Self-Determination Mini-Theories in Second Language Learning: A Systematic Review of Three Decades of Research

Ali H. Al-Hoorie[1], W. L. Quint Oga-Baldwin[2], Phil Hiver[3], and Joseph P. Vitta[4]

[1]Royal Commission for Jubail and Yanbu, Saudi Arabia

[2]Waseda University, Japan

[3]Florida State University, USA

[4]Kyushu Daigaku – Ito Campus, Japan

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Author Note:

Correspondences concerning this article should be addressed to Joseph P. Vitta, Kyushu Daigaku – Ito Campus, Faculty of Languages and Cultures, Japan. Email: jvitta01@qub.ac.uk

Abstract

Self-determination theory is one of the most established motivational theories both within second language learning and beyond. This theory has generated several mini-theories, namely: organismic integration theory, cognitive evaluation theory, basic psychological needs theory, goal contents theory, causality orientations theory, and relationships motivation theory. After providing an up-to-date account of these mini-theories, we present the results of a systematic review of empirical second language research into self-determination theory over a 30-year period (k = 111). Our analysis of studies in this report pool showed that some mini-theories were well-represented while others were underrepresented or absent from the literature. We also examined this report pool to note trends in research design, operationalization, measurement, and application of self-determination theory constructs. Based on our results, we highlight directions for future research in relation to theory and practice.

Keywords: self-determined, intrinsic, extrinsic, controlled, autonomous, systematic review

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Since its inception in the 1970s and early 1980s, self-determination theory (SDT; Deci & Ryan, 1985a) has become a major feature of empirical research in diverse fields, beginning with psychology (Deci, 1972) and expanding over the decades into fields like sports (Ntoumanis & Standage, 2009), business (Cerasoli et al., 2014), education (Skinner et al., 2008), and foreign language learning (Noels et al., 2000; Sugita-McEown & Oga-Baldwin, 2019). This reach into multiple domains and across cultural bounds (Chirkov, 2009) presents instruments, hypotheses, and theoretical principles for practice, with similar principles from one field providing potential insight, information, and validation to the same theory in another. Existing at the intersection of a philosophy of personal well-being and empirical measurement, this theory aims to offer a robust framework for creating interrelated hypotheses on optimal motivation (Ryan & Deci, 2017).

SDT has been a mainstay of second language (L2) education since the late 1990s, with work introducing the theory by Kimberly Noels and colleagues (e.g., Noels et al., 2000) extended by subsequent work with her students in the following decades (Noels et al., 2019; Sugita-McEown et al., 2014). Though SDT has been eclipsed, numerically, by other theories in the intervening years (Boo et al., 2015), its impact has remained strong—perhaps due to its theoretical and empirical consistency. That is, SDT research in the interim has indicated its robust applicability in multiple language learning contexts, including elementary school (Carreira, 2012), secondary school (Fryer & Oga-Baldwin, 2019), university (Joe et al., 2017), online learning (K. C. Chen & Jang, 2010), and independent language learning (Mynard & Shelton-Strong, 2022), with studies representing each of these contexts in multiple cultural

settings, including China (C. Chen et al., 2021), Iran (Karbakhsh & Safa, 2020), Malaysia (Khong & Kabilan, 2020) and Saudi Arabia (Alamer & Lee, 2021), in addition to the more commonly represented samples found in the United States (Davis, 2020), the UK (Parrish, 2020), Belgium (Rogiers et al., 2020), and Canada (Noels et al., 2019).

Given the scope, breadth, and depth of the broader theory and its interrelated mini-theories (Ryan & Deci, 2017), L2 research has primarily focused on only a portion of the facets and explanations that SDT can offer (Sugita-McEown & Oga-Baldwin, 2019). In this review, we present an updated explanation of SDT based on current literature (Ryan & Deci, 2020; Ryan et al., 2021), offer evidence for the over-representation of certain aspects of SDT and under-representation of others, and describe specific ways that language researchers can explore self-determined motivation using up-to-date methods and fresh theoretical questions.

Literature Review: The SDT Mini-Theories

Organismic Integration Theory

The most popular SDT mini-theory is organismic integration theory. This mini-theory posits that the diverse motives that arise from outside of a learner exist on a continuum from lack of motivation to forms of *extrinsic motivation* and *intrinsic motivation* (Ryan & Deci, 2017). Having no motivation for a task or topic, *amotivation*, indicates lack of value, excessive difficulty, or burdensome time costs (Fryer et al., 2014; Legault et al., 2006). Fully *external regulation* of motivation is the desire to avoid punishments or gain short-term rewards. Motives that come from guilt, shame, or a desire to please significant others (e.g., teachers, parents, or peers) with performance fall under *introjected regulation*. More internalized motives, titled *identified regulation*, may come from a desire to do well, such as being able to use a foreign

language effectively. When learners feel a sense of congruence with their conception of self, this is labeled *integrated regulation*. Finally, *intrinsic regulation* is representative of intrinsic motivation, a desire to do the task for the feelings of achievement, enjoyment, or value that they bring to the learner. In numerous studies, these regulations are grouped into *autonomous motivation*, comprised of identified and intrinsic regulations, and *controlled motivation*, comprised of introjected and extrinsic regulations (cf. Oga-Baldwin & Fryer, 2018; Vansteenkiste et al., 2009;). Recent meta-analytic work corroborates the link between autonomous motives and the promotion of learning, well-being, and persistence in school, as well as the prevention of negative outcomes such as anxiety, depression, and dropout (Howard et al., 2021).

When discussing self-determined motivation, the topic of intrinsic motivation and the continuum of motives/orientations/regulations that connects with it is perhaps the most recognizable. Multiple instruments have been developed to measure this continuum, including the Self-Regulation Questionnaire (Ryan & Connell, 1989), which is freely available through the Center for Self-Determination Theory website (www.selfdeterminationtheory.org) with translations into multiple languages. Other instruments include the Academic Motivation scale (Chanal & Guay, 2015; Guay et al., 2014) and the Language Learning Orientations Scale (Noels et al., 2000).

These instruments are recognizable in language education from work in the late 1990s (Noels et al., 1999; Noels et al., 2000) and remain widely used (Alamer, 2021; Oga-Baldwin & Fryer, 2020). Recent uses of these instruments have also involved methodological improvements. Latent variable modeling has increased the detail and understanding using growth-curve modeling to show how students' motivation develops and changes over the course of a semester

(Noels et al., 2019). New methods such as exploratory structural equation modeling have supported the factor structure of the instruments with new populations (Alamer, 2021). Person-centered profiling studies which track the movement of students' motivational quality over time and across different languages (Liu & Oga-Baldwin, 2022; Oga-Baldwin & Fryer, 2018, 2020) have expanded the discussions on the idiographic nature of students' motivational profiles (cf. Gillet et al., 2017; Vansteenkiste et al., 2008). These studies are useful for understanding the dynamic nature of how learners' motives change over time, while also offering insight into how other covariates, such as the quality of engagement, self-efficacy, emotions, and other environmental factors, may predict both individual- and group-level changes. Recent results (Oga-Baldwin & Fryer, 2020) also align with Vallerand's (1997) hypothesis that motivation in schools is hierarchical, with school subjects nested within a more generalized motivation for schooling (Guay et al., 2014), further disconfirming aspects of the Fundamental Difference Hypothesis that language motivation is somehow distinct from other forms of motivation (see Al-Hoorie & Hiver, 2020).

Cognitive Evaluation Theory

In promoting learners to move toward better quality motivation, interpersonal interactions can help learners develop internally regulated, sustainable motives. Often applied to education (Reeve & Cheon, 2021), need support—especially *autonomy support*—forms a crucial part of cognitive evaluation theory. In educational settings, teachers can help students develop a sense of ownership for their learning by helping nurture their inner motivational resources (Reeve & Jang, 2006). Through autonomy support, teachers work with learners to build feelings of investment and agency (Jang, Reeve, et al., 2016). Similar to the idea of scaffolding, *structure* provides the

guidance that learners need to succeed in class, keeping them on task and providing clarity (Oga-Baldwin & Nakata, 2015; Sugita-McEown & Oga-Baldwin, 2019). *Involvement* describes how individuals develop quality relationships in classroom settings, both teacher–pupil and peer-to-peer (Furrer & Skinner, 2003). All three elements together promote need satisfaction and engagement (Skinner et al., 2008), with the sum being greater than any single part (Jang et al., 2010). Finally, external *control* illustrates how teachers, parents, and others in the environment can thwart student motivation not through encouragement and nurturing, but rather through coercion, unilateral authority, and resource control (Reeve & Jang, 2006).

