz et al. (2011)	Effective family-school communication was positively associated with quality of involvement (autonomy and competence support)
Dumont et al., 2014	Longitudinal	Germany	2023 & 2830	Parent & Child	Parenting	gender education level others abilities others' positive behaviors others' negative behaviors	Need supportive interpersonal style Relatedness support Competence support Need thwarting interpersonal style Autonomy thwarting	Child report: Instrument developed for the study of Dumont et al. (2013)	Childs reported parental control was negatively predicted by student reading achievement, and positively predicted by reading effort. Also, reading effort was a positive predictor of structure. Homework procrastination was a negative predictor of child's reported parental responsiveness.

Duprez et al., 2020	Cross-sectional	Belgium	389	Nurse	Healthcare	Amotivation Autonomous motivation Controlled motivation Need satisfaction	Need supportive interpersonal style Autonomy support´ Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations In Self-management Support – Health Care Professionals (SIS-HCP) tool (Duprez et al., 2019).	High-quality motivation, feelings of competence and adaptive work context are conducive to a more motivating profile among nurses. Nurses in the motivating profile displayed the most positive pattern of indicators: high levels of competence and job autonomy and being motivated out of interest and perceived importance. This was followed by nurses in the active profile, additionally driven by external pressure. Not being interested in providing self-management support, feelings of incompetency are associated with the demotivating chaotic profile.
Duriez et al., 2009	Cross-sectional	Belgium	935 & 935	Parent & Child	Parenting	Negative beliefs (religious) Positive beliefs (religious)	Need supportive interpersonal style Autonomy support Relatedness support	Both parent and child report: Psychological Control Scale (Barber, 1996) Perception of Parent Scale (Grolnick et al., 1991)	Parental symbolic religiosity was positively related to need support as reported by both parent and child.
Egeli & Rinaldi., 2016	Cross-sectional	Canada	400	Parent	Parenting	Social competence **Social connection/support** age gender Others' age	Need supportive interpersonal style Autonomy support	Revised-Parent as Social Context Questionnaire (R-PSCQ; Egeli et al., 2015; Skinner et al., 2005)	Each of the facets contributed to the prediction of the quality of parenting style. Negative assertion, conflict management,

						Subordinates' gender Emotional intelligence Others' positive emotions others' negative behaviors	Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting		social support and communion had positive associations. Of controls, child's sex and parent's age had positive associations. Child's age and frequency of misbehavior had a negative association.
Escriva-Boulley, Guillet-Descas et al., 2021	Cross-sectional	Belgium & France	395	PE teacher	Education	Amotivation Autonomous motivation Controlled motivation experience	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	SIS-PE Questionnaire (Aelterman et al., 2019)	Autonomous motivation was related to the adoption of need supportive strategies, whereas controlled motivation and amotivation were related to need thwarting strategies.
Escriva-Boulley, Haerens et al., 2021	Cross-sectional	France	509	PE teacher	Education	Autonomous motivation Controlled motivation Negative beliefs about motivation entity beliefs **External pressure**	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence	Teacher as Social Context Questionnaire (TASC; Belmont et al., 1992); Learning Climate Questionnaire (Black and Deci, 2000) Validated assessment of autonomy supportive behavior (Reeve et al., 2004)	Need-supportive style was negatively predicted by students' disengagement and teachers' adherence to entity theory. Less pressure from below and from within predicts more need-supportive style A need-thwarting style was positively predicted by pressure to display authority and beliefs

							thwarting		about the effectiveness of rewards. Pressures from above and from within predicted need-thwarting style. Autonomous motivation mediated the effects of students' engagement and adherence to entity theory on need-supportive style
Figueiredo, 2019	Cross-sectional	Brazil	358	Teacher	Education	Educational level **External pressure in terms of constraints**	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Problems in School Questionnaire (Bzuneck & Guimarães, 2007)	Trained musicians recorded higher scores in the controlling factor than trained music educators. Teachers who worked in public music schools recorded higher scores in the controlling factor than teachers who worked in private music schools.
Fox et al., 2023	Cross-sectional	USA	66	Parent	Parenting	Age (parent) Gender (parent) Age (child) Gender (child) SES Need satisfaction Need frustration	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Parent Socioemotional Context of Feeding Questionnaire (PSCFQ; Zimmer-Gembeck et al., 2019)	The results show that need frustration was positively associated with autonomy thwarting and competence thwarting.

García-Cazorla et al., 2024	Cross-sectional	Spain	667	PE teacher	Education	Gender Experience Need satisfaction Need frustration Autonomous motivation Controlled motivation Amotivation	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations-in-School Questionnaire in PE (SIS-PE; Burgueño et al., 2024)	There were positive indirect effects between teachers' need satisfaction and autonomy and competence support via autonomous motivation. There were positive indirect effects between teachers' need frustration and autonomy thwarting and competence thwarting via amotivation. Need satisfaction and frustration were negatively associated with autonomy and competence support, and positively associated with autonomy and competence thwarting, via controlled motivation.
George et al., 2019	Cross-sectional	Australia	257	Teacher	Education	mastery goals Social connection performance goals	Need supportive interpersonal style Autonomy support Competence support Relatedness support	Teacher as Social Context Questionnaire (TASC; Belmont et al., 1988)	Mastery and relational goal orientations positively predicted teachers' perceptions about their expectation, structure, and relatedness with students, but not autonomy support. Work-avoidance goal orientations negatively predicted teachers' discernments of supporting student autonomy.

Gershy & Katz, 2023	Cross-sectional	Israel	336	Teacher	Education	Need satisfaction	Need supportive interpersonal style Autonomy support Competence support	Situations in School Questionnaire (SIS; Aelterman et al., 2019)	The results showed that teachers' experience of need satisfaction positively predicted their autonomy and competence supportive teaching styles.
Gurland & Grolnick, 2023	Longitudinal	USA	201 & 201	Parent & child	Parenting	External pressure SES	Need thwarting interpersonal style Autonomy thwarting	Child report: Parenting Context Questionnaire (Wellborn & Grolnick, 1988) Children's Report of Parental Behavior Inventory (CRPBI; Schaefer, 1965)	The results showed that parental perceived threat predicted their autonomy thwarting style. Moreover, higher family income predicted lower perceived threat and less autonomy thwarting parenting.
Ha et al., 2022	Cross-sectional	China	946 & 946	Parent & child	Parenting	Knowledge Others' age Others' gender Age Gender Education level	Need supportive interpersonal style Autonomy support	Child report: Perceived Parental Autonomy Support Scale (Mageau et al., 2015)	Parents' physical literacy was positively associated with their values towards physical activity, which in turn was positively associated with parental autonomy support for physical activity.
Hagenauer et al., 2018	Cross-sectional	Austria	132	Teacher	Education	others' positive behavior others' negative behavior Social connection/support Well-being Ill-being	Need supportive interpersonal style Autonomy support	Assor et al. 's (2002) and Baumert et al.'s (2008) scales for measuring autonomy supportive teaching behaviors.	The results revealed associations between student behavior, teacher emotions, occupational well-being and provision of autonomy support. The associations remained, but weaker, when controlling for teaching self-efficacy.

Halvari et al., 2022	Longitudinal	Norway	299	Dental hygienist	Healthcare	Age Education External pressure Autonomous orientation Controlled orientation Impersonal orientation	Need supportive interpersonal style Autonomy support	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)	The more autonomous dental hygienists reported higher values on provision of autonomy support, compared to the controlled and impersonal dental hygienists.
Haw et al., 2023 (study 1)	Cross-sectional	Philippines	581	Teacher	Education	Social connection/support Autonomous motivation Others' gender Experience	Need supportive interpersonal style	Teacher as a Social Context Questionnaire (Iglesias-García et al., 2020)	Need-supportive school leadership was positively associated with need-supportive teaching via the teachers' autonomous motivation.
Hollman et al., 2018	Longitudinal	Germany	948 & 946	Parent & child	Parenting	extrinsic goals intrinsic goals	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Parental Behaviour Scale (Wild, 1999)	Relative importance of extrinsic goals for children was associated positively with lower autonomy-supportive and more controlling strategies. Higher intrinsic parental goals are related positively to autonomy support and negatively to parental control.
Iachini, 2013	Cross-sectional	N/A	304	Coach	Sport	others' positive behavior Others' autonomous motivation Self-efficacy Internal pressure external pressures Self-efficacy Autonomous motivation	Need supportive interpersonal style Autonomy support	Problems in Sports Questionnaire (PISQ; Amorose, 2008)	Twenty-nine percent of the variance in autonomy-support was explained by the predictors in the model. External pressure was a significant negative predictor of coaches' autonomy-supportive behaviors.

