



Basic psychological need theory: Advancements, critical themes, and future directions

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Abstract

The study of basic psychological needs has witnessed a strong revival, in part spurred by Basic Psychological Need Theory (BPNT), one of the six mini-theories within Self-Determination Theory. Empirical studies on BPNT have increased exponentially since the millennium turn, leading to refinements and extensions in theory. In this contribution we review these two decades of research in order to introduce two special issues on BPNT. We first discuss key criteria that define and identify a basic need within BPNT. We then review several need-relevant themes, highlighting advancements and trends that characterize contemporary research on BPNT. Specifically, we address potential extensions of the shortlist of basic psychological needs, the role of psychological need frustration in increasing vulnerability to maladjustment, the study of the interface between individuals' psychological and physical needs (e.g., sleep, sex, hunger), novel insights into critical need-supportive and need-thwarting practices, and the universality (versus variability) of effects of need satisfactions and supports across demographics, psychological characteristics, and cultural contexts. We also situate each of the 19 contributions that appear in this special double-issue on BPNT within these themes, while suggesting avenues for further research on the role of basic psychological needs in motivation, adjustment, and wellness.

Keywords Basic psychological needs · Adjustment · Universality · Self-determination theory

In everyday language, the term 'need' is used in reference to specific desired attributes or outcomes. Children may say that they need a toy for their birthday, adolescents that they need a new smartphone to stay better connected with their peers, and adults that they need vacation to recover from work. In each of these cases, the term 'need' denotes the presence of a particular desire or preference, often rooted in a deficit or shortage, with such preferences varying widely between individuals.

In contrast, within Self-Determination Theory (SDT; Ryan and Deci 2017) the term psychological need is defined in a more specific and narrow way, that is, as a *psychological nutrient that is essential for individuals' adjustment, integrity, and growth* (Ryan 1995). In this framework, a specific desire can only be assigned the more formal status of a basic

psychological need when its satisfaction is not only conducive to, but essential for individuals' well-being, while its frustration increases risk for passivity, ill-being, and defensiveness (Ryan and Deci 2000a; Vansteenkiste and Ryan 2013). Clearly, not all motives or desires fit this narrower definition. To illustrate, material purchases do not necessarily increase well-being, even when highly desired (e.g., Howell and Hill 2009; Van Boven 2005).

This more restrictive definition of basic needs as necessities provides the conceptual basis for a parsimonious functional viewpoint on wellness, unlike broader *need-naming* approaches common in the first half of the twentieth century (e.g., McDougall 1932; Murray 1938). For a need candidate to be incorporated in SDT's shortlist of psychological needs, a number of objective criteria have to be met (Baumeister and Leary 1995; Deci and Ryan 2000; Ryan and Deci 2017). These criteria have been articulated within *Basic Psychological Need Theory* (BPNT), a central mini-theory within the broader framework of SDT (Ryan and Deci 2017; Vansteenkiste et al. 2010; Vansteenkiste and Soenens 2015).

Deci and Ryan (2000) formally identified the needs for autonomy, competence, and relatedness as basic

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psychological needs, arguing that support for and satisfaction of these needs accounts for a broad variety of phenomena across developmental periods, cultures, and personality differences. Basic psychological needs were broadly defined as critical resources underlying individuals' natural inclination to move towards increasing self-organization, adjustment, and flourishing (Ryan 1995). Abundant research, some of which has been summarized in meta-analyses (Ng et al. 2012; Slemp et al. 2018; Van den Broeck et al. 2016; Vasquez et al. 2016; Yu et al. 2018), has since shown that these three psychological needs indeed play a prominent role in development, adjustment, and wellness across cultures, with strong implications for basic motivational science, applied practices, and even broad social policies (Ryan and Deci 2017).

Reflective of this burgeoning interest in basic psychological needs are these two special issues in *Motivation and Emotion* (i.e., Volume 44, Issue 1 and 2), which it is our pleasure to introduce. In this contribution we do so by reviewing research on BPNT, highlighting advancements and emerging trends, as well as future directions. We also describe a number of themes that have been central to the study of basic psychological needs and that are addressed in the contributions within these upcoming issues. Given space limitations, our review is necessarily selective, both in

terms of the themes discussed and in terms of the empirical contributions reviewed.

As can be noticed in Fig. 1, the review of these different topics follows a particular order. We open with two themes that focus on the construct of basic psychological needs as such, discussing potential extensions of SDT's current shortlist of psychological needs (Theme 1) and the critical role of psychological need frustration in increasing risk for maladjustment (Theme 2). The next theme moves beyond psychological needs per se by reviewing work on the interface between psychological needs and physical needs and drives (e.g., sleep, sex, hunger; Theme 3). We then shift the focus to social contexts, highlighting the importance of need-supportive and need-thwarting practices (Theme 4). We conclude with a discussion of the universality (vs. variability) of the effects of need satisfactions and need supports as a function of demographic (e.g., age, socioeconomic status), psychological (e.g., personality, need strength) and contextual (e.g., culture) characteristics (Theme 5). Table 1 lists the 19 empirical contributions in the two upcoming volumes according to the themes in which they can be situated. Yet, before addressing these themes, we open by discussing the criteria used to identify and describe psychological needs within BPNT.

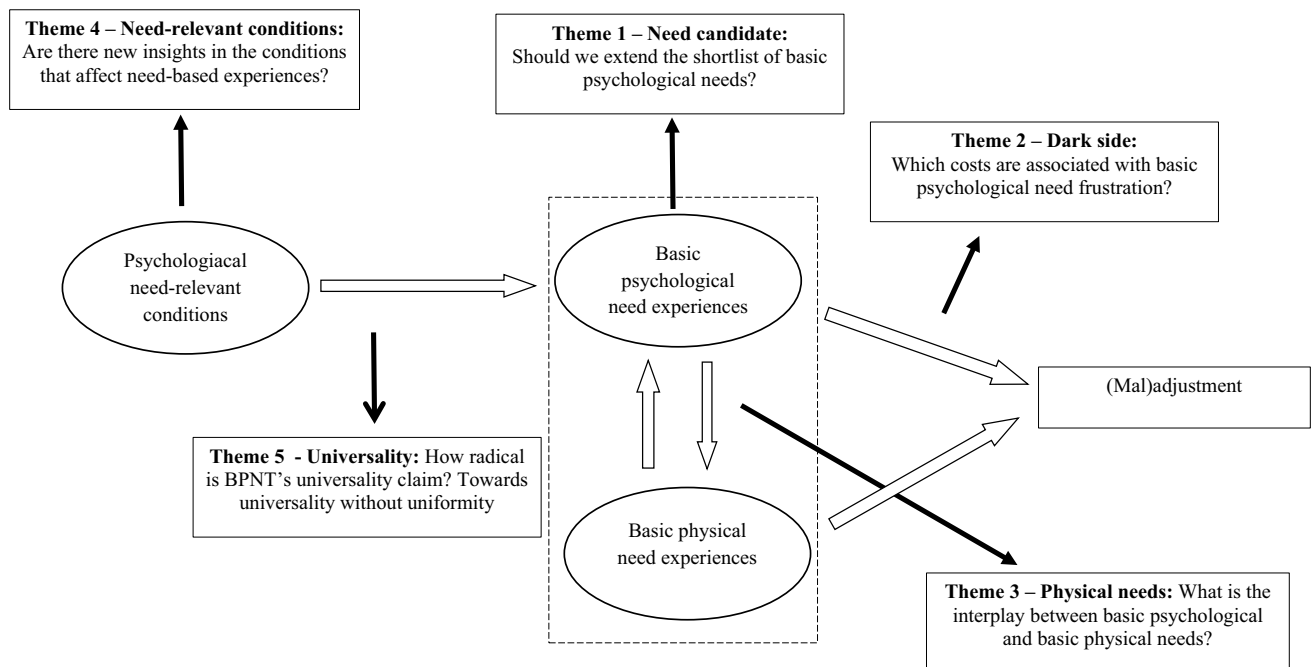


Fig. 1 Overview of the five reviewed themes related to basic psychological need theory

Table 1 Overview of the contributions in the two special issues in relation to the five core themes

	Key concept	Theme
<i>Issue 1 (February, 2020)</i>		
1. Bagheri and Milyavskaya	Novelty-variety	Need candidate
2. Warburton, Wang, Bartholomew, Tuff, and Bishop	Need profiles	Dark side
3. Benita, Benis-Weisman, Matos, and Torres	Emotion regulation	Universality
4. Waterschoot, Van der Kaap-Deeder, and Vansteenkiste	Attentional bias	Dark side
5. Holding, St-Jacques, Verner-Filion, Kachanoff, and Koestner	Need sacrificing	Dark side
6. Martela and Ryan	Benevolence	Need candidate
7. Wüttke	Political engagement	Need-relevant conditions
8. Lee and Reeve	Brain morphometry	Definitional criteria needs
<i>Issue 2 (April, 2020)</i>		
9. Assor, Soenens, Yitshaki, Geifman, Olshtein, and Ezra	Identity development	Need-relevant conditions
10. Rouse, Turner, Siddall, Schmid, Standage, and Bilzon	Need profiles	Dark side
11. Selvi and Bozo	Drive for muscularity	Dark side
12. Uysal, Aykutoglu, and Ascig	Sleep and cholesterol	Physical needs
13. Vahlstein, Mutter, Oettingen, and Gollwitzer	Obsessive thinking	Dark side
14. Prentice, Jayawickreme, and Fleeson	Morality	Need candidate
15. Van Egmond, Omarshah, Berges, Benton, Zalira, and Morrell	Resource scarcity	Physical needs
16. Vermote, Aelterman, Beyers, Aper, Buysschaert, and Vansteenkiste	Circumplex model	Need-relevant conditions
17. González-Cutre, Romero-Elias, Jiménez-Loaisa, Beltrán-Carrillo, and Hagger	Novelty	Need candidate
18. Wörtler, Van Yperen, and Barelds	Need strength	Universality
19. Baker, Watlington, and Knee	Rapport	Need-relevant conditions

Basic psychological need theory

Definitional criteria of basic psychological needs

BPNT's trio of needs

At the heart of BPNT (Ryan and Deci 2017) is the argument that individuals have a limited set of basic psychological needs, the satisfaction of which is essential for flourishing and well-being. Although the list of psychological needs is and has always been open for additions, the current set is limited to three: autonomy, competence, and relatedness. BPNT considers both the satisfaction and frustration of these three needs, with frustration representing a stronger and more threatening experience than the mere absence of its fulfilment. *Autonomy* refers to the experience of volition and willingness. When satisfied, one experiences a sense of integrity as when one's actions, thoughts, and feelings are self-endorsed and authentic. When frustrated,

one experiences a sense of pressure and often conflict, such as feeling pushed in an unwanted direction. *Relatedness* denotes the experience of warmth, bonding, and care, and is satisfied by connecting to and feeling significant to others. Relatedness frustration comes with a sense of social alienation, exclusion, and loneliness. *Competence* concerns the experience of effectiveness and mastery. It becomes satisfied as one capably engages in activities and experiences opportunities for using and extending skills and expertise. When frustrated, one experiences a sense of ineffectiveness or even failure and helplessness.

Ryan and Deci (2017) highlight that these three psychological needs were distinguished and derived from both inductive and deductive bases. These broad needs first emerged inductively from research showing that experiences of competence and autonomy were essential to developing and maintaining intrinsic motivation. To illustrate, positive feedback was found to promote greater interest and enjoyment of an activity (Vallerand and Reid 1984), an effect

accounted for by the satisfaction of individuals' need for competence (De Muyne et al. 2017). In contrast, offering external rewards for partaking in an interesting activity can undermine intrinsic motivation (Deci et al. 1999), presumably because controlling rewards can shift one's perceived locus of causality (deCharms 1968) from internal to external, thereby diminishing a sense of autonomy (Houffort et al. 2002).