Instruments to measure and interventions to test individuals' cognitive evaluations are well-established. The earliest studies contributing to SDT indicated the negative effects of contingent rewards, a form of external control, on subsequent motivation and behavior (Deci, 1972); these results have shown robust validity over time (Deci et al., 1999). Applications in educational settings have made use of several survey instruments, including the Learning Climate questionnaire (Black & Deci, 2000) and the Teacher as Social Context questionnaire (Skinner, 1996). Most recently, the Situations in Schools instrument (Aelterman et al., 2019) has been used to assess the social environment that teachers create on four broad categories of autonomy support, structure, control, and chaos. The theoretical map created by this circumplex model (Aelterman et al., 2019) with its corresponding descriptions of the quality of teaching environments may further offer novel directions for exploration. Studies involving these instruments and constructs in general education consistently demonstrate the power of this theory to predict positive motivational outcomes across contexts and samples (Bureau et al., 2020).

Research using the above instruments and modified forms also have sustained history in language education (Fryer & Oga-Baldwin, 2019; Noels et al. 1999). Cross-sectional studies

indicate that learners benefit from increased autonomy support in the classroom environment (Dincer et al., 2019; Joe et al., 2017; Khajavy et al., 2016). More communicative language classes in a Korean university showed greater relevance of intrinsic motivation to learning outcomes, while more traditional classes were associated with a more externally regulated source of motives (Pae & Shin, 2011). Parental support for foreign language learning has similarly shown positive outcomes (Butler, 2015; Sugita-McEown & McEown, 2019). Experimental results similarly indicate that increased control, in the form of extrinsic monetary rewards, can have a negative effect on students' performance on vocabulary tests (Kuhbandner et al., 2016). In German secondary schools, English as a foreign language classes where teachers provided increased support were perceived as more motivating and interesting (Vieluf & Göbel, 2019).

In just this vein, other work has shown how the *in situ* learning environment can support and thwart learners' motivation. Examples illustrating the dynamic interaction between the environment and intrinsic motivation have been mixed-methods studies looking at how said motivation decreases over time (Busse, 2013; Busse & Walter, 2013; Oga-Baldwin & Nakata, 2020). In a series of longitudinal studies on students studying German in the UK, researchers showed that students lost intrinsic motivation to learn the language when classes lacked intellectual challenge, when there was less interpersonal communication in the language, and when teachers failed to teach students in a desired fashion (Busse & Walter, 2013). Among elementary school children first exposed to English classes, teachers who provided optimal autonomy support and structure through appropriate classroom routines and language use were more able to engage students, thereby increasing intrinsic motivation over the course of a year of study (Oga-Baldwin & Nakata, 2020). These findings offer insight into the mechanisms for how

interpersonal environmental factors can help to nurture students, and how failing to meet desires and expectations can negate their desire to learn and grow.

Basic Psychological Needs Theory

Following from the notion that the environment can nurture or impair motivation arises the question of exactly what is being nurtured or impaired. According to basic psychological needs theory, just as people have basic physiological needs for health, such as nutritious food and adequate sleep, individuals' optimal intrinsic motivation has a *basic need for competence*, *relatedness*, and *autonomy* (Vansteenkiste et al., 2020). This mini-theory states that when learners feel competent at a task, this can nurture their intrinsic motives (Ryan & Deci, 2017). When they feel connected with the people around them, this is satisfaction of the need for relatedness (Furrer & Skinner, 2003). When they feel a sense of autonomy—that is, a sense of purpose, relevance, and volition in their behavior—they are likely to engage and feel right doing so (Jang et al., 2009). Interrelated with cognitive evaluation theory, this mini-theory indicates that these needs are met (or thwarted) in moment-to-moment interactions, successes, failures, interpretations, and assessments, just as day-to-day life prompts individuals to feel a need for food, water, sleep, or exercise (Skinner, 1995). In the same way that optimal physical well-being requires all of the physiological needs to be met, all three needs are expected to be met in order to create intrinsic motivation. When these needs are not met, optimal functioning becomes more difficult, and motivation may be damaged when the needs are actively thwarted (Ryan & Deci, 2017).

The instrumentation supplying evidence for this mini-theory has been well-developed and applied across a multitude of domains (Ryan & Deci, 2017). Studies in education and language

(Jang et al., 2012; Jang, Kim, et al., 2016; Oga-Baldwin & Nakata, 2015; Oga-Baldwin et al., 2017) have made use of the Activity Feeling Scales (Reeve & Sickenius, 1994), and validated them as a measure of strongly interrelated needs. The most recent cross-national, cross-cultural validations of the Basic Psychological Needs Satisfaction and Frustration Scales (B. Chen et al., 2015) has indicated that the mini-theory can be measured appropriately in a variety of contexts and languages.

Most research in education and other settings has treated psychological needs as a mediating influence between external or environmental predictors and motivational or behavioral outcomes (Ryan & Deci, 2017). Applications of basic psychological needs theory to language learning are no exception to this (Joe et al., 2017; Oga-Baldwin et al., 2017). Theoretically, the concept of need satisfaction and thwarting stands as the lens for interpretating classroom events, prompting action based on whether the environment nurtures internal resources or frustrates them by exerting unwanted control (Jang, Kim, et al., 2016). Empirical results have shown that the basic needs correlate with and predict the different forms of motivational regulation (Agawa & Takeuchi, 2017; Carreira, 2012; Hiromori, 2003; Noels, 2013). Additional research provides evidence for the mediating role of the basic needs among international students for promoting well-being and preventing depression (Vansteenkiste et al., 2006). Recent work has shown that the three basic needs mediate teachers' belief in language learners' potential for change onto students' self-confidence and failure avoidance strategies (Lou & Noels, 2020). Consequently, these basic needs provide a clear mechanism for understanding what fuels autonomous motivation both for school and language learning.

Goal Contents Theory

According to goal contents theory, the intrinsic or extrinsic quality of a goal can determine how long learners will persist at a task. Learners' *intrinsic goals* satisfy their basic needs which will improve their well-being and guide intrinsic motives. Intrinsic goals might be to make deep fulfilling friendships characterized by trust and love; create and enjoy music, food or art; open new avenues for learning; and build a sense of sustainable value (Vansteenkiste et al., 2006). *Extrinsic goals* might be comparable to the reasons shown by the often parodied shallow online influencer: These goals push individuals to follow peer pressure; seek to make quick money; or want praise from myriad family, friends, or strangers. While these goals can motivate in the short term, they can also limit learners' ability to express themselves in the long term. These goals are an outgrowth of the organismic integration process described in the mini-theory of the same name and nurtured by the other mini-theories (Ryan & Deci, 2017), but should be distinguished in their temporal framing. Where the "why" of organismic integration theory is representative of current feelings and internalized experiences, goal contents theory is always oriented toward future outcomes.

This theory has seen significant attention in the field of general education, but intrinsic and extrinsic goals have generally been underrepresented in the literature on language education (Lee & Bong, 2019). One notable study by Alamer and Lee (2019) made use of SDT variables to build a model to predict basic needs, motivation, achievement goals, and course learning. Need satisfaction predicted achievement goals, which in turn were used to predict positive emotions and the different motivational regulations. Though the study did not use intrinsic and extrinsic goals as such, it replicates work relating SDT, achievement goals, and learning outcomes (Michou et al., 2014).

Methods from other fields such as psychology and educational psychology for assessing and testing the quality of goals include both surveys (Kasser & Ryan, 1996), as well as experimental studies on goal framing (Vansteenkiste et al., 2004; Vansteenkiste et al., 2005; Vansteenkiste et al., 2008). The main survey instrument to assess the quality of individuals' life-goals with regard to vectors such as wealth, learning, and interpersonal relationships is the Aspirations Index (Kasser & Ryan, 1996). This questionnaire measures individuals' attitudes to these goals' importance, likelihood, and current degree of attainment. The questionnaire has been used in a variety of cultural settings (Nishimura et al., 2020). Experimental treatments (e.g., Vansteenkiste et al., 2004) involve providing participants with reasons for participation in the study that include helping communities and benefiting future generations through the use of inclusive language such as "we ask," "if you choose to participate," and "if you are interested, more information can be found…" In contrast, controlling treatments justify the participation in terms of saving money and beating competitors, using language such as "you must," "you'd better," and "you should learn more about this topic at…" Both of these main methods used in SDT studies have yet to be systematically used and applied to language learning research.