Inguglia et al., 2023	Cross-sectional	Italy	184	Coach	Sport	Need satisfaction Need frustration Autonomous motivation Controlled motivation Subjective vitality	Need supportive interpersonal style Need thwarting interpersonal	Interpersonal Behaviors Questionnaire (IBQ-self; Rocchi et al., 2017).	Coaches' need satisfaction was positively associated with need support via subjective vitality and autonomous motivation. Moreover, coaches' need frustration was positively associated with need thwarting via controlled motivation.
Jang, 2019 (study 3)	Cross-sectional	South Korea	147	Teacher	Education	Extrinsic goals Intrinsic goals others' age gender	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Teacher report: Situations in School questionnaire (SIS; Aelterman et al., 2017); Teaching Scenarios measure (TSM; Reeve et al., 2014)	Teachers' intrinsic instructional goals predicted an autonomy supportive motivating style (while being unrelated to a controlling motivating style), teachers' extrinsic instructional goals predicted a controlling motivating style (while being unrelated to an autonomy-supportive style).
Jang, 2019 (study 4)	Cross-sectional; Longitudinal	South Korea	92 & 2749	Teacher & student	Education	Extrinsic goals Intrinsic goals Subordinates' gender others' age	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Teacher report: Situations in School questionnaire (SIS; Aelterman et al., 2017); Teaching Scenarios measure (Reeve et al., 2014) Student report: Learning Climate Questionnaire (LCQ; Williams & Deci, 1996); Controlling Teacher Scale	Both teacher-report and student-reports showed that: Teacher reported intrinsic instructional goals predicted the longitudinal change of autonomy supportive style and extrinsic instructional goals predicted longitudinal change of controlling style.

								(CTS; Jang, Reeve, Ryan, & Kim, 2009)	
Jang & Basarkod et al., 2023	Longitudinal	South Korea	2908	Student	Education	Others' positive behaviors	Need supportive interpersonal style Autonomy support	Student report: Learning Climate Questionnaire (LCQ; Black & Deci, 2000)	There was a positive and reciprocal association between agenting engagement and autonomy support over time.
Jang & Cheon et al., 2023 (study 2)	Longitudinal	South Korea	134	Teacher	Education	Intrinsic goals	Need supportive interpersonal style Autonomy support	Situations-in-School Questionnaire (Aelterman et al., 2019)	Intrinsic instructional goals predicted an increase in autonomy support over time.
Jungert et al., 2015	Cross-sectional	USA, Canada, France	**Three samples**:153 (mother)151 (mother) 280 (mother & child)	Parent & child	Parenting	Autonomous motivation Controlled motivation	Need supportive interpersonal style Autonomy support	Child report: Perception of Autonomy Support Scale (Robbins, 1995)	Parents' autonomous motivation was positively associated to children's perceived autonomy support. Parents' controlled motivation was negatively associated to perceived autonomy support.
Katz et al., 2011	Cross-sectional	Israel	135 & 135	Parent & Child	Parenting	Positive attitudes Autonomous motivation Controlled motivation self-efficacy	Need supportive interpersonal style Autonomy supportive style Relatedness support Competence support	Parent & children report: Scales constructed based on several scales (e.g. Assor et al., 2002; Grolnick, Deci, & Ryan, 1997; Katz et al., 2010; Reeve, Jang, Carrell, Jeon, & Barch, 2004)	Parent's autonomous motivation for involvement and helping in homework and perceived competence beliefs was positively associated with parents' need supportive behaviors.

Katz & Shahar, 2015	Cross-sectional	N/A	154	Teacher	Education	Autonomous motivation Positive beliefs about motivation	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Problem in School Questionnaire (Deci et al., 1981)	Teachers who believe that autonomous motivation is desirable for their students' learning tend to opt for an autonomy-supportive rather than a controlling style. Teachers who are autonomously motivated are more likely to adopt an autonomy-supportive style, especially when they also believe that autonomous motivation is desirable for their students' learning
Kim et al., 2019	Cross-sectional	South Korea	172	Coaches	Sport	Social connection/support Harmonious passion Obsessive passion	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Health Care Questionnaire (Lee et al., 2004); Controlling Coach Behaviours Scale (K-CCBS; Song & Cheon, 2012)	Coaches' harmonious passion was a positive predictor of autonomy-supportive style, and a negative predictor of controlling style. The pathways were mediated by coaches' perception of the relationship with their athletes.
Kocak et al., 2024	Longitudinal	Turkey	925 & 925	Parent & child	Parenting	External pressure Others' age	Need supportive interpersonal style Autonomy support	Children's Perception of Parents Scale (Grolnick et al., 1991)	The results showed that mothers interparental conflict was negatively associated with their provision of autonomy support to their adolescent.

Kosir & Strasek, 2015	Cross-sectional	Slovenia	260	Teacher	Education	Autonomous motivation Social connection/support	Need supportive interpersonal style Autonomy support	Problems in School Questionnaire (Deci et al., 1981)	Teachers perceived job characteristics had no association with autonomy supportive behaviors. Teachers exhibiting external assessment scored lower on autonomy support.
Kwon & Wickrama, 2014	Longitudinal	USA	407 & 407	Parent & Child	Parenting	External pressure	Need supportive interpersonal style Autonomy support Relatedness support	Child report: Iowa Youth and Families Project (IYFP, 1990) questionnaire items	Family economic pressure as a significant negative predictor of autonomy supportive parenting.
Lauermann et al., 2021	Cross-sectional	Switzerland	96 & 1300	Teacher & student	Education	Experience Gender Education level Subordinates' gender Personal responsibility for others' motivation Self-efficacy	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Teacher report: Problems in School Questionnaire (Deci et al., 1981) Student report: Teacher as a Social Context Questionnaire (TASC; Belmont et al., 1992; Wellborn et al., 1988)	Teachers' motivational beliefs (self-efficacy & responsibility) predicted their endorsement of autonomy-supportive teaching but did not seem to play a protective role against such maladaptive practices as psychologically controlling teaching (near-zero associations).
Lerner et al., 2022	Cross-sectional	USA	145 & 145	Parent & Child	Parenting	Autonomous motivation Controlled motivation Education level	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Child Report of Autonomy Supportive Involvement (Lerner et al., 2022)	The results showed that parents' controlled motivation for involvement was negatively associated with their autonomy supportive involvement. Conversely, parents' autonomous motivation for involvement was positively associated

									with their autonomy supportive involvement.
Leroy et al., 2007	Cross-sectional	France	336	Teacher	Education	Entity beliefs Incremental beliefs External pressure Self-efficacy Experience	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Learning Climate Questionnaire (Black & Deci, 2000; Williams and Deci, 1996)	Theory of academic ability as a fixed trait was negatively associated with autonomy support. The belief that academic abilities can be improved through students' own efforts indirectly favored an autonomy supportive climate by acting positively on the teachers' self-efficacy. Seniority had a direct positive effect on autonomy support, but it was also mediated by self-efficacy. Perceived pressures had a negative impact on autonomy support, also mediated by self-efficacy.
Levine et al., 2021	Longitudinal	Canada	1544, 610 & 355	Student	Education	Others' autonomous motivation Others' positive Big 5 personality traits (conscientiousness, agreeableness, openness, extraversion, neuroticism) Social connection/support	Need supportive interpersonal style Autonomy support	Student report: Measure of autonomy support previously used by Koestner et al. (2002)	Agreeableness and conscientiousness were positively associated with autonomy support. Moreover, assisted autonomy and secure parental attachment was positively related to autonomy support.

Li et al., 2023	Cross-sectional	China	330 & 330	Parent & child	Parenting	Entity beliefs Incremental beliefs	Need supportive interpersonal style Autonomy support	Caregivers' self-reported autonomy support adapted from Gundersson et al. (2018)	The caregivers' provision of autonomy support to their children was negatively associated with a fixed mindset, and positively associated with a growth mindset and praise. Moreover, caregivers' lower growth mindset was linked with less autonomy support as reported by caregivers.
Mabbe et al., 2018	Longitudinal	Belgium	194 families (388 parents)	Parent & child	Parenting	Need satisfaction Need frustration	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Items selected from the Autonomy Support Scale of the POPS (Grolnick et al., 1991) Psychological controlling parenting from PCS-YSR (Barber, 1996)	Daily fluctuations of need satisfaction were related to daily fluctuations in reported autonomy supportive parenting. Same results were shown for need frustration and controlling parenting. These associations were not moderated by between-parent differences in those parenting dimensions.
Mageau et al., 2016	Cross-sectional	Canada	67 & 67	Parent (mother) & Child	Parenting	Mastery goals Performance goals	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Control	Child report: Perceived Parental Autonomy Support Scale (P-PASS; Mageau et al., 2015)	Parental performance-approach goals predict more controlling parenting and prevent acknowledgement of feelings, autonomy-supportive behavior. In addition, mothers who have mastery goals and who endorse performance-avoidance goals are less likely to use guilt-inducing criticisms.

Marshik et al., 2017	Cross-sectional	USA	N for teachers not reported & 10395 (third grade), 10120 (fifth grade)	Teacher & student	Education	Educational level Others' age Subordinates' gender Need satisfaction Teaching experience	Need supportive interpersonal style Autonomy support	Cognitive and procedural measures of autonomy support (Stefanou et al., 2004).	Teachers who report having low autonomy at work are less likely to support their students' need for autonomy compared to teachers who report having higher autonomy at work.
Martinek et al., 2020	Cross-sectional	Austria	340	Teacher (pre-service)	Education	Autonomous causality orientation Autonomy support by others Social connection/support	Need supportive interpersonal style Autonomy support	Situations in School Questionnaire (Aelterman et al., 2018)	Autonomy orientation fully mediates the relationship between perceived autonomy and tendencies for structured and autonomy-supportive teaching behavior of pre-service teachers.
Matosic et al., 2016	Cross-sectional	United-Kingdom	59 & 493	Coach & athlete	Sport	Negative personality Emotional intelligence	Need thwarting interpersonal style Autonomy thwarting	Reported by athlete: Controlling Coach Behaviours Scale (CCBS; Bartholomew et al., 2010)	Coach narcissism was directly and positively associated with athletes' perceptions of controlling behaviors. Dominance and empathic concern did not relate to athletes' perceptions of controlling behavior
Matosic et al., 2017	Cross-sectional	United Kingdom	211	Coach	Sport	Negative personality Emotional intelligence Negative personality	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Autonomy supportive and controlling coach behaviors were measured through responses to 12 vignettes (Matosic et al., 2017)	There was a positive direct relation between narcissism and controlling coach behaviors. Empathy (but not dominance) mediated the positive and negative indirect effects of narcissism on controlling and autonomy-supported interpersonal styles.

