Educational Psychology Review (2024) 36:127
https://doi.org/10.1007/s10648-024-09967-x

META-ANALYSIS

Relationships Between Experiences of Autonomy and Well(Ill)-Being for K-12 Youth: A Meta-Analysis

Amanda Vite[1] **· Erika A. Patall**[1] **· Man Chen**[2]

Accepted: 17 October 2024

Abstract

Childhood and adolescence are pivotal developmental stages for psychological health. An understanding of psychological mechanisms related to well-being is important for promoting positive life outcomes for youth. Research generally shows that the basic psychological need for autonomy is significantly associated with well-being. To examine the magnitude and sources of variation in this relationship, we conducted a meta-analysis of 90 reports to analyze the average effect of autonomy need satisfaction (ANS) and frustration (ANF) on indicators of psychological well- and ill-being for K-12 (Kindergarten to 12th grade) youth. Results indicated that ANS was positively associated with psychological well-being and negatively associated with psychological ill-being among youth. Further, ANF was negatively associated with psychological well-being and positively associated with psychological ill-being. Moderator analyses indicated that the association between ANS and well-being was stronger for studies conducted with children and adolescents in East Asian countries compared to studies conducted in the USA, Canada, or Northern Europe when controlling for publication status and measurement reliability. Results also showed that the average correlation between ANS and well-being was stronger for studies located in more collectivistic countries compared to individualistic countries when controlling for publication status and measurement reliability. The relationship between ANS and ill-being was stronger for studies conducted in the USA and Canada compared to East Asian and European contexts. Together, results suggest that autonomy satisfaction is related to the well- and ill-being of youth across cultural contexts, but that there is cultural variation in the association between experiences of autonomy and well-being.

Keywords Autonomy · Basic psychological needs · Well-being · Ill-being · Meta-analysis

Extended author information available on the last page of the article

Published online: 31 October 2024

The transition from childhood to adolescence and young adulthood is characterized by significant developmental changes. Throughout this phase, young individuals are vulnerable to shifts in their psychological well-being, which can unfortunately include the emergence of mental health issues. A recent meta-analysis with over 700,000 participants found that, worldwide, the average onset of mental health disorders is 14.5 years old (Solmi et al., 2021). Research also suggests that early experiences of well- and ill-being are significantly associated with well- and ill-being outcomes in later adulthood (Hoyt et al., 2012). That is, experiences of well- and ill-being during childhood and adolescence may have profound impacts on lifelong trajectories.

Numerous environmental factors, such as family and community support, peer relationships, and access to healthcare, significantly influence youth's well-being (Avedissian & Alayan, 2021). These many environmental factors are interconnected in their influence on the psychological mechanisms that ultimately mold an individual's state of psychological well- and ill-being. This meta-analysis seeks to investigate the extent to which the psychological mechanisms of autonomy need satisfaction (ANS) and frustration (ANF) are related to well- and ill-being outcomes for K-12 (Kindergarten to 12th grade) youth. The need for autonomy, as posited by self-determination theory (SDT), represents a fundamental psychological nutrient defined by experiences of being the origin of one's behaviors (Ryan & Deci, 2000a). Investigating the relationship between experiencing ANS and ANF with well- and ill-being can strengthen our understanding of the underlying drivers of mental health, enabling more targeted interventions and support systems to promote well-being among young individuals. Further, understanding the magnitude and sources of variation between ANS or ANF and well(ill)-being outcomes during this pivotal phase of life can offer crucial insights into the psychological well-being of young individuals, while also shedding light on potential sources of maladaptive outcomes, such as mental health disorders. Therefore, the overarching questions of this research synthesis were (1) to what extent are ANS and ANF related to psychological well(ill)-being among youth and (2) to what extent do those relationships vary depending on characteristics of the setting, sample, methods, predictor, and outcomes?

Self-Determination Theory and Basic Psychological Need Satisfaction

Self-determination theory (SDT) proposes that individuals have three basic psychological needs of autonomy (i.e., experiences of volition), competence (i.e., experiences of adequacy), and relatedness (i.e., experiences of belonging) (Ryan & Deci, 2000a). These three needs are defined as essential nutrients to one's growth, acting as important psychological mechanisms that, when satisfied, influence numerous life outcomes such as well- and ill-being, performance, and motivation (Ryan & Deci, 2000b; Vansteenkiste et al., 2020). Just as satisfaction of one's needs supports optimal functioning, experiences of psychological need frustration are posited to lead to a variety of suboptimal outcomes such as problem behaviors and mental illness (Ryan & Deci, 2000a; Vansteenkiste & Ryan, 2013). Low need satisfaction differs from need frustration, in that need frustration has the potential to provoke

negative outcomes, whereas low need satisfaction may only elicit decreased positive outcomes (Vansteenkiste & Ryan, 2013). Researchers who use SDT as a theoretical framework often measure both need satisfaction and frustration to account for these different effects on positive and negative life outcomes. Ryan and Deci (2000b) argue that satisfaction of these needs is important across developmental periods and cultural contexts. Although one's environment and means to satisfy the needs may differ across contexts and cultures, the importance of need satisfaction for positive outcomes remains salient.

ANS and ANF differ from autonomy support, which is defined as the extent to which one's environment provides opportunities for autonomous behavior (Patall & Zambrano, 2019). While certainly related, perceptions of autonomy support capture elements of the environment that may nurture or thwart one's experiences of autonomy, rather than the psychological experience of feeling as though one's need for autonomy is met or thwarted. In the present study, we examined the effect of ANS and ANF on outcomes, rather than autonomy support, due to the psychological proximity of ANS and ANF to well- and ill-being. Further, ANS and ANF constitute potential psychological mechanisms that may provide explanation for children's and adolescents' states of psychological well- or ill-being.

Autonomy and Well(Ill)-Being

There is much existing evidence to support a significant relationship between ANS and ANF with well(ill)-being among K-12 youth. Specifically, much of the present research supports a positive relationship between ANS and well-being and a negative relationship between ANS and ill-being. These results appear consistent across cultural contexts and setting domains. For instance, studies in sport domains suggest that ANS is negatively associated with ill-being outcomes, such as athlete burnout, and positively associated with well-being outcomes, such as self-esteem, across samples from the USA, France, and Singapore (Amorose et al., 2009; Isoard-Gautheur et al., 2012; Li et al., 2017). This negative relationship between ANS and burnout is also evident in academic domains across samples from the UK, China, and Taiwan (Earl et al., 2019; Shih, 2015; Zhou et al., 2020). Similarly, evidence largely supports a positive relationship between ANF and ill-being and a negative relationship between ANF with well-being. Research with samples of students from Belgium, the UK, Portugal, Spain, and China also suggests that ANF is positively associated with outcomes such as burnout, negative affect, depression, and general ill-being (Bartholomew et al., 2011; Cordeiro et al., 2016; Liu & Chung, 2018; Rodríguez-Meirinhos et al., 2020; Vandenkerckhove et al., 2019).

Although the relationships between ANS and ANF with well(ill)-being outcomes are generally significant and in the expected direction, some studies show differing results. For instance, one study conducted with middle school Australian students found a significant positive association between ANS and negative affect ($r = 0.13$) (Garn et al., 2012). They also found a negative association between ANS and positive affect ($r = -0.03$), although this correlation was not significant. Similarly, Quinlan et al. (2015) found a significant positive correlation between ANS and negative

affect ($r = 0.07$) among a sample of students in New Zealand. Overall, the magnitude of these correlation coefficients suggests weak relationships, meaning these results may be spurious and should be interpreted with caution.

Research also generally supports a dual process model to explain the relationships between need satisfaction, need frustration, and outcomes (Jang et al., 2016). The dual process model defines need satisfaction and need frustration as distinct processes, with experiences of need satisfaction primarily leading to more optimal outcomes and experiences of need frustration primarily leading to non-optimal outcomes (Jang et al., 2016; Vansteenkiste & Ryan, 2013. Thus, for this meta-analysis, we expected to find a pattern of results consistent with the dual process model of motivation. That is, we expected that the average effect between ANS and well-being would be stronger than the average effect between ANS and ill-being. Similarly, we expected the average effect between ANF and ill-being to be stronger than the average effect between ANF and well-being.

The large body of existing research that examines the relationships between ANS and ANF with well- and ill-being prompts us to synthesize current evidence and examine the magnitude of these relationships. Further, while the direction of relationships is generally consistent, there is a need for identifying potential characteristics of the sample and setting that may impact the strength of these relationships.

Autonomy and the Cultural Context

While SDT theorists acknowledge that psychological needs may be emphasized, supported, and valued differently between cultures, they also assert that these cultural variations do not change the overall positive impact of need satisfaction or the negative impact of need frustration on subsequent life outcomes (Ryan & Deci, 2000b). Instead, SDT claims that psychological needs are universally important for life outcomes (Ryan & Deci, 2000b). Some researchers have critiqued this perspective, asserting that autonomy is a culturally laden construct (Markus et al., 1996). Critics assert that the need for autonomy is a Western and individualistic phenomenon that may be emphasized less in Eastern collectivist cultures (Markus et al., 1996). Given these contentions in the field, we review four competing hypotheses regarding the role of culture in psychological needs and outcomes including a strict universalist perspective (Ryan & Deci, 2000b), a compensatory perspective (Lee et al., 2023; Gewirtz & Baer, 1958), a cultural matching perspective (Schüler et al., 2013), and a strict cultural relativist perspective (Markus & Kitayama, 1991). These four viewpoints represent a continuum from strict universalist to strict cultural relativist.

A strict universalist perspective asserts that there is no cultural variation in the effects of the psychological needs (Ryan & Deci, 2000b). Some research supports the strict universalist perspective, showing that the relationship between autonomy and outcomes does not significantly vary based on cultural context (Chen et al., 2015; Church et al., 2013; Walker et al., 2020; Yu et al., 2018). For instance, Chen et al.'s (2015) study on the relation between autonomy and well-being across four countries suggested that autonomy satisfaction was significantly

positively associated with well-being regardless of the cultural context. That is, neither the country, adolescents' desire for autonomy, nor value for the need for autonomy moderated the relationship between autonomy need satisfaction and well-being across adolescent and university student samples from the USA, Belgium, China, and Peru.

From a compensatory view, culture influences the extent to which needs are consistently versus inconsistently satisfied, much like how satiation and deprivation affect people's sensitivity to rewards and punishment (Lee et al., 2023; Gewirtz & Baer, 1958; Raynor & Epstein, 2003). That is, if autonomy is not consistently satisfied in one's cultural context, there may be stronger associations between autonomy satisfaction with outcomes compared to those in cultural contexts where autonomy is consistently satisfied in order to counteract, or compensate, for inconsistent autonomy satisfaction. Similarly, there may be weaker associations between autonomy frustration and outcomes for those in cultural contexts where autonomy is consistently frustrated compared to those in cultural contexts where autonomy is not consistently frustrated. The maladaptive function of ANF may be weakened when an individual is consistently exposed to ANF to counteract the consequences of such an environment. This perspective is aligned with literature on rewards and deprivation/satiation, which suggests frequent deprivation of phenomena can enhance its impact once experienced (Gewirtz & Baer, 1958).