Causality Orientations Theory

The framework of causality orientations theory (Ryan & Deci, 2017; Weinstein et al., 2012) takes a personality-centered approach to motivation (McAdams & Pals, 2006), with an eye toward using motivational orientations to determine generalized and systemic psychological functioning (Duriez, 2011). *Autonomously oriented* individuals prefer to be self-starters, seeking their own path and self-regulating their learning processes (Ryan & Deci, 2017). At the opposite, those with a *controlled orientation* are more comfortable in a passive role, preferring to take

outside direction and respond to social pressure or external rewards (Ryan & Deci, 2017). These two alignments are somewhat contiguous with the dichotomies represented by independence and interdependence (Markus & Kitayama, 1991), with key differences in that they make no statement about how the self is defined, but rather represent a malleable personal orientation for how to act. Finally, an *impersonal orientation* may indicate that the learner does not believe any aspect of learning a language is within their control, perhaps because they feel failure is likely (Amoura et al., 2013; Kwan et al., 2011). As with organismic integrations theory, these orientations appear to exist simultaneously within individuals, with each orientation represented at some level to form profiles (Hagger & Hamilton, 2020).

Causality orientations have most often been measured by the General Causality Scale (Deci & Ryan, 1985b). The scales are represented by a series of vignettes, and measure individuals' responses in line with an autonomous, controlled, or impersonal orientation for each of the situations presented. More recently, Weinstein and colleagues (2012) developed the Index of Autonomous Functioning, a survey instrument designed to measure individuals' self-congruence, interest taking in their environment, and susceptibility to external control. According to a recent meta-analysis by Hagger and Hamilton (2020), studies employing causality orientations have consistently indicated the positive predictive effect of autonomous orientation on autonomous motivation, with direct predictive effects on behavior. Controlled orientations similarly predicted more controlled motivations, with weak negative effects on behavioral outcomes. Impersonal orientations negatively predicted autonomous motivation and positively correlated with controlled orientations, but had no effects on behaviors. Though results from this comprehensive meta-analysis (Hagger & Hamilton, 2020) using samples from multiple countries and cultures has shown the scope of these orientations, the question of whether the

effects of this personality-based approach to motivation are a clear fit with language learning remains an open one.

Although the Language Learning Orientation Scale (Noels et al., 2000) uses the terminology of orientations in line with that employed by Gardner (1985), it is theoretically and practically much closer to organismic integrations theory in operation. As a theory of personality rather than a theory of situational motives or reasons for action, existing instruments and research (e.g., Sugita-McEown et al., 2014; Noels et al., 2000) can and do show some inferential implications regarding autonomous, controlled, and impersonal orientations based on proximity to certain cultural values and profiling approaches, but the deeper personality theory has not been explored in the field of language education. As indicated by the Hagger and Hamilton (2020) meta-analysis, causality orientations predict and correlate with autonomous and controlled motivations, but key differences are also present.

Relationships Motivation Theory

Relationships motivation theory (Ryan & Deci, 2017) indicates that the relationships that meaningfully satisfy basic needs will develop strong, lasting motivation. The quality of relationships with significant others will change the way that individuals are motivated (Guay et al., 2013; Ratelle et al., 2012). High-quality *autonomy supportive* interpersonal relationships nurture individuals' basic needs for autonomy, relatedness, and competence. Here, people feel that they are meaningfully connected to others, that they are capable in the eyes of the people around them, and that the values of the group are the values they themselves espouse. When these social elements are not met, individuals will feel their motivation and well-being diminish. On the negative side, significant others may withhold affection when individuals do not perform

in a specified or desired manner in what is labeled *conditional regard*, in essence ostracizing the person for failure to perform. This may prompt an individual toward feelings of shame, poor coping skills, low self-worth and loss of self-esteem, and resentment toward said others (Assor et al., 2004). Conditional regard from teachers and parents associates negatively with perceived psychological need satisfaction (Assor et al., 2004; Kaplan, 2018). At the same time, providing support and care to others can often have a positive reciprocal benefit to the self, where individuals who give care feel better about themselves (Deci et al., 2006).

Instruments for measuring the effects of parental relationships include the Perceived Parental Autonomy Support Scale (Mageau et al., 2015), which measures supportive and controlling parenting. These scales include items to measure how parents offer explanation of reasons and choice within limits, and take the child's perspective on the autonomy supportive side of parenting, with threats of punishment, inducement of guilt, and encouragement of performance goals representing more controlling parenting. Earlier scales include the Perceptions of Parents Scales (Grolnick et al., 1991), which measure autonomy support and involvement for both mothers and fathers.

Very little if any empirical work has investigated this mini-theory in language education, though there have been theoretical inroads (see Oga-Baldwin, 2022). Some cursory interpretations related to the theory can be taken from studies on parental influence on language learning (Butler, 2015; Sugita-McEown & McEown, 2019). According to Butler (2015), Chinese children showed some personal relatedness to the foreign language if parents showed interest, but whether the quality of the relationship had an influence on motivation remains yet unclear. More direct evidence for the theory can be seen in work by Sugita-McEown and McEown (2019), who showed that parental support positively predicted a sense of enjoyment and benefit

to the family for learning the foreign language, which in turn had positive indirect effects on effort and ability. Though these language learning studies were not explicitly interpreted in light of relationships motivation theory, they provide some initial evidence for the applicability of this mini-theory.

The Mini-Theories and Their Key Covariates

As shown above, each of the interrelated mini-theories offers can offer insight into different aspects of the intrapersonal and interpersonal nature of motivation for learning languages. At the same time, aspects of the theory remain unexplored or underexplored. Wider integration with the methods and instrumentation employed in fields such as general education, psychology, and physical education can help improve the generalizability and replicability of findings for language education and for SDT more generally. This integration naturally involves the use of cross-theoretical covariates with shared concepts and constructs.

Choice, Individualism, and Collectivism

Important to note are studies whose results, on the surface, question the notion that providing autonomy increases motivation. One study indicated that requiring regular vocabulary quizzes did not negatively affect students, but rather showed a more positive outcome than making these quizzes optional (Lee & Harris, 2018). Another study showed that providing choices regarding the subject of a short writing project did not meaningfully change the task motivation, and may have negatively affected task outcomes (Mozgalina, 2015). While these two noted studies seem to challenge the notion and applicability of cognitive evaluation theory for measuring motivation, it may also be inappropriate to equate providing autonomy with providing choices.

Meaningful autonomy support can involve providing meaningful choices, but just as often it means creating a sense that tasks are relevant (Assor et al., 2002) and interacting with students in a fashion they feel is appropriate, supportive, and non-coercive (Cheon et al., 2020). These supportive interactions can be found even within societies using hierarchical and collectivistic relationships (Reeve, 2015). As such, the simple dichotomy of choice/no choice is one which will likely provide limited outcomes and applicability (Katz & Assor, 2006). Given the complex nature of teaching and the realities of classroom life, a focus on simply injecting more choice into the learning environment may have negligible effects on motivation. Instead, an array of classroom antecedents and features, such as autonomy support through improving interest and taking students' perspectives or providing additional structure through improved pacing and clarity (Reeve & Jang, 2006), can offer a more nuanced picture of how to influence learners' motivation over time (Skinner et al., 2008).

While there have previously been questions and contentions regarding the nature of the three basic needs across varying contexts (Iyengar & Lepper, 1999; Markus & Kitayama, 1991), these needs have again shown validity across cultures, indicating their universal nature in promoting intrinsic motivation and well-being (B. Chen et al., 2015; Chirkov, 2009; Reeve et al., 2013). Research within language education (Agawa & Takeuchi, 2017; Carreira, 2012; Noels, 2013; Oga-Baldwin & Nakata, 2015) has similarly indicated that the basic needs function in many interdependent, collectivist cultures where they have been previously questioned (cf. Iyengar & Lepper, 1999). As noted previously, while autonomy support is often equated with a sense of choice, it is more accurately recognized as a sense of agreement, endorsement, and alignment with a proposed direction of action (Ryan & Deci, 2017). Thus, to achieve sustainable motives for learning a language, in some sense students need to be convinced that learning the language

is the right thing for them, that they are capable of the tasks at hand, and that they are surrounded by caring individuals.

Indeed, SDT research into the cultural norms of individualism and collectivism shows that collectivist individuals autonomously endorse direction from in-group members without the perception that it is controlling (Deci & Ryan, 2000). According to the tenets of the theory, people living in collectivist societies may autonomously endorse in-group decisions, processing them in similar fashion to their own goals and values (Hagger et al., 2013). A recent study in Japan (Nishimura et al., 2020) has shown that fathers' autonomous aspirations influence their children's own goals in this same direction, providing some evidence for how in-group models may influence individuals' proclivities. Ultimately, this process of cultural normalization works with the organismic integration theory of external events and occurrences (Ryan & Deci, 2017), utilizing emic, culture-specific localizations for how those affinity mechanisms work in context (King & McInerney, 2014). This allows for the universal application of the theory without uniformity across all cultures (Vansteenkiste et al., 2020).