Matosic et al., 2020	Cross-sectional	United Kingdom	210	Coach	Sport	Negative personality style-related beliefs	Need thwarting interpersonal style Autonomy thwarting	Controlling Coach Behaviours Scale (CCBS; Bartholomew et al., 2010)	Global- and maladaptive narcissism and effectiveness and normalcy beliefs about controlling interpersonal style were positively associated with controlling coach behaviors. Adaptive narcissism had an indirect effect on controlling coach behaviors trough effectiveness belief.
Matte-Gagné et al., 2013	Longitudinal	Canada	69 & 69	Parent (mother) & Child	Parenting	Subordinates' gender Coherence of mind Negative life events	Need supportive interpersonal style Autonomy support	Adaptation of Whipple et al.'s (2011) rating system	Mothers of girls, mothers who showed greater coherence of mind with emphasis on attachment and reported less experience of stressful life events exhibited statistically significant stability of autonomy supportive style over time.
Minkels et al., 2023	Cross-sectional	Netherlands	128	Coach	Sport	Education level Experience Group size Gender	Need supportive interpersonal style Autonomy support Competence support Relatedness support	A modified SDT teaching style scale (Tessier et al., 2010) to observe the coaches interpersonal styles.	A SDT teaching program was positively associated with the coaches' interpersonal styles. No significant associations were found for experience, education and group size with the interpersonal styles.
Moe et al., 2020 (study 1)	Cross-sectional	Italy	171 & 171	Parent & child	Parenting	Need frustration Internal pressure	Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Child report: Perceived Parental Support during Homework Scale (PSH; Katz et al., 2011)	Parental need frustration was positively associated with parental adoption of need thwarting practices.

							Relatedness thwarting		
Moe et al., 2020 (study 2)	Experimental (non-randomized)	Italy	118 & 117	Parent & child	Parenting	Ill-being	Need supportive interpersonal style Autonomy support Relatedness support Competence support	Child and parent report: Perceived Parental Support during Homework Scale (PSH; Katz et al., 2011)	Parents in the experimental condition implemented more need supportive practices compared to the control condition as reported by both parents and their children. Applying need supportive practices reduced both parental and child stress.
Moe et al., 2022	Cross-sectional	Italy	949	Teacher	Education	Need satisfaction Need frustration	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations in School Questionnaire (SIS; Aelterman et al., 2019)	Teachers' need satisfaction was associated with need supportive styles, and their need frustration with need thwarting styles.
Morbée et al., 2020	Cross-sectional	Belgium	585	Coach	Sport	Age Experience External pressures	Need thwarting interpersonal style Autonomy thwarting	Controlling Coach Behaviours Scale (Bartholomew et al., 2010)	An evaluative context related to the use of a more controlling coaching style, with experiences of need frustration accounting for this relation. An evaluative sport context was found to relate to the use of each of the four facets, suggesting

									that coaches turn to a variety of pressuring strategies.
Morbée et al., 2023 (study 1)	Cross-sectional	Belgium	740	Coach	Sport	External pressure External pressure due to constraints Age Experience	Need supportive interpersonal style Competence support Need thwarting interpersonal style Autonomy thwarting	Situation in Sports Questionnaire (SIS-Q; Delrue et al., 2019)	The results showed that athlete-invested contingent self-worth (AICS) was positively associated with controlling coaching and negatively associated with structuring coaching. Pressures coming from the club board (but not from the athletes' parents) was associated with more AICS, which in turn had an indirect effect toward the use of more controlling and less structuring coaching practices.
Morbée et al., 2023 (study 2)	Cross-sectional	Belgium	318	Coach	Sport	External pressure External pressure due to constraints Need frustration Age Experience	Need supportive interpersonal style Competence support Need thwarting interpersonal style Autonomy thwarting	A multidimensional scaling was performed based on the SIS-Q (Delrue et al., 2019), the Controlling Coach Behavior Scale (Bartholomew et al., 2010), and the sport-adapted version of the Teacher as Social Context Questionnaire (Belmont et al., 1988).	The results showed that athlete-invested contingent self-worth (AICS) was positively associated with controlling coaching and negatively associated with structuring coaching. Moreover, an evaluative climate was positively associated with need frustration which, in turn, was related to higher levels of AICS and to a more controlling and less

									structuring coaching style.
Nachoum et al., 2021	Longitudinal	Israel	326	Parent (mother)	Parenting	Age Education level Subordinates' gender SES Autonomous motivation Controlled motivation	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Parents as Social Context Questionnaire for parents of young children (PSCQ-YC; Zimmer-Gembeck et al., 2015)	Prenatal autonomous childbearing motivation predicted autonomy supportive parenting style postpartum. Prenatal controlled childbearing motivation predicted controlled parenting style postpartum.
Ng et al., 2012	Cross-sectional	United Kingdom	164	Exercise professional	Exercise	Controlled motivation Autonomous motivation Others' controlled motivation Others' autonomous motivation Others' abilities	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)	Both the exercisers and instructors gender showed an importance for autonomy supportive style from exercise professionals. Also, the perceived motivation of the exerciser was important for the exercise professionals display of autonomy supportive or controlling styles.
Ozkal, 2014	Cross-sectional	Turkey	306	Teacher	Education	Self-efficacy	Need supportive interpersonal style Autonomy support	Learner Autonomy Support Scale (Oguz, 2013)	Teachers' self-efficacy beliefs positively predicted learner autonomy supportive behavior.
Pelletier et al., 2002	Cross-sectional	Canada	254	Teacher	Education	Autonomous motivation Others' autonomous motivation External pressures External pressure in terms of constraints	Need supportive interpersonal style Autonomy support	Problems in School Questionnaire (Deci et al., 1981)	The more teachers perceive pressure from above (they must comply with a curriculum, with colleagues, and with performance standards)

							Need thwarting interpersonal style Autonomy thwarting		and pressure from below (they perceived their students to be non-self-determined), the less they are self-determined toward teaching. the less they are self-determined toward teaching, the more they become controlling with students.
Pierro et al., 2009 (study 1)	Cross-sectional	Italy	378	Teacher	Education	Negative personality Positive personality	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Problems at School Questionnaire (Deci et al., 1981)	Teachers' autonomy support versus controlling style was positively related with locomotion orientation, and negatively related to assessment orientation.
Pulido et al., 2021	Cross-sectional	Spain	352	Coach	Sport	Social connection/support Need satisfaction Need frustration	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Coaches' Interpersonal Style Questionnaire (adapted to assess coaches)	Need satisfaction positively predicted coaches' need supportive style and need frustration predicted their need thwarting style. Additionally, need satisfaction and need frustration mediated the associations between satisfaction and need supportive style and need thwarting style respectively.

							Relatedness thwarting		
Raposo et al., 2020	Cross-sectional	Portugal	366	Exercise professional	Exercise	Amotivation Autonomous motivation Controlled motivation Others' autonomous motivation External pressures Internal pressure	Need thwarting interpersonal style Autonomy thwarting	Controlling Coach Behaviours Scale (CCBS; Bartholomew et al., 2010)	Organizational constraints and perceptions of clients 'controlled motivation was associated with the use of controlling strategies. Exercise professionals' amotivation and controlled regulations (external and introjected) towards work were related to the higher reported use of controlling strategies. Amotivation mediated the association between organizational constraints and controlling strategies.
Reeve, 1998 (study 1)	Cross-sectional	USA	142	Teacher (pre-service)	Education	Autonomous causality orientation	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Problems in School Questionnaire (Deci et al., 1981)	Teachers with a more autonomy-oriented causality orientation reported higher values in an autonomy supportive style. Teachers exhibiting a more control-oriented causality orientation reported higher values in a controlling style.