Although initial SDT-based research focused primarily on intrinsic motivation, later studies addressed the *internalization* of extrinsically motivated activities (e.g., Ryan and Connell 1989). Internalization reflects the extent to which people truly assimilate or take in ambient values or practices. For individuals to fully internalize a non-interesting activity, they must personally value and experience ownership of the behavior (Ryan and Deci 2017; Vansteenkiste et al. 2018). Internalization, like intrinsic motivation, requires a sense of effectiveness (i.e., competence satisfaction) and volition (i.e., autonomy satisfaction). Yet to fully understand the variability in the process of internalization, it was necessary to include also the need for relatedness because it became clear that activities are more likely to be well-internalized when there is a genuine sense of connection with those encouraging these goals and activities. Ideally then, all three psychological needs are satisfied to foster the process of internalization (Milyasvkaya et al. 2014). If one of the needs is frustrated, internalization is hampered. For instance, although experiencing a strong bond with a socializing agent and feeling effective in carrying out a non-interesting activity may provide a starting point to begin internalizing its regulation, the internalization process will be only partial when the need for autonomy remains

unfulfilled. In the absence of autonomy, one may engage in the activity to please others, get approval, avoid feelings of guilt, or other controlled forms of regulation (Haerens et al. 2015; Markland and Tobin 2010).

Yet a primary source for the inductive evidence leading to the postulate of these three constructs as basic needs came from studies of well-being and flourishing. Evidence repeatedly showed that satisfaction of basic needs for autonomy, relatedness, and competence (ARC) were essential for well-being, both developmentally (e.g., Grolnick et al. 1991) and situationally (e.g., Reis et al. 2000). These three needs, each uniquely but also in interactive ways (e.g., Kluwer et al. 2019), appeared to be essential for individuals' well-being across ages, contexts, and cultures.

In addition to inductive reasons to invoke the needs for autonomy, competence, and relatedness as basic psychological needs, Ryan and Deci (2017) argued for the importance of these needs also on deductive grounds. Specifically, in the *organismic* view that underpins SDT (see Deci and Ryan 1985; Ryan 1995), it is assumed that human beings naturally develop in the direction of increasing adaptation, integration, and coherence where possible. Such integrative tendencies are both supported and characterized by experiences of autonomy, competence, and relatedness. Within this organismic view on development, these needs are integral to the very conception of a *fully functioning* person.

Given the view that full functioning entails ongoing psychological need satisfactions, BPNT became relevant not only to intrinsic and well-internalized motivation but also to well-being more generally (Ryan and Deci 2000a) and to various developmental outcomes, including pro-social tendencies (Tian et al. 2018; Wray-Lake et al. 2019), identity

Table 2 Description of the key criteria of a basic need within basic psychological need theory

<i>Basic criteria</i>	
1. Psychological	A basic need concerns the psychological and not the physical functioning of human beings
2. Essential	The satisfaction of a basic need contributes to growth, well-being, and adjustment <i>and</i> the frustration of the need predicts problem behavior, ill-being, and psychopathology
3. Inherent	A basic need represents an evolved aspect of our psychological nature due to adaptive advantages associated with need satisfaction
4. Distinct	A basic need concerns a distinct set of experiences and its emergence is not contingent upon or derivative from the frustration of other needs
5. Universal	Felt need satisfaction and need frustration should predict the thriving and ill-being of <i>all</i> individuals, regardless of differences in socio-demographics, personality, cultural background or need strength
<i>Associated criteria</i>	
1. Pervasive	The effects associated with need-based experiences should be reflected in myriad cognitive, affective, and behavioral outcomes, while also surfacing at different levels, from the psychological to the neurological/biological
2. Content-specific	Satisfaction and frustration of a basic need manifests through specific behaviors, experiences, and is well represented in natural language
3. Directional	A basic need directs and shapes individuals' thinking, acting, and feeling, thereby spurring the pro-active search for need-conducive circumstances, partners, and activities under supportive conditions, while eliciting corrective behavior under need thwarting circumstances
4. Explanatory	A basic need helps to account for or explain the relation between variations in social contexts, both growth-promoting and toxic, and wellness-related outcomes

consolidation (Luyckx et al. 2009; Skhirtladze et al. 2019), emotion regulation (Roth et al. 2018, 2019) and political engagement (Wüttke 2020). That is, BPNT specified that these varied positive developmental outcomes would be facilitated by need supports and satisfactions.

Because the basic psychological needs play such a significant role within SDT, both theoretically and empirically, it is important to consider the criteria used to describe BPNT's needs (Ryan and Deci 2017). Table 2 presents an overview of nine criteria that characterize the current psychological needs and that any new basic need-candidate would need to evidence. Although similar criteria have been proposed by others (e.g., Baumeister and Leary 1995), herein we group some criteria, discuss the interconnections between them, introduce underemphasized criteria, and indicate how they can be tested empirically. In doing so, we distinguish two categories of criteria, with a first set of five criteria characterizing the needs studied within BPNT at a more basic level and with a second set of four criteria following from this basic characterization and providing deeper insights into how basic needs operate.

Basic criteria

First, as a psychological theory, BPNT focuses on needs that are *psychological* in nature. Physiological needs, such as hunger, thirst, and sleep, have received considerable attention in the field of biology where the focus is on physical growth and health. This primary focus on psychological needs does not imply that physiological needs are ignored within BPNT, on the contrary. The interface and bidirectional relations between psychological and physiological needs is an intriguing topic in its own right, with an increasing number of studies shedding light on their dynamic interrelations (e.g., Campbell et al. 2018d), as also evidenced in the present special issue (Uysal et al. 2020). Indeed, the development and maintenance of a healthy lifestyle is affected by ongoing need satisfactions and frustrations (e.g., Ng et al. 2012), with a healthy lifestyle feeding back into individuals' need-based experiences (Campbell et al. 2018c).

Second, much like physiological needs such as hunger and thirst must be fulfilled to grow and thrive physically, the satisfaction of the psychological needs is seen as imperative or *essential* to fostering psychological growth, integrity, and wellness. Conversely, deprivation or frustration of these needs diminishes flourishing and increases risk for ill-being and psychopathology. Underscoring the claim that BPNT's core needs constitute such essential psychological nutrients, need satisfaction has been found to predict adjustment (e.g., Van den Broeck et al. 2016), to characterize satisfying life events (e.g., Sheldon et al. 2010), to be critical to a sense of meaning in life (González-Cutre et al. 2020; Martela et al. 2018) and to contribute to harmonious passions (Vallerand

2016). Conversely, the essential role of these basic psychological needs manifests also in the functional costs associated with their frustration, which predicts lower happiness and multiple forms of maladjustment (Bartholomew et al. 2011; Ryan et al. 2016).

A third criterion is that basic psychological needs have evolved as an integral part of our human natures. Because behaviors associated with these basic need satisfactions tend to provide adaptive advantages (Ryan and Deci 2017; Ryan and Hawley 2016), psychological needs have come to form an *inherent* part of individuals' functioning. This criterion fits with the organismic meta-theory underlying BPNT. The assumption that psychological needs form an ingrained part of our psychological make-up opposes blank slate conceptions in which people's needs, values, and satisfactions are scripted or programmed into individuals by social environments. Instead, BPNT gives recognition to the idea that there are energizing forces within human nature that foster psychological growth and proactivity. Indeed, it is hard to imagine any fully functioning person for whom relatedness, autonomy, and competence needs are unimportant or chronically unmet. Congruent with this assumption, an increasing number of studies have identified mechanistic correlates of need-based experiences (Di Domenico and Ryan 2017; Reeve and Lee 2019). For instance, Lee and Reeve (2020) report findings indicating that individuals' brain morphometry and, in particular the ventral striatum gray matter volume, correlates positively with participants' experienced need satisfaction.

Fourth, a basic psychological need in BPNT should be sufficiently *distinct* from other identified basic needs, both experientially and dynamically. At the experiential level, each need should be associated with a qualitatively different set of experiences. Dynamically, basic needs are not just a by-product of another (thwarted) need. If a candidate psychological need surfaces only as a correlate of another need or in response to the frustration of established basic psychological needs, such a need is derivative rather than basic (Ryan and Deci 2017). Needs that emerge only in response to frustrations of basic psychological needs often represent a *need-substitute* or a *compensatory* preference (Ryan and Deci 2017; Vansteenkiste and Ryan 2013). An illustrative example is the desire for security, a preference that typically becomes salient under conditions of need frustration, often because of controlling, uncaring, or overchallenging (i.e., need-thwarting) circumstances. Similarly, a desire for power (Hofer and Bush 2019; Winter 1973) may signal that one feels 'caged' and, hence, is attempting to compensate for a lack of autonomy (Martela et al. 2019).

A fifth criterion concerns the *universal* nature of basic needs. If psychological needs are inherent, they should be universally applicable and operative (Ryan and Deci 2017), and thus relevant for individuals regardless of their

demographic characteristics (e.g., age, nationality, gender; Henning et al. 2019), personality (e.g., Mabbe et al. 2016), or cultural background (e.g., Benita et al. 2020). Related to this issue is the question whether these needs have to be valued or desired for a person to benefit from their satisfaction or to suffer from their frustration. Individual differences in *need strength* have received substantial attention in other theoretical traditions, including motive disposition theory (McClelland 1987). According to BPNT's universality claim, these differences play a minimal role in altering effects of experienced need satisfaction and frustration relative to the expected main effects (Ryan et al. 2019a). At the same time, BPNT's universality claim should not be interpreted too rigidly. As discussed below, although the pathways to need fulfillment may differ as a function of factors such as culture, developmental history, and personality, the satisfaction and frustration of the needs will ultimately still produce, respectively, benefits and costs across such variations (e.g., Vansteenkiste et al. 2019; Yu et al. 2018).

Associated criteria

Based on these basic and fundamental criteria, additional criteria can be logically derived that describe the functioning of psychological needs more deeply. A first criterion is that the benefits associated with need satisfaction and the costs of need frustration should be *pervasive*, thus having relevance to myriad outcomes. That is, a host of motivational, affective, cognitive, and behavioral outcomes should reliably follow from need satisfactions and frustrations. These effects should operate at multiple levels of analysis from personal to societal levels (Ryan and Deci 2017), from conscious to non-conscious (e.g., Banting et al. 2011) and being observable not only behaviorally but also neurobiologically (Di Domenico and Ryan 2017; Reeve and Lee 2019). Illustrative of the ubiquitous outcomes associated with the psychological needs is the finding that need frustration predicts phenotypically diverse forms of dysfunctional behavior and ill-being, including obsessive thinking (Vahlstein et al. 2020), engagement in unhealthy muscularity-oriented behaviors (Selvi and Bozo 2020), dishonesty (Kanat-Maymon et al. 2015), and both internalizing and externalizing problems (e.g., Vandekerckhove et al. 2019a, b). Similarly, need satisfactions have been found to account for toddlers' curiosity-driven exploration of the environment (Whipple et al. 2011), adolescents' negotiation of parental requests (Van Petegem et al. 2017), and adults' engagement in volunteering (Huang et al. 2019). The observation that the psychological needs are involved in such phenotypically diverse phenomena speaks to the pervasive impact of these psychological needs and underscores the parsimony of BPNT as a theoretical framework.