Competence Constructs

While multiple studies show that all three needs correlate with and theoretically contribute to adaptive motivation, the basic needs may also have important differential functions in predicting proficiency and learning outcomes. Competence need satisfaction specifically has shown direct effects on both motivation and achievement among Korean university learners (Joe et al., 2017). Other studies have shown that competence has a particularly strong relationship with the different aspects of the organismic integration continuum of motivation (Agawa & Takeuchi, 2017; Hiromori, 2003). Of the three basic needs, competence offered the strongest positive

prediction for autonomous motives and negative prediction for controlled motives. In longitudinal studies, competence need satisfaction has also shown the strongest autoregressive predictive ability, indicating that it may be more stable than other needs over time (Oga-Baldwin & Nakata, 2015). When looked at more broadly in conjunction with other constructs such as self-efficacy (Fryer & Oga-Baldwin, 2019), self-concept (Chanal & Guay, 2015), and perceived control (Skinner, 1995), competence appears to play a particularly important role in the development of motivation in educational settings, as shown by a recent meta-analysis (Bureau et al., 2020). In their review of over 144 reports sampling just over 79,000 participants in educational settings, Bureau and colleagues (2020) reported that competence need satisfaction was the best predictor of both intrinsic motivation and identified regulation. There, thus, remains room for empirical exploration regarding the role of the different basic needs for language learning, especially in school settings.

Engagement

Engagement has become a construct of particular interest over the past two decades in education (Fredricks et al., 2004), with recent theoretical reviews (Oga-Baldwin, 2019) and edited books (Hiver et al., 2021b) bringing this key variable into the field of language learning. Self-determination theorists have employed the different aspects of engagement as a key outcome variable (Skinner et al., 2008); others have expanded the potential ways that engagement as a form of agency can improve learning environments for students (Reeve, 2013; Reeve & Lee, 2014; Reeve et al., 2020).

Working with the SDT model for predicting motivational changes in alignment with autonomy supportive and controlling features of the environment (Jang et al., 2012; Jang, Kim,

et al., 2016; Skinner et al., 2008), this variable can then be used to predict how learners themselves will influence the environment to change again in truly dynamic fashion (Papi & Hiver, 2020; Zhou et al., under review). Given the continued interest in engagement as a key function of education in both the SDT and L2 literatures (Hiver et al., 2021c; Oga-Baldwin & Nakata, 2017) this variable may be recognized as a keystone in the learning process.

The Present Study

Having outlined the theory, including discussions of instrumentation and the most recent findings in language learning and the broader educational field, we set out to investigate the current state of SDT research applied to language education. We therefore conducted a systematic synthesis of empirical SDT research to answer the following research questions:

1) What is the prevalence of the six SDT mini-theories in empirical L2 literature?
2) What are the characteristics of this literature in relation to sampling, context, design, and analytic strategy?
3) What are the most common measurement and application practices?

Method

Report Pool Creation

The PRISMA guidelines (Page et al., 2021) were utilized to construct the report pool through a sequential three-stage process (identification, screening, and inclusion). Each is discussed in turn (see Figure 1).

Identification

An automated index search was conducted on the Web of Science (WoS) Social Science Citation Index (SSCI) and Arts and Humanities Citation Index (AHCI) using SDT- and L2-related keywords (see Table 1). The AHCI was included as some relevant journals such as *Language Awareness* are also AHCI-indexed. This search strategy is in line with the recent trend in L2 systematic reviews and research syntheses that have likewise focused on WoS' most prestigious indexes (i.e., those with impact factors) to capture the research published in well-known journals in second language acquisition (e.g., Hiver et al., 2021c; Jiang et al., 2020; Nicklin & Plonsky, 2020; Vitta et al., 2021; Zhang, 2020). For systematic reviews such as the current study where scoping trends of the field are of interest, it is sensible to focus on journals upon which the field places its trust. Zhang (2020; citing Al-Hoorie & Vitta, 2019) for instance highlighted that reports in SSCI journals demonstrated higher research quality than those in non-SSCI journals to defend excluding the latter from its bibliometric-focused L2 research synthesis. As with Zhang (2020), we acknowledge the contributions that local and non-journal L2 research (e.g., book chapters) make to the field despite our excluding them.

Our automated search had the following parameters: 1) journal article only (early access included), 2) published in English, 3) searched using the 'topic' function which in the WoS interface includes title, abstract, and multiple keyword categories, and 4) a time constraint of 1-1-1990 to 31-7-2021. The beginning time constraint was due to WoS cataloguing and corresponded well to the publication of Deci and Ryan's (1985a) seminal work that introduced SDT to most of academia.

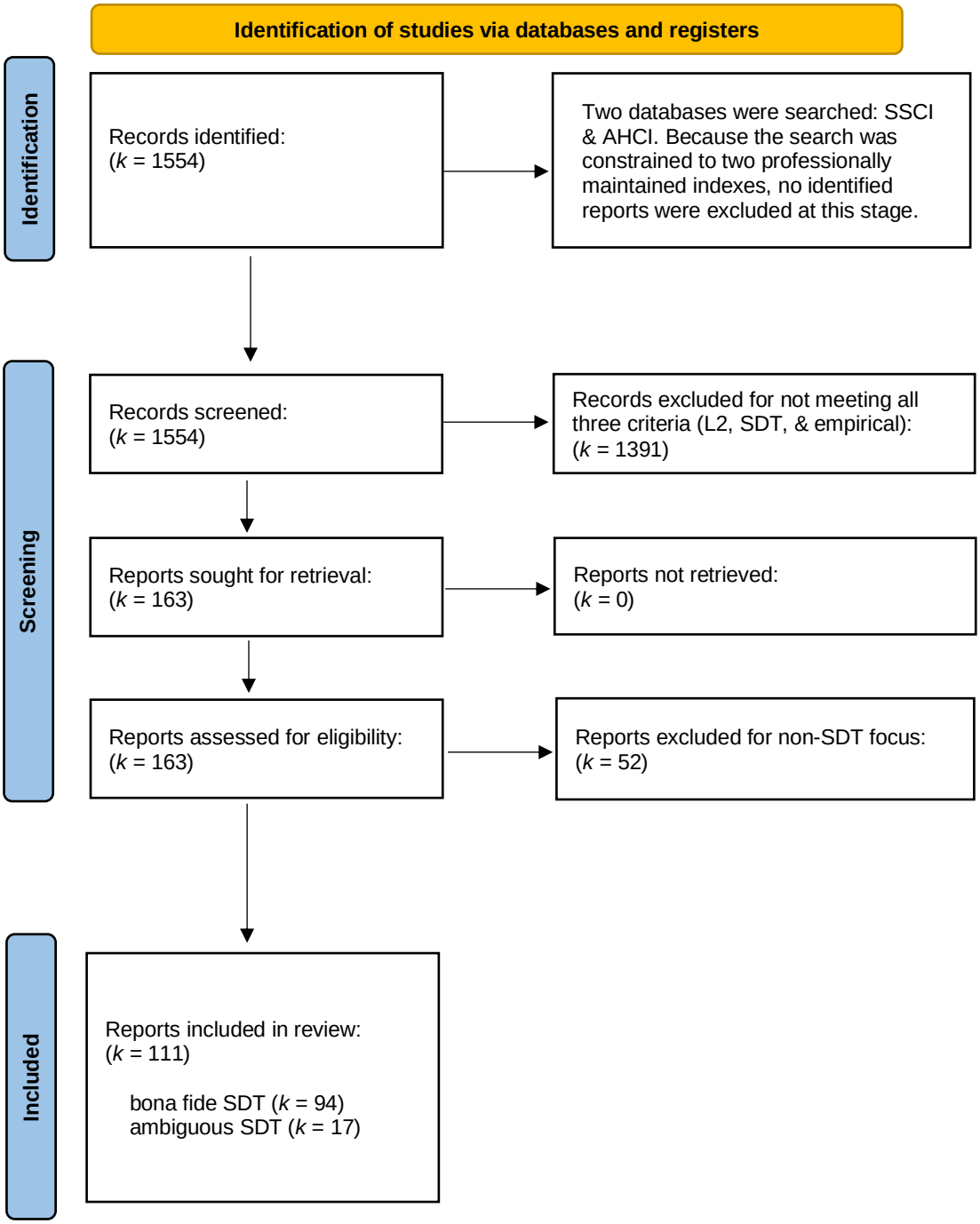

Figure 1. PRISMA flow diagram (Page et al., 2021).

