

ARTICLE

Coming of age in a warming world: A self-determination theory perspective

Jenna Spitzer¹  | Stathis Grapsas¹  | Astrid M. G. Poorthuis¹  | Maarten Vansteenkiste²  | Sander Thomaes¹ 

¹Department of Psychology, Utrecht University, Utrecht, The Netherlands

²Department of Psychology, Ghent University, Ghent, Belgium

Correspondence

Jenna Spitzer, Utrecht University, Heidelberglaan 1, 3584 TC Utrecht, The Netherlands.

Email: j.e.spitzer@uu.nl

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Abstract

Today's youth are growing up in a world threatened by climate change. Facing an uncertain future, young people—and especially adolescents—tend to be concerned about climate change, even more so than other age groups. How can socializing agents (e.g., educators, policymakers, clinicians) support and engage adolescents as they come of age in a warming world? In this article, we review studies on climate change and youth development from the perspective of self-determination theory (SDT). SDT provides a framework for understanding a nascent body of literature on adolescents' responses to climate change. In particular, SDT offers insights into the factors that can facilitate or undermine adolescents' internalization of climate science, engagement in pro-environmental behavior, and capacity for resilience and well-being. We discuss SDT's potential to inform efforts to encourage positive youth development amid climate change, and we identify priorities for investigation.

KEY WORDS

adolescence, basic psychological needs, climate change, pro-environmental behavior, resilience

Climate change and its impacts (e.g., flooding, famine, displacement) threaten the physical and psychological well-being of young people around the world, especially those living in marginalized or underresourced communities and regions (Intergovernmental Panel on Climate Change, 2023; United Nations Children's Fund [UNICEF], 2021b). For example, today's youth are expected to experience three to six times more extreme weather events in their lifetime than did older generations (Thiery et al., 2021). Such events threaten lives and exacerbate existing inequalities, for instance, by disrupting access to essential services (e.g., education, health care, clean water; Arpin et al., 2021). Understandably, many youth say they feel worried, hopeless, betrayed by their governments, and frustrated with older generations (Hickman et al., 2021; Swim et al., 2022).

Young people are not responsible for climate change, nor can they be held accountable for its solutions. At the same time, addressing climate change with youth is

important to help them prepare for the future. It is also developmentally opportune. Rapid social and cognitive developments during adolescence—including increased perspective-taking skills, a greater sensitivity to social justice, and a heightened need for meaning and purpose—can spur youth to engage proactively with societal problems (Crone et al., 2024; Fuligni, 2019). As illustrated by their central involvement in climate protests and their ability to inspire pro-environmental behavior in their parents (Fritz et al., 2023; Wang & Li, 2024), adolescents can be frontrunners in global action and drivers of change (Thomaes et al., 2023).

Research is beginning to uncover the psychosocial factors (e.g., motivations, beliefs, emotions, social influences) that support adolescents' resilient and proactive responses to climate change (e.g., Balundé et al., 2020; Busch et al., 2019; Huoponen, 2024). (For the sociodemographic characteristics of the primary studies reviewed herein, see Table S1.) Self-determination theory (SDT)

Abbreviation: SDT, self-determination theory

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offers a valuable theoretical framework for interpreting and informing this nascent field of research because it holistically considers the adaptive processes that promote youth engagement and well-being, and the contextual factors that may inhibit such responses.

In this article, we build on and complement previous reviews that examined youth development amid climate change from different theoretical perspectives (e.g., social cognitive theory, positive youth development; Bandura & Cherry, 2020; Pereira & Freire, 2021). After summarizing some of SDT's central tenets, we review studies in developmental and environmental psychology that either explicitly adopted this perspective or align with it, focusing on three key areas: adolescents' (1) internalization of climate science, (2) engagement in pro-environmental behavior, and (3) capacity for resilience and well-being.