A second associated criterion is that the experiences and behaviors associated with the satisfaction and frustration of

BPNT's psychological need are concrete. Without such a specified *content*, it remains unclear what it means exactly to have a psychological need met or thwarted (Ryan and Deci 2017). Examples of specific behaviors denoting psychological need satisfaction include the formation of harmonious relationships and building rapport (Baker et al. 2020), steadily extending one's skills, or pursuing one's core interests (Weinstein et al. 2016a). Experiencing failure (Waterschoot et al. 2020), feeling conflicted about identity-relevant choices (Assor et al. 2020), or feeling lonely (Baumeister and Leary 1995) each denote experiences of psychological need frustration. Further, these concrete experiences and behaviors should be *salient* in people's natural language when asked to reflect about their most (dis)satisfying experiences (Jang et al. 2009; Sheldon et al. 2001), to recall significant memories (Philippe et al. 2011), or to engage in a life review (Bauer and McAdams 2000). Qualitative studies are ideally suited to examine whether needs-based experiences naturally emerge as part of individuals' narratives (e.g., Dieleman et al. 2018; Quedsted et al. 2018). To illustrate, semi-structured interviews with Singaporean at-risk-youth revealed that they highly valued satisfying basic needs for autonomy, competence, and relatedness, yet they also noted frequent experiences of need frustration (Nagpaul and Chen 2019). Such qualitative studies help in identifying concrete manifestations and themes underlying experiences of need satisfaction and frustration in diverse life domains, developmental periods, and cultures.

Third, apart from readily producing benefits when fulfilled, these basic needs should at times *direct* individuals' actions, thereby leading people to proactively seek out and prefer certain types of activities. Consistent with the growth- instead of deficit-oriented character of basic needs within BPNT, people would have a *propensity* to actively seek activities, goals, and relationships in which they can experience a sense of volition, mastery, and connection, and to avoid need frustrating counterparts (Laporte et al. 2019; Weinstein et al. 2016a). People should also gravitate towards need-supportive contexts, a tendency more visible for those with high levels of agency (Legault et al. 2017; Patall et al. 2019; Reeve 2013). Conceptually, these psychological needs thus not only serve as nutrients at the 'input'-side (cfr. the essential criterion), but they also play a *directional* role, pulling individuals into action (see also Sheldon 2011). Similarly, need frustration should also play an important signaling function, potentially mobilizing corrective behavior and (adaptive) coping responses (Roth et al. 2019).

A final criterion is that the basic psychological needs should play an important *explanatory* role in the effects of social contexts on developmental outcomes. Technically, basic psychological needs should be context-responsive constructs (Prentice et al. 2019), thus systematically showing variability as a function of contextual variations, while also

mediating the relation between variations in social environments and individuals' psychosocial adjustment.

Research in the context of BPNT has addressed the intervening role of the psychological needs using various methods, including experimental inductions (e.g., Grouzet et al. 2004), observer ratings (e.g., Wuyts et al. 2017), and self-reports of perceived contexts (e.g., Ratelle et al. 2018). Overall, this research has confirmed that SDT's three basic needs can indeed account for the outcomes associated with a wide variety of contextual predictors such as physical abuse and controlling parenting (Ahmad et al. 2013; Laurin et al. 2015), gamification features (Przybylski et al. 2010; Sailer et al. 2017), socio-economic status (González et al. 2016), income inequality (Di Domenico and Fournier 2014), and transformational leadership (Jensen and Bro 2018), but also personality-based differences, such as the use of a suppressive emotion regulation style (Benita et al. 2020) or holding perfectionistic standards (Boone et al. 2014) to give but a few examples. Indeed, basic need supports and satisfaction provide clear criteria for "diagnosing" any human context. In the same way as we can "evaluate" parents', coaches', or teachers' behaviors as being more or less need-supportive and need-thwarting, schools, workplaces and even societies differ in the degree to which they generally support (or thwart) basic psychological needs (Ryan et al. 2019b). In this way, SDT provides an antidote to relativism insofar as it has strong assumptions regarding the essentials for individuals' mental health and wellness, which can be examined across both immediate and pervasive social contexts.

Critical themes

Theme 1: Should we extend the shortlist of basic psychological needs?

A retrospective look

The question whether the shortlist of basic needs requires extension has received ongoing attention over the years (e.g., Baxter and Pelletier 2019). Some studies have considered a broader set of need-candidates (including, but not limited to, ARC) in a comparative way. For instance, Sheldon et al. (2001) examined the role of ten candidate-needs in the prediction of event-related affect (cfr. Basic Criterion #2). In addition to SDT's three basic needs they included needs for security/safety, popularity, pleasure/stimulation, self-actualization, self-worth, physical thriving, and money/luxury. Their work largely confirmed the critical role of the three basic needs, which were ranked in the top five of the most satisfied (or deprived) needs during both satisfying (and unsatisfying) events, with all three needs uniquely relating

to event-related affect. Jang et al. (2009) found a similar pattern in asking Korean and American students about their most and least satisfying experiences at school. Autonomy and competence were most salient during self-generated satisfying events and accounted for substantial variation in event-related affect. In perhaps the largest study conducted on needs and well-being, sampling 123 countries, Tay and Diener (2011) reported that autonomy, competence, and relatedness each related uniquely to well-being (e.g., positive affect), with most associations remaining significant after controlling for basic income as well as other needs, such as having sufficient food, shelter, safety, and respect.

In addition to studies considering many needs simultaneously, other studies have zoomed in on one specific alternative psychological need. Some of these need candidates were eventually not included in the short list because a number of criteria were not met (see Ryan and Deci 2000a; Ryan and Deci 2017 for more extensive discussions). For instance, self-esteem is often mentioned as a highly salient experience during a satisfying event (Jang et al. 2009; Sheldon et al. 2001) and is considered a fundamental need in other theories (e.g., *terror management theory*, Pyszczynski et al. 2004). Still, self-esteem is not considered a basic need in BPNT because it does not operate sufficiently independently or distinctively from the ARC needs (Basic Criterion #4). Concerns about self-worth largely surface on moments when the basic psychological needs are frustrated (Bartholomew et al. 2018), and thus the dynamics of self-esteem are primarily dependent upon the basic needs (Ryan and Brown 2003). Also, much like other potential need candidates, such as self-actualization (Maslow 1971) and meaning (Martela and Steger 2016), self-esteem represents an *outcome* that follows from having psychological needs fulfilled. Indeed, past research has shown that all three need satisfactions promote self-esteem (e.g., Balaguer et al. 2008; Van Egmond et al. 2020), and help foster meaning (Martela et al. 2018), authenticity (Thomaes et al. 2017; Ryan and Ryan 2019) and self-actualization (Diener et al. 2010; Prentice et al. 2020), critical outcomes that signal a thriving, fully functioning person.

Advancements

In the special issues on BPNT, several author teams propose new candidate-needs, including a need for novelty (González-Cutre et al. 2020), novelty-variety (Bagheri and Milyavskaya 2020), beneficence (Martela and Ryan 2020), and morality (Prentice et al. 2020). These proposals are thought-provoking, and force us to sharpen our thinking about the key conceptual and empirical criteria characterizing basic needs that would have to be fulfilled for a candidate-need to be incorporated as a new basic need. The evidence offered by these different author teams is promising

at this point, with each team providing initial, yet not decisive, evidence for their proposed candidate-needs.

Defining novelty-variety as the individual's perception of experiencing or doing something new, including the possibility to switch things up in different combinations, Bagheri and Milyavskaya (2020) showed in a series of correlational and vignette-based experimental studies that novelty-variety can be factor-analytically separated from the other needs (Basic Criterion #4), that it contributes uniquely to domain-specific well-being (over and above ARC) and comes with a well-being cost when experimentally thwarted (Basic Criterion #2). Moreover, these effects did not depend on individuals' age or preference for novelty-seeking (Basic Criterion #5).

González-Cutre et al. (2020) adopted a more restrictive conceptual viewpoint by focusing only on the experience of novelty and by excluding the variety-feature incorporated by Bagheri and Milyavskaya (2020). They defined novelty as the need to experience something not previously experienced, or something that differs from a person's everyday routines. Controlling for SDT's three basic needs, novelty satisfaction was found to still contribute to individuals' motivation and adjustment during exercising (Study 1) and to well-being (Study 2), while its frustration was related negatively to well-being (Study 2; cfr. Basic Criterion #2). Different from Bagheri and Milyavskaya (2020), they reported some evidence for the moderating role of openness to experience in the relation between novelty satisfaction and well-being (cfr. Basic Criterion #5).

Prentice et al. (2020) present a number of arguments for why morality, defined as the subjective sense that one is moral, is a viable fourth basic need, while providing initial empirical evidence for their claim. In an earlier study, Prentice et al. (2019) had shown that moral need satisfaction was prevalent when participants were asked to recall events in which they felt (un)satisfied, meaningful, pleasurable, and at their best/worst. Moreover, moral need satisfaction explained unique variance in event-related affect above and beyond BPNT's classic basic needs (Basic Criterion #2). In their contribution to the special issue, they provided further evidence by showing that moral satisfaction is related to the enactment of moral behaviors and to wellness at both between- and within-person levels of analysis, thereby satisfying Basic Criterion #5.

While the proposed candidate needs of novelty, novelty-variety and morality passed the 'entrance exam' to use Prentice et al.'s (2019) metaphor, in this issue Martela and Ryan (2020) provided counter-evidence for the classification of beneficence as a basic need. Although they had convincingly shown in earlier work that beneficence satisfaction, defined as the feeling of having a positive impact on others, contributes uniquely to well-being (Martela and Ryan 2016) and sense of meaning (Martela et al. 2018),

they now sought to establish evidence for the unique role of beneficence frustration, defined as the feeling of having a negative impact on others. Although beneficence frustration correlated with various indicators of ill-being, it failed to predict incremental variance above the frustration of autonomy, competence, and relatedness. Because the criterion of essentialness (Basic Criterion #2) implies that *both* satisfaction and frustration of a basic need should play a unique role, the authors concluded that beneficence may constitute a *well-being enhancer*.

Future directions

The question of whether additional basic needs should eventually be added to the list is intriguing. In making such decisions, it is important to recall that there were both empirical (inductive) and theory-driven (deductive) reasons to propose the three current needs (Ryan and Deci 2017). Although some new need candidates have passed an initial test, this is just a starting point for a longer journey. Many criteria still need to be (re)addressed and extended. The criteria listed herein may provide a source of inspiration to generate hypotheses and ideas concerning the designs, methods, and samples needed to confirm or disconfirm the status of a newly proposed candidate-need as a basic need. Although all criteria deserve attention, we highlight the importance of two criteria.

Empirical issues First, the universality criterion (Basic Criterion #5) needs to be subjected to a rigorous test. To illustrate, there likely exist substantial interindividual differences in individuals' preference for novelty (Gordon and Luo 2011) and openness to experiences (McCrae and Costa 1987), with these individual differences potentially playing an important role in the extent to which people benefit (in terms of well-being) from the experience of novelty (see Bagheri and Milyavskaya 2020; González-Cutre et al. 2020). Cultural differences may also play a role as some individuals may live in contexts where routine practices are highly valued and internalized. Another potential moderator concerns the individual's reasons for acting. When one volitionally endorses routine activities, one may have a less pronounced preference for novelty and benefit less (or not at all) from novelty satisfaction. Similarly, although acting morally appears to constitute a unique source of well-being, the question is whether people's reasons for acting morally alter their effectiveness. In this context, Weinstein and Ryan (2010) showed that feeling pressured to engage in prosocial behavior (i.e., one specific type of moral behavior) failed to contribute to the well-being of either the help provider or recipient (see also Roth 2008).