Table 1. Identification Search Parameters

Feature	Details and Explanation
Time Period	1 January 1990 to 31 July 2021
Indexes Searched	Web of Science SSCI & AHCI
SDT-focused Search Terms	(self-determination theory OR intrinsic motivation OR basic needs OR basic psychological needs OR autonomy support OR autonomy supportive OR need support OR need supportive OR need of autonomy OR need for autonomy OR autonomy need OR self-determined motivation OR autonomous motivation OR autonomous self-regulation OR autonomous regulation OR need of competence OR need for competence OR competence need OR need of relatedness OR need for relatedness OR relatedness need)
L2-focused Search Terms (from Vitta & Al-Hoorie, 2020)	(second language or foreign language or L2 or ELT or ESL or EFL)

Note. AHCI = Arts & Humanities Citation Index; SSCI = Science Social Citation Index.

Screening and Inclusion

The abstracts of the 1554 identified reports were screened by one author to judge whether or not the report would be retrieved for further examination to include in the report pool. Each abstract was assessed using the following criteria:

1) the study is within an L2 learning context;
2) the study presents empirical research (primary or secondary; quantitative, qualitative, or mixed methods); and
3) the study is related to self-determination theory and associated concepts.

Based on this process, 163 reports were initially judged as meeting all three criteria and were retrieved for further review. To validate the abstract screening process, 200 randomly selected abstracts (100 coded as meeting all three criteria, 100 as not) were independently coded by a second expert. The observed agreement was 91% with good reliability ($\kappa = .82$) (McHugh, 2012). The second screening process involved the full-text review of the 163 reports retrieved. During this process, 52 reports were excluded for not actually having an SDT-focus. As with Hiver et al. (2021c), where some reports were labeled as being ambiguous in their operationalization of student engagement constructs, the included reports in this pool were differentiated further in relation to "bona fide" ($k = 94$) and "ambiguous" ($k = 17$). Bona fide SDT reports had explicit mention of SDT sources (e.g., Deci & Ryan, 1985a) while reflecting SDT concepts in both the theoretical underpinnings and method of inquiry. Ambiguous reports cited seminal SDT sources but lacked the consistent SDT-driven designs as exhibited by the bona fide reports. These coding decisions were validated by two independent teams of

researchers who coded all 163 reports included after the abstract screening process. The resulting inter-rater reliability was acceptable, (82.82%, $\kappa = .70$), especially since the nominal judgment had 3 possible categories (see McHugh, 2012).

Coding

The 111 (bona fide + ambiguous) reports were then coded with nominal judgments addressing the research questions presented in the preceding text (see Supplementary Material for report bibliometric data and judgements). In line with previous psychology in L2 research syntheses (e.g., Hiver et al., 2021c), there were general or methodological assessments (e.g., quantitative, qualitative, or mixed methods) coupled with theory-specific categories (e.g., utilization of the six mini-theories). All judgements were made by a team of three trained coders under the supervision of one author and are presented in the following section. To ensure coding reliability, joint judgements were made for each paper by at least two of the three coders. This synchronous, consensus coding was intended to reduce potential variation resulting from independent observations (i.e., a single coder) when coding a high number of nominally defined categories.

Results

SDT Mini-Theories

As our earlier review shows, SDT comprises several substantive mini-theories, each of which was developed to explain a set of motivationally based phenomena. These mini-theories include the constructs and hypotheses which together form the empirical evidence base for SDT research. With regard to the clarity of theoretical focus, Table 2 shows that 94 studies (84.6%) in the report pool were coded as clear and focused empirical reports of SDT, while the 17

remaining studies (15.4%) were coded as ambiguous reports and referred only to a generic, non-specific use of the notion *intrinsic motivation*. We then examined whether studies in this pool explicitly and consistently mentioned any of the six mini-theories. Of the six mini-theories, 46 reports (41.4%) focused on organismic integration theory, 14 (12.6%) on basic psychological needs theory, and 5 (4.5%) on cognitive evaluation theory. Forty-two studies (37.8%) included multiple mini-theories in their design, and in 4 (3.6%) remaining studies no specific information related to any mini-theory was included. Our analysis showed that goal contents theory was the focus of one study that also adopted multiple other mini-theories. No study in the pool investigated causality orientations theory or relationships motivation theory (but see Oga-Baldwin, 2022, who argues for the use of relationships motivation theory in independent learning). Together these results indicate that some facets of motivation and personal functioning have been investigated with more clarity and in more comprehensive ways compared to others that remain relatively un-examined.

Table 2. Definition and Operationalization of SDT

	k	%
SDT report		
yes (clear, focused)	94	84.6%
maybe (generic, ambiguous)	17	15.4%
Mini-theories		
organismic integration theory	46	41.4%
basic psychological needs theory	14	12.6%
cognitive evaluation theory	5	4.5%
causality orientations theory	0	0%
goal contents theory	0	0%
relationships motivation theory	0	0%
multiple mini-theories	42	37.8%
not specified	4	3.6%

What remained unclear from our analysis of the 42 studies (37.8%) that included multiple mini-theories, however, was the rationale for including those two or three mini-theories within the design of a single study. For instance, the lack of specificity both theoretically and methodologically as to why organismic integration theory and basic psychological needs theory should be used in conjunction (the most common combination, 29 out of 42 reports) in a particular study, but not any other mini-theories, leaves many questions unanswered. Studies in this category also appeared problematic due to the level of ambiguity surrounding how these mini-theories informed the 42 studies. This can be seen, for example, in studies where one mini-theory is reviewed exclusively in the introduction and literature review, and then another mini-theory altogether is used to interpret the results.

Study Characteristics

The sampling characteristics reported included the sample size, age group, and study context (Table 3) among other participant features. The 111 reports in our pool yielded a total of 128 independent samples (teachers = 3 samples; students = 125 samples), with a total sample size of N = 50,067. The sample range across all studies was 1 to 6,301 with a median sample of N = 194 (IQR = 362, M = 391.14, SD = 735.92). A large number of studies sampled upwards of 100 participants (77 studies, 69.4%), while 15 reports (13.5%) included multiple samples in their study (e.g., Oga-Baldwin & Nakata, 2015: study 1 N = 479 [quantitative] and 39 [qualitative], study 2 N = 344 [quantitative], study 3 N = 312 [qualitative]). Participant age was reported in all studies, though often imprecisely (i.e., “teens,” “children”). Table 3 shows that the largest category of participants recruited were adults (71 studies, 63.9%), and a sizeable number of studies sampled teenagers (20 studies, 18%) and children (16 studies, 14.4%). Participants were

enrolled as language learners at a range of institutions including university (67 studies, 60.4%), secondary school (20 studies, 18%), and elementary school and below (16 studies, 14.4%). These demographic characteristics are at least partly in line with many other recent reviews in the field (Hiver et al., 2021a; Hiver et al., 2021c; Sudina, 2021).

Table 3. Participant sampling characteristics

	k	%
Sample size		
1–5	6	5.4%
$5 < N \leq 20$	8	7.2%
$20 < N \leq 50$	10	9.0%
$50 < N \leq 100$	12	10.8%
$100 < N \leq 500$	50	45.0%
N > 500	27	24.3%
multiple samples	15	13.5%
Age		
children (under 12)	16	14.4%
teenagers (13–17)	20	18.0%
adult (over 18)	71	63.9%
multiple, mixed age groups	4	3.6%
Institution		
pre-K & kindergarten	4	3.6%
elementary school	12	10.8%
secondary school	20	18.0%
university	67	60.4%
other	8	7.2%

Note. Sample size *k* sums to 128, the total number of independent samples. "Other" institutions include homeschool, informal instructed settings, and private language institutions.