Reeve et al., 2014	Cross-sectional	South Korea, Singapore, Jordan, Israel, Norway, Belgium, Bedouin USA	815	Teacher	Education	Style-related beliefs	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Assessment of teacher self-described autonomy supportive and controlling motivating style (Reeve & Vansteenkiste et al., 2014)	All three teacher beliefs explained independent and substantial variance in teachers' self-described motivating styles. Believed effectiveness was a particularly strong predictor of self-described motivating style. Collectivism–individualism predicted which teachers were most likely to self-describe a controlling motivating style, and a mediation analysis showed that teachers in collectivistic nations self-described a controlling style because they believed it to be culturally normative classroom practice.
Reeve et al., 2018	Experimental (non-randomized)	South Korea	42 & 633	Teacher	Education	gender others' age teaching experience others autonomous motivation Autonomous causality orientation Mastery goals Emotional intelligence Controlled causality orientation positive leadership negative leadership negative personality	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Situations in School Questionnaire (Aelterman et al., 2017) Teaching scenario measure (Reeve et al., 2014)	At baseline, high levels of openness to experience and agreeableness predicted teachers' autonomy-supportive motivating style and high levels of control causality orientation and authoritarianism predicted controlling motivating style. High levels of autonomy causality orientation and personal growth initiative predicted a post-intervention change in autonomy-

									supportive motivating style; and high level of control causality orientation predicted a change in controlling motivating style.
Rocchi et al., 2013	Cross-sectional	N/A	303	Coach	Sport	External pressures Others' autonomous motivation Autonomous motivation	Need supportive interpersonal style Autonomy support	Interpersonal Behaviors Scale (Beaudry & Pelletier, 2008)	Pressure from above indirectly predicted autonomy support negatively through coach motivation. Pressure from below was a positively significant direct predictor of autonomy support and an indirect predictor through coach motivation.
Rocchi et al., 2017	Cross-sectional	Canada	240	Coach	Sport	Social connection/support Others' autonomous motivation Autonomous motivation Need frustration Need satisfaction	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Interpersonal Behaviors Questionnaire-Self (IBQ-Self; Rocchi, Pelletier & Cheung et al., 2017; Rocchi, Pelletier & Desmarais, 2017)	The results shows that coaches who exhibit more need-supportive behaviors also report higher values of autonomous motivation and need satisfaction. Coaches who report more need thwarting behaviors, report higher values of controlled motivation, and need frustration. All after controlling for social desirability.

Rocchi & Pelletier, 2017 (study 2)	Cross-sectional	Canada	424	Coach	Sport	need satisfaction need frustration autonomous motivation controlled motivation	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Interpersonal Behaviors Questionnaire-Self (IBQ-Self; Rocchi, Pelletier & Cheung et al., 2017; Rocchi, Pelletier & Desmarais, 2017)	Perceptions of the coaching context supported or thwarted coach basic psychological need which, in turn, predicted their autonomous or controlled motivation. Coach autonomous motivation predicted a need supportive interpersonal style. Coach controlled motivation predicted a need thwarting interpersonal style.
Rodrigues et al., 2019	Cross-sectional	Portugal	477	Fitness professional	Exercise	Need frustration Need satisfaction	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Interpersonal Behaviors Questionnaire-self (IBQ-self; Rocchi et al., 2017)	Basic psychological need satisfaction and frustration were significantly associated with need supportive and need thwarting interpersonal behaviors respectively.

Rodrigues et al., 2020	Cross-sectional	Portugal	799	Fitness professional	Exercise	Controlled motivation Autonomous motivation Amotivation	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Interpersonal Behaviour Questionnaire Self exercise version (IBQ-Self; Rodrigues, Pelletier et al., 2019)	Autonomous forms of motivation were positively associated with need-supportive behaviors; autonomous forms of motivation were negatively associated with need-thwarting behaviors; external regulation and amotivation were positively associated with need-thwarting behaviors, but not introjected regulation; and controlled forms of motivation were negatively associated with all need-supportive behavior styles
Rodriguez-Menéndez et al., 2023	Cross-sectional	Spain	2396 & 1325	Parent & child	Parenting	Internal pressure External pressure Mastery goals Performance goals Autonomous motivation Controlled motivation Ill-being	Need supportive interpersonal style Competence support Need thwarting interpersonal style Competence thwarting	Parents as a Social Context Questionnaire (PSCQ; Skinner et al., 2005)	Of parental background variables, mastery goals and separation anxiety were positively associated with structure. Child-invested contingent self-esteem was positively associated with chaos. Autonomous motivation, female gender, secondary school and university education were positively associated with structure and negatively with chaos.

Rodríguez-Menéndez et al., 2024	Cross-sectional	Spain	2396 & 1325	Parent & child	Parenting	Autonomous motivation Controlled motivation Internal pressure Mastery goals Performance goals Gender Educational level	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Perceived Parental Autonomy Support Scale (p-PASS; Mageau et al., 2015)	Parental autonomy support was positively associated with autonomous motivation to parenting, and negatively related with controlled motivation to parenting and performance goals. Autonomy thwarting was positively associated with parental child-invested contingent self-esteem, parents' unfulfilled dreams and performance goals. Moreover, autonomy thwarting was negatively related with autonomous motivation to parenting. Unfulfilled dreams, performance goals and female gender were positively associated with psychological control. Autonomous motivation was positively associated with autonomy support and negatively with control. Performance goals and controlled motivation were negatively associated with autonomy support.
Roth & Weinstock, 2013	Cross-sectional	Israel	23 & 622	Teacher & student	Education	Negative beliefs about knowledge and learning	Need supportive interpersonal style Autonomy support	Student report: Autonomy supportive Teaching (AST; Roth et al., 2011)	Teachers who assessed themselves as more objectivist in their epistemological belief were perceived as less

									autonomy supportive by their students.
Roth et al., 2016 (study 2)	Cross-sectional	Israel	128 & 128	Parent (mother) & child	Parenting	Social connection/support Autonomous orientation	Need supportive interpersonal style Autonomy support	Child report: Autonomy support subscale of the Perceptions of Parents Scale (Grolnick et al., 1991; Niemiec et al., 2006)	Demonstrated that mothers' authenticity predicted unconditional positive regard, which in turn was related to autonomy-supportive parenting.
Sanchez-Oliva et al., 2021	Cross-sectional	Portugal	366	Exercise professional	Exercise	External pressure Others' autonomous motivation Need satisfaction Need frustration	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Perceived Environmental Supportiveness Scale (Markland & Tobin, 2010) Controlling Coach Behaviours Scale (Bartholomew et al., 2010)	Professionals working less than 20 hours per week, more experienced, and female were more likely to integrate the most need-supportive and least controlling profile, which was also associated with higher levels of work-related need satisfaction and clients' perceived self-determination, and lower levels of job pressures and need-frustration. Less need-supportive and slightly controlling profile displayed the most maladaptive pattern of associations.
Silva et al., 2017	Cross-sectional	Portugal	366	Exercise professional	Exercise	Need frustration Need satisfaction Autonomous motivation	Need supportive interpersonal style Autonomy support	Perceived Environmental Supportiveness Scale (PESS; Markland & Tobin, 2010):	Need frustration was positively associated with controlling strategies, emotional exhaustion, work motivation and negatively associated

							Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Controlling Coach Behaviors Scale (CCBS; Bartholomew et al., 2010)	with personal accomplishment. Need satisfaction was positively associated with need supportive strategies and personal accomplishment, negatively associated with emotional exhaustion.
Slobodin et al., 2020	Cross-sectional	Israel	215	Parent	Parenting	Ill-being Need frustration Need satisfaction	Need thwarting interpersonal style Autonomy thwarting	Autonomy Support Scale (P-PASS; Mageau et al., 2015)	Maternal guilt was associated with more need frustration and controlling parenting. The level of guilt significantly moderated the association between need frustration and controlling parenting, so that the association was weaker for mothers with higher levels of guilt than for those with lower levels of guilt.
Soenens et al., 2012 (study 2)	Cross-sectional	Belgium	317	Teacher	Education	External pressure in terms of constraints Ill-being Others' autonomous motivation Autonomous motivation	Need thwarting interpersonal style Autonomy thwarting	Psychological Control Scale-Teacher self-report (PCS; Barber, 1996)	Pressure from above (i.e., a pressuring school environment) and pressure from within (i.e., teachers' low relative autonomy for teaching) were related to controlling teaching, mediated by depersonalization, whereas pressure from below (i.e., students' low relative autonomy for studying) and emotional exhaustion was not.

Solstad et al., 2015	Cross-sectional	Norway	222	Coach	Sport	Autonomous motivation External pressure Social connection/support	Need supportive interpersonal style Autonomy support	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996)	Coach perceived social unity among athletes and coaches' self-determined motivation for coaching positively predicted provision of autonomy supportive coaching.
Stebbings et al., 2011	Cross-sectional	United Kingdom	443	Coach	Sport	Need satisfaction Well-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996) Controlling Coach Behaviours Scale (CCBS; Bartholomew et al, 2010)	Coaches' competence and autonomy need satisfaction positively predicted their levels of psychological well-being. Psychological well-being positively predicted their perceived autonomy support toward their athletes, and negatively predicted their perceived controlling behaviors.
Stebbings et al., 2012	Cross-sectional	N/A	418	Coach	Sport	External pressure Ill-being Job security Need frustration Need satisfaction Opportunities for professional development Well-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996) Controlling Coach Behaviours Scale (CCBS; Bartholomew et al., 2010)	In a structural equation model, greater job security and opportunities for professional development, and lower work–life conflict were associated with psychological need satisfaction, which was related to psychological well-being which was related to perceived autonomy support toward athletes. Higher work–life conflict and fewer opportunities for development were associated with thwarted psychological need, which was

									associated with psychological ill-being, which was associated with perceived controlling interpersonal behavior.
Stebbings et al., 2015	Longitudinal	United Kingdom	195	Coach	Sport	Autonomous motivation Ill-being Well-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Health Care Climate Questionnaire (HCCQ; Williams et al., 1996) Controlling Coach Behaviours Scale (CCBS; Bartholomew et al., 2010)	Hedonic well-being was found to be positively associated with the perceived provision of autonomy support at both the within-person and individual difference level. Negative affect was significantly associated with more experienced coaches' interpersonal control at the within-person level, and for all coaches at the individual difference level. Less experienced coaches' feelings of integration beyond one's average state was associated with higher reported autonomy support. All coaches who generally considered their coaching role to be fully integrated into their sense of self, may be more likely to be autonomy supportive, compared to coaches reporting lower integration.