A second question is whether the effects of proposed new needs are pervasive (Associated Criterion #1). While

the evidence so far indicates that the newly proposed needs have affective benefits, it needs to be seen whether similar benefits arise at the cognitive, behavioral, and physiological level, and across varied domains and contexts. Also it remains a question whether observed effects are *lasting*, with the satisfaction and frustration of a newly proposed need yielding benefits, respectively costs, over a longer period of time. For example, many experiences of novelty produce immediate increases in curiosity and excitement, yet may fail to produce durable effects. Such empirical questions are, in fact, relevant to all satisfactions and frustrations presumably sustaining wellness.

Conceptual considerations Apart from these empirical considerations, also considerable conceptual work is needed. First, while most of the efforts have now concentrated on establishing a fourth need to *extend* BPNT, another possibility is to *refine* BPNT by differentiating different facets within a single need. The advantage of such differentiation is that parsimony would be maintained, while nuance would be gained. Facets of a single need should share a common foundation, while also containing unique aspects. For instance, relatedness is not a one-way street but instead entails reciprocity (Ryan and Deci 2017). As such, it may be possible to distinguish between a ‘giving’ facet and a ‘receiving’ facet within relatedness, with beneficence being indicative of the former facet (see also Brown et al. 2003). Further, relatedness does not only involve a sense of connection and mutuality at the individual level (e.g. Fedesco et al. 2019), but extends to feelings of inclusion and harmony at the group level (Kelly et al. 2008; Sheldon and Bettencourt 2002) as well as experiences of care vis-à-vis the broader society, the universe, and even the proposed need-candidate relatedness with nature (Baxter and Pelletier 2019). Similar differentiations can then be made for the need for autonomy and competence (e.g., Reeve et al. 2003). Along similar lines, it could be examined whether novelty and variety represent two facets of an overarching construct, thus sharing common features but also having unique properties. The exact relation between novelty and intrinsic motivation also deserves further exploration, as the latter type of motivation is also characterized by a tendency for interest-based exploration, presumably entailing greater novelty satisfaction while also following from it (see González-Cutre et al. 2016).

A second conceptual consideration is that it is important to develop a better understanding of how the social context affects newly proposed needs. The current focus is almost exclusively on the need-experience itself, with little conceptual work thus far regarding socialization practices that would characterize an interpersonal style supporting or undermining potential needs for morality, novelty, or beneficence (see Sylvester et al. 2016). This is important because,

according to Associated Criterion #4, a newly proposed need has to carry explanatory power, and account for (i.e., mediate) the effect of diverse contextual conditions on individuals’ (mal)adjustment.

As this journey moves forward, we can learn lessons from the field’s history and only conservatively add a new need to the list once convincing evidence and arguments are provided. Patience and openness are critical to avoid premature conclusions. Illustrative in this context is that beneficence satisfaction initially appeared to conform to the criteria of a basic need (Martela and Ryan 2016; Martela et al. 2018), with subsequent work indicating that frustration of beneficence may fail to yield a unique contribution. Having said this, we do not want to temper the enthusiasm of scholars exploring new needs. As affirmative data are gathered, possibly summarized in meta-analytical overviews, a stronger position can be taken regarding the ultimate position of proposed candidate needs.

Theme 2: Which costs are associated with basic psychological need frustration?

A retrospective look

The initial focus of BPNT was on the role of need supports and need satisfaction in well-being and healthy psychological development (e.g., Ryan et al. 1995). During the past decade, however, a conceptual and methodological breakthrough led to an exponential increase in the study of the ‘dark’ side of human functioning and to a focus on need thwarting conditions and need frustrating experiences (Bartholomew et al. 2011; Vansteenkiste and Ryan 2013). Conceptually, a shift took place from a view in which need satisfaction was contrasted with its absence on a single dimension, to a two-dimensional viewpoint in which experiences of need satisfaction and experiences of need frustration are considered independently. The reason for treating need frustration as a distinct notion is that it involves an active threat of the psychological needs (rather than a mere absence of need satisfaction). These two experiences (i.e., need satisfaction and frustration) stand in an *asymmetrical* relation to each other, as the absence of need satisfaction does not necessarily imply the presence of need frustration, whereas the presence of need frustration denotes the absence of need satisfaction (Vansteenkiste and Ryan 2013).

Earlier measures of BPNT’s psychological needs primarily tapped into the presence of need satisfaction, with a few items measuring the absence or deprivation of need satisfaction being reverse-scored and combined into a composite satisfaction score (e.g. Reeve and Sickenius 1994; Sheldon et al. 2001; Van den Broeck et al. 2010). Bartholomew et al. (2011) were the first to directly measure both types of need-based experiences. Their series of

studies revealed two important findings. First, congruent with the presumed asymmetrical relation between need satisfaction and need frustration, both types of need-based experiences were found to be negatively and moderately correlated. Second, as hypothesized, experiences of need frustration were especially predictive of ill-being, including symptoms of burn-out, eating symptomatology, and negative affect in athletes. In fact, need frustration predicted *incremental* variance in maladjustment above and beyond low need satisfaction, suggesting that need frustration does yield additional functional costs. This work in the sport context was quickly confirmed in other life domains, such as work (Trepanier et al. 2016), education (e.g., Jang et al. 2016a), romantic relationships (e.g., Kindt et al. 2016; Vanhee et al. 2016), and exercising (e.g., Teixeira et al. 2018).

This distinction has led to the development of two-dimensional need scales within BPNT, such as the *Balanced Measure of Psychological Needs* (BMPN; Sheldon and Hilpert 2012) and the *Basic Psychological Need Satisfaction and Frustration Scale* (BPNSFS; Chen et al. 2015a). The BPNSFS is currently the most widely used measure. Originally validated in Dutch, English, Spanish, and Chinese, today a variety of translations and context-specific adaptations are available, including validations in German (Heissel et al. 2018), Japanese (Nishimura and Suzuki 2016), Italian (Costa et al. 2018), Hebrew (Benita et al. 2020), Turkish (Selvi and Bozo 2020), and Portuguese (Cordeiro et al. 2016). It has also been adapted for specific contexts, including work (Rouse et al. 2020; Schultz et al. 2015), school (Vandenkerckhove 2019b), and volunteering, among others (see Appendix for an overview of different translations and adaptations).

The increasing attention paid to individuals' need frustration was also congruent with SDT's meta-theoretical assumption that individuals are vulnerable for being self-centered, passive, and aggressive (Ryan and Deci 2000b; Vansteenkiste and Ryan 2013). That is, although we have the natural tendency to move towards increasing growth under need-supportive circumstances, there is a potential for unintegrated regulation of behaviors, harm and defensiveness that can be activated by need thwarting conditions. It is in this sense that Ryan and Deci (2017) argued that 'distinct human natures' (p. 620) can manifest as a function of not only genetic inclinations, but also contextual variations in basic need supports and thwarts and their interplay (Van Assche et al. 2016).

Advancements

The development of more valid self-report measures, especially of need frustration and need thwarting, has spurred new research on basic psychological needs, widening the

scope of outcomes being researched. These outcomes can be grouped into various categories, with one category reflecting immediate ill-being and motivational costs associated with need frustration, with a second category pertaining to people's compensatory responses to need frustration, and with a third category involving the development of need substitutes to cope with (chronic) need frustration (Ryan et al. 2016).

Motivational costs and ill-being Among the direct costs associated with basic psychological need frustration are loss of motivation, disengagement, and experiences of ill-being and distress. For instance, in the domain of physical education, Haerens et al. (2015) found basic need frustration to relate positively to amotivation, reflecting discouragement and helplessness. Following students throughout an entire school year, Bartholomew et al. (2018) reported that semester-to-semester variation in students' need frustration covaried positively with amotivation and controlled motivation, and negatively with autonomous motivation. Further, using a 3-wave longitudinal design, Jang et al. (2016a) reported that Korean high school students' increases in need frustration from the beginning of the school year to midway in the semester predicted parallel increases in disengagement.

Need frustration has also been found to be a robust predictor of a variety of ill-being indicators, including stress (Campbell et al. 2017; Weinstein and Ryan 2011), depressive symptoms (Cordeiro et al. 2016), and anxiety (Ng et al. 2012). Such findings are evident at both the level of (relatively stable) between-person differences and at the level of within-person fluctuations across time, with monthly, weekly, daily, and even hourly fluctuations in need frustration co-varying with fluctuations in corresponding negative affect (e.g., Vandenkerckhove et al. 2019b), stress (e.g., Howell et al. 2011), or depressive symptoms (e.g., Bartholomew et al. 2018). Further underscoring the critical importance of need-based experiences, they were found to predict university students' vulnerability for suicidal ideation and behaviors (Britton et al. 2014; Rowe et al. 2013), even when controlling for depressive symptoms (see also Tucker and Wingate 2014). In older adults, reflections on need frustration across one's life relate to death anxiety, in part because higher need frustration is associated with greater feelings of despair, bitterness, and regret (Van der Kaap-Deeder et al. 2019). The fact that need-based experiences are implicated in the way people think about and handle their final destiny again speaks to the essential and pervasive nature of the SDT's current three basic needs.

Compensatory behaviors A confrontation with a need-frustrating activity or context may elicit different responses, including disengagement from the activity or context or more active attempts to compensate for frustrated needs.

Such compensatory attempts can take different forms (Vansteenkiste and Ryan 2013). One compensation strategy involves developing *rigid behavior patterns* that may be temporarily functional because they provide a sense of stability, predictability, and security (Deci and Ryan 2000). For instance, students, employees, or athletes may compulsively stick to specific routines that function as scripts for daily behavior (e.g., studying at least 8 h/day or training at least 4 h/day, even when the weather is bad). Especially when individuals' self-worth comes to depend on the successful enactment of these scripts, failing to live up to them elicits intense guilt and self-criticism, while succeeding in doing so brings relief and short-lived satisfaction. As such, there is a risk of developing *contingent self-worth* (Deci and Ryan 1995; Kernis 2003) insofar as individuals feel that they must live up to specific standards or attain particular outcomes to be worthy. Contingent self-worth functions as a double-edged sword, on the one hand entailing great commitment (Crocker et al. 2003) but on the other hand also relating to greater emotional distress (Van der Kaap-Deeder et al. 2016).

There is growing and varied evidence showing how experiences of need frustration can elicit insecurity about self-worth and, as one compensatory strategy, foster ego-involved behaviors. For instance, semester-to-semester fluctuations in students' need frustration covaried with semester-to-semester fluctuations in contingent self-worth (Bartholomew et al. 2018). Similarly, children's tendency to experience self-aggrandizement following success, and shame and inferiority following failure, appears to be associated with need-thwarting parenting styles (Assor and Tal 2012). Further, an obsessive investment in highly passionate activities is rooted in the experience of need frustration outside the beloved activity, suggesting that passionate activities, although naturally intrinsically motivated, may sometimes be mixed up with compensatory motives (Lalande et al. 2017). In the relational domain, adults' problematic use of *Tinder* was best predicted by their motive for self-worth enhancement which, in turn, was rooted in relatedness frustration (Orosz et al. 2018). Similarly, adolescents' dyregulated gaming has been predicted by need frustration in daily life (Mills et al. 2018) in accord with the need density hypothesis (Rigby and Ryan 2011).