SDT: SOME BASICS

SDT is an integrative, organismic account of human motivation and development, substantiated by thousands of empirical studies in various domains (e.g., education, health behavior; Ryan, 2023). SDT characterizes people as inherently active creatures who are naturally inclined to learn, self-regulate, and realize their goals (Ryan & Deci, 2000). At the same time, SDT suggests that individuals' ability to realize their potential depends on the environments in which they develop.

Just as humans have basic physical needs for food and shelter, SDT proposes that humans have basic psychological needs—for competence, autonomy, and relatedness (Vansteenkiste et al., 2020). *Competence* refers to the experience of effectiveness and mastery of one's pursuits, *autonomy* is defined as the experience of volition and choice regarding one's actions, and *relatedness* signifies the experience of connection and closeness with significant others. According to SDT, when individuals' interactions with their environments allow them to feel skillful, self-governed, and socially embedded, they experience more psychological well-being and vitality. Conversely, when individuals' interactions with their environments lead them to feel inept, controlled, and alienated from others, they become vulnerable to psychological ill-being and maladjustment (Rodríguez-Meirinhos et al., 2020; Vansteenkiste & Ryan, 2013). SDT considers the satisfaction (vs. frustration) of basic psychological needs essential throughout life, but it also recognizes that the factors leading to such satisfaction are developmentally specific (Soenens & Vansteenkiste, 2023). For instance, the conditions that enable adolescents to experience competence, autonomy, and relatedness can differ from those in other developmental phases (Gnambs & Hanfstingl, 2016; La Guardia & Ryan, 2002).

According to SDT, need satisfaction (vs. frustration) affects individuals' psychological adjustment directly

and indirectly by shaping their goals and motivations (Bradshaw, 2023; Pelletier & Rocchi, 2023). Psychological need satisfaction fosters individuals' pursuit of *intrinsic goals* (e.g., for personal growth) and facilitates their *internalization* of socially valued norms and behaviors so individuals experience autonomous motivations to engage in and contribute to their communities. When adolescents experience *autonomous motivations*, they feel personally driven to engage in behaviors they experience as aligned with their goals, interests, and identities. In contrast, psychological need frustration fosters individuals' pursuit of *extrinsic goals* (e.g., materialism) and interferes with the process of internalization, leading individuals to develop *controlled motivations* or become *amotivated*. When adolescents experience controlled motivations, they feel pressured by others (e.g., others' expectations of them) or by themselves (e.g., their own looming feelings of guilt) to live up to societal norms. When youth are amotivated, they feel detached from social norms and may appear passive or “checked out.” Psychological need frustration can even increase adolescents' motivation to thwart the perceived goals of others (i.e., *oppositional defiance*; van Petegem et al., 2015). Thus, social contexts that enable youth to feel competent, autonomous, and related foster their well-being and motivation to contribute, while psychological need frustration forestalls adolescents' well-being and undermines such motivation.

UNDERSTANDING AND SUPPORTING ADOLESCENT DEVELOPMENT AMID CLIMATE CHANGE: AN SDT PERSPECTIVE

Efforts to apply SDT in the environmental domain have focused primarily on adults (Cooke et al., 2016; Pelletier et al., 1998; Wullenkord et al., 2021). However, a growing number of studies point to SDT's potential to explain cognitive, behavioral, and emotional responses to climate change among young people (see Figure 1; e.g., Darner, 2012; Kaplan & Madjar, 2015; Spitzer et al., 2024; Wray-Lake et al., 2019).

