

Beyond Intrinsic and Extrinsic Motivation: A Meta-Analysis on Self-Determination Theory's Multidimensional Conceptualization of Work Motivation

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Abstract

This meta-analysis aims to shed light on the added value of the complex multidimensional view on motivation of self-determination theory (SDT). We assess the unique and incremental validity of each of SDT's types of motivation in predicting organizational behavior, and examine SDT's core proposition that increasing self-determined types of motivation should have increasingly positive outcomes. Meta-analytic findings (124 samples) support SDT, but also adds precision to its predictions: intrinsic motivation is the most important type of motivation for employee well-being, attitudes and behavior; yet identified regulation is more powerful in predicting performance and organizational citizenship behavior. Further, introjection has both positive and negative implications; while external regulation has limited associations with employee behavior and yields a well-being cost. Amotivation has entirely negative implications. We address conceptual and methodological implications arising from this research and exemplify how these results may inform and clarify lingering issues in the literature on employee motivation.

Key words: Extrinsic motivation; Intrinsic motivation; Self-determination Theory; Well-being; Performance; Meta-analysis; Motivation

Beyond Intrinsic and Extrinsic Motivation: A Meta-Analysis on Self-Determination Theory's Multidimensional Conceptualization of Work Motivation

Employee motivation is defined as the force that drives the direction, intensity, and persistence of employee behavior (Pinder, 2008). It is an important determinant of job performance, on par with employees' personal abilities (Van Iddekinge et al., 2014), and has been considered a contributing factor to employee well-being (e.g., Demerouti et al., 2001). It may therefore be no surprise that employee motivation is seen as one of the most enduring and compelling topics in work and organizational psychology (Kanfer et al., 2017).

Motivation has been approached from multiple different perspectives. The old saying "Find a job you enjoy, and you will never have to work a day in your life" advocates the value of intrinsic motivation (i.e., doing an activity out of inherent interest or pleasure) relative to extrinsic motivation (i.e., engaging in an activity to achieve a separable outcome; Ryan & Deci, 2017). Extending this dichotomy, in addition to amotivation (i.e., a lack of motivation) and intrinsic motivation, self-determination theory (SDT; Deci & Ryan, 1985) posits that people may have several different and unique extrinsic reasons to invest their time and energy in particular behaviors (Deci & Ryan, 2000). These reasons are referred to as: external (i.e., being pressured by others), introjected (i.e., putting pressure on oneself through ego-involvement), identified (i.e., doing an activity because one finds it meaningful), and integrated regulations (i.e., engaging in an activity because this is fully aligned with one's values and sense of self). Research on these various types of motivation in the context of work has grown exponentially and has been frequently cited (e.g., Gagné & Deci [2005] is cited over 2000 times), and their popularity in management books reflects their resonance within practice (e.g., Pink, 2009; Fowler, 2014). Given the growing importance of these types of motivation for research and practice, the first aim of this meta-analysis is to take stock: we provide a comprehensive overview of what we know about the outcomes associated with

these different types of motivation, and subsequently identify the gaps and limitations within this body of research in order to guide future research.

Second, and perhaps most importantly, we also aim to assess the degree to which it is valuable and necessary to differentiate between each of SDT's different types of motivation. According to SDT, each of these motivation types can be ordered along a continuum of self-determination, ranging from more controlled to more autonomous or volitional types of motivation. Yet despite this predictable linear order, they each are also expected to have different implications for employee outcomes (Deci & Ryan, 2000). Although the underlying structure and nature of the different types of motivation have been carefully conceptualized, their incremental and unique contribution to core organizational behavior outcomes are not well understood. At the empirical level, this is mainly due to the dominance of scoring methods that combine some of the motivation types (e.g. into a relative autonomy index or into the overarching factors of autonomous and controlled motivation; Howard et al., 2020), and multicollinearity issues caused by the highly correlated nature of these motives (Howard et al., 2017). Moreover, the theoretical proposition regarding how these motivation types should relate to specific facets of employee well-being and performance remains rather broad. For example, SDT-scholars argue that "when people's goal-directed behavior is autonomous rather than controlled, the correlates and consequences are more positive" (Deci & Ryan, 2000, p. 243; see also Deci et al., 2017). This however raises the question of whether each different type of motivation yields unique relations with outcomes. For example, if there is linear dependence between regulation types – that is, if intrinsic motivation always produces better employee outcomes than identified regulation, and identified regulation is always better than introjected regulation – a more simplified motivational perspective may be warranted. While some authors have theorized that each regulation type produces better outcomes in certain circumstances and for different outcomes

(Gagné & Deci, 2005; Koestner & Losier, 2002), strong evidence remains scattered and relatively scarce. Empirical evidence for the theorized differential associations with outcomes, and for explaining incremental variance in outcomes, is necessary in order to support (or refute) the theoretical claims within SDT.

To test the validity and unique contribution of SDT's multidimensional view to our understanding of work motivation and work outcomes, we conducted a meta-analysis aiming to examine how each of SDT's types of motivation relates to a broad array of outcomes. We used relative weights analyses to assess the incremental validity of the different types of work motivation in predicting employee outcomes, and summarized their specific relations with various aspects of employee well-being, attitudes, and behaviours. Furthermore, we examined the potential boundary conditions of these relations through both contextual (e.g. cultural contexts & job type) and methodological (scales used and publication bias) moderators. From these results, we address several theoretical and methodological issues within the SDT literature and take steps to integrate SDT with neighboring motivation theories.

In providing more detailed and nuanced information on SDT's different types of motivation, and their consequences, this study contributes to our understanding of employee motivation over and above recent qualitative reviews of work motivation (Kanfer & Chen, 2016; Kanfer, Frese, & Johnson, 2017). It goes beyond a meta-analysis shedding light on the importance of one's level of motivation (defined unidimensionally) for individual performance (Van Iddekinge et al., 2014). Our study goes further than meta-analyses on intrinsic and extrinsic motivation (or proxies, such as the presence of incentives), which have only focused on performance outcomes (Cerasoli, Nicklin, & Ford, 2014; Byron & Khazanchi, 2012). Moreover, by providing meta-analytic evidence for the relative importance of SDT's different types of motivation in predicting many organizationally relevant outcomes, we extend previous meta-analytic work, which is limited to examining: a) the

interrelations among the different types of motivation in and of themselves (Howard et al., 2017); b) leader autonomy support as a specific antecedent of these types of motivation (Slemp, Kern, Patrick, & Ryan, 2018); c) the relations of the different types of work motivation with the basic psychological needs at work (Van den Broeck, Ferris, Chang, & Rosen, 2016); d) the relations between specific health-related motivation and health-related outcomes (e.g. smoking cessation, healthy eating & mental health; Ng et al., 2012); and e) the associations of autonomous and controlled motivation on well-being and autonomy support in specific populations, such as teachers (Slemp, Field, & Cho, 2020). In the following we elaborate on SDT and the specific research questions of this meta-analysis.

Self-Determination Theory's Different Types of Motivation

Self-determination theory (SDT) is a broad theory of human motivation that has been applied to various life domains including sports, education, and organizational psychology. It originated from the work of Deci (1971) which built upon the distinction between intrinsic motivation (i.e., doing the activity because of the intrinsic interest derived from it) and extrinsic motivation (i.e., doing an activity to obtain an external outcome; Ryan & Deci, 2017). These ideas were developed further to propose that people have qualitatively different reasons to engage in extrinsically motivated behavior (Deci & Ryan, 1985).

To date, SDT arguably presents one of the most comprehensive perspectives on the complexities of human motivation. First, as depicted in Figure 1, SDT acknowledges that people may experience a lack of motivation, otherwise known as being “a-motivated” (Deci & Ryan, 2000). When *amotivated*, employees lack the intention to engage in a behavior as they do not see any reasons to do so. They may not value the activity, feel capable of engaging or sustaining the particular behavior, or perceive a contingency between their actions and the outcomes they desire, thereby resulting in very little desire to exert effort (e.g., Green-Demers, Legault, Pelletier, & Pelletier, 2008).

Furthermore, SDT differentiates between qualitatively different types of extrinsic motivation that fall along a continuum of self-determination (Deci & Ryan, 2000). First, *external regulation* is a non-self-determined type of extrinsic motivation and relates to the classic “carrot and stick” approach. Employees are externally regulated when they do something solely to obtain rewards or avoid punishments from others such as managers, colleagues, or clients. These external contingencies can be material (e.g., obtaining a bonus or avoiding being fired) or social in nature (e.g., when one seeks approval or avoiding being criticized by others; Gagné et al., 2015). Externally regulated tenure-track professors, for example, may put a lot of effort into their job because they want to be tenured.

Second, *introjected regulation* is a partially internalized form of extrinsic motivation and, hence, is still relatively low on self-determination. It is evident when people pursue an activity out of ego-involvement or contingent self-esteem such as when rewarding or punishing oneself through self-related emotions, that is, when one aims to approach positive feelings such as pride, and aim to avoid negative ones such as guilt or shame, often using self-controlling language such as “I should do X”. Scholars experiencing introjected regulation may, for example, attempt to publish more for perceived reputational gains, or remain silent in seminars to avoid losing face in front of their colleagues. Like in the case of external regulation, introjected regulation is characterized by feelings of being controlled and pressured, albeit by internal rather than external forces (Deci & Ryan, 2000). Consequently, external and introjected regulations are regarded as controlled forms of motivation and are often combined into one factor.

Third, in the case of *identified regulation*, the reasons for engaging in the behavior are more internalized and are thus more self-determined (Deci & Ryan, 2000). Identified regulation reflects engaging in activities because of perceived personal meaningfulness and importance. Academics identifying with the importance of student learning may, for example,

be motivated to provide extra help for students who are struggling to foster such learning.

Finally, in the case of *integrated regulation*, the reason underlying the behavior is not only completely internalized and self-determined, but also fully integrated within one's value system. Integrated reasons for engaging in an activity are seen as an inherent and coherent part of one's identity or true sense of self (Deci & Ryan, 2000). When driven by integrated regulation, people do not only find the behavior valuable, they enact the behavior simply because it reflects who they are. For example, academics may study how to best design online classes, because applying evidence-based procedures has become a critical part of their professional identity, which they endeavor to enact across situations and time. Notably, identified and integrated regulations are still considered extrinsic forms of motivation as they are instrumental in reaching an outcome separate from the activity itself – however, they are most often considered as autonomous due to their volitional nature, just like intrinsic motivation.

Qualitatively or Quantitatively Different Constructs

Although SDT explicitly details the conceptual differences between the various types of motivation, in terms of the source and quality of motivation, there is an ongoing debate concerning whether SDT's types of motivation should be considered: a) qualitatively different constructs; or b) quantitatively different manifestations of the underlying construct of self-determination, ranging from non-self-determined (i.e., a-motivation) to fully self-determined motivation (i.e., intrinsic motivation). If the types of motivation are qualitatively different, they should factor into separate constructs and relate differentially to various outcomes. If they only differ in terms of the quantity of self-determined motivation, it would be possible and adequate to represent all types by using a single factor predicting all of the variance in outcomes (Chemolli & Gagné, 2014), thus questioning the validity of the complex multidimensional view of SDT.

Both perspectives have received some degree of empirical support through factor analysis and examination of the inter-correlations of the different types of motivation. On the one hand, Gagné et al. (2015) differentiated the various types of motivation into separate constructs based on confirmatory factor analysis using data from 3435 employees across several languages (e.g., French, English, German). On the other hand, using multi-dimensional scaling based on meta-analytic correlations, Howard, Gagné and Bureau (2017) concluded that “people experience these motivational regulations as differing in degree of self-determination” (p. 1357), due to the fact that adjacent types of motivation (e.g., external and introjected regulation) correlated more strongly than non-adjacent types (e.g., external and identified regulation). Most recently, Howard, Gagné, Morin, and Forest (2018) integrated both perspectives. Based on bifactor ESEM, they concluded that SDT’s types of motivation represent quantitatively different levels of self-determination, captured in a general factor; yet also have unique qualitative motivational characteristics that allow them to explain variance in basic need satisfaction and commitment over and above this general factor.

One exception is integrated regulation. This type of regulation could not be distinguished from identified and intrinsic regulation in confirmatory factor analysis (Gagné et al., 2015), and its meta-analytic correlations with identified and intrinsic regulation were untenably high (Howard et al., 2017). Questions have therefore been raised about the distinctiveness of this type of motivation, which may explain why integrated regulation has not been included in most validated scales (except for Tremblay, Blanchard, Taylor, Pelletier, & Villeneuve, 2009) and, consequently, why it has been often excluded from research on work motivation.

Associations with Outcomes

Despite their clear conceptual differentiation, whether the different types of

motivation also hold discriminant and incremental validity in empirically predicting important workplace outcomes remains unknown. SDT proposes that with increasingly autonomous forms of motivation (i.e., from amotivation to external to intrinsic motivation), employees should increasingly show “optimal functioning” (Deci & Ryan, 2000), which is defined as the “manifestation of intra- and interpersonal growth and development in terms of employee well-being (e.g., positive emotions, vitality), attitudes (e.g., job satisfaction, organizational commitment), and behavior (e.g., performance, proactivity, and collaborative behaviors)” (Van den Broeck, Carpini, & Dieffendorf, 2019, p.30). However, this general statement leaves us to question whether each of the different types of motivation has unique relations with such outcomes. Therefore, to further study the discriminant validity of SDT’s types of motivation, and hence examine the added value of differentiating between them, we aim to answer the following research question through this meta-analysis:

***Research Question 1:** Do the types of motivation correlate differentially, and in a non-linear fashion, with outcomes, therefore explaining incremental variance in outcomes?*

Studying the discriminant and incremental validity of the various types of motivation also allows for a more fine-grained analysis of how exactly the different types of motivation relate to various outcomes. The general statement that increasingly autonomous forms of motivation (i.e., from external to intrinsic) should lead to more positive outcomes (Gagné et al., 2015) leaves at least three questions around how the different types of motivation should be related to these outcomes.

First, the contribution of extrinsic autonomous types of motivation, relative to intrinsic motivation, remains unclear. Based on their conceptualization, we identified three different perspectives on their relative contribution in explaining employee well-being and behavior. First, given that intrinsic motivation is considered the ‘prototype of autonomous

motivation' (Ryan & Deci, 2017, p. 197), it may be posited that SDT considers intrinsic motivation as the most valuable type of motivation to drive employee outcomes (Sheldon et al., 2003). Secondly, and alternatively, as intrinsic motivation does not have 'greater value or greater autonomy' than integrated regulation (Ryan & Deci, 2017, p. 198), both may be similar in nature, and should therefore have similar relations with employee optimal functioning. Finally, in specifying several autonomous types of extrinsic motivation, SDT implies that each type should be beneficial in at least some circumstances and for some outcomes. While intrinsic motivation directs employees to do what they themselves find interesting in the moment, identified and integrated types of regulation should help employees sustain efforts towards personally meaningful goals (Gagné & Deci, 2005; Ryan & Deci, 2017). In line with this reasoning, identified regulation is sometimes shown to relate more strongly to outcomes such as proficient task performance, job effort, and health behaviors such as smoking abstinence than intrinsic motivation (Koestner & Losier, 2002; Ng et al., 2012) – suggesting that the effect of the motivational type depends on which outcome is of interest.