Alternatively, individuals may react to experiences of need frustration with *oppositional defiance*, thereby doing the opposite of what is requested by socializing figures (Vansteenkiste and Ryan 2013). Such defiance is reactive in nature because the primary goal is to escape from feeling controlled (Koestner and Losier 1996). Oppositional defiance is assumed to be an unskillful way of expressing resistance against authorities (Parkin and Kuczynski 2012). Although defiance may be undertaken to restore threatened psychological needs and to regain a sense of independence

and freedom, longitudinal research suggests that defiant adolescents become increasingly alienated from their personal preferences and interests, experiencing decreasing autonomy over time (Van Petegem et al. 2015b). Further, the fact that need frustration elicits oppositional defiance may help to explain why need frustration relates to a variety of externalizing problems such as the expression of resentment towards authorities (Aelterman et al. 2016), bullying (Hein et al. 2015), cheating (Kanat-Maymon et al. 2015), aggressive behaviors (Vandenkerckhove et al. 2019a), and delinquency (Van Petegem et al. 2015a).

Need substitutes The frustration of psychological needs may also prompt individuals' pursuit of need substitutes, which hold the promise of overcoming at least some of the insecurities and threats associated with need frustration. Illustrative in this context is individuals' endorsement and pursuit of extrinsic aspirations, including materialism, popularity and fame, as well as a perfect body (Kasser and Ryan 1996). Kasser et al. (1995) showed that a need-thwarting (i.e., controlling or cold) maternal style predicted teenagers' development of more extrinsic goal pursuits. Other studies have provided evidence for relations between need frustration and such substitute goals and attitudes (Unanue et al. 2014). For instance, need frustration related positively to a drive for muscularity among male bodybuilders (Selvi and Bozo 2020). Interestingly, particularly, relatedness frustration helped explain body builders' muscle checking and exercise-dependency (see also Edwards et al. 2016).

Ironically, the hoped-for emotional benefits associated with the pursuit of extrinsic goals are often overestimated (e.g., Sheldon et al. 2010). In reality, the pursuit of extrinsic goals and even their attainment has been found to relate to diminished need satisfaction and increased need frustration, which helps explain their detrimental effects on well-being (Hope et al. 2019; Leung and Law 2019; Unanue et al. 2014). Holding et al. (2020) illustrate how this can occur. In two large samples of university students, Holding et al. reported that individuals with more extrinsic goals had more controlled motives for the key career goal they had selected for themselves in the beginning of an academic year, which led them to forego the pursuit of psychological need-satisfying activities during the year. Such psychological *need sacrificing* had a cost, with these students displaying increases in need frustration and associated distress by the end of the year. These findings indicate that people who adopt extrinsic goals can get out of touch with what is truly growth-conducive (see also Sheldon and Corcoran 2019).

Future directions

Clearly, the study of need frustration as a separate dimension from need satisfaction has extended the reach of BPNT,

with need-based experiences potentially playing a unifying role between literature on psychological growth and well-being and literature on psychopathology and risk (Vansteenkiste and Ryan 2013). Moreover, findings concerning compensatory, substitute, and reactive processes associated with need frustration attest to the dynamic nature of need-related processes, and the depth in psychological functioning afforded by BPNT (Ryan and Deci 2017).

Although promising, this literature is still young and many issues remain. First, if the psychological needs are truly pervasive (Associated Criterion #1), need frustration should play a *transdiagnostic* role in accounting for a diversity of pathological symptoms (Nolen-Hoeksema and Watkins 2011). Illustrating such a potentially transdiagnostic role, Campbell et al. (2018a) showed that need frustration not only predicted adolescents' depressive symptoms and eating pathology, but also largely accounted for their co-occurrence and co-evolution across time (Campbell et al. 2018a). Thus, basic need frustration was found to underlie phenotypically different symptoms and to explain why these symptoms cluster at the surface level. Such findings are congruent with the continuity hypothesis (Haslam et al. 2012; Krueger et al. 2018), which suggests that there is no abrupt demarcation between adaptation and growth versus ill-being and psychopathology. Instead, the difference between mental health and risk for psychopathology is a matter of continuity, with need-relevant dynamics playing a role both in actualizing individuals' potential for growth and in awakening vulnerabilities for psychopathology, as manifest in both subclinical and clinical disorders (Ryan et al. 2016). Future research in diverse clinical samples, targeting diverse symptoms, and using longitudinal designs will help to further establish how basic need frustration is involved in the development, maintenance or exacerbation of symptoms shared across various disorders (Harvey et al. 2004). The possibility that need frustration may play a transdiagnostic role is promising because prevention and intervention efforts could then be oriented towards ameliorating the origins of psychological need frustration, yielding deep-level, enduring, and multiple benefits. At the same time, pathological symptoms may sustain need frustration such that one gets trapped in a negative vicious cycle, an issue that deserves greater attention in longitudinal work.

A second avenue for future research is to move towards a person-centered perspective to shed light on individuals' *need profiles* and *need trajectories* (Vansteenkiste and Mouratidis 2016). Such work allows one to gain a deeper insight into within-person combinations of need satisfaction and frustration, with profiles varying in both the level of satisfaction and frustration and the balance between needs (Sheldon and Niemiec 2006). Such profiles carry practical value because they provide a more overarching perspective on individuals' configuration of need-based functioning instead of "slicing"

an individual into different need-relevant dimensions. Knowing as a counselor to which need profile an individual belongs may allow for more tailored interventions targeting one or more basic needs. Although some studies have identified profiles based only on need satisfaction scores (Earl et al. 2019), two contributions in this special issue focused on the within-person patterning of both need satisfaction and need frustration in the domains of sport and physical education (Warburton et al. 2020) and work (Rouse et al. 2020). Various profiles were identified, with those being characterized by a stronger presence of need satisfaction and by an absence of need frustration yielding the most adaptive outcomes. The opposite profile of low need satisfaction and high frustration yielded the most maladaptive outcomes (see also Vanhove-Meriaux et al. 2018). Longitudinal work that charts individuals' trajectories of need satisfaction and need frustration over time is welcomed to examine the evolution in the identified profiles. Promising work in this area was conducted among secondary school (Ratelle and Duchesne 2014) and university (Gillet et al. 2019) students, thereby revealing considerable heterogeneity in need trajectories, although these studies focused on need satisfaction only.

A third avenue for future research involves examining in greater detail how individuals can learn to cope adaptively with need-frustrating experiences (Skinner and Zimmer-Gembeck 2007), with such coping responses speaking to the directional criterion characterizing basic needs (i.e., Associated Criterion #3). A variety of affective, cognitive, and behavioral responses may be involved, with need frustration eliciting a corresponding affective desire to get needs met (Sheldon and Gunz 2009), an attentional shift towards the thwarted need (Radel et al. 2011), and an ameliorative reaction to try and restore satisfaction of the thwarted need. In an experimental study, Waterschoot et al. (2020) showed that participants dispositionally high on resilience displayed an attentional bias towards competence-relevant cues in response to manipulated negative feedback. In turn, this attentional shift was found to be functional in recovering from the blow to their competence need. As noted by Waterschoot et al., the activation of such an attentional bias may only be a first step in a full-fledged process of recovery from need frustration. The activated attentional bias would be part of an early alarm stage (Radel et al. 2011), which then sets in motion coping strategies that, apart from mobilizing and orienting attention, can also help the individual to handle the emotional arousal elicited by need frustration. Skinner, Edge, Altman, and Sherwood (2003) identified for each of the three needs a family of need-relevant (mal)adaptive coping strategies that deserve more empirical attention. Notably, such need-specific coping reactions may, in turn, be partially genetically determined but also rooted in developmental exposure to need-supportive or thwarting contexts (Van Petegem et al. 2017).

Theme 3: What is the interplay between basic psychological and basic physical needs?

A retrospective look

Apart from BPNT's basic psychological needs, people also require food, water, air, sex, sleep and other inputs to survive and to be physically healthy, as noted by drive-based theories (Hull 1943). Also, in his highly popularized need-hierarchy Maslow (1954) proposed, in addition to these physiological needs, a physical need for safety and security, which involves being protected against physical harm, uncertainty, and pain. Unlike ARC, which represent growth needs, these deficit needs become salient and operative when unfulfilled, with their salience again waning when satisfied. Although these needs do not meet all the criteria for basic psychological needs, they deserve attention insofar as psychological and physiological/physical needs often dynamically interact.

In fact, until recently indices of physical health and health-related quality of life have mainly been studied as *outcomes* (e.g., Ng et al. 2012; Legate et al. 2017; Tilga et al. 2019). Studies have included measures of somatization and physical symptoms as indicators of ill-being (e.g., Reinboth et al. 2004; Reis et al. 2000), which were found to stem from low need satisfaction and especially high need frustration. Such findings were corroborated with objective markers of physical functioning, including increased cortisol secretion (Reeve and Tseng 2011), elevated diastolic blood pressure (Weinstein et al. 2016b), risk high-density lipoprotein levels (Uysal et al. 2020), immunological responses (e.g., Bartholomew et al. 2011), and even longevity (Kasser and Ryan 1999; Weinstein et al. 2019).

Advancements

Although studies including indices of physical functioning as an outcome are informative, a more full-fledged approach would consider the complex and dynamic interplay between ARC and individuals' physiological needs. This would involve (a) examining how the ARC-dynamics are related to the satisfaction and disruption in physiological needs and vice versa (i.e., reciprocal dynamics) and (b) whether and how both ARC and these other needs independently or interactively predict individuals' well-being. We briefly review relevant evidence for such a more dynamic point of view in relation to the needs for sex, food, sleep, and safety.

Sex Using an event-contingent diary methodology, Smith (2007) reported that undergraduates who experienced greater autonomy, competence, and relatedness during sexual interactions reported more positive outcomes (e.g. relaxed, satisfied) and less negative outcomes (e.g., regret,

guilt). Brunell and Webster (2013) further showed that the benefits of self-determined motives for sex yield basic need satisfaction during intimate interactions, which radiate to individuals' well-being and relationship quality.

Food In terms of individuals' physiological need for food, several studies have now reported that need satisfaction is predictive of healthier eating patterns, whereas need frustration predicts unhealthy and disrupted eating (e.g. Pelletier and Dion 2007). Both diary-based (Verstuyf et al. 2013) and longitudinal (Boone et al. 2014) research among adolescents showed that need frustration predicts vulnerability for bulimic symptoms. Presumably, on days that one's needs get frustrated, binge eating is more tempting because it may compensate for the negative affect associated with need frustration. Also, need frustration has a direct energy-depleting effect, which helps to explain break-downs in self-control on such days. Other studies have taken a different approach to this issue by considering the moderating role of food deprivation in the relation between basic psychological needs and outcomes. For instance, Van Egmond et al. (2020) examined whether resource scarcity, including the deprivation of food and clean water on a daily basis, may attenuate the beneficial role of Malawian adolescent girls' psychological need satisfaction. No evidence for moderation was found, suggesting that psychological need satisfaction contributes to self-esteem, even among adolescents growing up in very poor circumstances.

Sleep Studies with both community samples (Campbell et al. 2015) and with samples of persons with severe sleep problems, such as patients with unexplained chronic fatigue (Campbell et al. 2017), have shown that need frustration relates positively to self-reported poor quality of sleep. In this special issue, Uysal and colleagues report further evidence from a large-scale study that psychological need frustration predicts subjective sleep indicators (e.g., poor sleep quality, poor sleep latency, sleep disturbance) two years later. Potentially explaining these dynamics, need frustration was associated with higher stress which, in turn, predicts dysfunctional pre-sleep cognitions that interfere with sleep patterns (Campbell et al. 2017, 2018b). Interestingly, the costs of need frustration even manifest through one's dreams, with individuals appraising their dreams in a more negative way and reporting more negative dream contents on days that their needs get frustrated (Weinstein et al. 2018).