In line with this perspective, one study showed that there was a stronger relationship between ANS and academic engagement for Latino students, a typically collectivist-oriented group, than for white students, a typically individualistic-oriented group (Lee et al., 2023). These findings may suggest that when autonomy is less consistently supported through one's cultural context (i.e., autonomy in collectivist cultures), autonomy satisfaction is more strongly associated with outcomes than needs that are more consistently supported in the broader cultural context (i.e., relatedness in collectivist cultures). While the overall positive association between autonomy and engagement remained significant across Latino and white student groups, the strength of this association appeared to be culturally bound. Other research shows a significant relationship between experiences of autonomy frustration with individual's desire to experience autonomy (Sheldon & Gunz, 2009). Sheldon and Gunz (2009) also found that changes in ANF predicted changes in the desire to experience autonomy. This evidence may suggest that when one feels their need for autonomy is consistently frustrated, they may seek out experiences of autonomy. Experiences of continued autonomy frustration may become less salient and impactful to an individual, as they compensate for such experiences by seeking out autonomy satisfaction. More research is needed to examine whether the compensatory hypothesis can be used to understand how culture may impact the relationships between autonomy need frustration and outcomes. There is also limited research that examines cross-cultural differences in the association between autonomy and well(ill)-being outcomes for youth and young adults to corroborate the compensatory hypothesis. Much of the present evidence suggests that there is a positive relationship between autonomy and well-being for youth, with only a few studies showing a null relationship (Demirbaş-Çelik & Keklik, 2019; Zhong et al., 2020). That is, research largely supports the notion that ANS and ANF are significantly related to well- and

ill-being outcomes across cultural contexts, although the sources of variation in the magnitude of this relationship remain less well examined.

From a cultural matching view, psychological needs are more strongly related to outcomes when the need is embedded in the broader cultural context (Schuler et al., Schüler et al., 2013). From this perspective, there are stronger associations between autonomy and outcomes for those in individualistic cultural communities than those in collectivist cultural communities. Although autonomy is significantly related to outcomes across cultural contexts, the strength of this relationship would depend on the extent to which autonomy is embedded in the cultural context. Some research supports this perspective, with findings that show a stronger relationship between experiences of freedom and life satisfaction for participants located in more individualistic compared to collectivist contexts across 39 countries worldwide (Oishi et al., 1999). While the direction of the relationships remained the same across cultural context, the strength of the relationships varied by cultural context. Although the conceptualization of autonomy in this study differs from that of ANS as proposed by SDT, this finding supports the notion that the strength of the association between autonomy and well-being may be culturally bound and related to the extent to which one's culture emphasizes a specific psychological need.

Finally, a strict cultural relativist hypothesis defines psychological needs as culturally bound (Markus & Kitayama, 1991; Markus et al., 1996). Aligned with the cultural matching perspective, cultural relativists believe that individuals benefit most when needs aligned with one's cultural context are supported and satisfied (Markus et al., 1996). A strict cultural relativist perspective asserts that psychological needs are entirely contextually specific, and not generalizable to multiple contexts. One study found that competence and relatedness need satisfaction were significantly negatively associated with depressive symptoms for Chinese children, but autonomy was not significantly related (Zhong et al., 2020). The authors used a cultural relativist framework to explain these results, by describing the importance of interpersonal relationships (i.e., relatedness) and academic success (i.e., competence) in Chinese culture. On the other hand, autonomy is less central to Chinese culture, which may explain the lack of relationship between autonomy need satisfaction and depressive symptoms.

In response to culturally focused critiques, SDT researchers have suggested some of the theoretical debate may be a result of conflicting definitions of autonomy. Specifically, SDT researchers claim that while a strong emphasis on independence may be culturally bound to individualistic cultural contexts, autonomy defined as one's endorsement of their own behavior does not conflict with collectivist cultures (Soenens et al., 2007). That is, an individual can act with a sense of volition to serve collectivist or individualistic goals. These researchers claim that a sense of endorsement over one's own behavior should not be conflated with autonomy as defined by acting in isolation. When autonomy is defined by endorsement rather than independence, consistent universal benefits of satisfaction and costs of frustration are expected. Similarly, scholars assert that autonomy satisfaction is also conceptually different from independent choice. Some research shows evidence for cultural variation in the relationships between experiences of independent choosing with motivation and performance (Iyengar & Lepper, 1999). These researchers found a stronger

relationship between independent choosing with outcomes for white Americans compared to their Asian American peers. While independent choosing is related to experiences of autonomy, experiences of choice alone do not fully define autonomy need satisfaction according to SDT. For this reason, we excluded studies that only measured autonomy need satisfaction in terms of opportunities for choice. We did not find enough variation in the definition of ANS and ANF for studies that linked autonomy with well(ill)-being for youth, so we could not examine the extent to which variations in definition affected the relationships between autonomy and outcomes.

Other Moderators of the Relationships Between Autonomy and Well(Ill)-Being

The present meta-analysis sought to explore other potential moderators that may impact the direction and strength of the relationships between autonomy and well(ill)-being. Confirmatory and exploratory hypotheses regarding these potential moderators are discussed.

First, we expected that some other characteristics of the sample may account for some variation in our analyses. For instance, one's gender may moderate the strength of the relationship between ANS and ANF with outcomes. The socialization of autonomy may vary between males and females, and thus, autonomy may be internalized differently across genders (Robinson & Biringen, 1995). More specifically, males are often socialized to be independent or agentic, whereas females are often socialized to be interdependent or communal. Given gendered stereotypes about the degree to which men are expected to behave independently and agentically compared to women and the extent to which males and females may be differentially supported throughout childhood and adolescence, it is possible that there are also gendered differences in the relationships between experiencing a sense of autonomy and outcomes. We initially predicted that ANS and ANF would be more strongly associated with well(ill)-being outcomes for males than females, particularly when autonomy is defined as independence. Conversely, when ANS or ANF are defined in line with SDT, we may expect no variation by gender. However, since we did not retrieve enough studies to examine whether the definition of autonomy (independence vs. SDT) moderated the proposed relationships, we did not expect to find differences based on gender.

One's age may also influence the strength of the relationship between ANS/ANF and well(ill)-being outcomes, as autonomy tends to become more salient across one's lifespan (Deci & Ryan, 2013). Adolescence is marked by a pronounced desire for autonomy compared to childhood, as individuals transition from childhood into adulthood (Beyers et al., 2024). During this phase, adolescents strive to behave in increasingly volitional ways as they grapple with the emerging complexities of physical and psychological changes (Beyers et al., 2024). Further, instances of autonomy satisfaction are critical for adolescents' identity development as they begin to navigate new roles and definitions of self (Assor, 2012). Consequently, the fulfillment of autonomy is likely to be salient during this developmental stage when compared to

younger children. Conversely, younger children rely more heavily on guidance from adults, are exposed to more structured environments than adolescents, and engage in less volitional behaviors. Therefore, autonomy-related demands are likely made less salient for younger children compared to adolescents. From this perspective, we may expect the relationship between autonomy and outcomes to be stronger for adolescents compared to younger children, due to increases in volitional autonomy as children develop. In contrast, we may find that autonomy is more strongly related to outcomes for children compared to adolescence since autonomy may be less consistently satisfied during this developmental stage, thus making them more salient. Finally, in line with the universal perspective proposed by SDT, we may expect no differences in the relationship between autonomy and outcomes based on age, since autonomy is proposed as universally important for positive outcomes across contexts. In this study, we examined whether students' grade level and age moderated the relationship between autonomy and outcomes to examine the validity of these three predictions.

Beyond the above four theoretically driven predictor and sample characteristics, that is, the cultural context or country, definition of autonomy, sample gender, and sample school level or age, we also examined the study setting domain as an exploratory moderator, though a theoretical rationale for expecting differences was limited. More explicitly, we explored whether there would be differences in the average effects between autonomy and well(ill)-being outcomes based on whether the study was conducted in academic or athletic domains. We expected that there may be differences in the average effects across these domains due to the amount of time spent in and contextual saliency of school compared to athletic settings for K-12 youth.

Finally, the reliability of measures and publication status were included as covariates in our models to examine the impact of research quality on the relationship between autonomy and outcomes. We expected that the more reliable the ANS, ANF, and outcome measurements were, the more we may attribute statistical significance to the relationship between these variables rather than to measurement error. Publication bias arises from the selective reporting of research findings based on their statistical significance. By investigating publication bias as a potential moderator, we were able to discern the extent to which the observed effect sizes were influenced by selective reporting of significant results.

Past Research Syntheses

Given contention in the field around the universality of autonomy for well- and ill-being outcomes, researchers have examined cultural variation of the effect of autonomy satisfaction on subjective well-being for US and East Asian participants. Yu et al. (2018) conducted a meta-analysis that included 27 studies with 36 independent samples that measured subjective well-being in terms of affect and/or satisfaction with life. Of the included studies, 6 were comprised of K-12 participants, while most studies included participants who were older than 17. Results from this meta-analysis revealed that autonomy need satisfaction was positively correlated with subjective well-being across studies. This effect did not significantly differ between US

and East Asian samples. The present meta-analysis extends this work by examining relationships between autonomy satisfaction and frustration with measures of both well- and ill-being. Our inclusion criteria for well-being extend beyond affect and satisfaction with life to include vitality, self-esteem, happiness, and quality of life. We also included studies with indicators of ill-being such as depression, anxiety, stress, and burnout. Further, our focus on K-12 participants allowed us to explore the developmental relevance of autonomy for developing children and adolescents. Including participants' school level as a moderator also allowed us to disentangle potential developmental differences. The present meta-analysis also extends Yu et al.'s work by including studies from any cultural context, allowing us to further examine cultural variation among the proposed relationships.

Another meta-analysis conducted in 2020 identified 10 studies that reported statistical tests of the relationship between autonomy satisfaction and well- and ill-being among elderly populations (ages greater than 50) (Tang et al., 2021). Overall, results revealed significant positive correlations between autonomy and overall well-being, positive affect, vitality, and psychological adjustment. Further, this study showed that autonomy satisfaction was negatively correlated with apathy and depressive symptoms. However, in line with the dual process model, a few studies reported no significant correlations between autonomy satisfaction and relevant ill-being outcomes. Findings from this meta-analysis generally corroborate our prediction that autonomy satisfaction would be positively associated with well-being outcomes and negatively associated with ill-being outcomes. The present study extends this work to examine these effects among children and adolescents worldwide.