***Research Question 2:** Do identified, integrated, and intrinsic regulation relate differentially to outcomes?*

Second, SDT's general proposition raises the question of whether the two forms of controlled motivation (i.e., external and introjected motivation): a) impair employee functioning (i.e., negatively relate to well-being, adaptive attitudes, and performance), b) are unrelated to these outcomes (i.e., are not important motivational processes), or c) are less positively related to these outcomes compared to autonomous types of motivation. The lack of theoretical specification on how external and introjected motivation relate to outcomes has led scholars to pose diverging hypotheses about these relations (e.g., Gagné et al., 2015; Van den Broeck et al., 2011). The literature demonstrates mixed empirical results; even when the

same scale is used to assess the types of motivation, external regulation has frequently failed to relate to employee functioning, but also sometimes seems to mildly improve it (Gagné et al., 2015). Introjected regulation has been shown to relate both positively and negatively to aspects of well-being such as burnout (van Beek, Hu, Schaufeli & Schreurs 2012; van Beek, Taris & Schaufeli, 2011). As such, it remains unclear how each of these regulations relate to outcomes, and the degree to which they are empirically distinguishable (or not). Therefore, we posit the following research question:

***Research Question 3:** Do external and introjected types of motivation relate differentially to employee well-being, attitudes, and behavior; and are these results indicative of these types of motivation being detrimental, unrelated, or beneficial to employee functioning?*

Finally, while it is posited that autonomous types of motivation lead to more beneficial outcomes than controlled types of motivation, the implications of amotivation are unclear. Is having controlled types of motivation more detrimental for employee functioning than having no motivation at all? Or does having at least some motivation yield better consequences than being amotivated. Theoretically, this has led to debate about whether the quality of motivation is more important than the quantity (Van den Broeck, Lens, De Witte, & Van Coillie, 2013); and questions about whether the use of incentives, which are assumed to increase levels of external regulation (Gerhart & Fang, 2015), may foster well-being and performance when employees are presently amotivated. To shed light on this issue, we examine the following research question:

***Research Question 4:** Does amotivation relate more negatively to employee well-being, attitudes, and behavior than external regulation?*

Contextual Moderators

Finally, we performed moderation analyses to explore whether contextual factors (i.e., national culture and blue versus white collar) and methodological factors (i.e., differences between measurement scales and publication status) influence the effects between the types of motivation and employee outcomes.

In terms of contextual factors, we first examine whether culture may affect the associations between SDT's types of motivation and employee well-being, attitudes, and behavior. Because of its emphasis on autonomy, SDT has frequently been criticized to be less applicable to people who may attach less value to autonomy (Iyengar & Lepper, 1999) – such as is the case in collectivistic (i.e., Eastern) rather than individualistic (i.e., Western) cultures, and among blue versus white collar workers. In collectivistic cultures, for example, following externally imposed group norms is socially encouraged and people are highly motivated to avoid guilt and shame (Buchtel et al., 2018). External and introjected regulations may naturally fit these cultures, and following the person-environment fit literature (Kristof-Brown, Zimmerman, & Johnson, 2005), more controlled types of motivation may therefore be related to better outcomes in collectivistic (compared to individualistic) cultures. Similarly, while blue-collar workers attach high importance to pay and job security, white collar workers put greater emphasis on developing themselves and being autonomous (De Witte & Van den Broeck, 2011). As such, the latter group may benefit more from more autonomous types of motivation, compared to the former. These assumptions stand in strong contrast to SDT's claim of being universal (Deci & Ryan, 2000), and research supporting SDT's propositions in collective cultures (Chirkov, Ryan, Kim, & Kaplan, 2003; Slemp, Kern, Patrick & Ryan, 2018; Yu, Levesque-Bristol & Maeda, 2018) and among blue-collar workers (Ilardi, Leone, Kasser, & Ryan, 1993). Given these conflicting perspectives, it is imperative to meta-analytically test whether culture and job type moderate the relations

between the types of motivation and their correlates.

Second, we also examine whether the results depend on methodological features such as publication status (published versus unpublished) and the specific operationalizations of the types of motivation. As the review process tends to be biased towards publishing significant results (Rosenthal, 1979), scholars may be tempted to include or exclude hypotheses and analyses based on whether or not they are supported, which may lead to the underreporting of empirical evidence that does not align with presumed theory and stronger support for a theory than is warranted based on empirical results (Rubin, 2017). Only including published studies in a meta-analysis may overestimate the true effect sizes by no less than 12% on average (McAuley, Ba'Pham, Tugwell, & Moher, 2000). Given this, we deemed it necessary to examine whether publication bias moderates the relations of the different types of motivation with outcome variables.

Finally, we examine whether apparent differences in the operationalization of types of motivation alter their correlations with outcomes. Much in line with the initial focus on tangible outcomes (Deci & Ryan, 2000), almost all available measures of external regulation focus on one's orientation to acquire money and earn an income (e.g., 'it allows me to earn money', 'I'm paid to do it'; Fernet et al., 2008; Tremblay et al., 2009). Recently however, Gagné et al., (2015) explicitly differentiated between external regulation for material (e.g., financial rewards, job security) and social reasons (e.g., to get approval or respect from others). While these material and social external reasons resulted in separate factors, Gagné et al. (2015) did not examine their differential effects. Yet, some research seems to suggest that the implications of external material and social motivation may diverge. For example, compared to external social motivation, being externally regulated for material reasons has been found to relate more strongly to job satisfaction (Smokrović, Žvanut, Bajan, Radić, & Žvanut, 2019) but less strongly to burnout (Tóth-Király, Morin, Bőthe, Rigó, & Orosz, 2020).

Also, in his initial research on SDT, Deci found that material rewards had more detrimental effects than feedback, the latter of which is more social in nature (Deci, 1971; Deci, Koestner, & Ryan, 1999). To examine whether the outcomes of material and social external regulation differ systematically, we examine, based on all available evidence, whether the nature of the external regulation scale (i.e., material versus social) moderates the relations of external motivation with employee well-being, attitudes, and performance.

Introjected regulation has also been operationalised in different ways. Some scales primarily include items that reflect employees' motivation to *avoid* negative feelings (e.g., feeling unworthy, ashamed, guilty) that put a threat to one's self-esteem (e.g., Fernet et al., 2008). Others adopt a more balanced approach, including also *approach-oriented* items referring to positive feelings (e.g. self-worth, pride) that may boost one's self esteem (e.g., Gagné et al., 2010, 2015). Yet each of these scales are considered to indicate the same SDT construct of introjected regulation. SDT scholars thus ignore the well-established differential effects of approach and avoidance motivation (Carver, 2006; Higgins, 2002), and initial studies suggesting that approach-oriented introjection may be less harmful than avoidance-oriented introjection (Assor, Vansteenkiste, & Kaplan, 2009). To see whether more nuanced measurement of introjected regulation is needed, this meta-analysis systematically compares introjection scales that rely only (Fernet et al., 2008) or heavily (Tremblay et al., 2009) on avoidance items compared to those that cover both approach and avoidance introjected regulation (Gagné, 2010, 2015; Fernet, 2011).

Finally, because integrated and identified regulation are hard to empirically differentiate (Howard et al., 2017), most scales do not have a separate subscale for integrated regulation. However, careful reading of the literature revealed that the identified regulation scale of Gagné et al., (2015) may include items that go above and beyond finding work merely meaningful, and may draw upon elements of integrated regulation (i.e., putting effort

in this jobs aligns with my personal values/has personal significance to me). To further assess the importance of separating the construct of integrated regulation, we therefore ran a moderation analysis comparing this scale reflecting identified *and* integrated regulation (i.e., Gagné et al., 2015) with all other scales purely referring to identified regulation.

In summary, to examine the degree to which our findings on the relationships between SDT's types of motivation and employee outcomes are generalizable and robust, we sought to answer the following research question:

***Research Question 5:** Are the relations between the types of motivation and their outcomes generalizable across cultures, job types, published versus unpublished studies, and measures?*

Method

We conducted a meta-analysis of the relations between SDT's types of motivation and their conceptual outcomes that have been examined in the literature. Before examining the strength and direction of these relations for each motivation type, we studied their relative importance in explaining employee outcomes using relative weights analysis (RWA). RWA is a procedure commonly employed in organizational psychology to determine the unique and relative contribution of multiple correlated predictors, thereby addressing the problem of multicollinearity and hence unstable beta-coefficients in regression analyses (Tonidandel & LeBreton, 2015). Multicollinearity is often encountered when using SDT-based motivation scales (Howard et al., 2017), which has forced most researchers to use aggregated scores (e.g., controlled and autonomous motivation or the relative autonomy index; Howard et al., 2020). Such scores however prevent examination of the precise relationships between each type of motivation and the outcomes, and potentially lead to information loss and reduced variance accounted for in published research. Using RWA in this meta-analysis allowed us to look at the relative importance of each motivation type in predicting work-related outcomes

and to determine if the multidimensional conceptualization of work motivation offered by SDT adds valuable information about work motivation.

Inclusion Criteria

We included empirical studies if they a) presented primary quantitative research b) referred to one of the major validated SDT scales specific to the work domain (i.e., Blais, Lachance, Vallerand, Briere, & Riddle, 1993; Fernet, Senecal, Guay, Marsh, & Dowson, 2008; Fernet, 2011; Gagné et al., 2010, 2015; Tremblay et al., 2009) or adaptations thereof; c) provided correlations between at least one regulation and one work-related outcome (well-being, attitudes, and behavior); and d) examined adult participants in an organizational setting. This resulted in the exclusion of studies including unemployed people, volunteers, students, and athletes; as well as experimental, laboratory, and intervention studies.

Literature Search

First, we searched for all articles validating a work motivation scale in the realm of SDT as mentioned above, and all studies citing these works (years 1989-Oct 2020). Second, the databases of Web of Science, Google Scholar, EBSCO and PsycINFO were searched independently by the authors using the following search terms: ‘external’ ‘introjected’ ‘identified’ ‘integrated’ and ‘intrinsic’ ‘motivation’ and ‘+ self determin*’, which were paired with ‘employ*’ or ‘work*’. Additionally, we searched using scale names as keywords (e.g., *Multidimensional Work Motivation Scale, MWMS*). All duplicates were removed and exclusion criteria were applied. Of the remaining articles, 92 did not provide correlation tables or other pertinent information (e.g., only aggregate motivation scores were reported). Authors were contacted to obtain missing information and simultaneously asked for other unpublished data. Accordingly, 90 authors were contacted with a 14% response rate. These authors provided an additional 21 samples. In total, our search resulted in 104 articles and manuscripts containing 124 samples (72 published, 32 unpublished samples) that met our

inclusion criteria. The overview of the search process (Figure S1), references, and final dataset are available in supplementary materials.

Coding

The first two authors and four research assistants (with expertise in organizational psychology) entered all potentially relevant information into a spreadsheet. These variables included the scale used, the nationality and sector of the sample, as well as outcomes of motivation. Correlation coefficients were collected as effect sizes of primary interest. Intercoder agreement rates were high (Cohen's $K = .94$; McHugh, 2012), and disagreements were all resolved through reexamination of articles. Correlations between regulations and covariates that did not occur at least twice and that could not be meaningfully integrated with similar variables were removed.

Meta-Analytic Procedures

We conducted this meta-analysis following the Hunter-Schmidt model (Schmidt & Hunter, 2015), with random-effects models applied throughout. This method assumes that between-study variance can be attributed to either study artifacts or moderating effects. It is strongly recommended over the alternative fixed-effects model which assumes that between-study variance is solely due to sampling error and does not allow for moderating factors – an untenable assumption in all but a few instances.

For each relation between a type of motivation and an expected outcome, corrections for reliability were made before weighting correlations according to sample size (Schmidt & Hunter, 2015). When alpha coefficients were not obtainable, mean reliability scores were imputed for the scale. The standard deviation and standard error of the corrected correlations were calculated (Schmidt & Hunter, 2015). Based upon the estimated standard error, 95% confidence intervals (CI) were calculated around the corrected correlation coefficients, with CIs indicating a significant effect when zero is not included within the CIs. Examination of

95% CIs were used to indicate the extent to which the relations of the various types of motivation with outcomes are significantly different or not. In accordance with Cumming and Finch (2005), non-overlapping CIs indicated differences between values at a probability approximately equal to $< .01$, and CIs which overlapped less than 50% were considered indicative of differences in values of approximately $p < .05$. The 80% credibility intervals (CV) and the percentage of the proportion of variance explained by sampling and measurement error (the “75% rule”) were used to assess the homogeneity of the effect size distribution (Schmidt & Hunter, 2015). We used two different metrics to assess publication bias: Egger’s regression intercept (z) test (Egger, Smith, Schneider, & Minder, 1997) and Begg and Mazumdar’s (1994) rank correlation (τ) test. As recommended by Van Aert, Wicherts, van Assen and Macleod (2019), we only calculated these statistics when 10 effect sizes were available in order to achieve sufficient statistical power.

To assess the incremental validity of the types of motivation, relative weights analysis (RWA) was conducted in the R software package following procedures from Tonidandel and LeBreton (2015). Analyses were based on the corrected meta-analytic correlations among the types of motivation derived in this study (see Table S2 in supplementary materials). Each model consisted of motivation types predicting a single outcome variable, with this process repeated for each available outcome. Results of these analyses produce relative weights representing the variance in an outcome accounted for by the predictor, as well as rescaled relative weights, which presents the information as a percentage of R^2 .

Subgroup analyses were performed to examine whether contextual and methodological moderators would influence the results. Following Aguinis et al.’s (2008) recommendations, we used Hunter and Schmidt’s (2004) procedures for a subgroup analysis with categorical variables. Even though we are aware that subgroup analysis is suboptimal to

meta-regressions (Geyskens et al. 2009), this analysis was chosen because of the at times limited number of effect sizes per relationship.

Results

The Relative Importance of the Motivation Types

To examine whether the types of motivation correlated differentially and in a non-linear fashion with employee outcomes, and therefore explain incremental variance in these outcomes (RQ1), we first provide an overview of the associations between SDT's motivation types and broad categories of desirable (e.g., performance) and undesirable outcomes (e.g., distress). Overall, results outlined in Figure 2 and Table S3, show that increasingly autonomous types of motivation related increasingly positively with desirable and increasingly negatively with undesirable outcomes. In general, intrinsic motivation related more strongly with the outcomes compared to identified regulation. The CIs of these relations did not overlap, providing first evidence for the discriminant validity of the types of motivation. Integrated regulation was an exception in this regard as its relations overlapped significantly with those of identified and intrinsic motivation (Cumming & Finch, 2005). These results should however be interpreted with caution due to the limited number of observations containing integrated regulation and the very large CIs resulting from this. External and introjected regulations were positively related to both desirable and undesirable outcomes, yet effect sizes were generally very small. Amotivation related more strongly to the outcomes than external regulation.