Internalizing climate science

Environmental education programs, implemented both in and out of schools, aim to give adolescents an awareness of and knowledge about climate change. These efforts are generally effective (van de Wetering et al., 2022). Still, an estimated 10% to 20% of adolescents remain skeptical of climate change, expressing doubt that it is real, impactful, or caused by human activity (Grapsas et al., 2023; Ojala, 2015). Such skepticism undermines mitigation and adaptation efforts (Douglas & Sutton, 2018; Uddin et al., 2023). SDT helps explain how and why skepticism about climate change can emerge. It proposes that

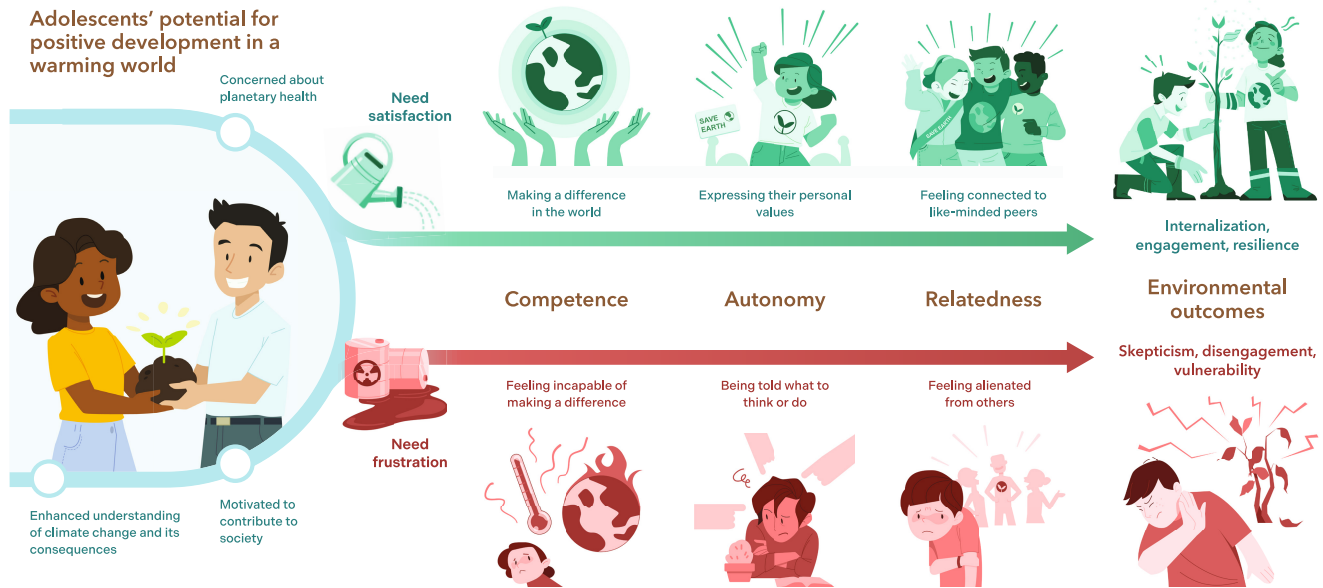


FIGURE 1 Using self-determination theory to support adolescent development amid climate change.

the rejection of climate science represents a form of oppositional defiance, resulting when adolescents feel incompetent, controlled, or estranged from others in the context of climate change (or perhaps more generally, in their day-to-day lives; van Petegem et al., 2015).

Initial studies support this idea. When youth identify with conservative political parties or hold self-focused personal values—possibly alienating them from individuals and contexts calling for climate action—they express more climate change skepticism (Grapsas et al., 2023; Uba et al., 2023). In addition, when adolescents' parents discuss climate change in a “doom-and-gloom” or a need-thwarting manner, youth are more likely to deny or de-emphasize climate change as a way to cope (Ojala & Bengtsson, 2019). Conversely, when parents adopt a more solution-oriented or need-supportive communication style, adolescents show more constructive means of coping (e.g., they are more likely to identify actions they can undertake to mitigate climate change). Similarly, in studies with adults, individuals were more likely to deny the “hard facts” of climate change when they reported more basic psychological need frustration in their daily lives (Wullenkord et al., 2021). Although research focusing on youth is limited, evidence suggests that the frustration of basic psychological needs may underlie climate change skepticism, pointing to opportunities for its prevention and reduction (e.g., through depoliticizing communication about climate change; Russo & Stattin, 2017).