Need for a New Research Synthesis

This meta-analysis synthesized current evidence to determine the magnitude and direction of the relationships between autonomy and well(ill)-being for K-12 participants. Because childhood and adolescence are particularly vulnerable and developmentally important periods, findings will contribute to our understanding of best practices to support healthy development. Further, the inclusion of samples in any country will help clarify the universality of the importance of autonomy for well- and ill-being outcomes. The current meta-analytic investigation assessed potential sources of variation to further illuminate how nuances related to the study setting, sample, and design impacted the proposed relationships. The scope of the present meta-analysis builds upon previous meta-analyses with broader inclusion criteria related to the study setting, sample, and theoretical considerations (Yu et al., 2018). The current meta-analysis aims to expand on prior work by comprehensively answering the following research questions:

1. What does the cumulative correlational evidence suggest regarding the magnitude and direction of the relationship between autonomy need satisfaction/frustration and psychological well(ill)-being among children and adolescents?

2. To what extent do the relationships between autonomy need satisfaction/frustration and outcomes vary depending on characteristics of the setting, sample, methods, predictor, and outcomes?

We expected that ANS would have an overall positive relation with well-being and a negative relation with ill-being. Further, we expected that ANF would have an overall positive relation with ill-being and a negative relation with well-being. In line with the dual process model, we expected that the average association between ANS and well-being would be stronger than the association between ANS and ill-being. Similarly, we expected the average association between ANF and ill-being to be stronger than the association between ANF and well-being. Given our discussion of potential sources of variation, we expected that these proposed relationships would be stronger for studies whose measurement of autonomy was reliable, for published work, and for studies located in academic domains. We were not able to test for differences in the relationship between autonomy and outcomes based on the definition of autonomy due to insufficient data. For gender, we did not expect differences due to the lack of variation in the definition of autonomy. We proposed three competing hypotheses (context matching, compensatory, and universalist) regarding the role of students' age or school level in moderating the relationship between autonomy and outcomes after considering how need saliency may connect with age and explain variation in correlations. From a context matching perspective, we may expect that autonomy is more strongly related to outcomes for adolescents compared to children due to increased salience and opportunities for autonomy during this developmental period compared to childhood. Conversely, from a compensatory perspective, autonomy may be more strongly related to outcomes for children compared to adolescents due to autonomy being less consistently satisfied during childhood. Or, from a universalist perspective, we may expect that age doesn't moderate the relationships between autonomy and outcomes. Finally, we proposed four hypotheses for the moderation of cultural context on the relationship between autonomy and well(ill)-being. From a strict universalist perspective, we would expect no significant moderation by cultural context. From a strict cultural relativist perspective, we would expect variation in the strength and significance of the relationship based on one's cultural context. From a compensatory perspective, we would expect a stronger relationship between autonomy need satisfaction and a weaker relationship between autonomy frustration with outcomes for those in collectivist cultural contexts, but still significant relationships between autonomy and outcomes in expected directions across cultural contexts. Finally, from a cultural matching perspective, we would expect that the association between autonomy need satisfaction and frustration with outcomes would be stronger for those in individualistic cultural contexts compared to collectivist contexts, but still significant relationships between autonomy in expected directions across cultural contexts.

Methods

Literature Search Procedures

Prior to conducting the literature search, screening, coding, and analyses, this synthesis was pre-registered at https://osf.io/hqckb/?view_only=f40b30fecdb74b14813a9185fcc87d3a. The literature search for this meta-analysis is a subsect of a larger search that included outcomes such as motivation, well-being, ill-being, physical health, academic performance, non-academic performance, and conduct with any age sample. Screening for literature relevant to the current investigation occurred once all electronic searches were completed and full texts were examined.

The first search involved the use of six electronic databases including PsycINFO, ERIC, Google Scholar, ProQuest Dissertations and Theses, PubMed, and Medline. The searches were conducted in October 2020 and February 2021. The initial search did not specify an outcome or sample restrictions. Researchers used the term "ab(autonomy* AND (need satisfaction OR psychological need OR need-support OR need support OR need thwart OR need frustration)" to search abstracts across all six databases for relevant work. This search yielded 8318 non-duplicate results. This electronic search was updated in December 2023 using PsycINFO, Google Scholar, ERIC, ProQuest Dissertations and Theses, PubMed, Medline, SCOPUS, and Web of Science with the following search term: autonomy ("need satisfaction" OR "need frustration" OR "psychological needs") ("K-12" OR elementary OR "middle school" OR "high school" OR child OR adolescent) ("well-being" OR wellbeing OR "well being" OR "ill-being" OR illbeing OR "ill being" OR "positive affect" OR vitality OR "life satisfaction" OR "quality of life" OR happiness OR depression OR anxiety OR "mental illness" OR "negative affect" OR burnout OR stress OR exhaustion). This second electronic search yielded 245 non-duplicate results.

Next, researchers used the Social Science Citation Index database to search for reports that may have cited any of three seminal pieces related to basic psychological need satisfaction for relevant research (Deci & Vansteenkiste, 2004; Ryan & Deci, 2000b; Vansteenkiste & Ryan, 2013). This search yielded 1117 non-duplicate results. Researchers also searched the self-determination theory website to locate research relevant to the current investigation. All articles listed under the basic psychological needs section of the website were downloaded and examined for relevancy in October 2022. Titles were screened using broader inclusion criteria than the scope of this study. Titles needed to indicate that the researchers quantitatively measured experiences of autonomy. Articles related to any outcome for the age group sample were included at this point. This search yielded 89 relevant, non-duplicate documents that were subsequently screened. Further, we reviewed reference sections of any manuscript that passed our inclusion criteria to locate any additional relevant work. This search yielded 674 relevant documents, using the broader inclusion criteria, that were then screened for inclusion in the present meta-analysis.

To account for research that may not be in electronic databases and to locate unpublished work, we employed direct contact strategies. We sent emails to

the SDT listserv, members of SPSP, members of APA (divisions 7, 8, 15, and 38), members of AERA (Division C, Motivation in Education SIG), and any researcher who had published more than two articles from our database of relevant work. These searches yielded 30 articles.

Across all these searches, we retrieved 10,435 titles and abstracts to determine whether the article seemed relevant to the research questions. One trained undergraduate and one graduate student screened the titles and abstracts for relevancy based on the article's inclusion of a measurement of autonomy. Screening decisions for each article were compared to ensure reliability and disagreements were resolved through discussion. After the initial title and abstract screen, undergraduate and graduate students screened titles and abstracts for inclusion in the present meta-analysis using stricter inclusion criteria. Then, full texts of any article that was deemed relevant, based on inclusive criteria, were retrieved and further screened to determine eligibility for coding. A total of 1817 articles were full text screened. Please see Fig. 1 for information regarding the search.

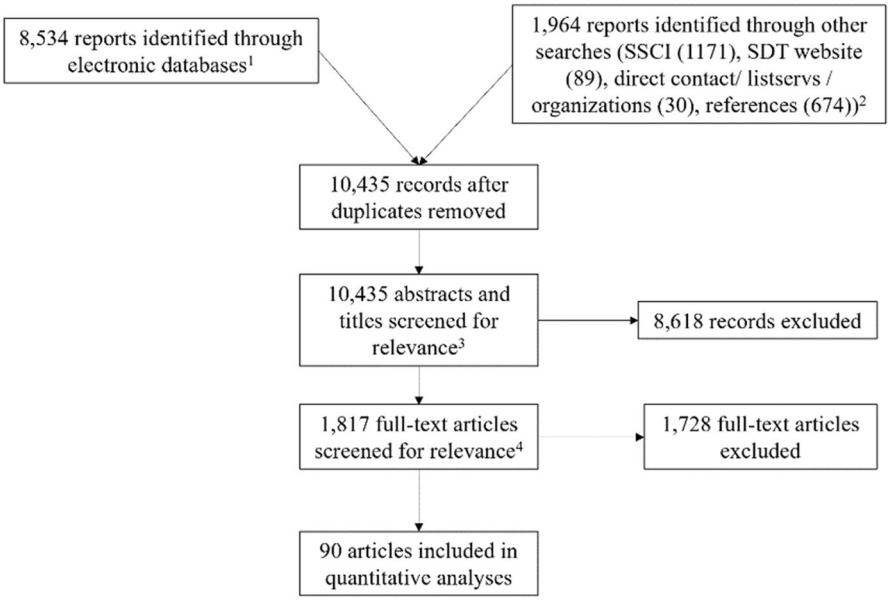

Fig. 1 PRISMA figure. Note. [1]Reports were identified using a search term broader than the scope of the current meta-analysis (relation between autonomy and any life outcome with any age group sample). [2]Reports were identified using broader inclusion criteria than the scope of the current meta-analysis (relation between autonomy and any life outcome with any age group sample). References for all studies included in the present meta-analysis were screened. [3]Titles and abstracts were first screened using inclusion criteria broader than the scope of the current study (relation between autonomy and any life outcome with any age group sample). Then, titles and abstracts were screened using the inclusion criteria for the present study (relation between autonomy and psychological well(ill)-being with K-12 youth). [4]Full texts were screened using the inclusion criteria for the present study (relation between autonomy and psychological well(ill)-being with K-12 youth)

Criteria for Including Studies

Studies passed several inclusion criteria to be included in the present study. First, all included studies were quantitative in nature; any qualitative studies were excluded. All included studies were also written in English. We included studies conducted in any country and any setting domain. In terms of participant characteristics, studies were included if participants were school-aged children including kindergartners through 12th grade.

In terms of relevancy to the current topic, all included studies measured ANS or ANF defined broadly as one's experience of having, or not having, autonomy. Common scales used to measure ANS and ANF included the Basic Psychological Need Satisfaction and Frustration Scales and the Basic Psychological Need Satisfaction Scale (BPNS) (Chen et al., 2015; Deci & Ryan, 2000; Gagné, 2003). Although many studies operationalized autonomy in line with SDT, any study that measured an individual's perceptions of experiences relating to autonomy was included. Further, studies were excluded if the data presented included autonomy only as a part of a composite measure, such as general need satisfaction.

Any document that measured individuals' perceptions of their psychological well- or ill-being was included. This could include self-reports or reports from another individual. Common scales used to measure well-being included the Positive Affect Scale, Satisfaction with Life Scale, and the Subjective Vitality Scale (Diener et al., 1985; Ryan & Frederick, 1997; Watson et al., 1988). Measures of ill-being included any measure of maladaptive functioning, including the Depression Anxiety and Stress Scale, Beck Depression Inventory, and negative affect scales (Beck et al., 1961; Lovibond & Lovibond, 1995; Watson et al., 1988). Researchers were contacted if the document did not report correlations between the autonomy satisfaction or frustration and the reported measure of well- or ill-being and was published within the past 10 years. Finally, the information had to provide enough information to collect or compute a correlation between ANS and ANF with a well(ill)-being outcome in the absence of any intervention intended to influence either variable.