Other studies have shed light on the issue of causality. Performing cross-lagged analyses, Tavernier et al. (2019) reported that, after controlling for multiple covariates (i.e., personality, chronotype, sleep medication, self-esteem, social desirability), need fulfillment among university students predicted improved sleep quality and an increase in

sleep duration during the weekend (but not over the week) over one semester, while sleep patterns did not reciprocally feed back into need satisfaction. Campbell et al. (2018c) reported on a controlled sleep deprivation experiment in which participants were deprived of sleep for three consecutive nights (i.e., 5 h per night). Although reduced sleep had an immediate energy-depleting effect after the first night, it took three nights before need satisfaction was eroded, with a reduction in morning energy and an impaired mindful approach during the day accounting for these effects.

Safety A number of studies have addressed the unique and interactive contribution of ARC and perceptions of physical safety/security in the prediction of well-being. In the Tay and Diener (2011) study, safety/security satisfaction and ARC independently contributed to the prediction of well-being. Chen et al. (2015b) went one step further by examining the interactive interplay between safety and ARC by sampling participants experiencing serious threats to safety/security, such as poor Chinese workers suffering from financial insecurity, and South-African adults living in unsafe neighborhoods. Based upon Maslow's (1954) presumed hierarchical structure of need satisfaction and the associated principle of *prepotency*, Chen et al. (2015b) reasoned that ARC might either fail to predict unique variance in well-being among individuals deprived of physical safety or that ARC would only contribute to enhanced well-being for those high in safety satisfaction. The growth-promoting role of ARC would be constrained among individuals high in physical insecurity because comparatively more resources would be devoted to the satisfaction of safety. In contrast, based on BPNT Chen et al. (2015b) argued that even people struggling for security experience different degrees of need satisfaction and frustration with ensuing consequences for their mental health. Findings in both samples indicated that all three need satisfactions uniquely predicted well-being above and beyond safety, and moreover, safety did not moderate effects of the basic psychological needs (see also Rasskazova et al. 2016).

Future directions

Based on the assumption that full functioning requires the satisfaction of both psychological and physiological/safety needs, it is critical for BPNT to further address the dynamic interplay between basic psychological needs and other needs and drives through experimental and longitudinal work. One question that could be addressed is whether the perceived *psychological threshold* for objective conditions of unsafety (e.g., low income) to translate into perceived insecurity is dependent upon one's psychological need satisfaction. That is, ARC may serve as a resource to better handle signs of

threat and insecurity and to be more satisfied with one's living conditions.

Another possibility is that effects of physiological and safety needs are partially accounted for by ARC. To illustrate, financial security may create the possibility for individuals to buy themselves the necessary time to pursue their interests, to connect with others, or to pursue the education to improve their skills (DeHaan et al. 2016; Di Domenico and Fournier 2014). In contrast, financial difficulties may be a source of pressure and interpersonal tension, which helps to explain why financial difficulties predict poorer well-being. Congruent with this reasoning, the experimental induction of prospective economic threat, relative to a no-threat condition, was sufficient to undermine participants' needs for autonomy and competence, which explained their decreased well-being (Dupuis and Newby-Clark 2016). Similarly, the threat of potentially losing one's job comes with a severe cost (e.g., greater burnout) because job insecurity impairs satisfaction of basic psychological needs (Vander Elst et al. 2012).

Theme 4: Are there new insights in the conditions that affect need-based experiences?

A retrospective look

Over the past two decades, SDT-based research has intensively studied key practices and correlates of need-supportive (i.e., autonomy support, structure, warmth) and need-thwarting (i.e., control, neglect, chaos) contexts (Ryan and Deci 2017; Vansteenkiste et al. 2010). Historically, autonomy support has received the most attention in part because the need for autonomy is both most unique to SDT and most controversial and in part because autonomy-supportive socializing agents tend to be responsive to competence and relatedness needs as well. Initially, autonomy support and control were assessed along a single dimension (e.g., Deci et al. 1981), yet, over the years, the practice of control was increasingly studied in its own right (e.g., Assor et al. 2005). Parallel to the differentiation between need satisfaction and need frustration, an increasing number of studies have explored the unique and independent contributions of autonomy-supportive and controlling styles (e.g., Bartholomew et al. 2011; Bhavsar et al. 2019; Haerens et al. 2018; Patail et al. 2018).

Also, as acting in an autonomy-supportive way is sometimes perceived to be at odds with setting limits, the question was addressed whether and how an autonomy-supportive style can be combined with structure (Jang et al. 2010; Siens et al. 2009). It is now very clear that autonomy support and structure are not antithetical. Rather, the setting of expectations (Vansteenkiste et al. 2012), the monitoring of whereabouts (Rodríguez-Meirinhos et al. 2019), and the

provision of feedback (Carpentier and Mageau 2013) can be done in more autonomy-supportive or controlling ways, with a combination of structure and autonomy-support yielding the most adaptive outcomes (e.g., Curran et al. 2013).

Advancements

The study of need-supportive and need-thwarting styles has rapidly grown over the past years, with studies becoming increasingly methodologically sophisticated and at the same time generating novel insights at the conceptual level.

Methodological improvements SDT research has from the outset iterated between observational (e.g., Deci et al. 1993; Grolnick et al. 1984) and self-report (e.g., Grolnick and Ryan 1989) methods. As the research evolved, scholars have made use of an increasing variety of methods, including longitudinal designs (e.g., Garn et al. 2019), multi-informant and/or observational measures of need-support (Bindman et al. 2015), and multilevel analyses to separate between-person, within-person (Mabbe et al. 2018) and between-group effects (Kachanoff et al. 2019).

Longitudinal studies spanning different time frames, from a few months to a decade, have now shown that need support predicts adjustment over time, as indexed by improved executive functioning (e.g., Bindman et al. 2015), increased engagement (e.g., Jang et al. 2016a), better emotion regulation (e.g., Brenning et al. 2015), and higher achievement and well-being (e.g., Duineveld et al. 2017; Joussemet et al. 2005). Wüttke (2020) adds to this body of literature. Two long-term representative cohort studies show that parental need-support plants the seeds of adults' interest and engagement with politics several decades later.

In contrast, longitudinal research has shown that perceived need thwarting predicts adolescents' vulnerability to various types of psychopathology, including both externalizing (Joussemet et al. 2008) and internalizing problems (Laurin et al. 2015; Soenens et al. 2008). Longitudinal work also reveals that need-relevant socialization and (mal)adjustment is not a one-way street. For instance, more autonomously motivated (Garn et al. 2019) and agentically engaged (Matos et al. 2018) students are capable of evoking more autonomy-supportive responses from teachers. Much as such a positive spiral can unfold over time, people can also get trapped in a negative vicious cycle, with children's disaffection and defiance eroding socializers' need supportiveness (e.g., Vansteenkiste et al. 2014) or eliciting more need-thwarting responses (e.g., Jang et al. 2016a; Soenens et al. 2008).

Because need-supportive socialization manifests differently in different contexts and at different ages (Grolnick et al. 2018), measures need to be attuned to the developmental stage of the sample and to the context at hand. While an autonomy-supportive style involves a number of basic

practices (i.e., taking the child's perspective, building in desired choice, offering a meaningful rationale for requests, and the use of informational language; Ryan and Deci 2017; Vansteenkiste and Soenens 2015), some of these practices may be more salient, critical and easily applicable in certain contexts and at certain ages than others. To illustrate, parental autonomy support and control manifest differently during a puzzle solving task with toddlers (e.g., Bernier et al. 2010) versus during a conversation about sexuality (Mauras et al. 2013) or friendships with adolescents (e.g., Wuyts et al. 2018).

Similarly, what a PE teacher says and does to support students' autonomy (Haerens et al. 2013) may not be identical to what science teachers do (Patall et al. 2018). Observation tools thus need to capture these sometimes subtle differences to be ecologically valid and to maximize the probability of establishing predictive validity. This idea applies not only to observational tools, but also to questionnaires, an increasing number of which are now tailored to context and sample (e.g., Andreasdakis et al. 2019).

Increasingly, studies are also examining need support and need thwarting at the level of within-person change. For instance, in sport athletes, both training-to-training (Carpentier and Mageau 2016) and game-to-game (Delrue et al. 2017) variation in experienced need-supportiveness are predictive of athletes' self-confidence, autonomous sport motivation and their pro- and anti-social play. Day-to-day variations in perceived parental (Van der Kaap-Deeder et al. 2017) and teacher (Patall et al. 2018) need support have similarly been related to daily fluctuations in children's well-being and engagement.

Finally, in more recent years, an increasing number of intervention studies have been conducted (Assor et al. 2018). These studies indicate that socializing agents can be trained to adopt a more need-supportive style and to move away from a need-thwarting style. Effective intervention programs for teachers (e.g., Cheon and Reeve 2015), parents (e.g., Joussemet et al. 2014; Moe et al. 2018) and coaches (e.g., Reynders et al. 2019) are now available, showing benefits for both the persons being motivated and for the socializing agents themselves.

Conceptual innovations Other studies have attempted to refine or extend the list of existing need-supportive and need-thwarting practices. To illustrate, Jang et al. (2016b) provided more refined insights in the way how choice can be implemented in the classroom by showing that teaching a lesson in student preferred vs. non-preferred ways promoted greater autonomy, in turn, relating to greater engagement and learning. Assor et al. (2020) proposed a number of new autonomy-relevant practices with specific relevance to identity development. Active parental efforts to facilitate decision-making on the basis of adolescents' authentic

inner compass, for instance by encouraging exploration of personal values and interests or by modeling intrinsic values oneself, were found to relate positively to adolescents' identity development and well-being.

Apart from such extensions and refinements, many studies also consider need-relevant dimensions simultaneously (e.g., Rocchi et al. 2017; Skinner et al. 2005; Zimmer-Gembeck, Webb et al. 2015). Such research reveals that socializing agents capable of nurturing one need often simultaneously support other needs (e.g., Baard et al. 2004), while the thwarting of all three needs also happens simultaneously in many instances (Costa et al. 2019). Further, using multi-dimensional scaling analyses, greater insights were produced in the way that different need-supportive and need-thwarting practices among teachers (Aelterman et al. 2019) and youth sport coaches (Delrue et al. 2019a) can best be situated vis-à-vis each other. This research has resulted in a model with a circumplex structure (see Fig. 2), which captures different ways in which socialization figures can support or thwart individuals' psychological needs. This circumplex serves as a *guide* or *compass* for socializing agents because, as can be expected, subareas on the right side in the model (i.e., attuning, guiding) yield the strongest correlates with need satisfaction and with desirable outcomes, whereas those on the left side (i.e., abandoning, domineering) yield the strongest correlates with need frustration and undesirable outcomes. Vermote et al. (2020) provide further evidence for the circumplex structure among teachers in higher education, showing that autonomously motivated teachers are more likely to adopt a need-supportive teaching style, whereas those who are more amotivated and hold

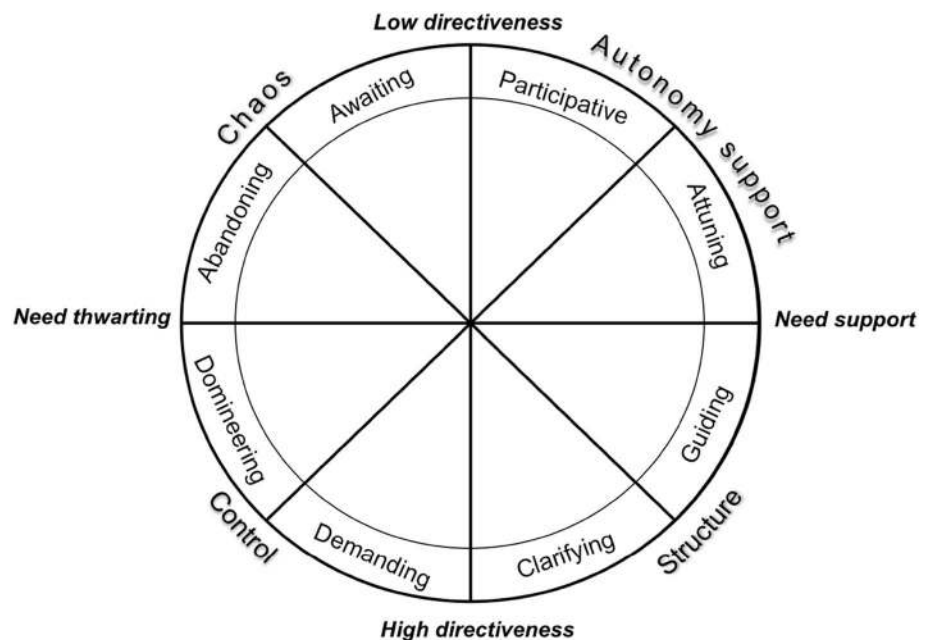
more controlled motives and entity beliefs are more likely to adopt need-thwarting styles.