Engaging in pro-environmental behavior

Individual behavior change, along with political and economic reform, is needed to mitigate climate change (Intergovernmental Panel on Climate Change, 2023).

From middle childhood and perhaps even earlier, children can engage in pro-environmental behavior (i.e., behavior that aims to benefit or minimize harm to the natural environment, such as reducing energy use and engaging in climate activism; Otto et al., 2019). From the perspective of SDT, such engagement may reflect children's innate tendencies to connect with and care for their surroundings (Pelletier & Rocchi, 2023). With the transition to adolescence, as youth become increasingly aware of the societal contexts in which they grow up (Fulgini, 2019), youth experience increased worry about environmental problems (Hickman et al., 2021; United Nations Development Programme, 2021). Still, for many adolescents, such worry does not translate into pro-environmental behavior (Krettenauer et al., 2020; Olsson & Gericke, 2016). While psychological barriers to engaging in pro-environmental behavior are certainly not unique to youth (Gifford, 2011), this worry-behavior gap reveals a missed opportunity to tap into adolescents' burgeoning interest in societal contribution (Thomaes et al., 2023).

From the perspective of SDT, if adolescents experience sufficient need satisfaction in the context of pro-environmental engagement, they will internalize the value of such behavior and can be autonomously motivated to engage (see Figure 2; Vansteenkiste et al., 2018). If they do not, their development of internalized, autonomous motivation is likely to be disrupted, leading to disengagement. Indeed, adolescence is when individuals begin to exhibit a capacity for *need-crafting* (i.e., the selection into or out of activities based on personal experiences of need satisfaction and frustration; Laporte et al., 2021).

Youth may experience less rather than more psychological need satisfaction as they develop greater

awareness of climate change. In terms of *competence*, adolescents' emerging ability to grasp the magnitude of climate change can cause a sense of powerlessness, making engagement in pro-environmental behavior seem futile (Ojala, 2013; Schwartz et al., 2022). In terms of *autonomy*, adolescents' strong desire to think for themselves may lead them to experience pro-environmental appeals as autonomy-thwarting (Thomaes et al., 2023). And in terms of *relatedness*, adolescents' heightened awareness of their social roles may lead them to refrain from engaging in pro-environmental behavior if they experience such behavior as irrelevant to, or even disapproved of by, significant others (e.g., if it is “not what people like us care about”; Collado et al., 2019; Stevenson et al., 2019).

However, adolescents can also exhibit strong, autonomous motivations to engage in pro-environmental behavior (e.g., to eat less meat or participate in climate activism; Fritz et al., 2023; Jürkenbeck et al., 2021). Youth report more autonomous environmental motivations when they experience more need-supportive parenting (e.g., “My mother/father allows me to decide things for myself”; Grønhøj & Thøgersen, 2017) or environmental education (e.g., “It's important for my moderator at

school that I do things for the environment that interest me”; Kaplan & Madjar, 2015). Adolescents' autonomous environmental motivations, in turn, are associated with their engagement in pro-environmental behavior (Covitt, 2006; Kaplan & Madjar, 2015). Qualitative research also suggests that need-satisfying experiences (e.g., gaining a sense of accomplishment, standing up for one's values, connecting with like-minded peers) play a central role in supporting and sustaining youth's pro-environmental behavior (Haugestad et al., 2021; Johnson et al., 2007). Thus, SDT sheds light on a psychological mechanism that can push adolescents away from, or rather pull them toward, pro-environmental engagement.