Stebbings et al., 2016	Cross-sectional	United Kingdom	82 & 82	Coach & Athlete	Sport	Ill-being Others' negative emotions Well-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Athlete report: Healthcare Climate Questionnaire (HCQ; Williams, et al., 1996) Controlling Coach Behaviors Scale (CCBS; Bartholomew et al., 2010)	Coaches' presession experiences of positive and negative affect were associated with changes in athletes' perceptions of coach autonomy support and autonomy thwarting during the session.
Su-Russel et al., 2021	Longitudinal	USA	N not specified for parent & 2233	Parent & child	Parenting	Education Ill-being SES	Need supportive interpersonal style Autonomy support	Child report: From the Fragile Family and Child Wellbeing Study (see Su-Russel et al., 2021)	Maternal education at baseline was directly related to autonomy supportive parenting, and maternal income at birth was indirectly associated with autonomy supportive parenting through the mediating role of maternal parenting stress
Sypré et al., 2023	Cross-sectional	Belgium	122	Teacher	Education	Style-related beliefs Others' abilities Entity beliefs Experience	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations-in-School Questionnaire (SISQ; Aelterman et al., 2019).	Autonomy support and chaos was higher for gifted students. In contrast, structure, control and a fixed mindset were lower for the gifted students than typical students. Also, teachers' fixed mindset related positively to control and chaos, and teachers' training in gifted education was positively related to the provision of autonomy support.

Taylor et al., 2008	Cross-sectional	United Kingdom	204	PE teacher	Education	Autonomous motivation Autonomous causality orientation External pressure External pressure in terms of constraints Need satisfaction others' self-determined motivation	Need supportive interpersonal style Autonomy support Competence support Relatedness support	Teacher as Social Context Questionnaire (TASCQ; Wellborn et al., 1988)	Perceived job pressure, perceptions of student self-determination, and teacher autonomous orientation predicted teacher psychological need satisfaction. Direct positive effects of teachers' psychological need satisfaction on the strategies of gaining an understanding of students and instrumental help and support were also found. Teachers' self-determined motivation predicted all three interpersonal styles.
Teuber et al., 2023	Longitudinal	Germany	1465	Child	Parent	Child academic achievement	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Parental Help in Home Learning Questionnaire (Lorenz & Wild, 2007)	A significant reciprocal and negative relation was found between parental control and child academic achievement.
Tunkkari et al., 2021	Cross-sectional	Finland	662 & 847	Parent (mother) & child	Parenting	Ill-being Others' abilities Others' negative behaviors Others' negative emotions Others' positive emotions Well-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Parent and child report: Learning Climate Questionnaire (Black & Deci, 2000; Williams et al., 1997).	Adolescents' poor prior academic achievement and higher level of task avoidance, and mothers' high negative emotions were associated with mothers' higher perceptions of psychological control. Adolescent task avoidance was negatively associated with mothers'

									perceptions of autonomy support, Mothers' high positive and low negative emotions were associated with mothers' higher perceptions of autonomy support. The stronger the beliefs mothers had about their child's school success, the more autonomy support. Weaker beliefs were associated with higher psychological control perceived by adolescents and mothers. Adolescent's positive academic emotions were associated with adolescent-perceived autonomy support, and negative with psychological control. Mothers' positive emotions were associated with adolescents' perceptions of autonomy support
Uztemur et al., 2020	Cross-sectional	Turkey	345	Teacher	Education	Negative beliefs about knowledge and learning Positive beliefs about knowledge and learning	Need supportive interpersonal style Autonomy support	Learner Autonomy Support Scale (Oguz, 2013)	Teachers' epistemological beliefs have a direct influence on their teaching-learning conceptions (Constructivist teaching-learning) and autonomy supportive behaviors.

Valdés-Cuervo et al., 2020	Cross-sectional	Mexico	508 & 508	Parent & child	Parenting	Education level Mastery goals Performance goals Personal responsibility for others' motivation Self-efficacy	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Parental Homework Involvement Scale (PHIS; Grijalva et al., 2020)	The mothers' mastery-oriented goals and self-efficacy had a positive relationship with the support of children's autonomy and a negative one with mothers' control on children's homework. The mothers' active role in education resulted negatively related to mothers' control. Whereas mothers' performance-oriented goals resulted negatively related to the support of children's autonomy, they were positively related to control.
Van den Berghe et al., 2013	Cross-sectional	Belgium	79	PE Teacher	Education	Autonomous causality orientation Controlled causality orientation	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting Competence thwarting Relatedness thwarting	Observation tool for need supportive style (Haerens et al., 2013) and need thwarting style (Van den Berghe et al., 2013)	Control-oriented teachers reported less use of need supportive teaching style, provided less structure and reported higher use of a need-thwarting style, control and cold teaching.

Van den Berghe et al., 2014	Cross-sectional	Belgium	201	PE Teacher	Education	Autonomous motivation Controlled motivation Need satisfaction	Need supportive interpersonal style Autonomy support Competence support Relatedness support	Teacher as Social Context Questionnaire (Belmont et al., 1988)	Groups based on two dimensions of motivation (quality, quantity): Teachers in the good quality group reported to provide more need support, autonomy support, and structure while teaching PE than those in the poor quality and the low quantity group. Teachers in the poor-quality group provided the least need support and involvement with their students compared to all other groups
Van den Berghe et al., 2015	Cross-sectional	Belgium	33 & 2004	PE teacher & student	Education	Others' positive behaviors Others' negative behaviors Others' positive emotions	Need supportive interpersonal style Autonomy support Competence support Relatedness support	Student and teacher report: Teacher as Social Context Questionnaire	Engagement related to more need support, but only at the student level. Teachers with a relatively low controlled orientation were more need supportive when perceiving their students as emotionally and behaviorally engaged.
Vansteenkiste al., 2014	Longitudinal	Belgium	532	Child	Parenting	Others' autonomous motivation Others' controlled motivation	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Measurements of Autonomy support and Autonomy thwarting were generated within this study.	The findings show that mothers' autonomy support was positively associated with identified regulation, and negatively associated with external regulation and oppositional defiance. Moreover, external regulation was positively associated with a controlling style.

Vermote et al., 2020	Cross-sectional	Belgium	357	Teacher	Education	Amotivation Autonomous motivation Controlled motivation Entity beliefs Incremental beliefs	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations in School Questionnaire-Higher Education (SISQ-HE; Vermote et al., 2020) inspired by SISQ-Secondary Education (Aelterman et al., 2019)	Autonomous motivation and a growth mindset related positively to more motivating approaches (e.g., guiding, attuning), while controlled motivation, amotivation and a fixed mindset related positively to more demotivating approaches (e.g., domineering, abandoning).
Vermote et al., 2024	Cross-sectional	Belgium	549	Teacher	Education	Teacher identity Autonomous motivation Controlled motivation Amotivation	Needs supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations in School Questionnaire-Higher Education (SISQ-HE; Vermote et al., 2020)	Teacher identity synthesis related directly and positively to autonomy and competence support, and negatively to autonomy and competence thwarting. Teacher identity synthesis had a positive indirect effect on both need supportive and thwarting styles via autonomous motivation. Need thwarting was indirectly and negatively predicted via amotivation. Ruminative exploration of teaching identity had a positive indirect association on need thwarting via controlled motivation and amotivation.

Vermote et al., 2023b	Cross-sectional	Belgium	482	Teacher	Education	External pressure due to constraints Need satisfaction Need frustration	Needs supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Situations in School Questionnaire-Education (SISQ-E; Aelterman et al., 2019).	Pressure from students negatively predicted autonomy support and structure, and positively predicted control and chaos. Pressure from colleagues and students negatively predicted autonomy support and structure positively via need satisfaction. Moreover, pressure from colleagues had a positive indirect association with control via need frustration.
Wang et al., 2012	Cross-sectional	China	341 & 341	Parent & Child	Parenting	Education levels Others' abilities Subordinates' gender Positive beliefs about knowledge and learning	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style Autonomy thwarting	Child report: Measure of autonomy support and control by Wang et al. (2007)	Statistically significant interactions were found between adolescents' grades and parents socialization goals which predicted parental autonomy support and control. When adolescents were doing well at school, the stronger parents' endorsement of self-development socialization goals, the greater their autonomy support and the lesser their psychological control; when adolescents were doing poorly at school, regardless of parents' socialization goals, their autonomy support was relatively low and their psychological control was relatively high

Williams & Deci, 1996 (study 2)	Longitudinal	USA	72	Medical students	Healthcare	Age Autonomous motivation Controlled motivation Gender Positive beliefs about knowledge and learning Self-efficacy	Need supportive interpersonal style Autonomy support	Health-Care Climate Questionnaire (HCCQ; Williams et al., 1996)	The medical students' autonomy supportive interviewing style was positively related to their autonomous self-regulation, perceived autonomy support from instructors Psychosocial beliefs and autonomy orientation. Also, controlled orientation was negatively related with their autonomy supportive style.
Woolfolk et al., 1990	Cross-sectional	USA	55	Teacher	Education	Others' controlled motivation Negative beliefs about motivation Self-efficacy	Need supportive interpersonal style Autonomy support	Problems in School Inventory (Deci et al., 1981)	Teachers reported self-efficacy was positively related to autonomy supportive style through a more humanistic view of pupil control.
Wu et al., 2021	Longitudinal	China	348	Parent	Parenting	Negative life events	Need thwarting interpersonal style Autonomy thwarting	Scale of Parental Psychological Control (mother's subscale) (Shek, 2005)	Children's victimization at Time 2 (T2) predicted increased maternal psychological control at T3, but not from T1 to T2. Children's bullying at T1 increased maternal psychological control at T2, but not from T2 to T3.
Wuyts et al., 2017	Cross-sectional	Belgium	62 & 62	Parent (mother) & Child	Parenting	Ill-being	Need supportive interpersonal style Autonomy support Need thwarting interpersonal style	Compilation of existing measures (Deci et al., 1993, Deci et al., 1982, Grolnick et al., 2002) and newly developed rating systems (Wuytz et al., 2017)	Mothers with high levels of separation anxiety were observed to be less autonomy-supportive and more controlling.