Second, we performed RWA to examine the incremental validity of SDT's types of motivation. Integrated regulation was omitted from this analysis due to the paucity of available effect sizes. As presented in Table 1, the results indicated that, in general, the other motivation types each made unique contributions in accounting for the outcomes. The total explained variance in each outcome ranged from 1% (i.e., absenteeism) to 40% (i.e.,

engagement), and the different types of motivation accounted for about 30% or more of the variance in the well-being outcomes (except for distress) and CWB. Intrinsic motivation was the most important motivation factor as evidenced by its disproportionately high relative weights and accounting for over 46.23% of the motivational effects on outcomes. It explained more than 50% of the variance in burnout, engagement, job satisfaction, affective commitment, turnover intentions, proactivity, counterproductive work behavior (CWB) and absenteeism and was the strongest predictor for 10 out of the 13 outcomes.

Identified regulation was the second most important motivation type, explaining over 22.67% of the variance in the outcomes. It was more important for performance than intrinsic motivation, predicted an equal amount of variance as intrinsic motivation in distress, and was, together with introjected regulation, the most important predictor of OCB. Introjected (11.95%) and amotivation (11.50%) predicted about the same amount of additional variance in the outcomes. Introjected regulation was particularly important in predicting normative commitment, while amotivation accounted for considerable variance in burnout. External regulation was the least important motivation type, explaining less than 10% of the variance in the outcomes. It was only of particular importance in explaining continuance commitment. Notably, except for external regulation, all types of motivation explained a substantial proportion of variance in performance, with identified regulation being the most important predictor.

Specific Relations Between Motivation Types and Outcomes

We then examined the specific relations between each of SDT's type of motivation and the specific outcomes to answer RQ2 and RQ3. Table 2 shows the meta-analytic calculations between the types of motivation and the four different well-being aspects we could examine given the available data (i.e., distress, burnout, engagement, and job satisfaction). Amotivation was clearly associated with decreased well-being: it related

positively to burnout and negatively to work engagement and job satisfaction. External regulation was also associated with well-being costs, relating positively to both distress and burnout, but it was unrelated to the positive well-being constructs of engagement and job satisfaction. Introjected regulation, in contrast, seemed to have both negative and positive well-being implications: it was positively related to burnout and distress, as well as to engagement and job satisfaction. Identified regulation and intrinsic motivation were negatively associated with distress and burnout, and were positively associated with engagement and job satisfaction. Results for integrated regulation followed the same pattern.

In terms of job attitudes, we calculated the meta-analytic correlations for turnover intention and affective, normative, and continuance commitment (Meyer, Becker, & Vandenberghe, 2004). As shown in Table 2, while amotivation was unrelated to normative commitment and turnover intentions, it was related negatively to affective commitment and positively to continuance commitment. External, introjected, and identified regulations were each positively associated with all types of commitment and negatively associated with turnover intentions. Integrated regulation and intrinsic motivation followed largely the same pattern, although intrinsic motivation was unrelated to continuance commitment.

As shown in Table 3, the results for workplace behaviors (i.e., performance, proactivity, organizational citizenship behavior [OCB], counterproductive work behavior [CWB], and absenteeism) seemed to deviate from the pattern observed for well-being and attitudes. Specifically, although few correlations were available for amotivation, the results showed its detrimental association with employee performance and proactivity and its positive relation with CWB. External regulation, in contrast, related positively to performance and proactivity, was negatively related to organizational citizenship behavior (OCB), and unrelated to the other performance outcomes. Introjected and Identified regulations were both positively related to performance, proactivity, and OCB, but also

unrelated to CWB and absenteeism. Integrated regulation was positively related to performance. Intrinsic motivation related positively to all constructive behaviors and was the only type of motivation that significantly related (negatively) to absenteeism.

We then examined if CIs overlapped to determine whether regulations were associated differentially with outcomes (Cumming & Finch, 2005). Focusing on adjacent types of motivation, amotivation and external regulation were similar in only 2 out of 11 comparisons (pertaining to distress and CWB). External and introjected regulations were similar in 5 out of 13 comparisons (the negative well-being indicators [distress and burnout], turnover, proactivity, and absenteeism). Introjected and identified regulations overlapped on 6 out of 13 comparisons, including normative and continuance commitment, and all types of behavior except for performance (i.e. proactivity, OCB, CWB, and absenteeism). Finally, identified and intrinsic motivation overlapped in 8 out of 13 comparisons. Exceptions were burnout, engagement, job satisfaction, affective commitment, and absenteeism. This indicates that there is some overlap in the consequences of these types of motivation for employee optimal functioning. The results for integrated regulation overlapped with either those of identification or intrinsic motivation in 6 out of 8 comparisons (job satisfaction and continuance commitment were exceptions herein), suggesting the nomological networks between these variables are nearly identical.

Moderation Analyses

As shown in Tables 2 and 3, for most relationships, sampling and measurement error account for less than 75% of the observed variance (Schmidt & Hunter, 2015). Only for a few relations, which were typically based on few observations, was this threshold exceeded, suggesting that sampling and measurement error could account for differences in the magnitude of these few correlations. The credibility intervals were generally large, including zero in 34% of the cases. Hence, moderator analyses are necessary to explain this observed

variance and to examine the generalizability of our results (i.e., RQ 5). This was done for all relations for which enough effect sizes were available. For amotivation this was generally not the case. The full results are available in the supplementary materials S4 to S10 and summarized in Tables 4 and 5.

In examining whether the relations between the motivation types and outcomes varied depending on cultural context (i.e., “Western” cultural contexts such as Canada vs. “Eastern” cultural contexts such as China), only 7 out of 47 correlations (15%) testing for different results did not overlap: Introjected regulation related more strongly to burnout, yet less strongly to job satisfaction and affective commitment in Western compared to Eastern countries. Intrinsic motivation also related more strongly to burnout, engagement, job satisfaction and affective commitment in the West than in the East.

The results comparing blue versus white collar workers showed significant differences between both groups in 10 out of 44 comparisons (23%). They all pointed at a stronger relation between motivation and employee well-being, attitudes, and performance for blue collar workers compared to white collar workers; external regulation related more strongly to engagement, and all types of motivation – except for external regulation – related more strongly to job satisfaction. Introjected regulation was more indicative of affective commitment, while intrinsic motivation associated more strongly with normative commitment. Both introjected regulation and intrinsic motivation related more strongly to turnover intentions and performance.

No systematic pattern was present regarding the effects of publication status. In only 12 out of 47 cases (25%) were differences were found between published and unpublished data. In nine cases the published data presented stronger effect sizes, while in the other three cases the effects in the unpublished data were stronger. To gain further insight into whether publication bias was an issue in our data, we supplement this moderation analysis with

Egger's regression test and the rank-correlation test. These tests further indicated that overall, the reported results did not seem affected by publication bias. However, for burnout, smaller correlations tended to be reported less often, which was also the case for studies examining the associations between intrinsic motivation and engagement, performance, and proactivity.

Finally, we examined whether the various operationalizations of SDT's types of motivation, as reflected in the different measurement scales, could explain differences in the strength of the relationships between these types of motivation and employee outcomes (Table 5 and S7-10). Concerning external regulation, material external regulation related more strongly than social external regulation to turnover intention, but no differences were found for burnout, engagement, performance, and OCB.

For introjected regulation, the results indicate that measures that only tap into avoiding negative emotions associate more strongly with burnout, compared to measures including some approach items or a balanced mix of avoidance and approach items. This result was not replicated with regards to distress, which was the only other outcome on which the three types of measures for introjected regulation could be compared. No further differences were found in the strength of the relations between the unbalanced and balanced scales tapping into introjected regulation and job satisfaction, affective commitment, or turnover intentions. Slight differences in the operationalization of identified regulation led to very few differences in the relationships: Identified measures excluding integrated regulation items associated more strongly with distress and job satisfaction; but no differences were found for burnout, engagement, affective or continuance commitment, turnover intentions, performance, proactivity, or OCB.

Discussion

Motivation is a critical issue for employees and employers alike (Kanfer & Chen, 2016). Self-determination theory (SDT; Deci & Ryan, 2000) has provided a nuanced view on

this topic, suggesting that one should not only take into account *how much* employees are motivated (i.e., amotivation versus motivation), or whether they are intrinsically or extrinsically motivated, but also *which types* of extrinsic motivation they hold (i.e., external, introjected, identified or integrated regulation).

SDT has become increasingly popular in organizational psychology, and it is therefore time to take stock of the associations between SDT's different types of work motivation and important outcomes in the organizational literature (i.e., employee well-being, attitudes, and performance). This helps us to understand the strengths and limitations of the current body of research, and to identify avenues for future research. By obtaining all relevant data, this meta-analysis allows us to shed light on some fundamental issues that remain unclear within existing SDT research: *whether* (i.e., RQ1) and *how* (i.e., RQ2-4) each of the SDT types of motivation is uniquely influential in predicting a broad range of employee outcomes, and to what extent these results are generalizable (i.e., RQ5). In doing so, this meta-analysis provides a more precise picture of the value and necessity of SDT's nuanced view of the nature and consequences of employee motivation.

Answers to Our Research Questions

Research question 1: Relative contribution of the types of motivation. All in all, our meta-analysis provides support for the discriminant and incremental validity of SDT's different types of motivation in explaining variance in employee outcomes that we consider to be crucial in the field of organizational psychology. Our results indicate that the correlations of SDT's types of motivation, ordered along the continuum of self-determination, show a linear trend with employee outcomes. While several relations between the motivation types and employee outcomes overlapped, RWA revealed that every type of motivation (including amotivation) holds incremental validity in predicting employee well-being, attitudes, and behavior.

These findings align with previous research that has examined the structure of SDT's types of motivation (Howard et al., 2017, 2018). Using meta-analytic multidimensional scaling and bi-factor analysis, respectively, these studies showed that each of the types of motivation can be ordered along a continuum of self-determination (Howard et al., 2017), reflected by their loadings on a general factor representing the degree of self-determination in each item (Howard et al., 2018). This 'truncus communis' likely accounts for most of the linear trend in our data and the overlapping confidence intervals. In addition to this general factor, SDT's types of motivation have been shown to possess unique properties, which are reflected in their specific factors. These factors likely play a strong role in the unique and incremental effects of the types of motivation on employee outcomes, as evidenced in our RWA.

Integrated regulation is an exception in this regard: the limited results pertaining to this type of motivation indicate that its correlations are almost identical to those of identified regulation or intrinsic motivation, meaning that it adds little incremental explanatory value beyond that of the other motivation types. Despite being clearly differentiated at the conceptual level, the measurement of integrated regulation has challenged SDT researchers for a long time. Even the first scale to assess SDT's different types of regulations (i.e., Ryan & Connell, 1989, tapping into academic motivation) did not include a scale for integrated regulation, which could be attributed to the fact that children may not be mature enough to have integrated extrinsic regulations in a coherent sense of self (Howard et al., 2017). The survey of Ryan and Connell (1989) served as an example for many subsequent scales to assess SDT's types of motivation in different life domains. Despite considerable efforts, many other authors also failed to include integrated regulation in these scales, as such items could not be differentiated from items of identification or intrinsic motivation through of factor analysis (see e.g., Gagné et al., 2015, and Pelletier et al., 1995, in the work and sports

domain, respectively). Moreover, meta-analytic findings indicated that the integrated regulation scales that were developed (e.g. Tremblay et al., 2018) were highly related to identification and intrinsic motivation and that the relations of these integrated regulation scales with the other types of motivation overlapped considerably with those of identification and intrinsic motivation (Howard et al., 2017).

Our meta-analysis expands these findings on integrated motivation. It shows that integrated regulation is hardly examined within the context of work, which is consistent with other meta-analysis in the academic setting (Slemp et al., 2020) and the health context (Ng et al., 2012). Our results add to this body of research in revealing that the associations between integrated regulation and employee well-being, attitudes, and performance almost always overlap with the associations of identified and intrinsic motivation. Further, when no overlap was found, contrary to expectations, integrated regulation (or scales mixing items for identified and integrated regulation) did *not* show the stronger relations with the outcomes than (purely) identified regulation.

We therefore see little compelling evidence to focus on integrated regulation in future questionnaire research in the context of work. This is not to say, however, that integrated regulations should be omitted from SDT theory. The lack of differentiation between integrated, identified, and intrinsic motivation in questionnaire research may simply be due to the fact that people may describe themselves as being more consistent across time and situations than they truly are (Sadler & Woody, 2003). This consistency bias may then cause individuals to say that they consistently engage in particular behaviour because they have integrated this reason (e.g., it has become a fundamental part of who they really are; Tremblay et al., 2009), while actually they may only merely identify with the value of the particular behaviour (e.g., because it allows them to attain work objectives that they consider important; Fernet et al., 2008), yet the behaviour may not be displayed across time and

settings. Hence, because people like to see themselves as more consistent than they really are, people may confuse valuing something as a lower order goal with striving for a higher level, well-integrated goal that defines one's identity and drives consistent behavior (Kruglanski et al., 2002). Future research avoiding, or accounting for, this consistency bias (e.g. through observations or interviews) may be better suited for examining whether integrated regulation has discriminant validity vis a vis SDT's other types of motivation.

Research questions 2-5: Specific associations for the types of motivation. With respect to the specific impact of the autonomous types of motivation (i.e., research questions 2), first, the results support the highly beneficial nature of intrinsic motivation in the workplace: intrinsic motivation explained the most variance in almost all outcomes (except continuance commitment and OCB), and was the sole predictor of absenteeism, albeit with a small impact. Overall, these results suggest that making work inherently enjoyable and interesting pays off.

Comparing these results with those of identified regulation, which represents an autonomous type of extrinsic motivation, we see some overlapping results. However, RWA suggests that intrinsic motivation and identified regulation yield differential and incremental effects: while intrinsic motivation associates more strongly with well-being than identified regulation, the opposite is true for employee behavior (i.e., performance and OCB). This supports the idea that engaging in a particular behavior because one considers it meaningful or valuable (e.g., because it corresponds to one's values, motives or goals; (Sheldon, 2011; Sheldon & Schüler, 2011) may be more important for continuous effort investment, goal directed behavior, or 'going the extra mile', than engaging in a behavior because it is inherently enjoyable – especially when work tasks become more tedious or stressful. This idea has already been voiced by some SDT-scholars (Gagné & Deci, 2005), and adds nuance to previous meta-analytic findings that have highlighted the importance of intrinsic

motivation for high quality performance (Cerasoli, et al. 2014). That is, the current meta-analytical results indicate that some types of extrinsic motivation (i.e., identified regulation) may sometimes lead to higher levels of performance, extra-role behavior, or helping behavior than intrinsic motivation. We encourage further research examining the differential impact of identified regulation and intrinsic motivation on the quantity, quality, and duration of (ideally objectively rated) performance to further support this claim. All in all, our findings indicate that work does not need to be ‘all play’ for employees to feel well and perform well, as long as they find their work meaningful.