Turning to the contextual aspects of study demographics (Table 4), participants were studied most often in foreign language settings (83 studies, 74.7%) and bilingual and multilingual contexts (14 studies, 12.6%). Only a handful of studies recruited participants from

second language or heritage language contexts (2 each). The instructional setting of most studies was a generic classroom setting, including study abroad (79 studies, 71.1%), with online, app-based, or a virtual language learning environment the second most frequent (23 studies, 20.7%) instructional setting. Several other instructional settings were featured in the report pool, including blended L2 learning environments, language for specific purposes (e.g., English for academic purposes) classrooms, language immersion settings, or content and language integrated learning (CLIL) and English medium instruction (EMI) classrooms. None of these settings were featured in more than 5 studies in the entire pool. Participants' first languages were most often Asian languages (53 studies, 47.7%) and European languages (34 studies, 30.6%). The largest L1 populations within these broad categories included Chinese (k = 21), Japanese (k = 18), English (k = 15), Persian (k = 10), Korean (k = 8), and Spanish (k = 8). A small number of participants were reported as having multiple or mixed L1s (10 studies, 9%). As many other reviews have found, the target language for the vast majority of learners sampled was L2 English (78 studies, 70.3%). Other target L2s included French (6 studies, 5.4%), Spanish and German (3 studies each), Mandarin Chinese and Japanese (2 studies each), and Russian (1 study, 0.9%). Ten additional studies (9%) reported multiple mixed languages as the target L2s, while 6 studies (5.4%) included no mention of the target L2.

Table 4. Contextual characteristics under study

	k	%
Context		
foreign language	83	74.7%
bilingual/multilingual	14	12.6%
first language	5	4.5%
second language	2	1.8%
heritage	2	1.8%

mixed	3	2.7%
not reported	2	1.8%
Instructional Setting		
generic classroom setting (including study abroad)	79	71.1%
online/app/virtual learning environment	23	20.7%
blended	5	4.5%
language for specific purposes (e.g., EAP)	5	4.5%
immersion	4	3.6%
CLIL/EMI	4	3.6%
not reported	3	2.7%
Participant L1		
Asian languages	53	47.7%
European languages	34	30.6%
Middle Eastern languages	14	12.6%
multiple/mixed	10	9.0%
Target L2		
English	78	70.3%
French	6	5.4%
Spanish	3	2.7%
German	3	2.7%
Mandarin Chinese	2	1.8%
Japanese	2	1.8%
Russian	1	0.9%
multiple/mixed	10	9.0%
not reported	6	5.4%

Note. Target L2s reported in the mixed category include combinations of the above languages as well as Latin and Swahili. EAP = English for Academic Purposes; EMI = English Medium Instruction; CLIL = Content and Language Integrated Learning.

Regarding the design characteristics shown in Table 5, the majority of studies were quantitative (86 studies, 77.5%). Only 7 studies (6.3%) employed exclusively qualitative methods, while 18 (12.2%) employed mixed methods. We note here that the balance of quantitative studies is somewhat higher than L2 motivational studies more generally in the most

recent decades (cf. 37.5% purely quantitative engagement studies over 20 years; Hiver et al., 2021c). Of the 104 studies involving some form of quantitative design, most were observational (i.e., in the sense that they employed a non-experimental design). This included correlational studies with cross-sectional (70 studies, 63%) and longitudinal designs (25 studies, 22.5%). Of the 9 studies in total that adopted an experimental design of some sort, only 3 (2.7%) were fully experimental. Data collection procedures show a pattern in line with these design characteristics. A total of 105 studies (94.6%) elicited data using surveys or questionnaires, a point we look at in greater detail below when we examine study instrumentation. Other studies relied on interviews (16 studies, 14.4%), focus groups (4 studies, 3.6%), or classroom observations (3 studies, 2.7%). Data were also elicited using reflective journals and diaries, stimulated recall, classroom tasks, test batteries, and writing samples once each.

Table 5. Design of study

	k	%
Method		
quantitative	86	77.5%
qualitative	7	6.3%
mixed	18	12.2%
of which…		
QUAN Approach		
correlational: cross-sectional	70	63%
correlational: longitudinal	25	22.5%
quasi-experimental	6	5.4%
experimental	3	2.7%
QUAL Approach		
interview	16	14.4%
case study	5	4.5%
focus group	4	3.6%
of which…		
Data Collection Procedures		

survey/questionnaire	105	94.6%
interview	16	14.4%
focus group	4	3.6%
classroom observation	3	2.7%
reflective journal/diary	1	0.9%
stimulated recall	1	0.9%
task	1	0.9%
test	1	0.9%
writing sample	1	0.9%

Note. Data collection procedures do not sum to $k = 111$ because of the many studies reporting multiple methods of data elicitation.

Related to these design and data elicitation details are authors' choice of data analytical strategy. Table 6 shows that the techniques most frequently adopted were structural equation modeling (25 studies, 22.5%), regression and bivariate correlation analyses (21 studies each), variations of ANOVA (20 studies, 18%), and *t*-tests (15 studies, 13.5%). Other quantitative data analysis techniques here included analyses of group membership and group comparison (e.g., MANOVA, cluster analysis, latent class/profile analysis), analyses of change and development (e.g., longitudinal tests, growth curve models, panel designs), and other advanced regression-based analyses (path analysis, exploratory structural equation modeling, partial least squares structural equation modeling, hierarchical linear modeling, multilevel models). Seven studies (6.3%) employed non-parametric analyses, and another 2 (1.8%) reported only descriptive statistics. From the relatively smaller number of studies choosing a qualitative or mixed design and drawing on qualitative data, some of the qualitative coding techniques used included content/text analysis (4 studies, 3.6%), sequential coding (4 studies, 3.6%), thematic coding (2 studies, 1.8%), and conceptual coding (2 studies, 1.8%). Two studies (1.8%) relied only on

informal descriptive comparisons, and another 3 studies (2.7%) did not report the analyses used for their qualitative data.

Table 6. Analytical strategy

	k	%
Quantitative data analysis		
SEM	25	22.5%
regression	21	18.9%
correlation	21	18.9%
ANOVA/ANCOVA	20	18%
t-test	15	13.5%
path analysis	7	6.3%
non-parametric tests	7	6.3%
MANOVA	6	5.4%
longitudinal analyses	3	2.7%
descriptive statistics	2	1.8%
hierarchical linear modeling	2	1.8%
LGCM/panel models	2	1.8%
multilevel models	2	1.8%
ESEM	1	0.9%
cluster analysis	1	0.9%
latent class analysis	1	0.9%
latent profile analysis/LPTA	1	0.9%
PLS-SEM	1	0.9%
Qualitative data analysis		
content/text analysis	4	3.6%
sequential coding	4	3.6%
thematic coding	3	2.7%
conceptual coding	2	1.8%
informal comparisons	2	1.8%
categorization	1	0.9%
grounded theory coding	1	0.9%
not reported	3	2.7%

Note. ESEM = Exploratory Structural Equation Modeling; LGCM = Latent Growth Curve Modeling; LPTA = Latent Profile Transition Analysis; PLS-SEM = Partial Least Squares Structural Equation Modeling; SEM = Structural Equation Modeling.

Finally, we were also interested specifically how these studies employed SDT in their designs. Table 7 shows that 63 studies (56.7%) adopted SDT constructs as explicit predictors of various learning outcomes—analogous to using SDT as an independent variable—and tested hypotheses related to this. In the analyses (see Table 6) conducted, SDT was used most often as predictor of other non-SDT motivational variables such as goal orientations, self-efficacy, and motivational intensity (19 studies, 17.1%), as well as affective variables such as anxiety, satisfaction, or well-being (10 studies, 9%). The predictive value of SDT variables was also tested against some conventional outcomes such as global measures of L2 achievement (9 studies, 8.1%), student engagement (8 studies, 7.2%), intended effort[1] (6 studies, 5.4%), grades and grade point average (6 studies, 5.4%), willingness to communicate (5 studies, 4.5%) and skill-specific L2 performance (5 studies, 4.5%). Several other non-language related outcomes were tested in a handful of studies each such as cultural awareness/competence, technological competence, developmental outcomes, and self-regulated strategy use.

Beyond its use as a predictor or independent variable, SDT variables were also tested in simple associations with other variables or covariates in 89 studies (80.2%). Among others, the variables tested in association with SDT constructs included non-SDT motivational variables (29 studies, 26.1%), instructional characteristics or teaching practices (15 studies, 13.5%), affective variables (12 studies, 10.8%), beliefs/attitudes (7 studies, 6.3%), student engagement (7 studies, 6.3%), and personality (3 studies, 2.7%). Several measures commonly used as outcomes were also included here, albeit tested only through simple associations, including L2 achievement (10

[1] While intended effort is sometimes adopted as a measure of motivational intensity, here we followed the studies' own reporting practices and coded for "motivational intensity" when that specific term was adopted and "intended effort" only when this specific term and its corresponding measurements were used.

studies, 9%), skill-specific L2 performance (8 studies, 7.2%), student engagement (7 studies, 6.3%), grades and grade point average (5 studies, 4.5%), and intended effort (4 studies, 3.6%).