Information Retrieved from Studies

Researchers retrieved information from studies relating to the report, setting, participant, measure, and effect size characteristics. All articles in the database were coded by two researchers to ensure reliability. Information retrieved from articles was sufficient to statistically examine the main research question and to test moderation hypotheses. For publication status, studies were coded as either published or not published. We used the alpha level of the autonomy measure and outcome measure to account for measurement reliability. The region of the study included the categories of USA/Canada, Asia, Europe, Australia/New Zealand, and the Middle East. We also conducted moderation analyses by sub-region, which included the following categories: South Asia, East Asia, Southeast Asia, USA/Canada, Northern Europe, Eastern Europe, Southern Europe, Western Europe, Middle East, Australia/

New Zealand. Individualism level was coded using the Hofstede Insights (2022) individualism scoring tool, which ranged from 0 to 100. Grade level was coded as elementary, middle, and high school. We also explored the mean age of the sample as a moderator. Gender was coded as the percentage of the sample that identified as female. Finally, the setting domain was coded as either academic or athletic. Because only four studies were conducted in the familial context and one in the medical context, these studies were excluded from analyses that included domain context as the moderator. Table 1 presents more detail on the codes collected.

There were a few moderators, for which we had predictions about, that we did not include in our analyses due to insufficient information retrieved. For instance, we did not have sufficient information on the sample's socioeconomic status (SES) to use in analyses. We used indicators of parent education, income level, occupation, and subjective SES measures to retrieve SES information. Only 15% of the effects retrieved were reported on sample SES. Further, only 22% of the effects retrieved had sufficient information about the sample's racial background. We also did not examine the conceptual definition of autonomy or students' mental health as moderators due to insufficient information.

Studies included in our analyses that measured well-being reported data on one or more of the following constructs: positive affect, life satisfaction, vitality, quality of life, happiness, general well-being. Studies that measured ill-being reported data on one or more of the following constructs: depression, anxiety, negative affect, burnout, stress, exhaustion, other mental illnesses, and general ill-being. For the studies we retrieved and analyzed, autonomy need satisfaction and frustration measurement aligned with SDT and used existing and validated scales.

Undergraduate and graduate students coded the articles for this synthesis. All coders attended introductory sessions to discuss the coding guide and practice coding an article together. Researchers then independently coded articles and reconvened as a group to discuss the coding tool. Discrepancies and challenges with the coding process were discussed until agreements were reached. If researchers did not obtain 80% agreement, the article was re-coded. This process was repeated until an 80% agreement was established. Coders regularly met to discuss and resolve disagreements, regardless of the percentage of agreement.

Effect Size Estimation

Our inclusion criteria required studies to be correlational in research design or to report pre-intervention/manipulation correlations. Researchers of papers published within the last 10 years were contacted if there was no report of correlations between autonomy and well- or ill-being measures. All effects were coded and calculated separately for studies that had more than one sample, measure of autonomy, or outcome measure. All effect sizes were retrieved from studies using Pearson's correlation *r*. Correlations were then converted to the Fisher's *z* scale to synthesize results across studies and reduce the influence of *r* distribution abnormality on results. All results were then converted back to Pearson's *r* for ease of interpretation. Prior to running the meta-analytic models, the distribution of effect sizes was examined to

Table 1 Information retrieved from studies

Report characteristics

1. Author name
2. Type of report (journal article, book or book chapter, dissertation, masters thesis, private research report, government report, school or district report, conference paper, other (specify))
3. Organization (university research, government entity, research firm, other)
4. Peer-review status (peer reviewed, not peer reviewed)
5. Publication status (published, unpublished)
6. Year
7. Data source (independent study, regional dataset, national dataset, international dataset)

Setting characteristics

1. Study geographical location (country, state, town/city)
2. Study country's individualism score (1–100 using the Hofstede Insights (2022) scoring tool)
3. Type of community (urban, suburban, rural)
4. Setting domain (school, medical, family, other)

Participant characteristics

1. Gender distribution (% of sample that is female)
2. Race/ethnicity distribution (% white, % Black, % Asian, % Hispanic/Latinx, % Native American, % Middle Eastern, % more than one race, % other)
3. Age distribution (mean, range)
4. Grade level distribution (pre-school, lower elementary, upper elementary, middle school, high school)
5. SES of sample (% low, % low to middle, % middle, % middle to high, % high)
6. Participant functioning (no label/diagnosis, learning difference, behavioral disorder, emotional disturbance, physical disability)

Autonomy measurement

1. Variable name
2. Name of scale
3. Measurement type (validated scale, researcher-created scale, single item, other)
4. Reliability (Cronbach alpha)
5. Definition of autonomy
6. Respondent (self, other)

Outcome measurement

1. Variable name
2. Name of scale
3. Outcome type (positive affect, life satisfaction, vitality, quality of life, happiness, general well-being, depression, anxiety, other mental illness, negative affect, burnout/exhaustion, general ill-being, other)
4. Measurement type (validated scale, researcher-created scale, single item, other)
5. Reliability (Cronbach alpha)
6. Respondent (self, other)

Effect size characteristics

1. Total sample size
2. Direction of correlation
3. Magnitude of correlation

determine whether there were outliers using Tukey's definition (values more than 1.5 times the interquartile range from the quartiles).

Analysis Strategy

Four separate random effects models were fitted to estimate the pooled effect sizes for autonomy satisfaction and frustration with well- and ill-being separately. We used random effect models to account for the likelihood that the true effect sizes differ across studies due to diverse populations, sampling, methodologies, or other sources of heterogeneity, allowing for a more conservative estimate of the average effects (Hedges & Vevea, 1998). To account for the dependency between multiple effect size estimates within studies and guard against potential model misspecification, we adopted a multi-level modeling approach in conjunction with a robust variance estimator (RVE; Pustejovsky & Tipton, 2022). For this approach, the metafor and clubSandwich R packages were used (Pustejovsky, 2022; Viechtbauer, 2010). We also assessed the heterogeneity among effect sizes, indicated by Q, τ^2, and I^2 statistics. A significant Q statistic indicates that variability in effect size estimation cannot be attributed to sampling error alone. Therefore, a significant Q statistic indicates that potential sources of heterogeneity should be examined. Tau-squared and I-squared statistics were examined to evaluate the between-study variance in effect sizes. We reported 95% confidence intervals (CI) for the weighted average effects (Borenstein et al., 2021). For CIs, we incorporated cluster-robust variance estimation (CRVE) for the standard errors and a small sample correction for the critical values (Tipton, 2015).

We used mixed-effects meta-regression models to examine the extent to which publication status, autonomy measurement reliability, outcome measurement reliability, study region, country individualism level, school level, mean age, setting domain, and gender contributed to differences in the correlations between autonomy and well(ill)-being. First, we included publication status, predictor reliability, and outcome reliability in a single model. Next, we examined the following moderators in separate models with the inclusion of predictor alpha, outcome alpha, and publication status as covariates: study region, country's individualism level, school level, mean age, gender, and setting domain. Finally, we examined the possibility of publication bias and funnel plot asymmetry by conducting an Egger's regression test that accounted for dependent effect sizes and by examining publication status as a moderator in meta-regression models (Egger et al., 1997; Rodgers & Pustejovsky, 2021).

Results

Our literature search yielded 270 total effects, 101 studies, and 90 reports (85 published, 4 unpublished) that were published between 2005 and 2023. There were 118 correlations from 74 studies and 67 reports (65 published, 2 unpublished) for the relationship between autonomy need satisfaction and well-being, 23 correlations from 14 studies and 14 reports (11 published, 3 unpublished) for the relationship

between autonomy need frustration and well-being, 93 correlations from 51 studies and 50 reports (47 published, 3 unpublished) for the relationship between autonomy need satisfaction and ill-being, and 36 correlations from 17 studies and 17 reports (16 published, 1 unpublished) for the relationship between autonomy need frustration and well-being. The authors, sample sizes, and effect sizes for all studies used in analyses are listed in Table S1 in the supplementary materials, along with other study characteristics.

We used Tukey's definition of outliers to examine the data and found that there were no outliers in effect sizes. Visual examination confirmed that there was no presence of outliers (Fig. 2). We also examined the data for publication bias by visually examining a funnel plot of standard errors of the correlations against the correlation values. Since we expected differences in the direction of relationships between ANS with well- and ill-being, we examined publication bias for these effects in different models. Visual examination of the funnel plots indicated asymmetry, with many studies reporting moderate positive correlations and low standard errors for the relationship between ANS and well-being and ANF and

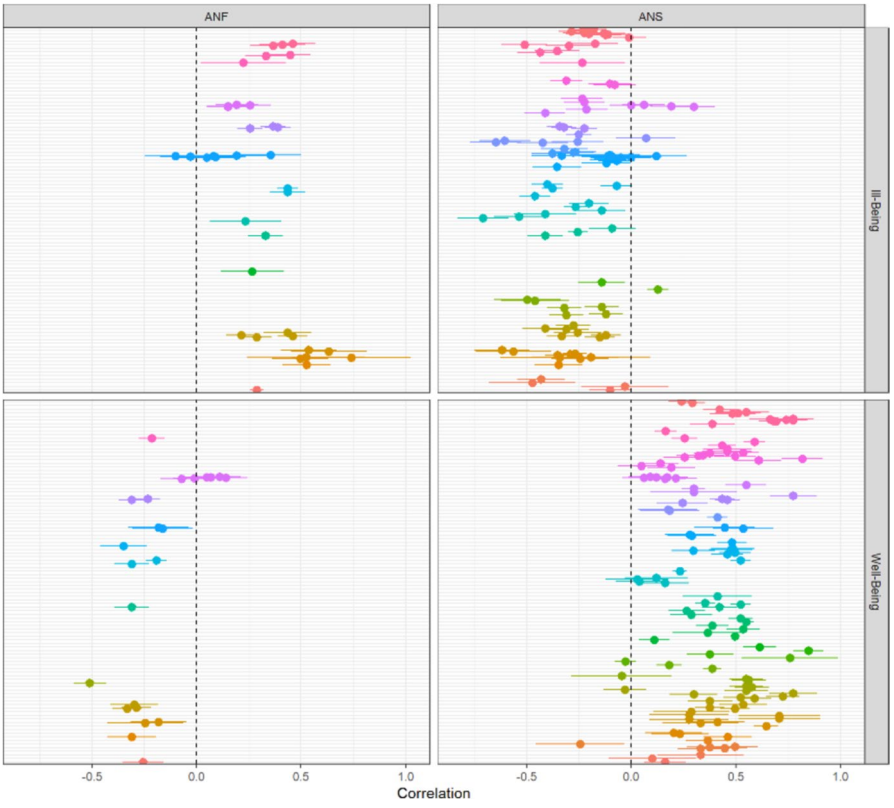

Fig. 2 Forest plot depicting distribution of effect sizes. Note. ANS, autonomy need satisfaction. ANF, autonomy need frustration