Our results furthermore highlight the complex nature of controlled motivation. Specifically, our results highlight that the question of whether controlled forms of motivation are detrimental, unrelated, or less positively related to employee outcomes (i.e., RQ3), should be answered in a nuanced way, taking into account the particular outcome and the type of controlled motivation under study. First, our meta-analysis highlights the Janus face of introjected regulation: engaging in a particular behavior to boost one’s self esteem was positively related to both ill-being (e.g., distress) and well-being (e.g., engagement). It also related to all forms of commitment, though most strongly to normative commitment (see also Meyer et al., 2004), and was a relatively strong predictor of performance and OCB. This indicates that introjected people may perform well by pressuring themselves or striving to feel better about themselves, but with some well-being price to pay. In general, these results were found across operationalizations of introjected regulation that focused solely on avoiding negative emotions such as guilt or shame (i.e., avoidance-based operationalization), and also operationalizations that also incorporated at least some measurement of striving for positive emotions such as pride (i.e., inclusion of approach-based operationalizations).

Second, the current results also show that expecting rewards (e.g., praise, bonus) or aiming to avoid of punishments (e.g., criticism, being fired) may not be the best types of

motivation: they may be stressful; will mostly lead to continuance commitment, which is the form of commitment associated with the worst performance and well-being outcomes (Meyer et al., 2004); offer quite limited contributions to employee performance; and inhibit OCB. These results resemble previous meta-analytic findings in the health context (Ng et al., 2012), but add the perspective of RWA, highlighting the small relative impact of external regulation in explaining these outcomes. Notably, whether one is driven by material (e.g., money) or social (e.g., social pressure) external reasons did not make a difference in terms of employee well-being or behavior, except that being driven by external material reasons may lead to increased chances of turnover. All in all, the results showed that external regulation should therefore not be the only, or even the most important, form of extrinsic work motivation to rely on in the work domain.

Pertaining to research question 4, the results indicated that amotivation proved particularly helpful in understanding burnout and was associated strongly (and negatively) with performance. The current meta-analytic results therefore indicate that having no motivation (i.e., low quantity of motivation) may be more detrimental than external regulation (i.e., low quality of motivation).

The moderation analysis (i.e., research question 5) showed that relationships between motivation types and employee outcomes are generally generalizable across contexts in terms of cultures and job types. With some exceptions, the results also did not seem to be systematically affected by publication bias or the particular operationalizations of the types of motivation. This attests to the universality of SDT and the reliability of our results. However, given the limited number of studies able to be included in the moderation analysis, we nonetheless encourage future research incorporating contextual and methodological variables to further explain the variability in our results and investigate the generalizability of our conclusions.

In sum, our results show that SDT's types of motivation can have different implications for employee well-being, attitudes, and performance. However, the relationships were a bit more complex than can be summarized by SDT's higher-level proposition that increasingly autonomous forms of motivation (i.e., from amotivation to external, introjected, and identified regulation, to intrinsic motivation) should associate increasingly (positively) with employee optimal functioning (Deci & Ryan, 2000). Specifically, identified regulation may sometimes associate with more beneficial (performance related) outcomes than intrinsic motivation; introjected regulation may associate with both positive and detrimental outcomes; while external regulation, and particularly amotivation, likely have negative implications. Despite these nuances, the results support the validity and usefulness of SDT's multidimensional view on motivation as a comprehensive framework to understand the complex phenomenon of motivation. Most importantly, these results indicate that not only the quantity, but also the nuanced differences in the quality of motivation matters. As such, SDT goes above and beyond most motivational theories, which do not take into account the nature or quality of motivation, and instead focus solely on how *much* one is motivated (Kanfer & Chen, 2016; Kanfer, Frese, & Johnson, 2017) – of which Goal Setting Theory is a prime example, yet has nonetheless dominated the literature on employee motivation and practice (Locke & Latham, 2019).

Implications for Theory and Practice

Modelling of the Different Types of Motivation. Our results attest to the discriminant validity of the various types of motivation and provide further evidence for their specific implications for employee outcomes. These results thus have clear implications for how the types of motivation should be modelled in future research. First, as mentioned above, we argue that questionnaire studies may currently leave out integrated regulation until we find better ways to capture it. Second, our results indicate that, unfortunately, relatively few

studies have paid attention to amotivation. Some scholars have posited that people would have at least some kind of motivation to do their job, making the study of amotivation irrelevant (Gagné et al, 2015). Yet, recent person-centered studies estimate that about 10 to 25% of workers are predominantly amotivated (Howard et al., 2016). The current meta-analytic results further attest to the importance of amotivation by showing its incremental value for understanding employee outcomes. We therefore contend that SDT scholars should not only focus on the motivational types (i.e., quality of motivation), but also on the amount of motivation (i.e., quantity of motivation) – and, importantly, include amotivation alongside SDT’s different types of motivation in order to fully understand employees’ motivation in the workplace.

Most importantly, the results highlight that there are clear advantages in considering the motivational regulations separately rather than in composites (e.g., a relative autonomy index, or autonomous versus controlled motivation). These results align with the conclusions of Howard et al., (2020), providing additional meta-analytic insights demonstrating that considering the regulations separately may not only lead to more explained variance, it also allows for a more nuanced understanding of the implications of motivation on employee functioning, thus offering more nuanced guidelines for interventions.

First and foremost, it is not advisable to group external and introjected regulations together to form a construct of controlled motivation, as the use of such a composite score masks their differential effects. Non-significant results of controlled motivation may be driven by the non-significant population correlations of external regulation with the various aspects of employee well-being, attitudes and behavior; and it may also mask the more nuanced and complex findings of introjected regulation.

Grouping identified and intrinsic motivation into the composite of autonomous motivation may be less problematic, as both relate to outcomes in the same direction.

However, such an approach would miss out on the difference in the strength of the relations of these two types of motivation with employee well-being and behavior (e.g., Losier & Koestner, 1996), and further prevent research verifying the effects of targeted interventions on each type of motivation. Future research therefore needs to consider the role of each type of motivation. While this can be achieved through the use of bi-factor models (Howard et al., 2020), this meta-analysis also points to the viability of using relative weights analysis as a way to circumvent potential issues of multicollinearity, and/or for when adopting a highly complex modelling strategy such as bi-factor modelling is not feasible. We do not recommend the use of regression analysis as regression analysis based on the current meta-analytic correlations (available upon request) indeed highlighted that multicollinearity leads to unreliable regression coefficients when the different types of motivation are included simultaneously, evidencing suppression effects and Heywood cases.

Contributions to the Motivation Literature. This meta-analysis also amplifies SDT's contribution to the wider literature on (employee) motivation. First, the results regarding the associations of intrinsic and identified motivation make clear there is not necessarily a tradeoff between motivating employees to perform well and sustaining their health-related well-being, as suggested by the HR-literature (Van De Voorde, Paauwe, & Van Veldhoven, 2012); enhancing both types of employee autonomous motivation may lead to both outcomes. SDT's types of motivation may also help explain why focusing on HR-practices that may increase external regulation (e.g., performance-contingent pay; Gagné & Forest, 2008) or introjected regulation (e.g. employee of the month programs; Johnson & Dickinson, 2010) may have no or limited implications for performance and raise well-being issues.

Second, the importance of identified regulation for employee outcomes is in line with, and contributes to the reviving of, research on the meaning of work (Allan, Batz-Barbarich, Sterling, & Tay, 2019; Rosso, Dekas, & Wrzesniewski, 2010). We complement this line of

work, showing that meaningful work may not only relate to well-being (Allan et al., 2019), but also – and particularly – contributes to predicting performance. Moreover, SDT may help to solve some issues regarding the conceptualization of ‘meaning’. When people identify with extrinsic reasons to engage in a particular behavior, they bring together both *inter-personal* and *intra-personal* experiences into one coherent sense of self – and meaning can therefore be derived from both other and self-oriented experiences (Bailey, Yeoman, Madden, Thompson, & Kerridge, 2019). SDT further specifies identified regulation as an autonomous extrinsic type of motivation, which helps us to understand why employees may find meaning in work because it serves another end (i.e., extrinsic motivation), yet experience this type of motivation as internal (Hackman & Oldham, 1976). Our findings indicate that theories that use the intrinsic/extrinsic dichotomy are too simplistic to capture this important nuance. This shows how SDT may help to understand and reconcile issues or inconsistencies regarding facets of motivation in the broader literature on organizational psychology

The results pertaining to introjected regulation point to the importance of specifying motivational constructs. We see at least four reasons why introjected regulation has these mixed correlates. First, introjected regulation includes both a focus on avoiding emotions that pose a threat to one’s self esteem (e.g., guilt, shame) and striving for positive emotions that may boost one’s self-esteem (e.g., pride). Our moderation analysis could not find any differences in the strength of the relations of introjected regulation operationalised in different ways – except for burnout, which was more strongly associated with scales tapping into avoiding negative emotions than with an (un)balanced mix of approach and avoidance items. However, a true comparison with solely approach oriented introjected regulation could not be made, as no such scales are available within organizational psychology. We would encourage future research to look further into this issue and marry approach/avoidance theories (e.g., Carver, 2006; Higgins, 2002; Kuhl, 2000) with SDT research. Such research

could allow us to see whether initial findings showing that avoidance introjected regulation is more detrimental than a focus on approach introjected regulation (Assor, Vansteenkiste, & Kaplan, 2009) can be replicated and generalized across contexts.

Second, even when focusing on either approach or avoidance, measures for introjected regulation can be criticized for including an amalgam of negative (e.g., guilt and shame) and positive (e.g., pride) emotions. Yet, each of these emotions represent qualitatively different constructs, with external shame and hubristic pride for example being more negatively related to outcomes than internal shame and authentic pride (Kim, Thibodeau, & Jorgensen, 2011; Tracy & Robins, 2007). Third, moderating variables may alter the implications of these discrete emotions. Shame may for example lead employees to engage in either OCB or CBW, depending on the reparability and injustice of the situation (Daniels & Robinson, 2019). Apart from these self-relevant emotions, the focus on maintaining or improving one's self-esteem included in introjected regulation (Leary, 2007) may be a fourth aspect, adding ambivalence to introjected regulation; as a focus on self-esteem may only lead to negative consequences if it pertains to contingent self-esteem (Ferris, Brown, Lian, & Keeping, 2009). Future research could further investigate whether, and under what circumstances, the various aspects inherent in introjected regulation may associate differently with employee outcomes.

Notably, some SDT-scholars argue that the heterogeneity inherent in introjected regulation represents the “partially internalized” nature of this type of motivation (Deci & Ryan, 2000). Introjected regulation is neither clearly controlled, nor clearly autonomous, but rather falls somewhere in between – and therefore will, by definition, result in a mix of desirable and undesirable outcomes. Our results pointing at the Janus-face of introjected regulation are in line with this perspective and expand previous results demonstrating that introjected regulation is equidistant between external and identified regulation (Howard et al.,

2017), with moderately positive factor loadings on a general factor of self-determination (Howard et al., 2018). In any case, our results overall indicate that managers should withhold from fostering employee motivation through introjected regulation, and focus instead on increasing autonomous types of motivation instead.

Finally, our results for external regulation stand in sharp contrast with studies of extrinsic motivation and monetary incentives (Cerasoli et al., 2014), and the ubiquitous use of management methods that coerce employees into behaving in certain ways through the use of reinforcements, monitoring, and sanctions. For example, the literature within HRM strongly supports the effectiveness of monetary-based incentives (Shaw & Gupta, 2015), and the prevalence of individual reward schemes in contemporary organizations likewise assume a positive effect on employee outcomes. The literature from SDT summarized here provides critical nuances to these strongly held beliefs. First, our findings indicate that external regulation, which likely results from striving for rewards and avoiding punishments, is far less strongly related to performance than the other types of motivation. This may be explained by previous meta-analytic findings that incentives are more strongly related to how much one performs (i.e., how much output one generates), and less predictive of performance quality (i.e., creativity, quality of the output; Cerasoli et al., 2014). Although the current results did not allow us to differentiate between these types of performance, delivering high quality performance is increasingly important in the context of work (Carpini, Parker, & Griffin, 2017). This then brings into question the value of motivating employees externally. Second, and perhaps most notably, HRM and management studies typically examine turnover and performance of employees following incentivization interventions, but rarely do they consider the well-being implications (Jiang, Hu, Liu, & Lepak, 2015; Shaw & Gupta, 2015). We show that external regulation is likely to have a negative impact on employee well-being. Such an effect may well lead to further problems over time, including performance issues and

turnover, and as such may not be as beneficial as is believed. We argue that much progress can be made through better integration of these literatures, building upon the current findings to inform future research.

Limitations and Suggestions for Future Research

This meta-analysis has some limitations, which may also inspire future research to advance the study of employee motivation through SDT's multidimensional perspective. First, the quality of this meta-analysis is of course based on the quality of the primary studies. As the majority of research included in this meta-analysis relied on cross-sectional correlational survey designs, shared method variance and self-report bias may have obscured our results (Podsakoff, MacKenzie, Lee & Podsakoff, 2003). There is a clear need for longitudinal and quasi-experimental field research that would meet more causality criteria so we can improve our understanding of how the various types of work motivation influence work-related outcomes.

Second, parts of the literature on SDT's multidimensional view on motivation include very few studies. This limited the sample size on which some of the effect sizes were based (e.g., relations with CWB, the relations of amotivation, moderation analysis) and forced us to aggregate several constructs into a broader category (e.g., CWB includes withdrawal as well as interpersonal deviance) to have sufficient sample numbers to run analyses. This may have influenced the precision of some of our estimates. The limited number of available correlations also prevented us from modelling the structural relations among our variables and testing research questions pertaining to, for example, the relative importance of motivation types for various aspects of performance, including the quantity and quality of work. Answering such questions would be informative in understanding to what extent the results differ for hedonic (e.g., happiness) versus eudemonic (e.g., mindfulness) well-being (Ryan, Huta & Deci, 2008).

The results of our meta-analysis clearly demonstrate SDT's focus on positive outcomes, much in line with the 20-year-old criticism that SDT does not account for the 'dark side' of human functioning (Pyszczynski, Greenberg, & Solomon, 2000). Although scholars have since broadened their scope and started to include ill-being (e.g., distress), this criticism is still very applicable to the behavioral outcomes studied to date. Future research could include more negative behaviors, such as antisocial behaviors (e.g., deviance, sabotage, theft, cheating; e.g., Tremblay et al., 2009), as this would increase our understanding of whether externally regulated people just "don't contribute" in organizations, as our current results suggest, or whether they actively cause trouble (e.g., conflict, cheating, etc.).

We also encourage future research to disentangle the finding that all types of motivation (except external) were important for performance. Relations between the types of motivation and performance may not be straightforward (Van Iddekinge et al., 2018), yet depend on task characteristics and types of performance (Byron & Khazanchi, 2012; Cerasoli et al., 2014). Consequently, it may be that external regulation is particularly relevant for task performance on simple/boring tasks; while identified regulation may be more relevant for complex tasks that require extended effort; and intrinsic motivation the strongest predictor of interesting or creative tasks. This would nuance earlier findings focusing on performance quantity and quality in the context of work (Cerasoli et al., 2014) and shed light on which of the types of motivation are likely to predict diverse performance criteria such as proficiency, creativity, being a good team player, and adapting to rapid changes.