Table 7. Study aim and use of SDT

	k	%
SDT used as predictor or independent variable		
yes	63	56.7%
no	48	43.3%
SDT as predictor of		
(non-SDT) motivational variables	19	17.1%
affective variables	10	9.0%
L2 achievement	9	8.1%
engagement	8	7.2%
intended effort	6	5.4%
grades/grade point average	6	5.4%
skill-specific performance	5	4.5%
willingness to communicate	5	4.5%
cultural awareness/competence	3	2.7%
perceived usefulness of learning content	3	2.7%
developmental outcomes	2	1.8%
technological competence	2	1.8%
self-regulated strategy use	2	1.8%
SDT in assoc. with variables/covariates of interest		
yes	89	80.2%
no	22	19.8%
SDT associated with		
(non-SDT) motivational variables	29	26.1%
teaching practices/instructional characteristics	15	13.5%
affective variables	12	10.8%
L2 achievement	10	9.0%
skill-specific performance	8	7.2%
beliefs/attitudes	7	6.3%
engagement	7	6.3%
grades/grade point average	5	4.5%
developmental outcomes	4	3.6%
intended effort	4	3.6%

cultural awareness/competence	3	2.7%
personality	3	2.7%
international posture/affiliation	3	2.7%
non-L2 learning performance	2	1.8%
self-regulated strategy use	2	1.8%
willingness to communicate	2	1.8%

Note. The detailed frequencies relate only to the studies coded as "yes" for each broad category above.

Measurement and Application

Study quality is often a function of how well measurement and theory are integrated, and we examined this in the current report pool (see Table 8). Ninety-eight studies (88.2%) reported specific information about the data elicitation instruments used. Related to the instrument origin, 94 (84.7%) studies reported using an existing instrument, while 17 (15.3%) employed a newly developed measure of their own (of these, 13 studies provided no further information). Over 25 different data elicitation instruments were reported in the pool. The Language Learning Orientations Scale (Noels et al., 2001) was the most commonly-used instrument (k = 24) followed by the Academic Motivation Scale (Vallerand et al., 1992) (k = 8). Other established instruments used include the Attitude/Motivation Test Battery (Gardner, 1985); the Intrinsic Motivation Inventory (Ryan, 1982), the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1993), the Need Satisfaction at Work Scale (Deci et al., 2001), the Learning Climate Questionnaire (Williams & Deci, 1996); and the Learning Self-Regulation Questionnaire (LSRQ aka SRQ-A; Ryan & Connell, 1989). All but 6 studies elicited data using indirect (i.e., subjective self-report) measures of SDT constructs. This not only parallels the widespread use of such measures in general, non-language learning SDT research, it dovetails with the data collection procedures reviewed earlier indicating that 95.5% of studies in the pool relied on survey or questionnaire data elicitation methods (see also Al-Hoorie, 2018).

Table 8. Measurement issues

	k	%
Data elicitation instrument reported		
yes	98	88.2%
no	13	11.8%
Instrument origin		
existing	94	84.7%
new/own	17	15.3%
Psychometric tests of validity or reliability		
yes	52	46.8%
no	56	50.4%
partial	4	3.6%
Validity tests		
confirmatory factor analysis	29	26.1%
exploratory factor analysis	25	22.5%
average variance extracted	7	6.3%
Rasch/IRT tests	4	3.6%
heterotrait-monotrait ratios	1	0.9%
measurement invariance	1	0.9%
Reliability tests		
α coefficient	84	75.5%
composite reliability	7	6.3%
IRT estimates of reliability	2	1.8%
Raykov's ρ	1	0.9%
κ coefficient	1	0.9%
ω coefficient	1	0.9%
test–retest reliability	1	0.9%

Note. IRT = item response theory.

Related to psychometric testing of instruments, 52 studies (46.8%) reported tests of validity or reliability, while 56 studies (50.4%) did not report having conducted any such tests. This frequency corresponds to other applied linguistics syntheses such as Vitta and Al-Hoorie (2021), who similarly found about 50% frequency of reliability reporting in experimental L2

flipped classroom research. This indicates that L2 SDT quantitative research appears to examine the psychometric properties of their instruments at the same low rate as some other L2 subcamps.

Four remaining studies reported partial tests of validity or reliability, that is, for some constructs or variables included in the analysis but not all. Some type of factor analysis was conducted in 54 studies (48.6%), with confirmatory factor analysis as the most common technique (29 studies, 26.1%) and exploratory factor analysis close behind (25 studies, 22.5%). Other tests of validity reported include average variance extracted (7 studies, 6.3%), Rasch tests (4 studies, 3.6%), and heterotrait-monotrait ratios and measurement invariance (1 study each). Studies reporting an index of instrument reliability, not surprisingly, relied most often on α coefficient (84 studies, 75.7%). Composite reliability (7 studies, 6.3%) and item response theory estimates of reliability (2 studies, 1.8%) also featured in the report pool. Additional measures of reliability such as Raykov's rho, kappa coefficient, omega coefficient, and test–retest reliability were used in 1 study each.

Table 9. Temporal measurement

Temporal Window	*K*	%
one-time snapshot	74	66.6%
years	19	17.1%
months (e.g., a semester)	10	9.1%
weeks	5	4.5%
hours (e.g., a class)	3	2.7%

Cutting across operational and measurement concerns, we wondered about the measurement granularity and whether SDT was being studied in relation to language learners' general tendencies or momentary instances (Table 9). We also wanted to know about the temporal congruency between the measures being used and the predictions being tested. In our

pool, 74 studies (66.6%) elicited data in a one-time snapshot related to general tendencies. Other studies adopted a time window of years (19 studies, 17.1%), months (10 studies, 9%), weeks (5 studies, 4.5%), or a time window measured in hours or less (3 studies, 2.7%). We coded for congruence between this temporal window and the measures of SDT being used for data elicitation as well as the congruence between the measures of SDT used and predictions being tested. In both cases we found 100% congruence.

We also investigated whether the application of SDT was theoretical (i.e., testing connections between constructs of SDT or refining understanding of the mini-theories for language learning writ large) or practical (i.e., with applications to the language learner, their language learning, or to the language instruction that takes place in a classroom). As Table 10 shows, the overwhelming majority of studies (90%) investigated SDT in ways that were oriented to practice. The most frequent implications of these studies were conceptual applications (68 studies, 61.2%) demonstrating the applicability of SDT to a topical or thematic area of research such as the need to promote intrinsic motivation in students, and applications to a specific classroom technique (45 studies, 40.5%), or a student learning activity (17 studies, 15.3%). Implications for other stakeholders are apparent in instructional design and planning (16 studies, 14.1%), policy or institutional practices (14 studies, 12.6%), and teacher preparation or education (11 studies, 9.9%). Only the 10 studies (9%) applying SDT in a theoretical manner did not propose any applications based on the empirical data presented. Here too, we noted the large number of studies (k = 68) with applications deliberately framed by study authors as being practical but which on closer scrutiny appeared superficial and circular in nature. For example, in a study of basic psychological needs theory, the authors argued that L2 classrooms should satisfy

learners' basic psychological needs instead of frustrating them—indicating the need for greater clarity in study aims and design. We return to this point in our discussion.

Table 10. Applications of SDT

	k	%
SDT applied in ways that are		
practical	100	90%
theoretical	10	9%
both	1	0.9%
Applications proposed based on empirical data		
conceptual	68	
classroom techniques	45	
students' learning activity	17	
instructional design and planning	16	
policy/institutional practices	14	
teacher preparation/education	11	
research methods	10	
culturally-responsive/community applications	9	
skill-specific pedagogy	5	
assessment	4	
none	10	

Note. Percentages in the applications are not listed due to the large number of studies proposing multiple applications.

Discussion

We now turn to a discussion of the main substantive lessons drawn from our review of this study pool. Our findings highlight concerns related to conceptual and theoretical clarity, applications from SDT to language teaching and learning, and methodological choices.

First, in this pool of studies spanning 30 years, SDT appears to be applied to the domain of language learning and teaching as a general motivational framework with little specificity

around the mini-theories themselves. SDT provides specific insight about how the quality of motivation that stems from external incentives, ego involvement, personal value, or intrinsic interest leads to qualitatively different outcomes in classroom settings, as in other social settings (Howard et al., 2021). Language learning research, too, has a clear interest in understanding how learner agency and proactivity are at the core of learner behavior and functioning, closely mirroring SDT's focus on individual capabilities that allow for self-regulated behavior.