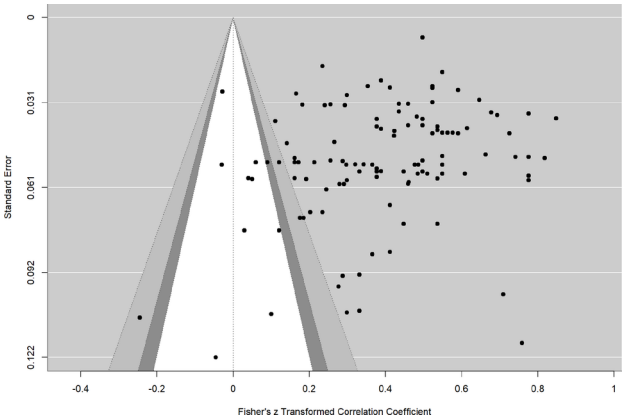

Fig. 3 Funnel plot of Fisher's *Z* transformed correlation coefficients for ANS and well-being. Note. The blank triangle represents *p*-values less than 1 but greater than .10. The darker gray represents the *p*-values less than .10 but greater than .05. The lighter gray represents the *p*-values less than .05 but greater than .01. The lightest gray represents the *p*-values less than .01

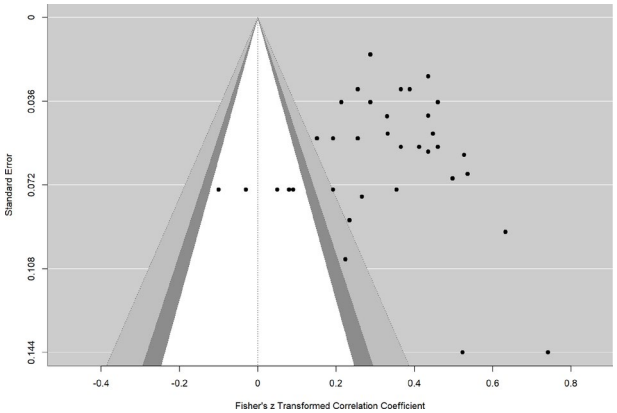

Fig. 4 Funnel plot of Fisher's *Z* transformed correlation coefficients for ANF and ill-being. Note. The blank triangle represents *p*-values less than 1 but greater than .10. The darker gray represents the *p*-values less than .10 but greater than .05. The lighter gray represents the *p*-values less than .05 but greater than .01. The lightest gray represents the *p*-values less than .01

ill-being (see Figs. 3 and 4) and many studies reporting moderate negative correlations with low standard errors for the relationship between ANS and ill-being and ANF and well-being (see Figs. 5 and 6). This asymmetry indicates that the observed effect sizes might be overestimated due to a lack of unpublished articles or studies including non-significant results. Further, the Egger's regression coefficients for the models testing the relationship between ANS and well-being ($b = 0.48$, SE $= 0.05$, $p < 0.001$) and ANS and ill-being ($b = -0.21$, SE $= 0.06$, $p = 0.001$) were significant, suggesting there may be publication bias in the effects

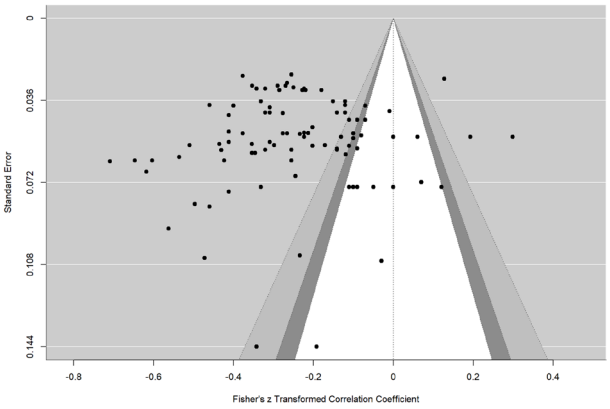

Fig. 5 Funnel plot of Fisher's *Z* transformed correlation coefficients for ANS and ill-being. Note. The blank triangle represents p-values less than 1 but greater than .10. The darker gray represents the *p*-values less than .10 but greater than .05. The lighter gray represents the *p*-values less than .05 but greater than .01. The lightest gray represents the *p*-values less than .01

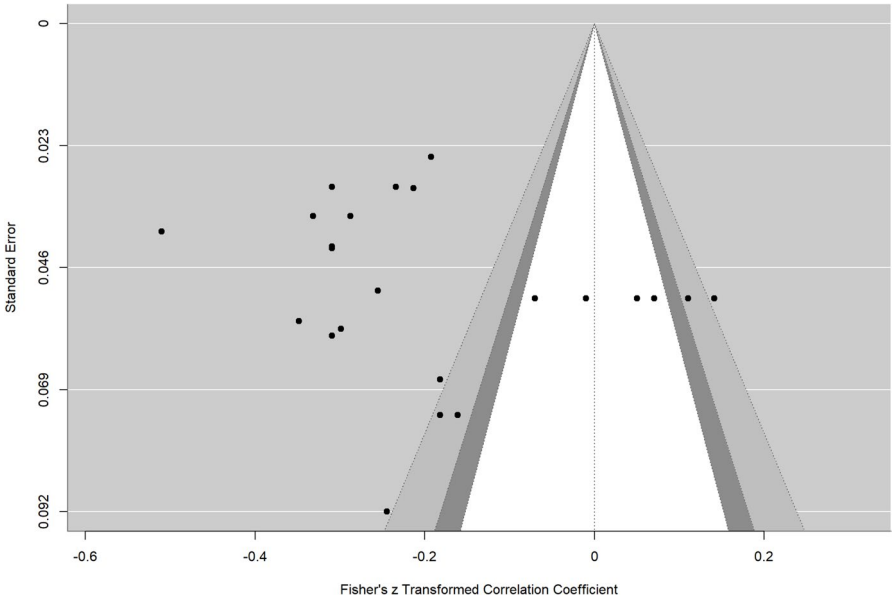

Fig. 6 Funnel plot of Fisher's *Z* transformed correlation coefficients for ANF and well-being. Note. The blank triangle represents *p*-values less than 1 but greater than .10. The darker gray represents the *p*-values less than .10 but greater than .05. The lighter gray represents the *p*-values less than .05 but greater than .01. The lightest gray represents the *p*-values less than .01

retrieved. Further, the Egger's regression coefficients for the models testing the relationship between ANF and well-being ($b = -0.28$, SE = 0.10, $p = 0.014$) and ANF and ill-being ($b = 0.31$, SE = 0.07, $p < 0.001$) were also significant.

Overall Correlations

As expected, the overall average correlations between ANS and well-being and ANF and ill-being were statistically significantly positive (see Table 3 for full results). Further, the overall average correlations between ANS and ill-being and ANF and well-being were statistically significantly negative (see Table 2 for full results). In line with the dual process model, the average correlation between autonomy and outcomes was stronger when the valence of the variables matched. That is, the positively valenced ANS and well-being relationship was stronger compared to ANF and well-being. Similarly, there was a stronger average effect between ANF and ill-being compared to ANF and well-being. The tau-squared and omega-squared values for each of these models, the relatively high I^2 values (> 88.85), and significant Q statistics for the autonomy need satisfaction and well(ill)-being models indicated heterogeneity between studies beyond sampling error. Moderator analyses were conducted to examine potential sources of heterogeneity among correlations between ANS and well-being and ill-being. We did not run moderator analyses for the ANF and well-being or ANF and ill-being models due to the small number of effect sizes.

Prior to conducting moderation analyses, we examined whether there were differences in the relationship between ANS and ANF with well- and ill-being. Results showed that the average correlation between ANF and well-being was $r = -0.17$ compared to 0.35 for the relationship between ANS and well-being when controlling for publication status and measurement reliability. This difference was statistically significant ($p = 0.002$). Similarly, we found that a statistically significant difference ($p < 0.001$) in the average correlation between ANS and ill-being ($r = -0.23$) compared to ANF and ill-being ($r = 0.30$) when controlling for publication status and measurement reliability. Given these significant differences, we included ANS and ANF in separate models for the moderation analyses.

Moderator Analyses

First, we included publication status, alpha level of the autonomy measure, and alpha level of the outcome measure in the ANS and well-being and ANS and ill-being models to examine the effect of scale reliability and publication status on the average correlations between autonomy and well(ill)-being. Next, we examined the

Table 2 Random effects model results

	k	n_{es}	Z (SE)	Z CI	r	r CI	Tau^2	Omega^2	I^2	Q
ANS-WB	74	118	.39 (.02)	.34/.43	.37	.33/41	.02	.01	96.16	2834.08***
ANS-IB	51	93	−.25 (.02)	−.30/−.21	−.25	−.29/−.20	.02	.01	93.07	1597.57***
ANF-WB	14	23	−.26 (.03)	−.33/−.18	−.25	−.32/−.18	.01	.00	88.85	179.57***
ANF-IB	17	36	.35 (.03)	.28/.42	.34	.27/.40	.01	.01	89.69	422.98***

k, number of studies. n_{es}, number of effects. Z, z corrected correlation coefficient. SE, standard error. Z CI, 95% confidence interval. R, correlation coefficient. rCI, 95% confidence interval. Models do not include covariates

*$p < .05$, **$p < .01$, ***$p < .001$

Table 3 Moderator analysis results for ANS and well-being

	k	n_{es}	*b (SE)*	*p*	*r*	CI
Predictor alpha	74	118	.42 (.26)	.12	–	–
Outcome alpha	74	118	.44 (.16)	.01	–	–
Publication status						
Unpublished	4	6	–	–	.39	−.02/.69
Published	70	112	−.04 (.14)	.79	.36	.32/.39
Region						
East Asia	14	21	–	–	.45	.39/.50
USA/Canada	13	18	−.21 (.05)	< .01	.27	.19/.34
Northern Europe	14	21	−.12 (.05)	.04	.35	.26/.43
Southern Europe	12	22	−.01 (.05)	.78	.44	.37/.50
Western Europe	6	7	−.06 (.09)	.51	.40	.21/.56
Middle East	5	12	−.09 (.07)	.21	.37	.25/.49
Individualism	69	113	−.002 (.00)	< .01	–	–
Grade level						
Elementary	8	13	–	–	.39	.26/.51
Middle	11	18	−.04 (.06)	.60	.36	.25/.46
High school	47	66	−.04 (.07)	.64	.36	.31/.41
Age	64	101	.00 (.01)	.74	–	–
Setting domain						
School	53	84	–	–	.38	.35/.45
Athletics	15	22	−.13 (.06)	.04	.27	.18/.40
Percent female	70	106	.00 (.00)	.24	–	–

All moderators were not included in the same model. Each of the following moderators was examined in separate models with the inclusion of predictor alpha, outcome alpha, and publication status as covariates: grade level, region, country's level of individualism, setting domain, gender distribution. *k*, number of studies. n_{es}, number of effects. *b*, beta coefficient. *SE*, standard error. *p*, *p*-value. *r*, correlation coefficient. *rCI*, 95% confidence interval. Predictor alpha, alpha of autonomy measure. Outcome alpha, alpha of outcome measure. Region, geographic region the study was conducted in. Individualism, country's level of individualism. Percent female, percentage of the sample that is female

study region, country's individualism level, school level, mean age, gender, and setting domain in separate models with publication status, predictor reliability, and outcome reliability as covariates. We conducted no intercept models for the categorical moderators (study region, grade level, setting domain) to retrieve the betas for each group and compare differences between groups.