We would also encourage scholars to move beyond the study of SDT's types of motivation in and of itself, and in relation to other OB-related constructs, and integrate other motivational theories. Previous research in the domain of work, for example, have endeavored to marry the different types of motivation with goal achievement theory. On the one hand, such studies show that autonomous motivation is related to mastery-approach

goals; while controlled motivation and amotivation relates to mastery-avoidance goals and both performance-approach and -avoidance goals (Vanthournout, Kyndt, Gijbels, & Van den Bossche, 2015). On the other hand, intrinsic motivation and mastery-approach goals also predict outcomes such as work effort (Dysvik & Kuvaas, 2013). We welcome future research that sheds more light on the temporal and synergistic effects of SDT's and other types of motivation in order to facilitate a more integrated literature on work motivation.

Relatedly, such studies could also make use of profile analysis to see which types of motivation naturally co-occur with SDT's types of motivation. Previous studies have differentiated employees based on profiles characterized by different levels of the types of motivation (e.g., Van den Broeck et al., 2013; Howard et al., 2016). Whereas these studies adopt a person-oriented perspective, our meta-analysis is the first to meta-analytically examine the nomological network of each type of motivation from a variable-centered perspective. Our results may therefore help profile studies further interpret their results and inform the literature about the added value of both approaches. Moreover, to shed further light on the specific nature of the types of motivation, future research may examine more closely the implications of holding various types of motivation at the same time by looking at their interactions. Previous research indicates that the specific combination of high autonomous and low controlled motivation is associated with high levels of performance; while the combination of low autonomous and high controlled motivation is associated most strongly with distress (Grant, Nurmohamed, Ashford, & Dekas, 2011; Strauss, Parker, & Shea, 2017). As our results provided evidence for differential effects of among the autonomous as well as the controlled motivation types, a nuanced perspective examining the implications of interactions between the types of motivation may provide additional insights.

Practical Implications

The results of this meta-analysis show that when organizations want to achieve

employee well-being, positive attitudes, and performance, they should shy away from trying to motivate employees to work through incentives and sanctions; external regulation was shown to be the least potent form of motivation to regulate performance, and was also associated with high well-being costs. Instead, organizations should nurture intrinsic motivation, perhaps through motivating, job design (Van den Broeck et al., 2016), or autonomy support from colleagues (Jungert, Van den Broeck, Schreurs, & Osterman, 2018) or supervisors (Slemp et al., 2018), as intrinsic motivation is most strongly associated with employee optimal functioning. However, organizations are not limited to solely intrinsic motivation. Though intrinsic motivation is the best predictor for most outcomes, when it comes to work performance and OCB, identified regulation is potentially more important. This means that organizations should not only think about how to make jobs more fun and interesting, but should also concentrate on creating meaning by, for example, increasing the perceived impact of one's work on beneficiaries (Grant, 2012). Leaders can also articulate a compelling vision that speaks to the values of their employees, which is the hallmark of transformational and charismatic leadership research (Bass & Avolio, 1995). All in all, our results highlight the importance of differentiating between the various types of motivation, above and beyond their general degree of self-determination or categorization into autonomous and controlled motivation. Organizations can therefore strategically decide which type of motivation they want to foster in order to achieve the outcomes they value the most.

Conclusion

Self-determination theory has become a popular theory within organizational psychology (see also Deci et al., 2017; Van den Broeck et al., 2016). Taking stock of this growing body of literature, this meta-analysis revealed that differentiating between each of the various types of motivation is valuable for understanding employee well-being, attitudes,

and behavior. The available empirical evidence also provided additional detail to SDT's overall theoretical statement that the correlates of the different types of motivation become more and more positive as autonomy increases (Deci & Ryan, 2000). It seems that, in some cases, identified regulation may be more important than intrinsic motivation. Introjected regulation is an ambivalent type of motivation; while external regulations has small positive associations with performance and negative relations with well-being. Our results show that amotivation should be considered too in SDT research, particularly because it is strongly associated with distress and low performance. Given the promising results regarding the incremental and discriminant validity of SDT's various types of motivation, we encourage scholars to further invest in examining their differential effects in more detail. Such endeavors should, however, make use of more nuanced analysis such as RWA, and rely on more ambitious research methods such that firmer conclusions can be drawn on the importance of the quality of employee motivation.

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Table 1
Relative Weights Analysis of the Different Types of Motivation Predicting Outcomes

Outcomes	R ²	Amotivation		External		Introjected		Identified		Intrinsic	
		RW	%	RW	%	RW	%	RW	%	RW	%
Distress	.10	.01	11.88	.00	4.82	.01	12.65	.04	35.60	.04	35.05
Burnout	.27	.10	33.96	.00	.56	.02	5.82	.02	8.85	.14	50.82
Engagement	.40	.03	6.29	.00	.14	.01	2.11	.12	28.75	.25	62.71
Job Satisfaction	.39	.07	17.73	.00	.42	.01	2.54	.10	24.96	.21	54.34
Affective Com.	.33	.02	4.51	.00	.72	.03	8.33	.09	27.80	.20	58.64
Normative Com.	.33	.00	.38	.01	3.43	.13	38.29	.05	15.54	.14	42.36
Continuance Com.	.05	.00	7.84	.04	76.78	.00	8.62	.00	4.87	.00	1.88
Turnover Intention	.12	.01	4.08	.01	4.99	.00	2.50	.04	34.96	.07	53.47
Performance	.25	.06	22.80	.00	.84	.04	17.40	.09	35.30	.06	23.65
Proactivity	.27	.01	2.54	.03	11.38	.03	9.93	.06	21.27	.15	54.87
OCB	.19	-	-	.02	9.99	.06	33.91	.06	31.05	.05	25.04
CWB	.28	.04	14.47	.02	8.12	.03	10.90	.04	14.45	.15	52.06
Absenteeism	.01	-	-	.00	0.34	.00	2.36	.00	11.26	.01	86.04
Average			11.50		9.43		11.95		22.67		46.23

Note: RW: relative weight; %: rescaled relative weight (i.e., relative weight divided by full model R²); Affective Com.: Affective commitment; Normative Com.: Normative commitment; Continuance Com.: Continuance Commitment; CWB: Counterproductive Work Behaviors.

Table 2

Meta Analytic Correlations of the Different Types of Motivation with Well-being and Attitudes

		k	N	r	ρ	S.D.	S.E.	95% CI	80% CV	% acc	Eggers' z	rank correlation test
Amotivation	Distress	5	1820	0.12	0.15	0.32	0.14	[-0.13 ; 0.43]	[-0.17 ; 0.47]	4.1%	-	-
	Burnout	16	8266	0.34	0.44	0.21	0.05	[0.34 ; 0.54]	[0.21 ; 0.67]	3.9%	-1.83	-.53**
	Engagement	12	6532	-0.22	-0.27	0.14	0.04	[-0.34 ; -0.19]	[-0.4 ; -0.13]	12.3%	-1.60	-.33
	Job satisfaction	18	11202	-0.25	-0.32	0.11	0.03	[-0.37 ; -0.27]	[-0.45 ; -0.19]	11%	.05	.17
	Affective com.	14	10277	-0.12	-0.17	0.28	0.07	[-0.31 ; -0.02]	[-0.42 ; 0.09]	3.1%	.32	.13
	Normative com.	4	5432	-0.02	-0.03	0.06	0.03	[-0.08 ; 0.03]	[-0.06 ; 0]	54.6%	-	-
	Continuance com.	5	5635	0.07	0.1	0.05	0.02	[0.06 ; 0.15]	[0.06 ; 0.15]	45.2%	-	-
	Turnover intention	9	9799	0.07	0.1	0.22	0.07	[-0.05 ; 0.24]	[-0.11 ; 0.3]	3.5%	-	-
External	Distress	40	20746	0.07	0.09	0.12	0.02	[0.05 ; 0.12]	[-0.02 ; 0.2]	20.1%	.99	.12
	Burnout	50	26679	0.07	0.08	0.18	0.03	[0.03 ; 0.13]	[-0.11 ; 0.28]	7.5%	-.33	-.32***
	Engagement	51	24809	0.01	0.01	0.14	0.02	[-0.03 ; 0.05]	[-0.13 ; 0.15]	14.7%	-.80	.07
	Job satisfaction	54	28594	0.02	0.03	0.19	0.03	[-0.02 ; 0.09]	[-0.15 ; 0.22]	7.9%	-.40	.20*
	Affective com.	45	23796	0.04	0.06	0.18	0.03	[0.01 ; 0.11]	[-0.11 ; 0.23]	10.1%	.68	.09
	Normative com.	8	6542	0.1	0.15	0.13	0.05	[0.06 ; 0.24]	[0.02 ; 0.27]	10.8%	-	-
	Continuance com.	13	8127	0.22	0.33	0.12	0.03	[0.26 ; 0.39]	[0.17 ; 0.48]	7.9%	1.00	.14
	Turnover intention	18	16184	-0.06	-0.08	0.13	0.03	[-0.14 ; -0.02]	[-0.18 ; 0.03]	14.4%	1.66	0.01
Introjected	Distress	38	20603	0.05	0.06	0.14	0.02	[0.02 ; 0.1]	[-0.07 ; 0.19]	15.4%	-.17	-.07
	Burnout	57	30625	0.07	0.08	0.18	0.02	[0.03 ; 0.13]	[-0.1 ; 0.26]	8.5%	-2.60**	-.19*
	Engagement	47	25852	0.15	0.18	0.13	0.02	[0.14 ; 0.21]	[0.04 ; 0.32]	12.5%	-.92	-.06
	Job satisfaction	54	28216	0.14	0.17	0.19	0.03	[0.12 ; 0.22]	[-0.02 ; 0.36]	7.6%	-.50	.08
	Affective com.	42	21208	0.21	0.26	0.22	0.03	[0.19 ; 0.33]	[0.03 ; 0.49]	5.3%	-.74	.08
	Normative com.	10	7352	0.36	0.45	0.07	0.02	[0.41 ; 0.50]	[0.31 ; 0.6]	6.4%	1.12	.20
	Continuance com.	12	7776	0.11	0.14	0.16	0.05	[0.05 ; 0.24]	[0.02 ; 0.27]	14%	.32	.17
	Turnover intention	23	20002	-0.08	-0.1	0.14	0.03	[-0.16 ; -0.05]	[-0.24 ; 0.03]	9.3%	-.06	-.08

Identified	Distress	39	17907	-0.2	-0.23	0.18	0.03	[-0.29 ; -0.18]	[-0.42 ; -0.04]	8%	1.54	.06
	Burnout	56	26730	-0.21	-0.25	0.17	0.02	[-0.29 ; -0.2]	[-0.42 ; -0.08]	9.3%	.28	.03
	Engagement	49	26633	0.49	0.57	0.1	0.01	[0.54 ; 0.59]	[0.42 ; 0.71]	6.2%	-1.33	-.13
	Job satisfaction	51	23451	0.38	0.47	0.18	0.02	[0.43 ; 0.52]	[0.26 ; 0.69]	4.3%	2.18*	-.07
	Affective com.	41	22840	0.37	0.46	0.12	0.02	[0.43 ; 0.5]	[0.3 ; 0.62]	6.9%	-1.31	-.07
	Normative com.	8	6804	0.3	0.38	0.13	0.05	[0.29 ; 0.47]	[0.27 ; 0.5]	9.4%	-	-
	Continuance com.	9	7047	0.07	0.09	0.11	0.04	[0.02 ; 0.17]	[0 ; 0.19]	19%	-	-
	Turnover intention	11	10762	-0.24	-0.29	0.18	0.06	[-0.4 ; -0.18]	[-0.48 ; -0.1]	3.7%	.40	.02
Integrated	Distress	5	7758	-0.14	-0.16	0.28	0.12	[-0.41 ; 0.08]	[-0.45 ; 0.12]	1.2%	-	-
	Burnout	4	7581	-0.18	-0.22	0.03	0.01	[-0.24 ; -0.19]	[-0.26 ; -0.18]	31%	-	-
	Engagement	2	3788	0.33	0.4	0.22	0.15	[0.1 ; 0.69]	[0.23 ; 0.56]	2.1%	-	-
	Job satisfaction	11	6859	0.3	0.35	0.1	0.03	[0.3 ; 0.41]	[0.24 ; 0.47]	14%	1.01	.11
	Affective com.	4	2728	0.4	0.47	0.12	0.06	[0.35 ; 0.6]	[0.36 ; 0.58]	10.5%	-	-
	Continuance com.	2	433	0.37	0.52	0.21	0.15	[0.23 ; 0.8]	[0.26 ; 0.77]	5.9%	-	-
	Turnover intention	5	4737	-0.14	-0.18	0.1	0.04	[-0.26 ; -0.09]	[-0.27 ; -0.08]	15.6%	-	-
Intrinsic	Distress	47	25114	-0.21	-0.24	0.21	0.03	[-0.3 ; -0.18]	[-0.48 ; 0]	4.5%	1.22	.12
	Burnout	62	33980	-0.34	-0.4	0.21	0.03	[-0.45 ; -0.35]	[-0.63 ; -0.17]	3.8%	.80	.12
	Engagement	62	30311	0.61	0.67	0.19	0.02	[0.62 ; 0.72]	[0.43 ; 0.91]	1.7%	-3.17**	-.35***
	Job satisfaction	60	32734	0.48	0.57	0.2	0.03	[0.52 ; 0.62]	[0.33 ; 0.81]	2.3%	-1.40	-.20*
	Affective com.	48	25748	0.44	0.55	0.14	0.02	[0.5 ; 0.59]	[0.37 ; 0.72]	4.6%	-1.80	-.13
	Normative com.	9	7455	0.37	0.47	0.11	0.04	[0.39 ; 0.54]	[0.3 ; 0.63]	4.2%	-	-
	Continuance com.	11	7857	0.04	0.05	0.12	0.04	[-0.02 ; 0.13]	[-0.04 ; 0.14]	22%	.32	.11
Turnover intention	24	20426	-0.28	-0.32	0.25	0.05	[-0.42 ; -0.22]	[-0.6 ; -0.05]	2%	.35	.09	

Note: *k*: number of effect sizes; *N*: total subject number; *r*: average correlation coefficient; ρ : correlation corrected for unreliability and weighted by sample; SD: Standard deviation, SE: Standard error; CI: Confidence intervals, CV: Credibility intervals; %acc: percent of variance attributable to sampling error; Com.: Commitment. Table only includes relations for which more than one correlation could be found.