Future directions

Although the circumplex model includes a broad variety of need-supportive and need-thwarting practices, the model is not exhaustive. Taxonomies involving an overview of critical need-relevant practices are now available and can form a basis for enriching the circumplex (e.g., Gillison et al. 2019). Also, more novel practices such as being patient with mistakes (Jiang et al. 2019) and facilitating the formation of an authentic inner compass (i.e., encouraging children to get in touch with and explore basic values, interests, and commitments; Assor et al. 2020) are being explored and may refine or extend the circumplex. The mapping of practices such as directive support (i.e., providing advice, guidance and reminders of actions needed to achieve goals) on the circumplex may help to gain deeper insight in the ambiguous and inconsistent effects obtained with these practices in past studies (Carbonneau et al. 2019). In addition, the broader dimension of relatedness support (e.g., Gonzalez and Chivacowsky 2018; Sparks et al. 2016) deserves being studied in relation to the circumplex. Finally, qualitative research may help enrich the circumplex as it sheds light on the multiple concrete manifestations of socializing agents' need-supportive and need thwarting styles (Côté-Lecaldare et al. 2016).

Further, longitudinal designs will help uncovering whether socializing agents slip from more structuring to more controlling and from more autonomy-supportive to chaotic styles as a function of encountered threats to their needs, personality characteristics, and the broader

Fig. 2 Graphical representation of the circumplex model (Aelterman et al. 2019)



motivating climate, or whether they shift in more desirable directions as they get trained to adopt a more need-supportive socialization style.

Overall then, the circumplex structure is in need of replication, extension, and refinement in diverse age groups, life domains, and cultures. Considerable care will be required to find out which practices carry the greatest ecological validity in every setting, while preserving theoretical precision. From a practical viewpoint, such in-depth investigations yield the promise of providing more hands-on guidelines for socializing agents to adopt a need-supportive style in daily practice.

Theme 5: How radical is BPNT's universalism claim? Towards universality without uniformity

A retrospective look

The notion that all human beings would share a similar set of basic psychological needs, the satisfaction of which is critical for well-being, flourishing, and psychological growth initially elicited quite some debate. SDT's view on human nature appeared especially controversial from the perspective of some cultural relativist views (e.g., Markus and Kitayama 2003) because the assumption of a growth tendency supported by universal needs contradicts their blank slate, culture-as-script understanding of human propensities (Vansteenkiste and Ryan 2013).

The discussion centered especially on the need for autonomy, the most disputed need. Although the concept of autonomy had received attention from scholars in the fields of cross-cultural psychology (Markus and Schwartz 2010), adolescent development (Steinberg and Silverberg 1986), and organizational psychology (Warr 1994), their view on autonomy was in many cases more *restrictive* (rather than universal). Specifically, autonomy was conceived as an attribute that should come only in moderate doses or that would be beneficial only to specific groups of individuals, such as those growing up in individualistic cultures (Markus and Kitayama 2003), adolescents who increasingly strive for more self-reliance (Zimmer-Gembeck and Collins 2003), and highly educated employees who are socialized in taking initiative and expressing their voice (Snibbe and Markus 2005). In such views the benefits of autonomy depend on one's culture, age, and social class. Yet, by conceiving autonomy as a universal psychological need, the claim made in SDT was that *any* person better thrives when this need is satisfied.

Part of the controversy was due to the conceptual confusion surrounding the notion of autonomy (Ryan and Lynch 1989; Vansteenkiste et al. 2005). Most scholars emphasizing the limited benefits associated with autonomy have defined autonomy as acting independently and making independent choices, whereas autonomy within SDT implies that one's

actions, thoughts, and feelings are undergirded by a sense of volition and authenticity. Such volitional functioning can characterize independent behavior, when one wants to act on one's own, as well as a willing dependency on others for inputs and guidance (Soenens et al. 2018). Chirkov et al. (2003) showed that volitional endorsement of cultural practices, whether vertical or horizontal, collectivistic or individualistic in orientation, contributed to the well-being of individuals from Russia, the US, South-Korea, and Turkey. Similarly, studies with Belgian (Van Petegem et al. 2012) and Chinese (Chen et al. 2013) adolescents have shown that experiencing a sense of volition during either independent decision-making or reliance on parents for advice and guidance was related to higher well-being. Across these studies, the experience of volition appears to be a more decisive factor in predicting adolescent adjustment than independent decision making as such (see also Wilde et al. 2018).

In addition to differentiating between autonomy-as-independence and autonomy-as-volition, researchers have increasingly tested the role of each of the three needs across diverse cultural backgrounds. For instance, having provided evidence for the measurement equivalence of the BPNSNF scale across Chinese, Belgian, American, and Peruvian university students, Chen et al. (2015a) reported that their need-based model held across different countries (see also Church et al. 2013; Sheldon et al. 2011; Taylor and Lonsdale 2010). The diversity of countries being sampled in the current special issues is remarkable, with participants coming from Brazil, Israel, Belgium, Peru, Canada, Turkey, Malawi, the US, the UK, the Netherlands, Spain, and Korea, and with all studies reporting various benefits in relation to ARC satisfaction and costs in relation to ARC frustration (see also Benita et al. 2020). Cross-cultural evidence has now been meta-analytically analyzed with autonomy as defined within BPNT appearing to carry similar benefits for individuals from diverse cultures (e.g., Slemp et al. 2018; Yu et al. 2018).

Advancements

Over the past years an increasing number of studies have examined the role of diverse moderators. Figure 3 provides an overview of the different places in the context—outcomes sequence in which moderators can be studied. After briefly introducing this model, we present a number of conclusions to summarize the state-of-the art of the literature and we selectively review empirical work underscoring these conclusions.

Theoretical model The theoretical model shown in Fig. 3 highlights that moderating variables can play a role (a) in the relation between subjective need-based experiences and outcomes (output-side of the model) and (b) in the relation

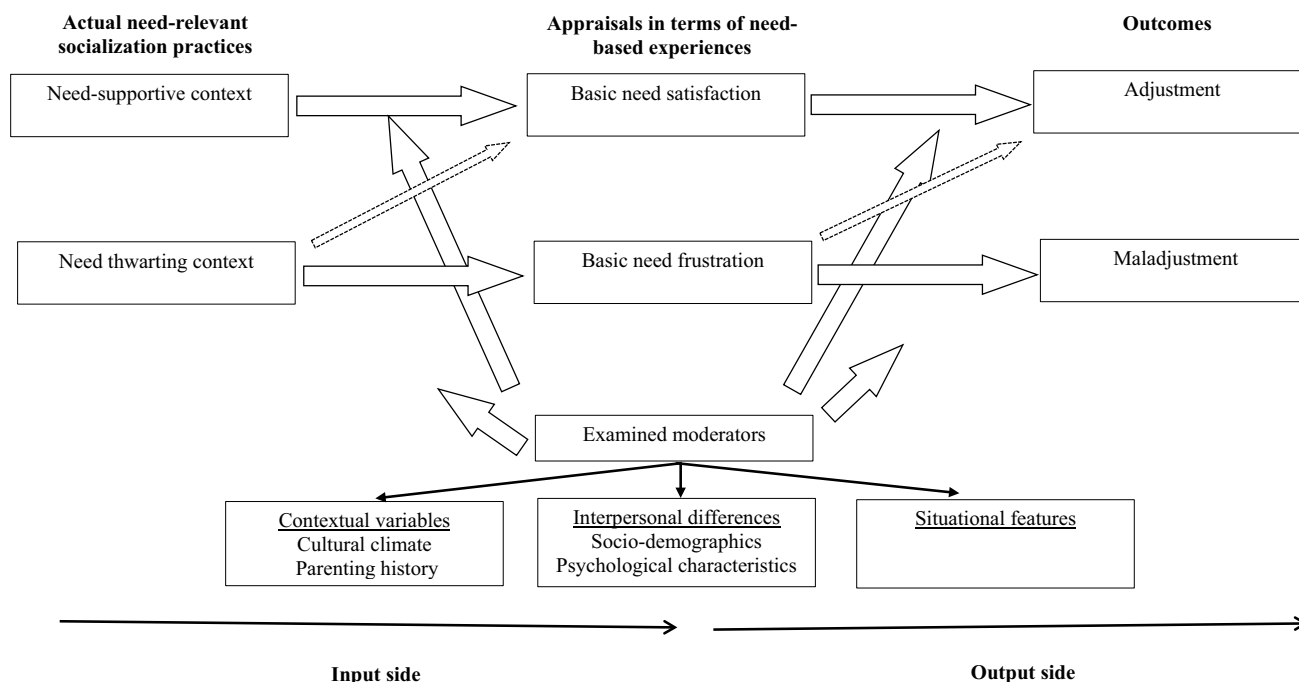


Fig. 3 Graphic Model Providing an Overview of the Empirical Work in BPNT Addressing the Topic of Universality

between objectively induced or self-reported contextual supports and thwarting of the needs and its appraisal in terms of need satisfaction and frustration (input-side of the model). Three features of this model deserve being highlighted.

First, the scope of potential moderators of need-based dynamics that are receiving attention has steadily *broadened*. Although considerable attention was initially devoted to the question whether individuals' cultural background and nationality would affect the functional impacts of need-based experiences (e.g., Chirkov and Ryan 2001), this question has now been widened by addressing demographic variables (e.g., gender, education, age; Mackenzie et al. 2018), psychological characteristics (e.g., personality, need strength, motivational differences), and situational features (e.g., group vs. individual interactions). Also, need-based dynamics have been studied in an increasing number of diverse populations. To illustrate, need-based dynamics now appear critical for individuals with mild intellectual disabilities (Frielink et al. 2019), for the engagement and productivity of crew members in a long-term mars simulation flight (Goemaere et al. 2019) and for senior adults' adjustment who face the challenge of achieving ego-integrity (Custers et al. 2012).

Second, BPNT's universality claim especially holds with respect to the output-side of the model: any person, regardless of sociodemographic or psychological characteristics, should benefit, in one way or another, from need satisfaction and suffer from need frustration, if subjectively

experienced (e.g., Vansteenkiste et al. 2006). In cross-cultural research, this part of the model would be considered *etic* (Kotlak 2006), meaning that the correlates associated with need-based experiences are robust and generalizable across cultural differences (Reeve et al. 2018). Yet such structural invariance in the associations between needs and outcomes does not imply that no gradations in the strength of the relations or variations in the type of outcomes are possible. Depending on individuals' personality and developmental history, they may have been differently (de)sensitized to the benefits associated with need satisfaction and the costs associated with need frustration (e.g., Moller et al. 2010).