Cultural Context

Overall, analyses revealed that the region a study was conducted in was a significant moderator of the ANS and well-being correlation, controlling for publication status, predictor reliability, and outcome reliability. In line with the compensatory hypothesis, pairwise comparisons revealed the average positive correlation between

ANS and well-being was stronger for studies conducted in Asian countries ($r = 0.45$) compared to studies conducted in the USA or Canada ($r = 0.27$), when testing for differences among the following regions: Asia, USA/Canada, Europe, the Middle East. The average effect between ANS and well-being was also lower for studies conducted in Europe ($r = 0.38$), although not statistically significantly different, than studies located in Asian countries. There were too few studies located in Australia/New Zealand, Mexico, and Africa ($n_k < 4$), so studies conducted in these regions were excluded from these analyses. To provide more nuance to these findings, we then ran analyses to determine whether there were differences in the average effects between ANS and well-being among geographic sub-regions. Sub-regions were coded as USA/Canada, East Asia, South Asia, Southeast Asia, Middle East, Australia/New Zealand, Central Europe, Northern Europe, Southern Europe, and Western Europe. Studies conducted in South Asia, Southeast Asia, Australia/New Zealand, Mexico, Eastern Europe, and Africa were excluded in these analyses due to a limited quantity of studies in each region ($n_k < 4$). Findings showed significantly different average correlations between ANS and well-being for studies conducted in the USA or Canada ($r = 0.27$) and Northern Europe ($r = 0.35$) compared to East Asia ($r = 0.45$). Results for the sub-region analyses are presented in Table 3. To further explore the role of culture, we used the Hofstede Insights (2022) conceptualization of individualism to score each country based on the extent to which they emphasize individualism versus collectivism. Again, consistent with the compensatory hypothesis, our results revealed that the positive correlation between ANS and well-being was stronger for studies located in countries that emphasize collectivism more so than individualism.

Results also showed that there were some statistically significant differences in the average correlation between ANS and ill-being based on cultural context. We found a stronger relationship between ANS and ill-being for studies conducted in the USA or Canada ($r = -0.40$) compared to studies conducted in Asia ($r = -0.27$), when testing for differences among the following regions: Asia, USA/Canada, Europe (there were too few studies conducted in Australia/New Zealand and the Middle East for inclusion in these analyses). We then tested for differences among geographic sub-regions as previously specified. Studies conducted in South Asia, Southeast Asia, Eastern Europe, the Middle East, Mexico, Africa, and Australia/New Zealand were not included in these analyses due to a limited quantity of effect sizes in each region ($n_k < 4$). Results from this analysis showed that there were statistically significant differences in the average correlation between ANS and ill-being for studies conducted in the USA or Canada ($r = -0.40$) compared to East Asia ($r = -0.26$), Northern Europe ($r = -0.23$), Southern Europe ($r = -0.20$), and Western Europe ($r = -0.20$). We did not find statistically significant differences between countries that emphasize collectivism more so than individualism when using the Hofstede Insights (2022) scoring tool.

Other Sample and Setting Characteristics

We examined various other aspects of the setting and sample characteristics as potential moderators of the relationships between ANS and well(ill)-being,

including school level, mean age, setting domain, and gender. For the school level, we compared studies conducted with elementary-, middle-, and high school-aged students. Results showed that there were no significant differences in the average correlations between ANS and well- or ill-being by school level when controlling for autonomy measure reliability, outcome measure reliability, and publication status. Similarly, participants' mean age did not significantly contribute to the variation in the average correlation between ANS and well- or ill-being. The percentage of the sample that identified as female also did not significantly moderate these relationships. Finally, results showed that there was a statistically significantly stronger positive correlation between ANS and well-being for studies conducted in school settings ($r = 0.40$) compared to studies conducted in athletic settings ($r = 0.29$). See Table 3 and Table 4 for these results.

Table 4 Moderator analysis results for ANS and ill-being

	k	n_{es}	*b (SE)*	*p*	*r*	*r*CI
Predictor alpha	51	93	−.15 (.31)	.63	–	–
Outcome alpha	51	93	−.65 (.22)	.01	–	–
Publication status						
Unpublished	3	7	–	–	−.35	−.65/.03
Published	48	86	.13 (.10)	.30	−.23	−.27/−.19
Region						
East Asia	13	26	–	–	−.26	−.33/−.19
USA/Canada	7	13	−.15 (.06)	.03	−.40	−.49/−.29
Northern Europe	5	7	.04 (.06)	.47	−.23	−.34/−.11
Southern Europe	12	20	.07 (.05)	.13	−.20	−.25/−.14
Western Europe	6	15	.05 (.06)	.41	−.20	−.33/−.09
Individualism	51	93	.00 (.00)	.75	–	–
Grade level						
Elementary	5	11	–	–	−.22	−.40/−.02
Middle	11	16	.03 (.09)	.76	−.19	−.28/−.10
High school	28	45	−.07 (.07)	.37	−.29	−.33/−.24
Age	82	71	.00 (.02)	.05	–	–
Setting domain						
School	34	63	–	–	−.25	−.30/−.21
Athletics	11	14	.00 (.06)	.99	−.25	−.36/−.14
Percent female	49	84	.00 (.00)	.84	–	–

All moderators were not included in the same model. Each of the following moderators was examined in separate models with the inclusion of predictor alpha, outcome alpha, and publication status as covariates: grade level, region, country's level of individualism, setting domain, gender distribution. *k*, number of studies. n_{es}, number of effects. *b*, beta coefficient. *SE*, standard error. *p*, *p*-value. *r*, correlation coefficient. *rCI*, 95% confidence interval. Predictor alpha, alpha of autonomy measure. Outcome alpha, alpha of outcome measure. Region, geographic region the study was conducted in. Individualism, country's level of individualism. Percent female, percentage of the sample that is female

Discussion

This article provides a systematic overview and meta-analysis of the correlations between autonomy need satisfaction and frustration with well- and ill-being for K-12 youth. Consistent with SDT, results showed significant relationships between autonomy and well- and ill-being across 90 total reports. Specifically, we found statistically significant positive relationships between ANS and well-being and between ANF and ill-being. That is, experiences of having one's need for autonomy satisfied are associated with higher ratings of well-being, and experiences of having one's needs thwarted are associated with higher ratings of ill-being. Similarly, we found statistically significant negative relationships between ANS and ill-being and between ANF and well-being. Overall, effect sizes were moderate and comparable to previous meta-analyses that have examined the relationship between ANS and well-being (Yu et al., 2018). These results establish a consistent association between autonomy and well(ill)-being outcomes, elucidating the importance of supporting children and adolescents' needs for autonomy to promote positive life outcomes. Further, in line with the dual process model, we found that the association between autonomy and outcomes was stronger when the valences matched. That is, ANS was more strongly associated with well-being, and ANF was more strongly associated with ill-being. This may be because the processes of ANS and ANF are distinct and thus differentially related to optimal and suboptimal outcomes. Research that measures ANF is limited compared to research that measures ANS. Our search retrieved 57 effect sizes for the relationships between ANF and well(ill)-being, compared to 206 effect sizes for the relationships between ANS and well(ill)-being. Since ANS and ANF are theorized as separate psychological processes that may be differentially related to outcomes, we recommend that future research continue to examine both need satisfaction and frustration distinctly to parse out these unique relationships.

Moderator Analyses

Cultural Context

We examined whether the cultural context of the study affected the proposed relationships. Results from these analyses demonstrated that the relationship between ANS and well-being was stronger for studies located in collectivist countries compared to individualistic countries using the Hofstede Insights (2022) individualism scoring tool. We also examined whether there were meaningful differences in results contingent upon the geographic region of the study. Consistent with our results for individualism scores, results showed that the average correlation between ANS and well-being was stronger for studies located in East Asian countries, where collectivism is typically more strongly emphasized, compared to studies located in the USA, Canada, or Northern Europe, where individualism is typically more strongly emphasized. These results support a compensatory-based or sensitivity perspective, which asserts that psychological needs are more

strongly associated with outcomes when they are less strongly or consistently supported in the broader cultural context. We found evidence for this when examining differences in the average correlation between ANS and well-being by the study region and individualism score. This finding suggests that the functional significance of autonomy may be more pronounced when satisfied within a cultural context that attends to autonomy less consistently. That is, it could be that collectivist-oriented cultural contexts consistently support individuals' needs for relatedness or competence, but perhaps less consistently support autonomy. Thus, in settings where autonomy is less consistently satisfied, people may be more sensitive to experiences of autonomy satisfaction that become more salient or more sought after, and therefore have stronger associations with outcomes (Sheldon & Gunz, 2009). However, results also suggested that there was a stronger relationship between ANS and ill-being for studies conducted in the USA and Canada compared to East Asian and European contexts. This result was unexpected, as it was not in line with our proposed predictions regarding potential cultural sources of variation. We had expected cultural variation in terms of individualism versus collectivism, where studies conducted in the USA and Canada may follow a similar pattern of results as other individualistic regions. We suspect that the strength of this association could be due to an increased emphasis on adolescent mental illness treatment in US contexts in recent years, particularly through reforms aimed at improving access to mental health care (Ronis et al., 2017). However, more research is needed to identify contextual sources of variation in the relationship between ANS and ill-being to explain the particular strength of this relationship in the USA and Canada.