Capacity for resilience and well-being

Climate change poses substantial mental health risks, including increased experiences of posttraumatic stress, anxiety, depression, and sleep disturbance (Burke et al., 2018; Clayton, 2020). Some adolescents develop mental health problems from direct exposure to the impacts of climate change (e.g., when forced to migrate from areas exposed to

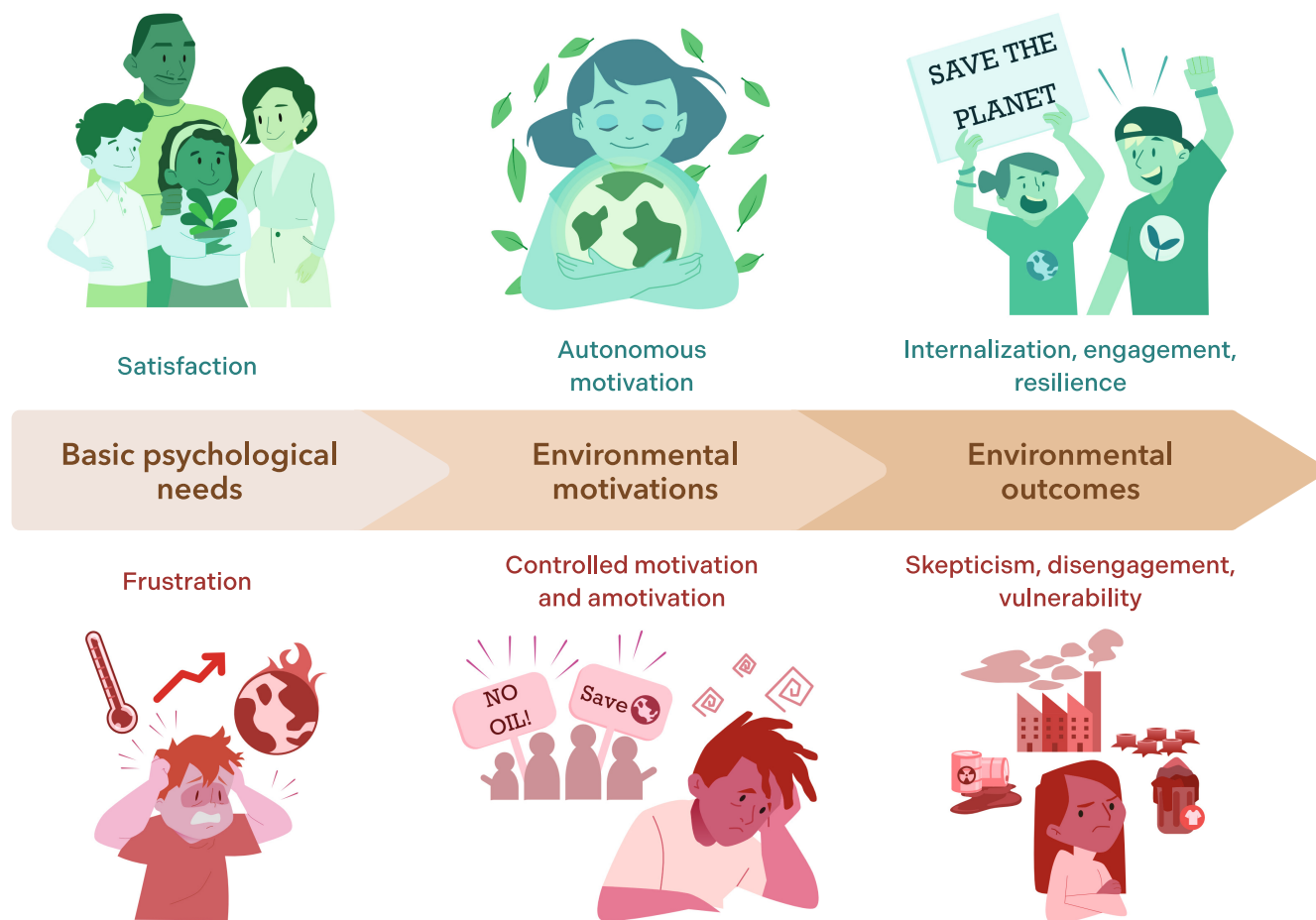


FIGURE 2 Development of adolescents' environmental motivations and outcomes from the perspective of self-determination theory.

wildfires), while others are affected more indirectly (e.g., when learning about climate change and its impacts from media or at school). Mental health concerns prevail in both groups (Sanson et al., 2019).