							Autonomy thwarting		
Yotyodying & Wild, 2014	Cross-sectional	Germany & Thailand	288 & 288 494 & 494	Parent & Child	Parenting	Mastery goals Invitation from others to help Low personal responsibility for others Performance goals Personal responsibility for others Prior positive related experiences Self-efficacy Well-being SES	Need supportive interpersonal style Autonomy support Competence support Relatedness support Need thwarting interpersonal style Autonomy thwarting	Child report: German Parental Help in Home Learning Questionnaire (GPHHL; Wild, 1999)	Responsiveness was positively predicted by domain specific teaching efficacy and personal time and energy through authoritative style, and negatively predicted by goal orientation towards achievement and invitation from the school and teachers. Structure was positively predicted by goal orientation towards achievement-, and negatively predicted by valence towards school, personal time and energy, invitation from the school and teachers and conception of passive responsibility via authoritarian parental instruction.
Yotyodying & Wild, 2016	Cross-sectional	Germany	357	Parent	Parenting	Ill-being Internal pressure Personal responsibility for others' motivation SES	Need supportive interpersonal style Competence support Need thwarting interpersonal style Autonomy thwarting	German Parental Help in Home Learning Questionnaire (GPHHL; Wild, 1999)	SES, parental aspiration, and role conception were predictive of the amount of involvement. Higher degrees of role conception determined parents' use of structure. Higher aspirations and feelings of shame motivated parents to be more controlling.

									Bootstrap analyses confirmed the fully mediating effects of aspiration and shame on an inclusive setting through parental control.
Zimmer-Gembeck et al., 2019	Cross-sectional	Australia	167	Parent	Parenting	Education levels Emotional intelligence Ill-being Subordinates' age Subordinates' gender Others positive behavior Others' negative emotions SES	Need supportive interpersonal style Autonomy support Competence support Need thwarting interpersonal style Autonomy thwarting Competence thwarting	Parent Socioemotional Context of Feeling Questionnaire (PSCFQ; Deci & Ryan, 1985; Ryan & Deci, 2000)	Parents higher in mindfulness reported more food-related supportiveness and structure and less food-related coerciveness and chaos; most associations were significant even after accounting for children's temperament and all other measures. Children's effortful control was associated with higher levels of parent supportiveness and structure, whereas negative affectivity was positively associated with coerciveness and chaos. Few associations of parents' body dissatisfaction and concerns about their children's weight remained significant in the multivariate models.

Supplementary Table S3

Quality Appraisal of Included Studies using the Mixed Methods Assessment Tool

	Criteria from the Mixed Methods Appraisal Tool															
	Randomized controlled trials					Non-randomized controlled trials					Quantitative descriptive studies					Quality rating
Study	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	
Aelterman et al. (2014)	1	0	0	1	1											***
Aelterman et al. (2016)						0	1	1	1	0						***
Ahn et al. (2022)											1	1	1	1	1	*****
André et al. (2023)											1	0	1	0	1	***
Andreadakis et al. (2020)											1	0	1	1	1	****
Ascigil et al. (2019)											1	0	1	0	1	***
Balk et al. (2019)											0	0	1	0	1	**
Behzadnia et al. (2021)											1	0	1	1	1	****
Benckwitz et al. (2023)											1	0	1	1	1	****
Bennett et al. (2017)											0	0	1	0	1	**
Berger & Girardet (2021)											1	1	1	1	1	*****
Berger et al. (2017)											0	0	1	0	1	**
Brenning & Soenens (2017)											1	1	1	1	1	*****
Brenning et al. (2020)											1	1	1	1	1	*****
Burel et al. (2020)											1	0	1	0	1	***
Cadima et al. (2018)											1	1	1	1	1	*****
Cañabate et al. (2021)						0	1	0	0	0						*
Costa et al. (2018)											1	1	1	1	1	*****
Costa et al. (2019) study 1											1	1	1	0	1	****
Costa et al. (2019) study 2											1	0	1	0	1	***
De Clerck (2022)											1	0	1	1	1	****
Desimpelaere et al. (2023)											1	0	1	1	1	****
Dettmers et al. (2019)											0	0	1	1	1	***
Dumont et al. (2014)											1	1	1	0	1	****

Duriez et al. (2009)						1	0	1	1	1	****
Egeli & Rinaldi (2016)						1	0	1	0	1	***
Escriva-Boulley, Guillet et al. (2021)						1	0	1	0	1	***
Escriva-Boulley, Haerens et al. (2021)						1	0	1	0	1	***
Figueiredo (2019)						1	0	1	0	1	***
Fox et al. (2023)						1	0	1	1	1	****
García-Cazorla et al. (2024)						1	1	1	1	1	*****
George et al. (2019)						1	1	1	0	1	****
Gershy & Katz (2023)						0	0	1	1	1	***
Gurland & Grolnick (2023)						0	0	1	0	1	**
Ha et al. (2022)						1	0	1	0	1	***
Hagenauer et al. (2018)						1	0	1	0	1	***
Halvari et al. (2021)	1	1	0	1	1						****
Haw & King (study 1) (2023)						0	0	1	1	1	***
Hollmann et al. (2018)						1	0	1	0	1	***
Iachini (2013)						1	0	1	1	1	****
Inguglia et al. (2023)						1	0	1	1	1	****
Jang (2019) study 3						0	0	1	1	1	***
Jang (2019) study 4						0	0	1	1	1	***
Jang, Basarkod et al. (2024)						0	0	1	1	1	***
Jang, Cheon et al. (study 2) (2023)						0	0	1	1	1	***
Jungert et al. (2015)						1	0	1	0	1	***
Katz & Shahar (2015)						1	0	1	0	1	***
Katz, Kaplan, et al. (2011)						1	1	1	0	1	****
Kim et al. (2019)						1	0	1	0	1	***
Koçak et al. (2024)						1	1	1	1	1	*****
Košir & Strašek (2015)						0	0	0	0	1	*
Kwon & Wickrama (2014)						1	1	1	1	1	*****
Lauermann & Berger (2021)						0	0	1	1	1	***

Lerner et al. (2022)						1	0	0	1	1	***
Leroy et al. (2007)						1	1	1	1	1	*****
Levine et al. (2021)						1	0	1	1	1	****
Li et al. (2023)						1	0	0	1	1	***
Mabbe et al. (2018)						0	0	1	1	1	***
Mageau et al. (2016)						0	0	1	0	1	**
Marshik et al. (2017)						1	1	1	0	1	****
Martinek et al. (2020)						1	0	1	0	1	***
Matosic et al. (2016)						1	1	1	1	1	*****
Matosic et al. (2017)						1	1	1	1	1	*****
Matosic et al. (2020)						1	1	1	1	1	*****
Matte-Gagné et al. (2013)						1	1	1	1	1	*****
Minkels et al. (2023)						1	1	1	1	1	*****
Moe et al. (2020) study 1						1	0	1	1	1	****
Moe et al. (2020) study 2						0	1	0	0	0	*
Moe et al. (2022)						0	0	1	0	1	**
Morbée et al. (2020)						1	1	1	1	1	*****
Morbee et al. (study 1) (2023)						1	0	1	0	1	***
Morbee et al. (study 2) (2023)	0	1	0	1	1						***
Minkels et al. (2023)						1	1	1	1	1	*****
Nachoum et al. (2021)						1	0	1	1	1	****
Ng et al. (2012)						1	0	1	0	1	***
Ozkal (2014)						1	0	1	0	1	***
Pelletier et al. (2002)						1	0	1	1	1	****
Pierro et al. (2009) study 1						1	0	1	0	1	***
Pulido et al. (2021)						1	0	1	1	1	****
Raposo et al. (2020)						1	0	1	1	1	****
Reeve (1998)						1	0	1	0	1	***
Reeve, Jang et al. (2018)	0	1	1	1	0						***
Reeve, V et al. (2014)						1	0	1	1	1	****