Results related to cultural variation across models contrast with findings from a previous meta-analysis, which report no significant difference in the effect of autonomy on subjective well-being for studies located in the USA compared to East Asian countries (Yu et al., 2018). One reason could be the differences in sample demographics. In this meta-analysis, we focused solely on K-12 participants, whereas Yu et al. (2018) focused primarily on college-aged and older adults. It could be that cultural socialization is more salient during these developing years, and thus has a more pronounced effect on the relationships between autonomy and well(ill)-being outcomes. Another reason for this difference may be our inclusion of studies located worldwide. With more variation in the cultural contexts, differences in the average effects may emerge more clearly. However, although our literature search was inclusive of studies in any country or cultural context, there are many regions, particularly regions of Africa and Latin America, that are not well represented in this data. Studies retrieved were primarily from the USA or Canada, Asian countries, and European countries. Further, much of the research conducted in Asia was from Chinese contexts (73%). This cultural bias present in our dataset does not allow for a holistic understanding of the ways that culture may affect the relationships among autonomy and well(ill)-being outcomes. Findings based on region and sub-region may not be generalizable due to the overrepresentation of some countries within each region, particularly in Asia and East Asia. More research is needed in these regions to identify the magnitude and direction of relationships among autonomy and well(ill)-being in these cultural contexts.

Taken together, these findings suggest that while the direction and significance of the relationship remain consistent across cultural contexts, the strength of the association between autonomy and well-being may differ based on the cultural influences associated with one's context. Although the magnitude of the examined relationships differed across cultural context, autonomy satisfaction was importantly related to well(ill)-being across cultural contexts in the expected directions. Overall, these results are in line with the universality without uniformity perspective held by self-determination theorists, which states that the basic psychological needs are universally related to life outcomes, but the strength of this relation may be moderated by various contextual, interpersonal, and situational factors (Soenens et al., 2015).

Sample and Setting Characteristics

We also examined whether the school level, mean age, setting domain, and gender distribution of the sample affected the average effect of autonomy on well(ill)-being. Contrary to our predictions, these moderators did not affect the proposed relationships. In line with the universalist perspective, it could be that the developmental saliency of the psychological needs does not affect their association with outcomes. Instead, autonomy is importantly related to well- and ill-being despite developmental importance. Similarly, when autonomy is defined in alignment with SDT, the extent to which gendered stereotype and socialization of men as more independent or autonomous than women may not impact the importance of the satisfaction of autonomy for life outcomes, as indicated in our data. These two findings suggest that the internal saliency of the psychological needs, defined here by developmental or gendered importance, may not affect the magnitude of the relationship between autonomy and outcomes. Rather, one's environmental context, as indicated by significant differences between cultural contexts, may have more influence on the strength of these relationships.

In terms of setting domain, results suggested variation in the association between autonomy need satisfaction and well-being for studies conducted in academic settings compared to athletic settings. One explanation for these differences could simply be the amount of time youth spend in school compared to athletic settings and the salience of the academic setting to students' perceptions of thriving. That is, with increased opportunities for autonomy satisfaction, we may expect a stronger association between autonomy and outcomes. With more time typically spent in academic than in athletic settings, there may be more opportunities for experiencing need satisfaction and, in turn, more opportunities for stronger relationships with well-being. Moreover, for many students, experiences of success in school are core to evaluations of thriving (Ng et al., 2015), making need satisfaction in school particularly salient to well-being.

Taken together, these results suggest that one's environmental context, as defined by the cultural context and setting domain, plays a more significant role on the functional significance of need satisfaction than individual salience, as defined by age and gender. The extent to which one's needs are consistently satisfied in their environment seems to bolster the relationship between autonomy and outcomes. Conversely, the internal or developmental perceptions an individual has about the

saliency of autonomy, whether due to their age or gender, have a lesser bearing on the nature of the relationship between autonomy and outcomes.

Limitations and Future Research

Although our literature search procedures and analysis strategies aimed to be comprehensive, a few key limitations should be noted. First, there is always risk that our literature search did not encompass all relevant work, although many strategies were employed to mitigate the magnitude of this shortcoming. For example, one of the goals of this meta-analysis was to examine the role of geographic location or culture on the relationship of interest. However, we required all studies to be written in English, which may have excluded important relevant work. Future researchers who are fluent in languages other than English may consider expanding on our work to incorporate a more culturally diverse body of literature. Although inclusive of any geographic region, our search also did not reveal relevant work from many regions of the world, such as Africa and Latin America. More research in these regions is needed to understand the role of autonomy on outcomes in these cultural contexts. Further, although we included strategies to find unpublished work, our final dataset included only four unpublished reports.

There was also a lack of sufficient data to examine all moderators of interest. For example, although we sought to analyze the differences between studies that defined and measured autonomy in line with SDT compared to those that did not, our search did not reveal any studies that examined the relationship with well(ill)-being using a definition other than those aligned with SDT. Such analyses would have helped identify whether conceptual definitions of autonomy affect the association of autonomy with well- and ill-being. There was also insufficient information provided for participants' race/ethnicity and socioeconomic status. Future research may examine the extent to which these potentially important demographic characteristics affect the relationships between autonomy and well(ill)-being.

Finally, results from this meta-analysis cannot be inferred as causal. Our analyses examine the direction and strength of the correlations across studies but cannot contribute to causal evidence on the relationship between autonomy and well(ill)-being. However, we do believe that the results provide an important rationale for conducting experimental research across contexts and cultures that seeks to understand how autonomy need satisfaction can be promoted and autonomy need frustration minimized, as well as the benefits of autonomy support initiatives for children's and adolescents' mental health.

Conclusion

Results from this meta-analysis indicate that ANS is related to greater well-being and less ill-being. Likewise, ANF is related to less well-being and greater ill-being. In line with the dual process model, associations between ANS were stronger with well-being than ill-being, and ANF was more strongly associated

with ill-being than well-being. There was both some universality and some cultural variation in these results. While the direction and statistical significance of relationships were generally consistent across countries, for countries that emphasize collectivism, we found a stronger association between autonomy need satisfaction and well-being than for countries that emphasize individualism. We suspect that in collectivist cultural contexts, where the satisfaction of an individual's autonomy is widely and routinely less prioritized in interactions compared to individualistic cultural contexts, the functional significance of experiences of autonomy satisfaction for well-being outcomes is actually greater. That is, autonomy satisfaction may be more strongly associated with well-being for those in cultural contexts that satisfy this psychological need less consistently. Results also showed that autonomy need satisfaction was similarly related to ill-being for studies conducted in East Asia and Europe. However, this relationship was stronger for studies located in the USA or Canada, compared to East Asian or European contexts. These results may suggest that autonomy is more strongly associated with decreases in negative outcomes for certain cultural contexts, although the source of this variation remains unclear. Together, results suggest that one's social and cultural environment may play an important role in determining the strength of the association between autonomy and well-being outcomes for K-12 youth. We recommend that future research examine other potential sources of variation in the relationships between autonomy and well(ill)-being. We also recommend that future research continues to examine whether one's cultural context affects the relationships between autonomy and life outcomes.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10648-024-09967-x.

Acknowledgements The authors would like to thank Isabella Lostaglio, Julia Sherman, Mei Ku, and Tanvi Barman for their support with this project.

Funding Open access funding provided by SCELC, Statewide California Electronic Library Consortium.

Declarations

Conflict of Interest The authors declare no competing interests.

References

Amorose, A. J., Anderson-Butcher, D., & Cooper, J. (2009). Predicting changes in athletes' well-being from changes in need satisfaction over the course of a competitive season. *Research Quarterly for Exercise and Sport, 80*(2), 386–392. https://doi.org/10.1080/02701367.2009.10599575

Assor, A. (2012). Allowing choice and nurturing an inner compass: Educational practices supporting students' need for autonomy. *Handbook of research on student engagement* (pp. 421–439). Boston, MA: Springer, US. https://doi.org/10.1007/978-1-4614-2018-7_20

Avedissian, T., & Alayan, N. (2021). Adolescent well-being: A concept analysis. *International Journal of Mental Health Nursing, 30*(2), 357–367. https://doi.org/10.1111/inm.12833

Bartholomew, K., Ntoumanis, N., Ryan, R., & Thøgersen-Ntoumani, C. (2011). Psychological need thwarting in the sport context: Assessing the darker side of athletic experience. *Journal of Sport & Exercise Psychology, 33*, 75–102. https://doi.org/10.1123/jsep.33.1.75

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4*, 561–571. https://doi.org/10.1001/archpsyc.1961.017101200310044

Beyers, W., Soenens, B., & Vansteenkiste, M. (2024). Autonomy in adolescence: A conceptual, developmental and cross-cultural perspective. *European Journal of Developmental Psychology*, 1–21. https://doi.org/10.1080/17405629.2024.2330734

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2021). Introduction to meta-analysis. *John Wiley & Sons*. https://doi.org/10.1002/9781119558378

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion, 39*(2), 216–236. https://doi.org/10.1007/s11031-014-9450-1

Church, A. T., Katigbak, M. S., Locke, K. D., Zhang, H., Shen, J., de Jesús Vargas-Flores, J., Ibáñez-Reyes, J., Tanaka-Matsumi, J., Curtis, G. J., Cabrera, H. F., Mastor, K. A., Alvarez, J. M., Ortiz, F. A., Simon, J.-Y.R., & Ching, C. M. (2013). Need satisfaction and well-being: Testing self-determination theory in eight cultures. *Journal of Cross-Cultural Psychology, 44*(4), 507–534. https://doi.org/10.1177/0022022112466590

Cordeiro, P., Paixão, P., Lens, W., Lacante, M., & Luyckx, K. (2016). The Portuguese validation of the basic psychological need satisfaction and frustration scale: Concurrent and longitudinal relations to well-being and ill-being. *Psychologica Belgica, 56*(3), 193–209. https://doi.org/10.5334/pb.252

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Deci, E. L., & Ryan, R. M. (2013). The importance of autonomy for development and well-being. *Self-Regulation and Autonomy: Social and Developmental Dimensions of Human Conduct,* 19–46. https://doi.org/10.1017/CBO9781139152198.005

Deci, E. L., & Vansteenkiste, M. (2004). Self-determination theory and basic need satisfaction: Understanding human development in positive psychology. *Ricerche Di Psicologia, 27*(1), 23–40.

Demirbaş-Çelik, N., & Keklik, İ. (2019). Personality factors and meaning in life: The mediating role of competence, relatedness and autonomy. *Journal of Happiness Studies, 20*(4), 995–1013. https://doi.org/10.1007/s10902-018-9984-0

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Earl, S., Taylor, A., Meijen, C., & Passfield, L. (2019). Young adolescent psychological need profiles: Associations with classroom achievement and well-being. *Psychology in the Schools, 56*(6), 1004–1022. https://doi.org/10.1002/pits.22243

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *BMJ, 315*(7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629

Gagné, M. (2003). The role of autonomy support and autonomy orientation in prosocial behavior engagement. *Motivation and Emotion, 27*(3), 199–223. https://doi.org/10.1023/A:1025007614869

Garn, A. C., McCaughtry, N., Martin, J., Shen, B., & Fahlman, M. (2012). A basic needs theory investigation of adolescents' physical self-concept and global self-esteem. *International Journal of Sport and Exercise Psychology, 10*(4), 314–328. https://doi.org/10.1080/1612197X.2012.705521

Gewirtz, J. L., & Baer, D. M. (1958). Deprivation and satiation of social reinforcers as drive conditions. *The Journal of Abnormal and Social Psychology, 57*(2), 165.