Table 3
Meta Analytic Correlations of the Different Types of Motivation with Behaviors

		k	N	r	ρ	S.D.	S.E.	95% CI	80% CV	% acc	Eggers' z	rank correlation test
Amotivation	Performance	10	9531	-0.2	-0.28	0.06	0.02	[-0.32 ; -0.24]	[-0.39 ; -0.17]	10.4%	-.15	-.11
	Proactivity	2	444	-0.1	-0.11	0.01	0.01	[-0.13 ; -0.09]	[-0.19 ; -0.03]	1819.9%	-	-
	CWB	2	332	0.18	0.21	0.07	0.05	[0.11 ; 0.31]	[0.17 ; 0.25]	123.5%	-	-
External	Performance	29	17335	0.03	0.04	0.11	0.02	[0 ; 0.08]	[-0.06 ; 0.13]	22.8%	-.46	.03
	Proactivity	18	6759	0.15	0.2	0.3	0.07	[0.06 ; 0.34]	[-0.05 ; 0.45]	6.2%	-1.66	.11
	OCB	10	9939	-0.05	-0.07	0.06	0.02	[-0.11 ; -0.03]	[-0.12 ; -0.03]	47.1%	.96	.07
	CWB	5	1088	0.12	0.14	0.17	0.07	[-0.01 ; 0.28]	[-0.02 ; 0.29]	23.4%	-	-
	Absenteeism	18	7556	.00	.00	0.07	0.02	[-0.04 ; 0.03]	[-0.05 ; 0.04]	64.7%	-.76	-.06
Introjected	Performance	25	16628	0.22	0.28	0.17	0.03	[0.22 ; 0.35]	[0.13 ; 0.44]	8%	-.80	.03
	Proactivity	11	4712	0.22	0.27	0.16	0.05	[0.17 ; 0.37]	[0.1 ; 0.44]	10%	-.06	-.16
	OCB	8	9414	0.24	0.29	0.21	0.07	[0.15 ; 0.44]	[0.1 ; 0.49]	3%	-	-
	CWB	2	332	-0.12	-0.14	0.15	0.11	[-0.35 ; 0.07]	[-0.26 ; -0.02]	39.7%	-	-
	Absenteeism	18	7556	0	0	0.07	0.02	[-0.03 ; 0.03]	[-0.05 ; 0.05]	64.2%	-.67	-.09
Identified	Performance	27	17163	0.35	0.43	0.16	0.03	[0.37 ; 0.49]	[0.24 ; 0.61]	4.7%	-1.78	-.11
	Proactivity	15	5187	0.33	0.38	0.18	0.05	[0.29 ; 0.48]	[0.18 ; 0.59]	7.8%	-1.07	-.20
	OCB	8	9414	0.29	0.34	0.27	0.1	[0.16 ; 0.53]	[0.08 ; 0.61]	1.5%	-	-
	CWB	4	687	-0.02	-0.04	0.41	0.2	[-0.44 ; 0.36]	[-0.43 ; 0.35]	6%	-	-
	Absenteeism	18	7556	-0.02	-0.02	0.07	0.02	[-0.05 ; 0.01]	[-0.07 ; 0.03]	62.9%	-.88	-.12
Integrated	Performance	4	1128	0.26	0.31	0.04	0.02	[0.27 ; 0.35]	[0.27 ; 0.34]	77.2%	-	-
Intrinsic	Performance	43	21200	0.3	0.36	0.2	0.03	[0.3 ; 0.42]	[0.15 ; 0.56]	5.7%	-2.44*	-.21*
	Proactivity	26	9491	0.39	0.47	0.21	0.04	[0.39 ; 0.55]	[0.27 ; 0.66]	6.9%	-3.29***	-.29*
	OCB	16	12259	0.26	0.31	0.29	0.07	[0.17 ; 0.45]	[0 ; 0.62]	1.8%	.03	-.24
	CWB	5	1337	-0.3	-0.36	0.14	0.06	[-0.48 ; -0.24]	[-0.51 ; -0.21]	17.3%	-	-
	Absenteeism	18	7556	-0.07	-0.07	0.06	0.02	[-0.1 ; -0.04]	[-0.12 ; -0.02]	60.5%	-.12	-.05

Note: k: number of effect sizes; N: total subject number; r: average correlation coefficient; ρ : correlation corrected for unreliability and weighted by sample; SD: Standard deviation, SE: Standard error; CI: Confidence intervals, CV: Credibility intervals; %acc: percent of variance attributable to sampling error; Com.: Commitment. Table only includes relations for which more than one correlation could be found.

Table 4
Subgroup Analyses Testing Moderation of Various Sample Characteristics

Covariates	Western vs. Eastern					Blue vs. White Collar					Published vs. Unpublished				
	Amotivation	External	Introjected	Identified	Intrinsic	Amotivation	External	Introjected	Identified	Intrinsic	Amotivation	External	Introjected	Identified	Intrinsic
Distress		=	=	=	=		=	=	=	=		<	<	>	=
Burnout	=	=	>	=	>		=	=	=	=		=	=	=	<
Engagement	=	=	=	=	>		>	=	=	=		=	=	=	=
Job Satisfaction	=	=	<	=	>		=	>	>	>	=	<	=	=	<
Affective Com.	=	=	<	=	>	=	=	>	=	=	>	=	=	>	=
Normative Com.			=		=		=	=	=	>		=	=	=	=
Continuance Com.			=		=		=	=	=	=		<	=	=	=
Turnover Intention	=	=	=	=	=		=	>	=	>		=	=	=	=
Performance	=	=	=	=	=	=	=	>	=	>		=	<	=	=
Proactivity		=	=	=	=				=	=		=	=	=	=
CWB		=													=
OCB		=	=	=	=							=	<	=	<
Absenteeism							=	=	=	=					

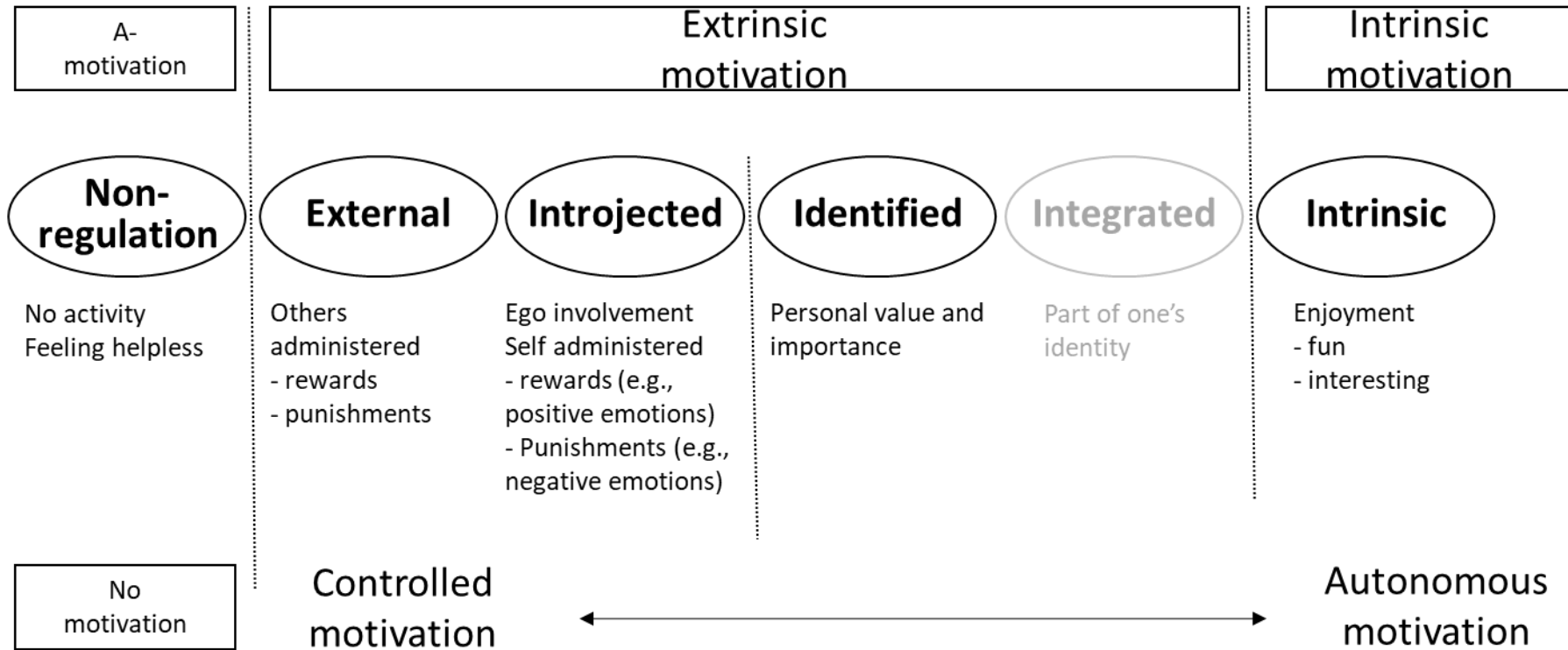
Note. < indicates e.g., significantly lower effect sizes for published data compared to unpublished; > represents greater effect sizes e.g., for published compared to unpublished; = represents non-significant differences using $p = .05$ as a cut-off. More detailed results are available in the supplementary materials Tables S4-6.

Table 5
Subgroup Analyses Testing Moderation of Various Operationalizations of the Types of Motivation

Covariates	Material vs. Social External Regulation	Only avoidance vs. unbalanced avoidance introjected regulation	Only avoidance vs. balanced avoidance/approach introjected regulation	Unbalanced vs. balanced avoidance/approach introjected regulation	Identified measures without vs. with integration items
Distress		=	=	=	>
Burnout	=	>	>	=	=
Engagement	=				=
Job Satisfaction				=	>
Affective Com.				=	=
Normative Com.					
Continuance Com.					=
Turnover Intention	>			=	=
Performance	=				=
Proactivity					=
CWB					
OCB	=				=
Absenteeism					

Note. > represents greater effect sizes for e.g., material vs. social external regulation scales; = represents non-significant differences using $p = .05$ as a cut-off. More detailed results are available in the supplementary materials Tables S7-10.

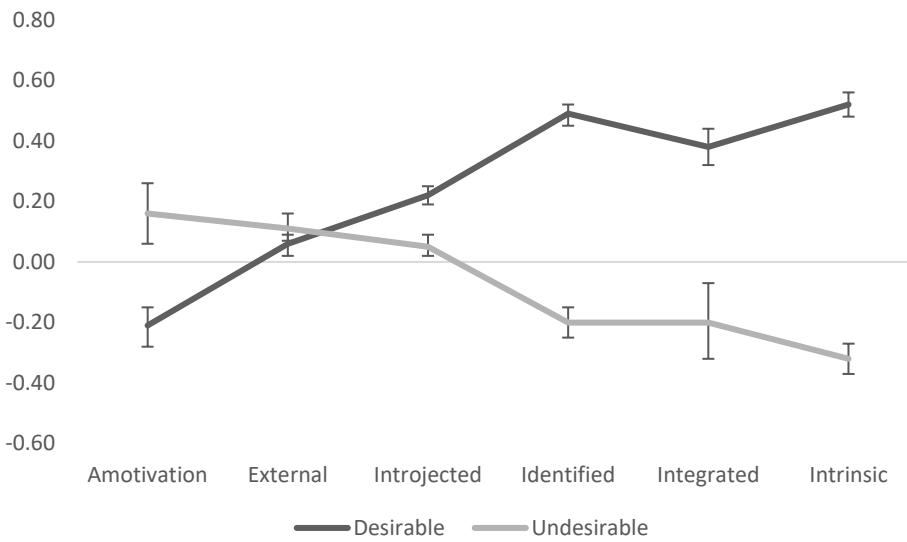
FIGURE 1
Different Types of Motivation



Note: Integration is put in grey as together with previous evidence, our results show there is little added value in considering this type of motivation

FIGURE 2

Summary of Results Regarding the Relationships of the Types of Motivation on Outcomes



Note. Desirable outcomes include affective commitment, normative commitment, engagement, job satisfaction, OCB, performance, & proactivity. Undesirable outcomes include absenteeism, burnout, continuance commitment, distress, turnover intention.

Online Supplementary Materials for:
**BEYOND INTRINSIC AND EXTRINSIC MOTIVATION: A META-ANALYSIS ON SELF-
DETERMINATION THEORY'S MULTIDIMENSIONAL CONCEPTUALIZATION OF
WORK MOTIVATION**

Table S1: Overview of Recent Meta-analyses and Reviews on (Intrinsic and Extrinsic) Work Motivation

Table S2: Meta Analytic Correlations among the Different types of Motivation

Table S3: Summary of Results Regarding Desirable and Undesirable Outcomes and Antecedents

Table S4: Moderation effect of Cultural Context on Outcomes

Table S5: Moderation effect of Job Type on Outcomes

Table S6: Moderation effect of Published vs. Unpublished Studies

Table S7: Scale items

Table S8: Moderation effect of Material and Social External Regulation

Table S9: Moderation effect of Approach and Avoidance Introjected Regulation

Table S10: Moderation effect of Integration items in the scale for identification

Figure S1: Overview of the Search and Selection Process

REFERENCES DATA INCLUDED IN THE META-ANALYSIS

Table S1
Overview of Recent Meta-analyses and Reviews on (Intrinsic and Extrinsic) Work Motivation

Authors	Type of study	Research question	Difference with the current review and meta-analysis
Motivation in general			
Kanfer & Chen, (2016) Kanfer et al. (2017)	Review	Reviews the different theoretical frameworks used to understand the what (i.e. goals) and why (i.e. behavioral regulations) of motivation as well as the contextual influences on these aspects of motivation.	Rather than providing an overview of all theories relevant to understand employee motivation, the present meta-analysis focuses on one theory (i.e., SDT and more specifically its multidimensional conceptualization of motivation. This study examines based on meta-analytic correlations the added value of SDT's multidimensional view on motivation to understand employee functioning and its antecedents.
Van Iddekinge, Aguinis, Mackey, & Deortentis (2018)	Meta-analysis	Examined interactive, additive, and relative effects of cognitive ability and motivation on performance	They measured motivation broadly in terms of "achievement (to capture achievement striving, need for achievement, and related terms), attentional focus/resources, diligence, effort, goal (to capture goals, goal setting, goal commitment, and related terms), hard work, intensity, mental effort/workload, motivation, on-task/off-task thoughts, persist/persistence, time spent, work ethic, and work orientation" (Van Iddekinge et al., 2018, p258).
Cerasoli, Nicklin, & Ford (2014)	Meta-analysis	Examined how Intrinsic Motivation and Extrinsic Incentives Jointly Predict Performance	Similar to our study, these authors wanted to examine how intrinsic and extrinsic motivation relate to performance. Rather than measuring extrinsic motivation (i.e. an internal state), they focused on the provision of extrinsic rewards (i.e. what is provided in the environment to externally motivated people), which may potentially lead to external regulation. We move beyond this classic (external) representation of extrinsic motivation by including all different types of motivation as

			detailed by SDT and examine their associations not only with performance, but also with employee well-being and attitudes.
Byron & Khazanchi (2012)	Meta-analysis	Examined the association between extrinsic motivation and creativity and studied the moderating effect of performance feedback, engagement information, choice and control as well as task complexity in this relation.	They model extrinsic motivation in terms of “reinforcement, rewards, extrinsic motivation, and pay-for-performance” (p. 815) and hence combine both the external rewards and the internal feelings that likely represent external motivation. We focus on a broader set of types of extrinsic motivation. They focus only on creativity as an outcome, while we examine well-being, attitudes and performance.
A set of nine meta-analyses (Cameron, Banko, & Pierce, 2001; Cameron & Pierce, 1994; Eisenberger & Cameron, 1996; Deci et al., 1999, 2001; Eisenberger, Pierce, & Cameron, 1999; Rummel & Feinberg, 1988; Tang & Hall, 1995; Wiersma, 1992)	Meta-analyses	Focused the undermining effect referring to the idea that motivating intrinsically motivated people extrinsically by presenting incentives reduces subsequent intrinsic motivation for the task.	These authors focused on rewards – rather than the internal feelings of motivation, and sole focus on external regulation while we included all types of extrinsic motivation. These authors only attended to the interplay between intrinsic and extrinsic motivation, while we focus not on their interrelation, but rather on the relations of each of the different types of motivation with their antecedents and outcomes.
Research in SDT			
Deci, Olafsen, & Ryan (2017)	Review	Review the literature on SDT in the context of work	Not based on meta-analytic correlations.
Van den Broeck, Ferris, Chang, & Rosen (2016)	Meta-analysis	Reviewed SDT’s conceptualization of the basic psychological needs of autonomy, competence and relatedness and assessed their meta-analytic correlations with intrinsic motivation, the different types of extrinsic motivation, employee well-being, attitudes and performance as well as their potential antecedents	This study examines the relationship between basic psychological needs and outcomes, including the different types of motivation. To avoid overlap, we therefore did not include basic needs in our meta-analysis.