However, it is apparent from our analysis that certain aspects of SDT have saturated the literature while others remain dormant and unexplored (see also Sugita-McEown & Oga-Baldwin, 2019). Intrinsic motivation is not a concept exclusive to SDT, and indeed most studies in the pool that purported to study intrinsic motivation provided no further detail than *motivation that comes from the learner*. Such an imprecise description, based on early atheoretical dichotomies of intrinsic versus extrinsic motives, might apply equally well to goals, value, self-concept, autonomy, agency, effort, or other motivational constructs. Such inattention to conceptual clarity no doubt precludes the field from building a cumulative body of evidence that can inform practice.

Our analysis shows that, where mini-theories can be extrapolated from study instruments and constructs, the lion's share of studies adopted organismic integration theory, with basic psychological needs theory and cognitive evaluation theory distant runners up. The utility and contribution of the mini-theories causality orientations theory, goal contents theory, and relationships motivation theory to language learning and teaching are relatively uncharted given that they are not yet a part of the extant literature. It is also interesting to note the large number of studies that combined two or three mini-theories in a single study, though as we have noted, few of the studies that did so articulated a clear rationale for this. Ryan et al. (2021) point to the

growing number of empirical studies on each of the mini-theories in both general and educational psychology as evidence of an upward "trajectory of both basic research efforts and evidence-supported applications" (p. 97) leading to refinements and extensions in theory. Without the requisite conceptual clarity and transparency, SDT research in the field of language learning and teaching risks being left behind from these advances as SDT surges forward. We would suggest that, going forward, best practice for SDT studies in this domain would be to 1) explicitly describe the mini-theory being adopted, 2) specify how the mini-theory's constructs are thought to contribute to L2 learner and teacher functioning (e.g., proximal influences, distal influences, mediators), and 3) articulate a clear rationale for including the concepts or constructs of multiple mini-theories within the design of a single study.

A second main takeaway from our analysis is the importance for many studies to provide, or at least appear to provide, practical applications (i.e., applied takeaways based on empirical data) for L2 learners and their teachers. We note that studies to date have come from the 'proof of concept' phase of research; many studies have demonstrated the validity and relevance of the theory and demonstrated aspects of the universality-without-uniformity (Soenens et al., 2014) claims of the theory. Indeed, as our above review indicates, the pioneers of this field (e.g., Noels et al., 1999) have admirably and robustly demonstrated that SDT applies to the field of language learning. Likewise, given the strong representation of Asian and European L1s (nearly 80% of the studies), studies in these contexts have also shown that the constructs and instruments have validity in multiple diverse cultures. Moving the theory forward through the next phase of research now requires deeper investigations beyond demonstrating the applicability to new contexts. We welcome new contextual replications and instrument validations in underrepresented samples; as with much of the research in the social sciences (Henrich et al.,

2010), African, South American, and South Asian populations have seen little attention. At the same time, knowing that the theory works across cultures means that these replications and expansions to new languages and cultural settings can go beyond simple construct validation towards meaningful exploration of outcomes.

As an applied field, language education research is in constant pursuit of evidence for what works, for whom, under what circumstances, how, and why. A large number of insightful applications were part of the report pool, related specifically to L2 classroom techniques, students' learning activity/behavior, L2 instructional design and planning, L2 policy and institutional practices, and L2 teacher preparation. However, the equally large number of studies in the pool whose applications remained conceptual or theoretical in nature is cause for alarm. Research on language motivation, more broadly than SDT-proper, has *not* adequately informed practice (Al-Hoorie et al., 2021a; Lamb, 2017). An SDT-informed empirical study of language learning or teaching should be expected to provide more than a glib confirmation that the theory holds in L2 classroom settings, particularly since SDT is no newcomer in L2 motivation research. We would argue that the superficial quality of such applications does not speak to substantive concerns and issues in the field, and offers little insight into the core questions of concern to researchers of language learners and their learning. Instead, there is a need to probe how empirical findings can be applied based on a theoretical framework of instructed L2 learning (Henry, 2021; Papi & Hiver, 2022), and how results from SDT research connect with specific aspects of language development. For instance, what do findings from SDT research say for L2 interaction and negotiation of meaning, learners' deliberate and selective attention to form and/or meaning in skill-specific task performance, their depth of processing, mental elaboration,

and retrieval of previously constructed L2 knowledge, or their response to corrective feedback? These remain unanswered questions entirely.

Then too, there is the question of whether language learning and its motivational processes are substantively different from the learning/instruction of other subjects (Al-Hoorie et al., 2021b) and what empirical evidence there is that applications of SDT would be L2-specific or unique from all other learning domains. We would suggest that in the absence of such cross-domain evidence for *fundamental differences* (Al-Hoorie & Hiver, 2020; Oga-Baldwin & Fryer, 2020), the principle of parsimony suggests that there are superordinate motivational processes at play which may apply equally well across many subjects and topical areas of focus (though see Sugita-McEown & Oga-Baldwin, 2019, and Soenens et al., 2014, for discussion of cultural localization). The parsimonious view here mirrors Vallerand's (1997) hypothesis of hierarchical school-based motives which underlie domain specific motives, with confirmatory and meta-analytic evidence mounting in its favor (Chanal & Guay, 2015; Guay et al., 2014; Howard et al., 2021).

In relation to this, recent meta-scientific commentary has pointed out the counterproductive nature of individual studies, which represent single data points, investing previous space on a full-length discussion section when the reality is that circumstances that are part and parcel of everyday L2 classrooms act as constraints on applicability of effects (Al-Hoorie et al., 2021b). Informing the teaching and learning of additional languages is a central mission of SDT research in the field, but it must be balanced with guarding against pseudo-applications (Al-Hoorie et al., 2021a).

Finally, these issues all suggest the need for greater methodological diversity and innovation in future studies. The number of studies relying, almost exclusively, on self-report

survey data is perhaps not surprising given the tradition of educational psychology research that our field has drawn on. One sign that this conventional method of data elicitation has been applied rather uncritically, though, is the widespread use of self-report measures for both predictors and outcome measures, introducing common-method bias into study design. The consequences of common method bias—when both the independent and dependent variables are captured by the same response method—can be detrimental to a study's validity unless appropriate procedural and statistical controls are employed. As other scholars have noted (e.g., Al-Hoorie et al., 2021a; Lamb, 2017), intervention studies on L2 motivation are scarce, and SDT research is no exception. This is surprising considering that the most fundamental mandate of L2 motivation research (indeed any educational research associated with motivation science) is to explore innovations in instructional practices, systems, materials, and assessments that will address the motivational challenges (e.g., related to effort, persistence, etc.) learners face.

This inattention to the heart of motivation research is exacerbated by the distracting distinction made between research on *motivation* and research on *motivating* (cf. Dörnyei & Ushioda, 2021). While studying L2 motivation itself (i.e., as a construct that makes some learners unique) or how its dimensions cause variation among learners can satisfy intellectual curiosity, applying motivational science to L2 research relates to much more pressing concerns: uncovering, motivationally, why some learners are more successful than others in their rates and routes of development and their levels of ultimate attainment, and what can be done to level the playing field. In essence, all L2 motivation research should be research on motivat*ing* (Henry, 2021; Lamb, 2017). As with other domains, form (research design) follows function (purpose). From our report pool, it is unclear why yet more studies on SDT would be necessary if they are to remain merely descriptive and linked to a representational mindset (Al-Hoorie et al., 2021b).

Empirical research is needed on how SDT interventions, related to various mini-theories, can have a direct or indirect impact on L2 learning processes and outcomes.

We would further propose that these studies need not narrowly follow the classic experimental model (i.e., a linear pre-post design), as there are multiple appropriate approaches that can be used to study the complex experimental effects of educational interventions. Some of these include case-based research methods, design-based intervention research, experimental ethnography, and single-case designs (see Hiver & Al-Hoorie, 2020). The goal with such new approaches to SDT research would be to adopt an explicit intervention mindset that examines the quantitative and qualitative effects of various models, constructs, and techniques on the socio-cognitive processes involved in learning an additional language. Such an SDT-learning interface can have substantial implications for L2 pedagogy.

Conclusion

As demonstrated in this review, SDT has shown robust research power over the past several decades in the domain of language education. Its staying power has largely stemmed from its connection with a broader array of domains, its potential for strong hypotheses, and the embrace of new methods for exploring these hypotheses on the part of its research community. The theory is simultaneously one of well-being and personal liberation, with an ethos of promoting and improving well-being in the lives of learners. In this review, we have presented findings, tools, and ways to push these ideas forward using newer hypotheses and methods. With feet planted solidly in both the inspirational and the technically rigorous, future research can adopt these philosophical and methodological tools to offer actionable strategies for building classrooms that increase student potential by nurturing basic needs and language proficiencies.

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