Hedges, L. V., & Vevea, J. L. (1998). Fixed-and random-effects models in meta-analysis. *Psychological Methods, 3*(4), 486. https://doi.org/10.1037/1082-989x.3.4.486

Hofstede Insights. (2022). *Country comparison tool*. Hofstede Insights. Retrieved March, 10, 2023 from https://www.hofstede-insights.com/country-comparison-tool

Hoyt, L. T., Chase-Lansdale, P. L., McDade, T. W., & Adam, E. K. (2012). Positive youth, healthy adults: Does positive well-being in adolescence predict better perceived health and fewer risky health behaviors in young adulthood? *Journal of Adolescent Health, 50*(1), 66–73. https://doi.org/10.1016/j.jadohealth.2011.05.002

Isoard-Gautheur, S., Guillet-Descas, E., & Lemyre, P. N. (2012). A prospective study of the influence of perceived coaching style on burnout propensity in high level young athletes: Using a self-determination theory perspective. *Sport Psychologist, 26*, 282–298. https://doi.org/10.1123/tsp.26.2.282

Iyengar, S. S., & Lepper, M. R. (1999). Rethinking the value of choice: A cultural perspective on intrinsic motivation. *Journal of Personality and Social Psychology, 76*(3), 349–366. https://doi.org/10.1037/0022-3514.76.3.349

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction, 43*, 27–38. https://doi.org/10.1016/j.learninstruc.2016.01.002

Lee, D. J., Vite, A., Patall, E. A., & Zambrano, J. (2023). *Daily Autonomy, Relatedness, and Classroom Engagement among Latino and White High School Science Students*. [Conference Presentation]. Society for Personality and Social Psychology 2023 Annual Convention, Atlanta.

Li, C., Wang, C., & Pyun, D. (2017). Impacts of talent development environments on athlete burnout: A self-determination perspective. *Journal of Sports Sciences, 35*(18), 1838–1845. https://doi.org/10.1080/02640414.2016.1240370

Liu, J. D., & Chung, P.-K. (2018). Motivational profiles in physical education: Evidence from secondary school students in Hong Kong. *Journal of Teaching in Physical Education, 37*(2), 186–196. https://doi.org/10.1123/jtpe.2017-0153

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales*. (2nd. Ed.) Sydney: Psychology Foundation. https://doi.org/10.1037/t01004-000

Markus, H. R., Kitayama, S., & Heiman, R. J. (1996). Culture and "basic" psychological principles. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 857–913). The Guilford Press.

Markus, H., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*, 224–253.

Ng, Z. J., Huebner, S. E., & Hills, K. J. (2015). Life satisfaction and academic performance in early adolescents: Evidence for reciprocal association. *Journal of School Psychology, 53*(6), 479–491.

Oishi, S., Diener, E., Lucas, R. E., & Suh, E. M. (1999). Cross cultural variations in predictors of life satisfaction: Perspectives from needs and values. *Personality and Social Psychology Bulletin, 25*, 980–990. https://doi.org/10.1177/01461672992511006

Patall, E. A., & Zambrano, J. (2019). Facilitating student outcomes by supporting autonomy: Implications for practice and policy. *Policy Insights from the Behavioral and Brain Sciences, 6*(2), 115–122. https://doi.org/10.1177/2372732219862572

Pustejovsky, J. E., & Tipton, E. (2022). Meta-analysis with robust variance estimation: Expanding the range of working models. *Prevention Science, 23*(3), 425–438. https://doi.org/10.1007/s11121-021-01246-3

Pustejovsky, J. (2022). clubSandwich: Cluster-robust (sandwich) variance estimators with small-sample corrections. R package version 0.5.8. Retrieved March 16, 2023 from https://CRAN.R-project.org/package=clubSandwich

Quinlan, D. M., Swain, N., Cameron, C., & Vella-Brodrick, D. A. (2015). How 'other people matter' in a classroom-based strengths intervention: Exploring interpersonal strategies and classroom outcomes. *The Journal of Positive Psychology, 10*(1), 77–89. https://doi.org/10.1080/17439760.2014.920407

Raynor, H. A., & Epstein, L. H. (2003). The relative-reinforcing value of food under differing levels of food deprivation and restriction. *Appetite, 40*(1), 15–24. https://doi.org/10.1016/S0195-6663(02)00161-7

Robinson, J. L., & Biringen, Z. (1995). Gender and emerging autonomy in development. *Psychoanalytic Inquiry, 15*(1), 60–74. https://doi.org/10.1080/07351699509534017

Rodgers, M. A., & Pustejovsky, J. E. (2021). Evaluating meta-analytic methods to detect selective reporting in the presence of dependent effect sizes. *Psychological Methods, 26*(2), 141. https://doi.org/10.1037/met0000300

Rodríguez-Meirinhos, A., Antolín-Suárez, L., Brenning, K., Vansteenkiste, M., & Oliva, A. (2020). A bright and a dark path to adolescents' functioning: The role of need satisfaction and need frustration across gender, age, and socioeconomic status. *Journal of Happiness Studies, 21*(1), 95–116. https://doi.org/10.1007/s10902-018-00072-9

Ronis, S. T., Slaunwhite, A. K., & Malcom, K. E. (2017). Comparing strategies for providing child and youth mental health care services in Canada, the United States, and the Netherlands. *Administration and Policy in Mental Health and Mental Health Services Research, 44*, 955–966. https://doi.org/10.1007/s10488-017-0808-z

Ryan, R. M., & Deci, E. L. (2000a). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2000b). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry, 11*(14), 319–338. https://doi.org/10.1207/s15327965pli1104_03

Ryan, R. M., & Frederick, C. M. (1997). On energy, personality and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality, 65*, 529–565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x

Schüler, J., Brandstätter, V., & Sheldon, K. M. (2013). Do implicit motives and basic psychological needs interact to predict well-being and flow? Testing a universal hypothesis and a matching hypothesis. *Motivation and Emotion, 37*, 480–495.

Sheldon, K. M., & Gunz, A. (2009). Psychological needs as basic motives, not just experiential requirements. *Journal of Personality, 77*(5), 1467–1492.

Shih, S.-S. (2015). An investigation into academic burnout among Taiwanese adolescents from the self-determination theory perspective. *Social Psychology of Education: An International Journal, 18*(1), 201–219. https://doi.org/10.1007/s11218-013-9214-x

Soenens, B., Vansteenkiste, M., Lens, W., Luyckx, K., Goossens, L., Beyers, W., & Ryan, R. M. (2007). Conceptualizing parental autonomy support: Adolescent perceptions of promotion of independence versus promotion of volitional functioning. *Developmental Psychology, 43*(3), 633. https://doi.org/10.1037/0012-1649.43.3.633

Soenens, B., Vansteenkiste, M., & Van Petegem, S. (2015). Let us not throw out the baby with the bathwater: Applying the principle of universalism without uniformity to autonomy-supportive and controlling parenting. *Child Development Perspectives, 9*(1), 44–49. https://doi.org/10.1111/cdep.12103

Solmi, M., Radua, J., Olivola, M., Croce, E., Soardo, L., Salazar de Pablo, G., Il Shin, J., Kirkbride, J. B., Jones, P., Kim, J. H., Kim, J. Y., Carvalho, A. F., Seeman, M. V., Correll, C. U., & Fusar-Poli, P. (2021). Age at onset of mental disorders worldwide: Large-scale meta-analysis of 192 epidemiological studies. *Molecular Psychiatry, 27*(1), 281–295. https://doi.org/10.1038/s41380-021-01161-7

Tang, M., Wang, D., & Guerrien, A. (2021). The contribution of basic psychological need satisfaction to psychological well-being via autonomous motivation among older adults: A cross-cultural study in China and France. *Frontiers in Psychology, 12*, 734461. https://doi.org/10.3389/fpsyg.2021.734461

Tipton, E. (2015). Small sample adjustments for robust variance estimation with meta-regression. *Psychological Methods, 20*(3), 375. https://doi.org/10.1037/met0000011

Vandenkerckhove, B., Brenning, K., Vansteenkiste, M., Luyten, P., & Soenens, B. (2019). The explanatory role of basic psychological need experiences in the relation between dependency, self-criticism and psychopathology in adolescence. *Journal of Psychopathology and Behavioral Assessment, 41*(4), 574–588. https://doi.org/10.1007/s10862-019-09719-0

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration, 23*, 263–280. https://doi.org/10.1037/a0032359

Vansteenkiste, M., Ryan, R. M., & Soenens, B. (2020). Basic psychological need theory: Advancements, critical themes, and future directions. *Motivation and Emotion, 44*, 1–31. https://doi.org/10.1007/s11031-019-09818-1

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software, 36*, 1–48. https://doi.org/10.18637/jss.v036.i03

Walker, G. J., Yan, N., & Kono, S. (2020). Basic psychological need satisfaction and intrinsic motivation during leisure: A cross-cultural comparison. *Journal of Leisure Research, 51*(4), 489–510. https://doi.org/10.1080/00222216.2020.1735973

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Yu, S., Levesque-Bristol, C., & Maeda, Y. (2018). General need for autonomy and subjective well-being: A meta-analysis of studies in the US and East Asia. *Journal of Happiness Studies, 19*, 1863–1882. https://doi.org/10.1007/s10902-017-9898-2

Zhong, M., Huebner, E. S., & Tian, L. (2020). Gender-specific trajectories of depressive symptoms in Chinese children: Relations with basic psychological needs satisfaction at school. *Journal of Abnormal Child Psychology, 48*, 1367–1378. https://doi.org/10.1007/s10802-020-00674-z

Zhou, J., Jiang, S., Zhu, X., Huebner, E. S., & Tian, L. (2020). Profiles and transitions of dual-factor mental health among Chinese early adolescents: The predictive roles of perceived psychological need satisfaction and stress in school. *Journal of Youth and Adolescence, 49*(10), 2090–2108. https://doi.org/10.1007/s10964-020-01253-7

Authors and Affiliations

Amanda Vite[1] · Erika A. Patall[1] · Man Chen[2]

✉ Amanda Vite
avite@usc.edu

[1] Rossier School of Education, University of Southern California, 3470 Trousdale Parkway, Waite Phillips Hall, Los Angeles, CA 90089-4036, USA

[2] College of Education, The University of Texas at Austin, Austin, TX 78712, USA