SDT considers the conditions that support adolescents' well-being, even under challenging circumstances like climate change. Such conditions arise, for example, when youth feel they can make a positive impact (supporting *competence*; Pickard, 2022), undertake actions that express their values and goals (supporting *autonomy*; Kiilakoski & Piispa, 2023), and receive emotional support from those willing to listen to their concerns (supporting *relatedness*; Conner et al., 2023). In addition, engaging in pro-environmental behavior can enhance adolescents' psychological well-being by facilitating their basic psychological need satisfaction (e.g., by taking action to support the environment, youth can experience a greater sense of efficacy, connection, and personal volition, which fosters well-being; Wray-Lake et al., 2019). Moreover, communication about climate change (e.g., through educational material) can buffer adolescents from experiencing anxiety when such communication is designed to support these basic psychological needs (Spitzer et al., 2024).

Experiences of need satisfaction (vs. frustration) may also affect adolescents' climate-related well-being indirectly, by shaping their inner resources for resilience (Lera & Abualkibash, 2022; Vansteenkiste & Ryan, 2013). Psychological need satisfaction fosters adolescents' capacity for adaptive emotion regulation (i.e., the ability to experience and process stressful information and events nondefensively; Roth et al., 2019). Conversely, psychological need frustration predisposes adolescents to suppress or otherwise regulate their emotions ineffectively, placing them at risk for psychological maladjustment (Brenning et al., 2022). Naturally, youth can be expected to experience negative emotions as they face climate change (Clayton et al., 2023). In adolescents whose psychological needs are satisfied, these negative emotions may come to guide volitional action (e.g., climate anxiety motivates pro-environmental behavior; Becht et al., 2024). In contrast, in adolescents whose needs are frustrated, the negative emotions may increase the risk of dysregulation and ill-being (Veijonaho et al., 2023). Thus, supporting adolescents' basic psychological needs as they confront the adverse realities of climate change may strengthen their psychological resources for sustained well-being.

IMPLICATIONS FOR EDUCATION, POLICY, AND CLINICAL PRACTICE

Our review suggests that socializing agents can support youth as they respond to climate change by attending to their experiences of basic psychological need satisfaction

(vs. frustration). Environmental education, public communication, and clinical practice may benefit from this perspective.

In pioneering educational programs, supporting adolescents' basic psychological needs as they learn about climate change increased their pro-environmental motivations and behavior (Darner, 2014; Kaplan & Madjar, 2015; Osbaldiston & Sheldon, 2003). Consistent with SDT, teachers could, for example, highlight adolescents' capacity to help redress environmental inequity through their own behaviors (*competence*); enable youth to lead their own sustainability initiatives (*autonomy*); and encourage students to reflect together on how climate change affects their well-being and future perspectives, emphasizing shared experiences (*relatedness*; cf. Darner, 2009, 2014). Such strategies could complement or enrich existing climate education programs, some of which have been criticized for insufficiently addressing issues of climate justice, local (place-based) relevance, and students' well-being (Ajaps & Forh Mbah, 2022; Ojala, 2023; Stapleton, 2019). Strategies like these do not follow uniquely from SDT, but are consistent with other classic pedagogies (e.g., Dewey's democratic pedagogy, Freire's pedagogy of the oppressed; Dewey, 1916; Freire & Ramos, 1970).

Public communication campaigns could also draw on SDT-based communication guidelines (Lavergne et al., 2010; Martela et al., 2021; Pelletier & Sharp, 2008). Although these guidelines have not been tailored to adolescents, they identify methods for establishing clear and informative norms while remaining caring and supporting autonomy. By attending to adolescents' basic psychological needs, such communication campaigns could also help reduce their experiences of climate anxiety (Spitzer et al., 2024). To address the persistent underrepresentation of young voices in climate policy (Narksompong & Limjirakan, 2015; UNICEF, 2021a), youth could contribute to the development of these communication guidelines and to the policy decisions, more generally, that will affect their futures (Crone et al., 2024).