Howard et al., (2017)	Meta-analysis	Reviewed the correlations among SDT's different types of motivation to see whether they resemble a simplex pattern	Focus on the interrelations of the different types of motivation, across life domains (the work domain is included). This is why we didn't report on the these relations. However, these authors did not examine the outcomes of motivation, which was the focus of our meta-analysis.
Slemp, Kern, Patrick, & Ryan (2018)	Meta-analysis	Examining the meta-analytic relations between leader autonomy support with basic need satisfaction, autonomous and controlled motivation and employee well-being, attitudes and performance.	Focus was on autonomy supportive leadership as an antecedent of SDT's types of motivation, but this articles also provides the relationship between the composite scores of autonomous and controlled motivation and outcomes. We however carefully scrutinize the associations of each of the different types of motivation with the outcomes to advance theory and research on the nuanced differentiation between these types of motivation.
Slemp, Field, & Cho (2020)	Meta-analysis	Examining the meta-analytic relations between teacher basic need satisfaction, autonomous and controlled motivation and teacher outcomes in terms of well-being, distress and autonomy supportive teaching.	While this study focusses on the associations of the broader categories of autonomous and controlled motivation among teachers as a particular profession, our results span to total population of employees. We furthermore provide more insights in the added value of differentiation the types of motivation by including a) a broader range of outcomes, b) examining the relative weights of the various types of motivation and c) studying a broad set of moderators which allow to draw conclusions about the generalizability of our results.
Ng et al., (2012)	Meta-analysis	Reviewed the correlations among SDT's different types of motivation in the health context	Associations of motivation types with a limited set of contextual (i.e., autonomy supportive health climate) and personal (i.e., causality orientations, values, needs) antecedents and need satisfaction, mental (e.g. depression) and physical

			health related behaviors (e.g., smoking cessation) as consequences.
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Table S2
Meta Analytic Correlations among the Different types of Motivation

	Relationship	k	N	Bare-bones r	ρ	S.D.	S.E.	95% CI	80% CV	% acc	Eggers' z	rank correlation test
Amotivation	External	63	40685	0.12	0.15	0.23	0.03	[0.1 ; 0.21]	[-0.07 ; 0.38]	4.6%	-1.97*	-.12
	Introjected	61	40727	0.04	0.07	0.23	0.03	[0.01 ; 0.13]	[-0.17 ; 0.27]	5.8%	-0.44	-.00
	Identified	59	39328	-0.23	-0.29	0.24	0.03	[-0.35 ; -0.23]	[-0.53 ; -0.05]	3.4%	3.34***	.32***
	Integrated	10	2542	-0.07	-0.09	0.17	0.06	[-0.2 ; 0.02]	[-0.24 ; 0.06]	21.3%	.22	.24
	Intrinsic	65	48289	-0.16	-0.23	0.28	0.04	[-0.3 ; -0.16]	[-0.54 ; 0.02]	2.6%	1.65	.27***
External	Introjected	96	54733	0.39	0.5	0.2	0.02	[0.46 ; 0.54]	[0.26 ; 0.73]	2.8%	-3.78***	-.29***
	Identified	95	51053	0.11	0.14	0.21	0.02	[0.1 ; 0.19]	[-0.06 ; 0.35]	6.7%	.52	-.05
	Integrated	23	11267	0.09	0.11	0.22	0.05	[0.03 ; 0.2]	[-0.07 ; 0.3]	8.6%	1.49	.12
	Intrinsic	98	55931	-0.01	-0.01	0.26	0.03	[-0.06 ; 0.05]	[-0.28 ; 0.26]	3.8%	.50	-.05
Introjected	Identified	98	56170	0.42	0.54	0.25	0.03	[0.49 ; 0.59]	[0.26 ; 0.82]	1.8%	-3.27***	-.11
	Integrated	21	8594	0.27	0.34	0.42	0.09	[0.16 ; 0.53]	[-0.01 ; 0.7]	2.5%	-.41	-.29
	Intrinsic	98	55274	0.27	0.33	0.27	0.03	[0.28 ; 0.39]	[0.06 ; 0.61]	3.0%	-1.98*	-.10
Identified	Integrated	19	9429	0.56	0.7	0.16	0.04	[0.63 ; 0.77]	[0.48 ; 0.92]	1.7%	-2.31*	-.26
	Intrinsic	98	53930	0.64	0.77	0.2	0.02	[0.73 ; 0.81]	[0.55 ; 0.99]	1.0%	-3.92***	-.23***
Integrated	Intrinsic	23	11472	0.62	0.75	0.1	0.02	[0.71 ; 0.79]	[0.56 ; 0.94]	1.7%	-4.32***	-.37*

Table S3
Summary of Results Regarding Desirable and Undesirable Outcomes and Antecedents

	Relationship	k	N	Bare-bones r	ρ	S.D.	S.E.	95% CI	80% CV	% acc
Desirable	Amotivation	36	19566	-0.16	-0.21	0.2	0.03	[-0.27 ; -0.14]	[-0.4 ; -0.02]	6.9%
	External	113	55101	0.05	0.06	0.19	0.02	[0.03 ; 0.1]	[-0.13 ; 0.25]	8.8%
	Introjected	93	49188	0.18	0.22	0.16	0.02	[0.19 ; 0.25]	[0.06 ; 0.38]	9.4%
	Identified	100	51214	0.4	0.49	0.18	0.02	[0.46 ; 0.53]	[0.27 ; 0.71]	3.7%
	Integrated	17	11659	0.32	0.38	0.12	0.03	[0.32 ; 0.44]	[0.24 ; 0.52]	8.1%
	Intrinsic	138	67797	0.45	0.52	0.22	0.02	[0.48 ; 0.56]	[0.26 ; 0.78]	2.5%
Undesirable	Amotivation	23	15747	0.12	0.16	0.25	0.05	[0.06 ; 0.26]	[-0.08 ; 0.4]	3.8%
	External	79	42254	0.08	0.11	0.21	0.02	[0.06 ; 0.15]	[-0.09 ; 0.31]	7%
	Introjected	81	44094	0.04	0.05	0.17	0.02	[0.01 ; 0.08]	[-0.12 ; 0.21]	10.1%
	Identified	77	39465	-0.17	-0.2	0.21	0.02	[-0.25 ; -0.15]	[-0.42 ; 0.03]	5.6%
	Integrated	9	8672	-0.17	-0.2	0.19	0.06	[-0.33 ; -0.08]	[-0.37 ; -0.04]	5.6%
	Intrinsic	96	53061	-0.27	-0.32	0.24	0.02	[-0.37 ; -0.27]	[-0.58 ; -0.05]	3.3%

Table S4
Moderation effect of Cultural Context on Outcomes

		Individualistic culture	Collectivistic culture	t
Amotivation	Burnout	0.46 (13)	0.27 (2)	0.82ns
	Engagement	-0.30 (7)	-0.13 (4)	1.05ns
	Job Satisfaction	-0.32 (16)	-0.33 (2)	0.08ns
	Affective Com.	-0.2 (11)	0.09 (3)	1.13ns
	Turnover Intention	-0.03 (4)	-0.05 (3)	0.07ns
	Performance	-0.25 (3)	-0.26 (4)	0.09ns
External regulation	Distress	0.1 (36)	0.01 (4)	0.77ns
	Burnout	0.12 (43)	-0.08 (6)	1.39ns
	Engagement	-0.02 (42)	0.08 (7)	1.15ns
	Job Satisfaction	0.00 (50)	0.49 (3)	1.45ns
	Affective Com.	0.02 (38)	0.18 (5)	1.08ns
	Turnover Intention	-0.05 (13)	-0.04 (2)	0.07ns
	Performance	0.04 (18)	0.05 (7)	0.07ns
	Proactivity	0.11 (11)	0.36 (6)	1.45ns
	CWB	0.07 (3)	0.22 (2)	0.64ns
OCB	-0.04 (6)	-0.02 (3)	0.19ns	
Introjection	Distress	0.08 (36)	-0.02 (2)	1.15ns
	Burnout	0.12 (51)	-0.12 (5)	3.85***
	Engagement	0.16 (42)	0.25 (4)	0.79ns
	Job Satisfaction	0.11 (51)	0.60 (2)	5.51***
	Affective Com.	0.15 (36)	0.44 (4)	2.16*
	Normative Com.	0.43 (7)	0.41 (2)	0.08ns
	Continuance Com.	0.23 (8)	0.28 (2)	0.13ns
	Turnover Intention	-0.06 (17)	-0.12 (3)	0.50ns
	Performance	0.21 (16)	0.16 (6)	0.57ns
	Proactivity	0.28 (8)	0.18 (2)	0.55ns
OCB	0.14 (5)	0.05 (2)	0.70ns	
Identified	Distress	-0.2 (36)	-0.35 (3)	1.01ns
	Burnout	-0.29 (50)	-0.07 (5)	1.83ns
	Engagement	0.58 (44)	0.5 (4)	0.79ns
	Job Satisfaction	0.43 (48)	0.68 (2)	1.84ns
	Affective Com.	0.48 (36)	0.51 (3)	0.33ns
	Turnover Intention	-0.27 (8)	-0.24 (2)	0.12ns
	Performance	0.44 (17)	0.27 (7)	1.61ns
	Proactivity	0.38 (10)	0.41 (4)	0.19ns
	OCB	0.33 (5)	0.24 (2)	0.51ns
Integrated	Affective Com.	0.62 (2)	0.45 (2)	0.86ns
Intrinsic	Distress	-0.24 (42)	-0.24 (5)	0.03ns
	Burnout	-0.43 (53)	-0.19 (7)	2.18*
	Engagement	0.75 (47)	0.45 (12)	3.99***
	Job Satisfaction	0.57 (53)	0.22 (6)	2.48*
	Affective Com.	0.57 (37)	0.39 (8)	2.45*
	Normative Com.	0.36 (6)	0.40 (2)	0.17ns
	Continuance Com.	0.04 (7)	0.35 (2)	1.55ns
	Turnover Intention	-0.33 (18)	0.00 (3)	1.87ns
	Performance	0.34 (24)	0.19 (12)	1.85ns
	Proactivity	0.42 (18)	0.51 (7)	0.65ns
OCB	0.18 (9)	0.30 (6)	0.73ns	

Table S5
Moderation effect of Job Type on Outcomes

		Blue collar	White collar	t
Amotivation	Affective Com.	-0.06 (3)	-0.27 (7)	1.15ns
	Performance	-0.30 (3)	-0.14 (3)	1.27ns
External regulation	Distress	0.08 (6)	0.08 (19)	0.09ns
	Burnout	0.17 (3)	0.12 (32)	0.44ns
	Engagement	0.10 (3)	-0.04 (26)	2.88**
	Job Satisfaction	0.11 (5)	-0.02 (34)	1.55ns
	Affective Com.	0.08 (8)	0.03 (30)	0.81ns
	Normative Com.	0.16 (4)	0.05 (2)	0.59ns
	Continuance Com.	0.38 (5)	0.2 (3)	1.43ns
	Turnover Intention	-0.18 (3)	0.01 (8)	1.90ns
	Performance	0.00 (5)	0.03 (9)	0.34ns
Absenteeism	-0.05 (3)	0.01 (11)	0.41ns	
Introjection	Distress	0.04 (5)	0.06 (22)	0.18ns
	Burnout	-0.03 (4)	0.10(38)	1.54ns
	Engagement	0.29 (3)	0.17 (24)	1.41ns
	Job Satisfaction	0.41 (5)	0.12 (35)	3.06**
	Affective Com.	0.49 (9)	0.17 (26)	4.34***
	Normative Com.	0.48 (4)	0.36 (4)	1.25ns
	Continuance Com.	0.09 (5)	0.21 (5)	0.89ns
	Turnover Intention	-0.25 (3)	0.00 (12)	2.98**
	Performance	0.45 (4)	0.17 (9)	2.68*
Absenteeism	-0.06 (3)	-0.01 (11)	0.42ns	
Identified	Distress	-0.14 (7)	-0.21 (20)	0.77ns
	Burnout	-0.24 (4)	-0.30 (36)	0.66ns
	Engagement	0.56 (3)	0.56 (26)	0.09ns
	Job Satisfaction	0.62 (5)	0.45 (32)	2.23*
	Affective Com.	0.41 (7)	0.50 (27)	1.14ns
	Normative Com.	0.36 (3)	0.41 (3)	0.35ns
	Continuance Com.	0.08 (4)	0.08 (4)	0.03ns
	Turnover Intention	-0.32 (2)	-0.15 (4)	1.19ns
	Performance	0.46 (5)	0.30 (9)	1.68ns
Proactivity	0.45 (3)	0.25 (3)	0.98ns	
Absenteeism	0.01 (3)	-0.04 (11)	0.29ns	
Intrinsic	Distress	-0.19 (10)	-0.20 (23)	0.05ns
	Burnout	-0.39 (4)	-0.40 (42)	0.09ns
	Engagement	0.76 (3)	0.70 (32)	0.81ns
	Job Satisfaction	0.74 (6)	0.49 (39)	4.27***
	Affective Com.	0.56 (7)	0.53 (34)	0.60ns
	Normative Com.	0.53 (3)	0.31 (4)	2.48*
	Continuance Com.	0.01 (4)	0.12 (4)	0.86ns
	Turnover Intention	-0.41 (3)	-0.13 (13)	2.57*
	Performance	0.47 (8)	0.24 (18)	2.81**
Proactivity	0.38 (3)	0.45 (10)	0.37ns	
Absenteeism	-0.08 (3)	-0.06 (11)	0.13ns	