Rocchi & Pelletier (2017)	1	0	1	1	1	****
Rochi et al. (2013)	1	0	1	1	1	****
Rochi et al. (2017) study 2	1	0	1	1	1	****
Rodrigues et al. (2020)	1	0	1	1	1	****
Rodrigues, Neiva et al. (2019)	1	0	1	1	1	****
Rodríguez-Menéndez et al. (2024)	1	0	1	0	1	***
Rodríguez-Menéndez et al. (2023)	1	0	1	0	1	***
Roth & Weinstock (2013)	0	0	1	0	1	**
Roth et al. (2016) study 2	1	0	1	0	1	***
Sánchez-Oliva et al. (2021)	1	0	1	1	1	****
Silva et al. (2017)	1	0	1	1	1	****
Slobodin et al. (2020)	1	0	1	0	1	***
Soenens et al. (2012) study 2	1	0	1	0	1	***
Solstad et al. (2015)	1	0	1	1	1	****
Stebbings et al. (2011)	1	1	1	1	1	*****
Stebbings et al. (2012)	1	0	1	1	1	****
Stebbings et al. (2015)	1	0	1	0	1	***
Stebbings et al.(2016)	1	0	1	1	1	****
Su-Russell & Russell (2021)	1	0	1	1	1	****
Sypré et al. (2023)	1	0	1	1	1	****
Taylor et al. (2008)	1	0	1	1	1	****
Teuber et al. (2023)	0	0	1	1	1	***
Tunkkari et al. (2021)	1	1	1	0	1	****
Valdés-Cuervo et al. (2020)	1	0	1	1	1	***
Van den Berghe et al. (2013)	1	0	0	0	1	**
Van den Berghe et al. (2014)	1	0	1	0	1	***
Van den Berghe et al. (2015)	1	0	1	0	1	***
Vansteenkiste et al. (2014)	1	0	1	1	1	****
Vermote et al. (2020)	1	0	1	1	1	****

Vermote…Aelterman et al. (2023)	1	1	1	1	1	*****
Vermote…Soenens et al. (2023)	1	1	1	1	1	*****
Wang et al. (2012)	1	0	1	0	1	***
Williams & Deci (1996) study 2	1	0	1	0	1	***
Woofolk et al. (1990)	0	0	0	0	1	*
Wu et al. (2021)	1	0	1	1	1	****
Wuyts et al. (2017)	1	0	1	0	1	***
Yotyodying & Wild (2014)	1	0	1	0	1	***
Yotyodying & Wild (2016)	1	0	1	1	1	****
Üztemur et al. (2020)	1	1	0	1	1	****
Zimmer-Gembeck et al. (2019)	1	0	1	1	1	****

Note. Methodological quality criteria: 2.1. Is randomization appropriately performed? 2.2. Are the groups comparable at baseline? 2.3. Are there complete outcome data? 2.4. Are outcome assessors blinded to the intervention provided? 2.5 Did the participants adhere to the assigned intervention? 3.1. Are the participants representative of the target population? 3.2. Are measurements appropriate regarding both the outcome and intervention (or exposure)? 3.3. Are there complete outcome data? 3.4. Are the confounders accounted for in the design and analysis? 3.5. During the study period, is the intervention administered (or exposure occurred) as intended? 4.1. Is the sampling strategy relevant to address the research question? 4.2. Is the sample representative of the target population? 4.3. Are the measurements appropriate? 4.4. Is the risk of nonresponse bias low? 4.5. Is the statistical analysis appropriate to answer the research question? (1 = yes, 0 = no or can't tell).

Supplementary Table S4

Effect Sizes and 95% Confidence Intervals of the Associations between Specific Candidate Antecedent Factors and Need Supportive Styles

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need Support	14 (44)	-.04	-.14, .06
	Autonomy	12 (30)	-.04	-.13, .06
	Competence	4 (9)	-.13*	-.24, -.03
	Relatedness	2 (4)	.02	-.32, .36
External pressures due to constrains	Overall Need Support	8 (18)	.01	-.09, .07
	Autonomy	6 (12)	-.01	-.09, .08
	Competence	3 (3)	-.03	-.28, .22
	Relatedness	2 (2)	-.003	-.39, .37
Social connection/support	Overall Need Support	16 (36)	.33*	.16, .48
	Autonomy	11 (19)	.29*	.08, .48
	Competence	4 (7)	.45	-.07, .76
	Relatedness	2 (3)	.36	-.54, .88
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Others' autonomous motivation	Overall Need Support	12 (45)	.17*	.05, .29
	Autonomy	11 (39)	.13	-.001, .26
	Competence	2 (2)	.35*	.24, .45
	Relatedness	2 (2)	.36*	.07, .60
Others' controlled motivation	Overall Need Support	5 (12)	.04	-.21, .12
	Autonomy	4 (10)	-.02	-.13, .10
	Competence	0	NA	
	Relatedness	0	NA	
Others' positive behaviors	Overall Need Support	11 (23)	.23*	.12, .33
	Autonomy	8 (10)	.26*	.01, .49
	Competence	5 (6)	.23*	.03, .42
	Relatedness	2 (3)	.17	-.76, .87
Others' negative behaviors	Overall Need Support	9 (17)	-.10	-.25, .05
	Autonomy	4 (7)	-.19	-.51, .18
	Competence	3 (4)	-.04	-.21, .13
	Relatedness	1 (2)	NA	
Others' abilities	Overall Need Support	9 (23)	.17	-.03, .37
	Autonomy	7 (12)	.23*	.02, .41
	Competence	2 (5)	-.01	-.39, .37
	Relatedness	1 (4)	NA	
Others' positive emotions	Overall Need Support	5 (10)	.26*	.13, .37

	Autonomy	3 (5)	.28*	.09, .45
	Competence	0	NA	
	Relatedness	0	NA	
Others' negative emotions	Overall Need Support	4 (11)	-.13	-.29, .03
	Autonomy	4 (9)	-.16	-.32, .01
	Competence	1 (2)	NA	
	Relatedness	0	NA	
Motivators' Personal Factors				
Autonomous motivation	Overall Need Support	34 (121)	.28*	.22, .34
	Autonomy	27 (72)	.22*	.17, .27
	Competence	13 (30)	.29*	.15, .40
	Relatedness	5 (7)	.45*	.19, .65
Controlled motivation	Overall Need Support	22 (63)	-.07	-.14, .001
	Autonomy	17 (30)	*-.04*	*-.10, .03*
	Competence	11 (19)	-.07	-.22, .07
	Relatedness	3 (5)	-.06	-.32, .20
Amotivation	Overall Need Support	6 (23)	-.10	-.29, .09
	Autonomy	5 (11)	-.05	-.27, .17
	Competence	5 (11)	-.12*	-.22, -.01
	Relatedness	0	NA	
Need frustration	Overall Need Support	15 (66)	-.15*	-.23, -.06
	Autonomy	14 (38)	-.14*	-.26, -.01
	Competence	7 (20)	-.13*	-.24, -.03
	Relatedness	3 (7)	-.20	-.45, .11
Need satisfaction	Overall Need Support	25 (125)	.25*	.18, .31
	Autonomy	22 (71)	.23*	.15, .31
	Competence	12 (31)	.26*	.18, .33
	Relatedness	5 (14)	.38*	.14, .59
Autonomous causality orientation	Overall Need Support	6 (13)	.26*	.01, .48
	Autonomy	6 (6)	.27*	.07, .46
	Competence	3 (4)	.28	-.27, .69
	Relatedness	2 (2)	.18	-.42, .67
Controlled causality orientation	Overall Need Support	3 (7)	-.12	-.38, .16
	Autonomy	3 (3)	*-.05*	*-.34, .25*
	Competence	1 (2)	NA	
	Relatedness	1 (1)	NA	
Intrinsic goals	Overall Need Support	4 (7)	.28*	.09, .45
	Autonomy	4 (7)	.28*	.09, .44
	Competence	0	NA	
	Relatedness	0	NA	
Extrinsic goals	Overall Need Support	3 (6)	-.04	-.49, 44
	Autonomy	3 (6)	-.04	-.48, .42
	Competence	0	NA	
	Relatedness	0	NA	
Self-efficacy	Overall Need Support	10 (36)	.26*	.16, .35
	Autonomy	9 (25)	.28*	.18, .37
	Competence	2 (5)	.13	-.86, .92
	Relatedness	1 (4)	NA	

Mastery goals	Overall Need Support	7 (14)	.24*	.13, .34
	Autonomy	6 (7)	.24*	.05, .41
	Competence	3 (4)	.15	-.21, .48
	Relatedness	2 (3)	-.07	-.69, .44
Performance goals	Overall Need Support	6 (16)	-.06	-.41, .31
	Autonomy	5 (8)	-.10	-.29, .09
	Competence	3 (5)	-.02	-.62, .60
	Relatedness	2 (3)	-.40	-.96, .80
Style-related beliefs	Overall Need Support	4 (30)	.24	-.12, .55
	Autonomy	4 (17)	.25	-.12, .57
	Competence	3 (13)	.16*	.004, .32
	Relatedness	0	NA	
Positive beliefs about knowledge and learning	Overall Need Support	4 (6)	.18*	.04, .32
	Autonomy	4 (6)	.18*	.03, .32
	Competence	0	NA	
	Relatedness	0	NA	
Negative beliefs about knowledge and learning	Overall Need Support	2 (19)	-.03	-.89, .85
	Autonomy	2 (19)	-.04	-.87, .85
	Competence	0	NA	
	Relatedness	0	NA	
Negative beliefs about motivation	Overall Need Support	2 (2)	-.28	-.93, .81
	Autonomy	1 (1)	NA	
	Competence	0	NA	
	Relatedness	0	NA	
High personal responsibility for others motivation	Overall Need Support	5 (18)	.25*	.13, .37
	Autonomy	4 (9)	.23*	.13, .35
	Competence	3 (7)	.20	-.25, .58
	Relatedness	1 (2)	NA	
Low personal responsibility for others motivation	Overall Need Support	1 (2)	NA	
	Autonomy	1 (2)	NA	
	Competence	1 (2)	NA	
	Relatedness	1 (2)	NA	
Entity beliefs	Overall Need Support	5 (9)	-.14*	-.30, .03
	Autonomy	4 (5)	-.17	-.35, .03
	Competence	2 (3)	-.01	-.22, .07
	Relatedness	0	NA	
Incremental beliefs	Overall Need Support	3 (4)	.15*	.05, .24
	Autonomy	3 (3)	.10	-.04, .24
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Emotional intelligence	Overall Need Support	6 (16)	.31*	.17, .44
	Autonomy	5 (14)	.29*	.14, .43
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Internal pressures	Overall Need Support	6 (7)	-.09	-.21, .35
	Autonomy	3 (4)	-.09	-.33, .16
	Competence	3 (3)	-.06	-.48, .38
	Relatedness	0	NA	
Well-being	Overall Need Support	11 (26)	.35*	.22, .47
	Autonomy	10 (19)	.35*	.24, .45