As youth increasingly report climate-related mental health complaints (Ogunbode et al., 2022; Wullenkord & Ojala, 2023), clinical practitioners could also draw on SDT to support adolescents' well-being and psychological health (Baudon & Jachens, 2021; Brenning et al., 2022). Basic psychological needs play a transdiagnostic role in adolescents' internalizing and externalizing symptoms, and therapists' support of autonomy is associated with greater engagement and more successful outcomes across diverse forms of psychotherapy and clinical applications (Campbell et al., 2018; van der Kaap-Deeder, 2023; Zuroff & Koestner, 2023). Thus, clinical practice and research may benefit from developing and adopting needs-satisfying interventions and therapeutic approaches (Savard et al., 2013; Thoma et al., 2021).

IMPLICATIONS FOR RESEARCH

The research we have reviewed illustrates SDT's potential to inform efforts to understand and support youth as they face climate change. We highlight several research priorities to evaluate and harness this potential. Prospective longitudinal research is needed to test if and how adolescents' need-satisfying (vs. need-frustrating) experiences—both in general (i.e., overall, in their day-to-day lives) and more specifically (i.e., in particular, in the context of climate change)—shape their developmental trajectories of responding to climate change (see Figure 2). Researchers should also address potentially confounding factors (e.g., adolescents' level of education, socioeconomic status) to determine whether the proposed mechanisms drive these trajectories as SDT predicts.

Building on some of the work reviewed here (e.g., Darnier, 2014; Kaplan & Madjar, 2015), researchers can bridge theory and application by developing SDT-based proof-of-concept interventions for education, policy, and clinical practice, and testing them at scale in real-world contexts (Yeager & Walton, 2011). By using co-creation and participatory research methods (Bowler et al., 2021; Crone et al., 2024; King et al., 2021), researchers could engage directly with youth and practitioners to maximize the relevance, usefulness, and accessibility of the developed applications.

SDT-based research on pro-environmental development could also deepen understanding of the conditions that foster positive youth development more broadly (Damon, 2004; Hui & Tsang, 2012). For example, researchers could investigate if need satisfaction in the context of climate change, which can boost autonomous motivation to protect the natural environment (Kaplan & Madjar, 2015), also spills over into a wider interest in societal engagement and contribution. A more thorough understanding of such developmental processes and cascades could inform efforts to capitalize on youth's strengths and promote their unique capacities and potentials (Lewin-Bizan et al., 2010).

This research must engage diverse samples of adolescents around the world and improve on developmental science's history of underrepresenting most of the world's population in its research (Henrich et al., 2010; Nielsen et al., 2017). Such inclusion is especially urgent in the context of climate change, given its disproportionate impact on youth from disadvantaged and underrepresented communities, both within and between countries (UNICEF, 2021b). Collaborative and international efforts (e.g., Hickman et al., 2021; Ogunbode et al., 2022) demonstrate that it is possible to build a more representative field of research.

CONCLUSION

SDT offers a unifying framework for understanding and supporting youth as they grow up in a warming world.

We hope this review inspires efforts to uncover adolescents' innate potential for growth, contribution, and well-being—even, or especially, as they face the devastating effects of climate change.

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CONFLICT OF INTEREST STATEMENT

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ORCID

Jenna Spitzer  <https://orcid.org/0000-0002-5100-076X>
 Stathis Grapsas  <https://orcid.org/0000-0002-3837-9701>
 Astrid M. G. Poorthuis  <https://orcid.org/0000-0002-6541-5288>
 Maarten Vansteenkiste  <https://orcid.org/0000-0001-6983-3607>
 Sander Thomaes  <https://orcid.org/0000-0002-0838-6222>

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