Table S6
Moderation effect of Published vs. Unpublished Studies

		Published	Unpublished	t
Amotivation	Job Satisfaction	-0.39 (13)	-0.25 (5)	1.78ns
	Affective Com.	-0.28 (12)	-0.04 (2)	2.32*
External regulation	Distress	0.03 (21)	0.18 (19)	3.27**
	Burnout	0.10 (25)	0.05 (25)	0.79ns
	Engagement	-0.01 (24)	0.04 (27)	1.07ns
	Job Satisfaction	-0.03 (23)	0.09 (31)	2.61*
	Affective Com.	0.04 (23)	0.08 (22)	0.75ns
	Normative Com.	0.07 (6)	0.18 (2)	0.78ns
	Continuance Com.	0.23 (11)	0.40 (2)	2.60*
	Turnover Intention	-0.03 (13)	-0.16 (5)	1.30ns
	Performance	0.04 (20)	0.03 (9)	0.24ns
	Proactivity	0.12 (12)	0.25 (6)	0.78ns
	OCB	-0.04 (8)	-0.11 (2)	0.56ns
Introjection	Distress	0.01 (19)	0.15 (19)	2.59*
	Burnout	0.08 (33)	0.07 (24)	0.37ns
	Engagement	0.14 (20)	0.22 (27)	1.71ns
	Job Satisfaction	0.12 (23)	0.21 (31)	1.86ns
	Affective Com.	0.23 (22)	0.28 (20)	0.70ns
	Normative Com.	0.42 (8)	0.48 (2)	0.75ns
	Continuance Com.	0.24 (10)	0.08 (2)	1.35ns
	Turnover Intention	-0.04 (17)	-0.20 (6)	1.75ns
	Performance	0.18 (16)	0.38 (9)	2.98**
	Proactivity	0.15 (7)	0.34 (4)	1.49ns
	OCB	0.11 (6)	0.46 (2)	2.65*
Identified	Distress	-0.32 (21)	-0.10 (18)	4.13***
	Burnout	-0.25 (31)	-0.24 (25)	0.32ns
	Engagement	0.58 (21)	0.55 (28)	0.63ns
	Job Satisfaction	0.49 (21)	0.46 (30)	0.41ns
	Affective Com.	0.53 (21)	0.40 (20)	3.02**
	Normative Com.	0.47 (6)	0.34 (2)	1.13ns
	Continuance Com.	0.13 (7)	0.08 (2)	0.30ns
	Turnover Intention	-0.30 (9)	-0.27 (2)	0.08ns
	Performance	0.41 (18)	0.43 (9)	0.28ns
	Proactivity	0.34 (11)	0.43 (4)	0.74ns
	OCB	0.30 (6)	0.38 (2)	0.42ns
Integrated	Job Satisfaction	0.34 (6)	0.43 (5)	0.80ns
Intrinsic	Distress	-0.24 (28)	-0.24 (19)	0.01ns
	Burnout	-0.37 (37)	-0.48 (25)	2.70**
	Engagement	0.65 (32)	0.70 (30)	1.16ns
	Job Satisfaction	0.49 (27)	0.67 (33)	3.86***
	Affective Com.	0.54 (26)	0.55 (22)	0.07ns
	Normative Com.	0.35 (7)	0.53 (2)	1.53ns
	Continuance Com.	0.12 (9)	0.01 (2)	1.07ns
	Turnover Intention	-0.27 (17)	-0.40 (7)	1.02ns
	Performance	0.33 (29)	0.38 (14)	0.68ns
	Proactivity	0.39 (16)	0.49 (10)	1.10ns
	CWB	-0.43 (3)	-0.28 (2)	0.80ns
	OCB	0.18 (11)	0.45 (5)	2.29*

Table S7
Scale items

Tremblay 2009 (WEIMS)	Fernet 2008	Fernet 2011	Gagné 2010 MAWS	Gagné 2015 MWMS
Intrinsic Motivation	Intrinsic Motivation	Intrinsic motivation	Intrinsic motivation	Intrinsic motivation
4. Because I derive much pleasure from learning new things.	Because it is pleasant to carry out this task.	For the pleasure that I get from performing this role.	Because I enjoy this work very much	Because I have fun doing my job.
8. For the satisfaction I experience from taking on interesting challenges	Because I find this task interesting to do.	Because the activities related to this role are interesting and stimulating.	For the moments of pleasure that this job brings me	Because what I do in my work is exciting.
15. For the satisfaction I experience when I am successful at doing difficult tasks.	Because I like doing this task.		Because I have fun doing my job	Because the work I do is interesting.
Integrated Regulation				
5. Because it has become a fundamental part of who I am.				
10. Because it is part of the way in which I have chosen to live my life.				
18. Because this job is a part of my life.				
Identified Regulation	Identified Regulation	Identified regulation	Identified regulation	Identified regulation
1. Because this is the type of work I chose to do to attain a certain lifestyle.	Because it is important for me to carry out this task.	Because this role enables me to achieve my own work objectives.	I chose this job because it allows me to reach my life goals	Because I personally consider it important to put efforts in this job.
7. Because I chose this type of work to attain my career goals.	Because this task allows me to attain work objectives that I consider important.	Because I feel this role is essential in performing my job.	Because this job fulfils my career plans	Because putting efforts in this job aligns with my personal values.
14. Because it is the type of work I have chosen to attain certain important objectives.	Because I find this task important for the academic success of my students.		Because this job fits my personal values	Because putting efforts in this job has personal significance to me.
Introjected Regulation	Introjected Regulation	Introjected regulation	Introjected regulation	Introjected regulation
6. Because I want to succeed at this job, if not I would be very ashamed of myself.	Because if I don't carry out this task, I will feel bad.	Because I would feel guilty if I did not perform this role properly.	Because I have to be the best in my job, I have to be a "winner"	Because I have to prove to myself that I can.
11. Because I want to be very good at this work, otherwise I would be very disappointed.	Because I would feel guilty not doing it.	To prove to myself that I can perform this role properly.	Because my work is my life and I don't want to fail	Because it makes me feel proud of myself.
13. Because I want to be a "winner" in life.	To not feel bad if I don't do it.			Because otherwise I will feel ashamed of myself. Because otherwise I will feel bad about myself.
External Regulation	External Regulation	External regulation	External regulation	External regulation social
2. For the income it provides me.	Because my work demands it.	Because this role is part of my job.	Because my reputation depends on it	To get others' approval (e.g., supervisor, colleagues, family, clients ...).

9. Because it allows me to earn money.	Because the school obliges me to do it.	Because my position requires it.	Because this job affords me a certain standard of living	Because others will respect me more (e.g., supervisor, colleagues, family, clients ...).
16. Because this type of work provides me with security.	Because I'm paid to do it.	We are paid to do this.	Because it allows me to make a lot of money I do this job for the paycheck	To avoid being criticized by others (e.g., supervisor, colleagues, family, clients ...).
External regulation material				
Because others will reward me financially only if I put enough effort in my job (e.g., employer, supervisor ...).				
Because others offer me greater job security if I put enough effort in my job (e.g., employer, supervisor ...).				
Because I risk losing my job if I don't put enough effort in it.				
Amotivation	Amotivation	Amotivation	Amotivation	Amotivation
3. I ask myself this question, I don't seem to be able to manage the important tasks related to this work.	I don't know, I don't always see the relevance of carrying out this task.	I don't know. Sometimes it seems pointless.		I don't, because I really feel that I'm wasting my time at work.
12. I don't know why, we are provided with unrealistic working conditions.	I used to know why I was doing this task, but I don't see the reason anymore.	I don't know. Most of the time, I'm not really keen on performing this role.		I do little because I don't think this work is worth putting efforts into.
17. I don't know, too much is expected of us.	I don't know, sometimes I don't see its purpose.			I don't know why I'm doing this job, it's pointless work.

- Items measuring integrated motivation
- Items measuring approach introjected regulation
- Items measuring avoidance introjected regulation
- Items measuring material external regulation
- Items measuring social external regulation

Table S8
Moderation effect of Material and Social External Regulation

	Relationship	k	N	Bare-bones r	ρ	S.D.	S.E.	95% CI	80% CV	% acc
External material	Burnout	3	1823	0.08	0.09	0.1	0.06	[-0.02 ; 0.21]	[-0.01 ; 0.2]	20.1%
	Engagement	2	1396	-0.01	0	0.18	0.13	[-0.25 ; 0.25]	[-0.18 ; 0.18]	6.6%
	Turnover intention	2	3129	-0.19	-0.23	0.11	0.08	[-0.39 ; -0.07]	[-0.33 ; -0.13]	9.1%
	Performance	4	6334	0.02	0.04	0.03	0.02	[0.01 ; 0.07]	[0.04 ; 0.04]	98.9%
	OCB	2	2976	0.01	0.01	0.08	0.06	[-0.1 ; 0.13]	[-0.02 ; 0.05]	45.4%
External social	Burnout	3	1823	0.08	0.1	0.12	0.07	[-0.04 ; 0.24]	[-0.02 ; 0.22]	15.5%
	Engagement	2	1396	0.02	0.03	0.05	0.03	[-0.04 ; 0.09]	[0.02 ; 0.04]	101.5%
	Turnover intention	3	3639	-0.03	-0.03	0.06	0.04	[-0.1 ; 0.04]	[-0.07 ; 0.01]	50.5%
	Performance	3	3680	0.01	0.02	0.07	0.04	[-0.07 ; 0.1]	[-0.04 ; 0.07]	31.8%
	OCB	2	2976	-0.06	-0.07	0.13	0.09	[-0.25 ; 0.1]	[-0.14 ; 0]	18.4%

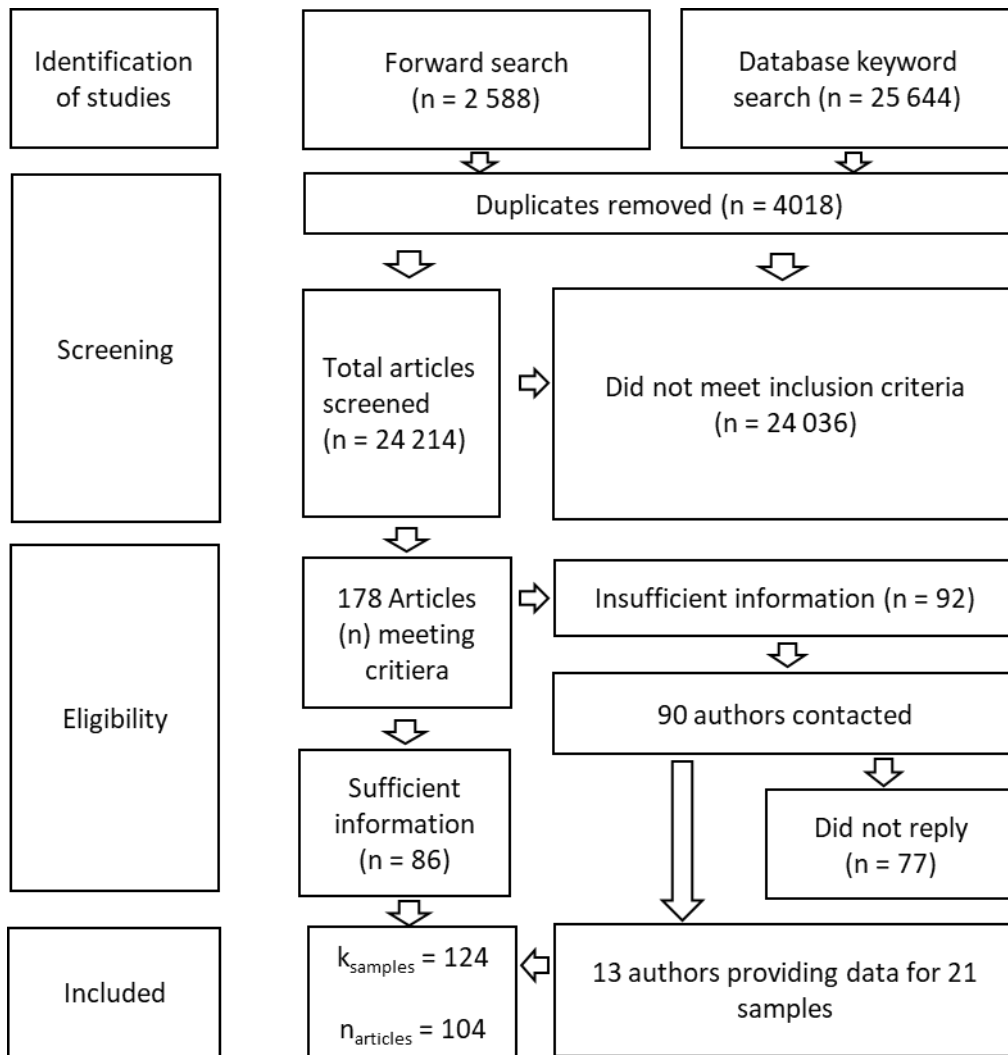
Table S9
Moderation effect of Approach and Avoidance Introjected Regulation

	Measures only with avoidance (Fernet et al. 2008)	Measures mainly with avoidance items (Trembley et al, 2009)	Measures with a mix of approach and avoidance items (Fernet, 2011; Gagné et al., 2010; Gagné et al., 2015)	t(1 vs 2)	t(1 vs 3)	t(2 vs 3)
Distress	0.12 (2)	0.04 (2)	0.06 (34)	0.31ns (p =0.765)	0.25ns (p =0.804)	0.21ns (p =0.832)
Burnout	0.37 (6)	0.01 (2)	0.06 (40)	7.22*** (p<0.001)	5.82*** (p<0.001)	1.77ns (p =0.080)
Job Satisfaction	-	0.18 (8)	0.16 (45)	-	-	0.22ns (p =0.83)
Affective Com.	-	0.41 (3)	0.25 (39)	-	-	1.38ns (p =0.172)
Turnover Intention	-	0.00 (3)	-0.13 (20)	-	-	0.90ns (p =0.372)

Table S10
Moderation effect of Integration items in the scale for identification

	Identified measures <i>without</i> integration items	Identified measures <i>with</i> integration items (Gagné et al. 2015)	t
Distress	acc	-0.16 (27)	2.57* (p =0.012)
Burnout	-0.25 (19)	-0.24 (37)	0.12ns (p =0.902)
Engagement	0.56 (8)	0.57 (41)	0.21ns (p =0.834)
Job Satisfaction	0.59 (20)	0.36 (31)	4.61*** (p<0.001)
Affective Com.	0.50 (18)	0.43 (23)	1.40ns (p =0.165)
Continuance Com.	0.09 (7)	0.08 (2)	0.07ns (p =0.946)
Turnover Intention	-0.30 (5)	-0.27 (6)	0.23ns (p =0.817)
Performance	0.41 (11)	0.44 (16)	0.46ns (p =0.649)
Proactivity	0.44 (8)	0.36 (7)	0.60ns (p =0.552)
OCB	0.34 (4)	0.36 (4)	0.10ns (p =0.922)

Figure S1
Overview of the Search and Selection Process



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