	Competence	2 (3)	.07	-.57, .65
	Relatedness	2 (3)	-.01	-.47, .46
Illbeing	Overall Need Support	17 (38)	-.16*	-.28, -.04
	Autonomy	14 (27)	-.20*	-.36, -.04
	Competence	5 (7)	-.06	-.17, .06
	Relatedness	1 (2)	NA	
Negative personality	Overall Need Support	3 (5)	-.38	-.77, .41
	Autonomy	3 (5)	-.28	-.76, .40
	Competence	0	NA	
	Relatedness	0	NA	

Note: n = Number of studies; k = Number of effects sizes; CI = Confidence Interval; NA = Not Available; * = $p<.05$. Specific antecedents listed in Table 1 but not here were measured in only one study and were, therefore, excluded from the analysis.

Supplementary Table S5

Effect Sizes and 95% Confidence Intervals of the Associations between Specific Candidate Antecedent Factors and Need Thwarting Styles

	Interpersonal Style	*n (k)*	*r*	95% CI
Socio-Contextual Factors				
External pressures	Overall Need Thwarting	8 (21)	.21*	.16, .27
	Autonomy	7 (17)	.21*	.14, .28
	Competence	1 (3)	NA	
	Relatedness	0	NA	
External pressures due to constrains	Overall Need Thwarting	7 (10)	.07	-.03, .17
	Autonomy	5 (6)	.08	-.11, .27
	Competence	2 (2)	.09	-.59, .70
	Relatedness	1 (1)	NA	
Social connection/support	Overall Need Thwarting	3 (19)	-.11	-.47, .27
	Autonomy	2 (14)	-.15	-.71, .52
	Competence	1 (2)	NA	
	Relatedness	1 (2)	NA	
Motivators' Perceptions of Motivatees' Motivation and Behavior				
Others' autonomous motivation	Overall Need Thwarting	9 (14)	-.14	-.37, .10
	Autonomy	9 (12)	-.06	-.18, .06
	Competence	1 (1)	NA	
	Relatedness	1 (1)	NA	
Others' controlled motivation	Overall Need Thwarting	4 (10)	.19	-.06, .42
	Autonomy	4 (10)	.21	-.02, 43
	Competence	0	NA	
	Relatedness	0	NA	
Others' positive behaviors	Overall Need Thwarting	4 (6)	-.07	-.25, .10
	Autonomy	3 (4)	-.10	-.32, .12
	Competence	2 (2)	-.05	-.33, .23
	Relatedness	0	NA	
Others' negative behaviors	Overall Need Thwarting	6 (8)	.33*	.09, .54
	Autonomy	4 (6)	.39*	.06, .65
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Others' abilities	Overall Need Thwarting	6 (15)	-.30*	-.54, -.003
	Autonomy	6 (15)	-.29	-.54, .001
	Competence	0	NA	
	Relatedness	0	NA	
Others' positive emotions	Overall Need Thwarting	2 (4)	-.16*	-.30, -.02
	Autonomy	2 (4)	-.16*	-.30, -.02
	Competence	0	NA	

	Relatedness	0	NA	
Others' negative emotions	Overall Need Thwarting	4 (12)	.22*	.15, .30
	Autonomy	4 (10)	.22*	.13, .31
	Competence	1 (2)	NA	
	Relatedness	0	NA	
Motivators' Personal Factors				
Autonomous motivation	Overall Need Thwarting	21 (66)	-.03	-.10, .05
	Autonomy	16 (33)	-.03	-.17, .13
	Competence	11 (26)	-.04	-08, .002
	Relatedness	2 (2)	-.02	-.93, .93
Controlled motivation	Overall Need Thwarting	18 (44)	.12*	.01, .23
	Autonomy	14 (22)	.16*	.03, .29
	Competence	10 (16)	.08	-.09, .25
	Relatedness	2 (2)	-.04	-.95, .94
Amotivation	Overall Need Thwarting	7 (24)	.32*	.10, .52
	Autonomy	6 (12)	.26*	.08, .42
	Competence	5 (11)	.36	-.05, .67
	Relatedness	0	NA	
Need satisfaction	Overall Need Thwarting	19 (75)	-.11*	-.16, -.06
	Autonomy	17 (44)	-.10*	-.18, -.04
	Competence	8 (22)	-.13*	-.20, -.05
	Relatedness	3 (7)	-.13	-.44, .21
Need frustration	Overall Need Thwarting	18 (68)	.25*	.18, .31
	Autonomy	16 (39)	.25*	.16, .34
	Competence	7 (20)	.22*	.16, .28
	Relatedness	3 (7)	.24	-.09, .52
Autonomous orientation	Overall Need Thwarting	2 (5)	-.07	-.70, .62
	Autonomy	2 (2)	-.18	-.58, .30
	Competence	1 (1)	NA	
	Relatedness	1 (1)	NA	
Controlled orientation	Overall Need Thwarting	2 (5)	.37	-.91, .98
	Autonomy	2 (2)	.50	-.90, .98
	Competence	1 (1)	NA	
	Relatedness	1 (1)	NA	
Intrinsic goals	Overall Need Thwarting	3 (6)	-.04	-.40, .32
	Autonomy	3 (6)	-.05	-.41, .33
	Competence	0	NA	
	Relatedness	0	NA	
Extrinsic goals	Overall Need Thwarting	3 (6)	.25	-.24, .64
	Autonomy	3 (6)	.25	-.24, .64
	Competence	0	NA	
	Relatedness	0	NA	
Self-efficacy	Overall Need Thwarting	3 (7)	-.09	-.20, .03
	Autonomy	3 (7)	-.09	-.20, .03
	Competence	0	NA	
	Relatedness	0	NA	
Mastery goals	Overall Need Thwarting	6 (7)	-.08	-.20, .04
	Autonomy	5 (6)	-.09	-.23, .06
	Competence	1 (1)	NA	

	Relatedness	0	NA	
Performance goals	Overall Need Thwarting	5 (9)	.11	-.01, .22
	Autonomy	4 (7)	.15*	.04, .25
	Competence	1 (2)	NA	
	Relatedness	0	NA	
Style-related beliefs	Overall Need Thwarting	3 (13)	.38	-.01, .66
	Autonomy	3 (9)	.40*	.04, .66
	Competence	1 (4)	NA	
	Relatedness	0	NA	
High personal responsibilities for others' motivation	Overall Need Thwarting	5 (14)	-.11	-.22, .02
	Autonomy	5 (10)	-.08	-.22, .06
	Competence	1 (4)	NA	
	Relatedness	0	NA	
Low personal responsibilities for others' motivation	Overall Need Thwarting	1 (2)	NA	
	Autonomy	1 (2)	NA	
	Competence	0	NA	
	Relatedness	0	NA	
Entity beliefs	Overall Need Thwarting	3 (6)	.25*	.10, .38
	Autonomy	2 (2)	.35	-.69, .92
	Competence	2 (3)	.20*	.03, .37
	Relatedness	0	NA	
Internal pressures	Overall Need Thwarting	6 (6)	.17*	.10, .25
	Autonomy	5 (5)	.18*	.08, .27
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Emotional intelligence	Overall Need Thwarting	5 (15)	-.23*	-.41, -.04
	Autonomy	5 (14)	-.20*	-.36, -.04
	Competence	1 (1)	NA	
	Relatedness	0	NA	
Well-being	Overall Need Thwarting	8 (14)	-.19*	-.29, -.08
	Autonomy	6 (10)	-.19*	-.35, -.02
	Competence	1 (2)	NA	
	Relatedness	1 (1)	NA	
Illbeing	Overall Need Thwarting	13 (23)	.23*	.11, .35
	Autonomy	11 (17)	.24*	.07, .39
	Competence	4 (6)	.21	-.09, .48
	Relatedness	0	NA	
Negative personality	Overall Need Thwarting	4 (9)	.29*	.20, .37
	Autonomy	4 (9)	.30*	.18, .39
	Competence	0	NA	
	Relatedness	0	NA	

Note: *n* = Number of studies; *k* = Number of effects sizes; CI = Confidence Interval; NA = Not Available; * = $p<.05$. Specific antecedents listed in Table 1 but not here were measured in only one study and were, therefore, excluded from the analysis.