Third, as for the input-side of the model, BPNT does not involve a *one-size-fits-all perspective*, as if there would be no variation in the way how individuals' needs get supported. Such a radical perspective would not only be pragmatically naïve, it would also be theoretically inconsistent with the very idea of what need-supportive socializing agents do. That is, *inherent* to the practice of need support is that socializing agents take both personal characteristics (e.g., personality, preferences) and situational circumstances into account to maximize participants' need-satisfying experiences (Mabbe et al. 2020; Mageau et al. 2017). Thus, need-supportive socialization implies ongoing *calibration* of one's approach to others (Vansteenkiste et al. 2019). Overall then, BPNT's universality perspective does not require perfect uniformity (Soenens et al. 2015). Instead, different ways can lead to Rome, and thus it is important to understand variations in

the *emic* meanings and functions of SDT constructs. Indeed, within SDT, such emic differences reflect variations in the *functional significance* (Deci and Ryan 1985) or meaning that individuals attribute to a need-relevant practice, a meaning that can vary as a function of cultural, socio-demographic, or personality differences. To illustrate, parents' request to monitor homework may be perceived as intrusive and meddling by some children, thwarting their need for autonomy, whereas for others it may be experienced as useful and constructive guidance so they can competently complete their homework (e.g., Moe et al. 2018).

Empirical findings Based on the increasing interest in studying moderators of the effects of need-based experiences, we tentatively present four intermediate conclusions. Because the study of moderators within BPNT is relatively recent and still ongoing, some conclusions formulated herein may need modification as the field progresses.

First, the extant evidence strongly suggests that the explanatory power of the main effects of ARC or ARC-supportive contexts heavily outweighs the supplementary role played by interaction effects. That is, both the percentage of variance explained by interactions but also the number of obtained interactions is rather limited in most, if not all, studies (e.g., Katz et al. 2009; Van Assche et al. 2018). Such findings align with BPNT's core idea that the satisfaction and support of these needs is essential in and of themselves. To illustrate, Wörtler et al. (2020) found in samples of both Dutch and American employees that experiences of volition, mastery, and connection at work are conducive to employees' engagement and organizational citizenship behavior, with need strength moderating these effects only to a very limited degree. Similarly, experimental studies indicate that learners benefit from an autonomy-supportive teaching style, with participants' motivational differences affecting these effects only to a limited extent (e.g., Delrue et al. 2019b; De Meyer et al. 2016; Flünger et al. 2019).

Second, the type of interaction emerging deserves attention. Although there is some evidence for gradations in the strength of the benefits and costs associated with, respectively, subjectively felt basic need satisfaction and need frustration, no evidence for cross-over interactions has emerged. That is, there is no evidence that individuals suffer from basic need satisfaction, or show gains from frustrations; if anything, the nutritional basis of need satisfaction is more pronounced for some individuals. To illustrate, the effects of need satisfaction on individuals' felt emotions (Flünger et al. 2013) and well-being (Van Assche et al. 2018) become gradually less strong with decreasing explicit need strength, but even those low in need strength did not benefit from dissatisfaction or frustration of their needs (see also Schüler et al. 2016).

Third, comparatively more interactions have been identified in the relation between the social context and

need-based experiences and outcomes (i.e., the input side of the model in Fig. 3) than in the relation between need-based experiences and outcomes (i.e., the output side of the model in Fig. 3). Although mean-level differences in need-based experiences exist as a function of demographic differences, the *effects* of need-based experiences in the prediction of (mal)adjustment are often found to be independent of participants' gender, age (Mackenzie et al. 2018), ethnic background (Froiland et al. 2019), or socio-economic status (Rodriguez-Meirinhos et al. 2019). Similarly, Big Five personality traits (Mabbe et al. 2016) and differences in need strength (e.g., Sheldon et al. 2001) have not been shown to reliably affect the functional role of need satisfactions on developmental outcomes. Yet, as for the first part of the model, differences in individuals' autonomous motivation (e.g., Baten et al. 2020; Black and Deci 2000; Mouratidis et al. 2011), causality orientations (e.g., Hagger and Chatzisarantis 2011), need strength (Katz et al. 2009) and motive dispositions (Sheldon and Schüler 2011) can moderate to some extent the relation between various need-supportive and need-thwarting practices and outcomes.

Finally, although need frustration and contextual need thwarting are generally detrimental to development and psychological growth, there is some evidence that interindividual differences determine the *type* of costs associated with need frustration and perceived need-thwarting socialization. To illustrate, adolescents high and low on trait autonomous functioning experienced a controlling parental request to put out extra effort after poor exams as equally autonomy frustrating, but those high on trait autonomy did not perceive the request as illegitimate, nor did they intend to defy the request, signaling a nuanced pattern of moderation (Van Petegem et al. 2019). Similarly, psychologically controlling parenting (i.e., a specific type of need-thwarting parenting characterized by love withdrawal and guilt-induction) has been found to relate to more internalizing problems irrespective of children's Big Five personality traits but to relate to externalizing problems mainly among children low on agreeableness (Mabbe et al. 2016).

Future directions

First, theoretical grounds can best form the basis for selecting potential moderators in future research. In this respect, the *psychological distance* between the independent, moderating, and dependent variable may be taken into consideration; the closer the psychological distance, the greater the probability of finding an interaction pattern. To illustrate, trait differences in indecisiveness (Germeijs and De Boeck 2002) may be a more viable moderator of the effects of choice compared to other trait differences as indecisiveness addresses individuals' skill for choosing. Indeed, prior work among rope skippers (DeMuyne et al. 2019) and

elementary school children (Waterschoot et al. 2019) indicates that some of the effects of experimentally provided choice were less pronounced among highly indecisive individuals. Further, although a number of studies (e.g., Schüler et al. 2013) have looked for moderating effects of motives for power, achievement, and affiliation, as conceived within *Motive Disposition Theory*, there is no conceptual one-to-one relation between these motives, denoting interindividual differences, and BPNT's basic needs (see Ryan et al. 2019a). For this reason, more narrowly defined and operationalized measures of need strength, tapping into the experience of need desire (Sheldon and Gunz 2009) or need valuation (Chen et al. 2015a), have been used in BPNT research. Nonetheless, their moderating role in the relations between need-based experiences and outcomes still appears to be relatively weak (e.g., Chen et al. 2015a; Flünger et al. 2013; Van Assche et al. 2018).

Second, future research examining the possibility that need-supportive practices need to be aligned with individuals' characteristics may benefit from the circumplex model shown in Fig. 2 because this model is detailed and rather nuanced. Illustrative in this context is work by Marbell-Pierre et al. (2019), who reported that parental provision of choice related to positive developmental outcomes among US, but not among Ghanaian adolescents. In contrast, parental perspective taking, a central element of autonomy support and the attuning approach in particular, was related to higher adjustment irrespective of participants' cultural background. Such findings are fully congruent with the circumplex model, which suggests that the attuning approach may be more directly need-nurturing, while the participative approach is merely need-enabling (Aelterman et al. 2019).

Third, also the broader (cultural) climate may affect the functional significance of specific need-relevant practices. For instance, American compared to Chinese elementary school children perceived a controlling teacher as more hurtful and controlling, which was reflected in their reduced motivation for schoolwork (Zhou et al. 2012). Similarly, Chinese adolescents perceive the parental practice of guilt-induction as more benign compared to Belgian teens, yet still as more controlling and autonomy-thwarting compared to autonomy support (Chen et al. 2016; see also Chao and Aque 2009). Not only the broader cultural ambience but also the more immediate family environment may alter the meaning attributed to need-relevant practices. For example, adolescents who grew up in a home characterized by increasing autonomy-supportive socialization over the years perceived

exposure to a new autonomy-supportive, relative to a controlling, encounter with parents as more autonomy satisfying and reacted in more constructive ways to a controlling situation (Van Petegem et al. 2017).

Finally, specific situational features may play a role in altering the perceived meaning and effectiveness of need-supportive and need-thwarting practices. For instance, in a study among judo athletes, a controlling intervention by a judo coach was perceived as more controlling and harmful when athletes, despite clear efforts, struggled to master a new technique compared to when the athletes were depicted as disturbing the training of their peers (Delrue et al. 2019b). Although a controlling response was less favorable in *both* situations compared to an autonomy-supportive one, the context of disturbance attenuated some of the costs associated with coach control.

Conclusion

The present overview makes clear that, today, research on basic psychological needs is active and growing. Based on BPNT, the topic of basic psychological needs has been studied by researchers across the world, presumably because it touches upon fundamental theoretical questions regarding our human nature and carries far-reaching practical implications for parents, educators, managers, coaches and other social relationships. Concern for basic psychological needs also has implications for (re)organizing schools and work settings, as well as for developing sustainable health care and welfare policies.

At this point, pressing, yet exciting questions loom, such as possible extensions of the shortlist of basic needs, the multiple and variable manifestations of need frustration, and the variable pathways towards psychological growth, flourishing, and integrity on the “bright side”, and towards ill-being and psychopathology on the “dark side”. It is our hope that this special double-issue in *Motivation and Emotion* contributes to this intensive research journey, ultimately helping to shed light on what it means to live, and to support a purposeful and flourishing life.

Appendix

See Table 3.

Table 3 Overview of different translations and adaptations of the basic psychological need satisfaction and frustration scale (BPNSFS)

General measures	Language	Population
Chen et al. (2015a)	Chinese	Adults
Chen et al. (2015a)	Dutch	Adults
Frielink et al. (2019)	Dutch	Adults with intellectual disability
Van der Kaap-Deeder et al. (2015)	Dutch	Children
Chen et al. (2015a)	English	Adults
Heissel et al. (2018)	German	Adults
Benita et al. (2020)	Hebrew	Adults
Costa et al. (2018)	Italian	Adults
Nishimura and Suzuki (2016)	Japanese	Adults
Cordeiro et al. (2016)	Portuguese	Adults
Chen et al. (2015a)	Spanish	Adults
Rodríguez-Meirinhos et al. (2019a, b)	Spanish	Children
Domain-specific measures	Language	Domain
Haerens et al. (2015)	Dutch	Physical education
Aelterman et al. (2016)	Dutch	Training
Van Petegem et al. (2015a)	Dutch	Vignette/Situation
Vanhee et al. (2016)	Dutch	Romantic relations
Vandenkerckhove (2019)	Dutch	Education (students)
Aelterman et al. (2019)	Dutch	Education (teachers)
Delrue et al. (2019a, b)	Dutch	Sport
Aelterman et al. (2016)	English	Training
Goemaere et al. (2019)	English	Space travel
Schultz et al. (2015)	English	Work
Tilga et al. (2018)	Estonian	Physical education
Behzadnia et al. (2018)	Persian	Physical education
Rodrigues et al. (2019a)	Portuguese	Physical exercise
Rodrigues et al. (2019b)	Portuguese	Exercise instructors
Diary measures	Language	Domain
Mabbe et al. (2018)	Dutch	Parents' general functioning
Kindt et al. (2016)	Dutch	Romantic relations
Van der Kaap-Deeder et al. (2017)	Dutch	Children's general functioning
Brenning et al. (2019)	Dutch	Parent–child relation

A manual with the different versions of the BPNSFS can be retrieved from the Self-Determination Theory website (<https://selfdeterminationtheory.org/>) or can be provided by the first author

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