

Positive Development in Adolescence: The Development and Role of Intentional Self-Regulation

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Key Words

Adolescent development • Agency • Intentional self-regulation • Selection, Optimization, and Compensation model

Abstract

Adolescence is a period of marked change in the person's cognitive, physical, psychological, and social development and in the individual's relations with the people and institutions of the social world. These changes place adaptational demands on adolescents, ones involving relations between their actions upon the context and the action of the context on them, a bidirectional process that has been labeled developmental regulation. The attributes and means through which the adolescent contributes to such regulation may be termed self-regulation. This article differentiates between organismic and intentional self-regulation and examines the development of intentional self-regulation in adolescence, and the individual and contextual contributions to its development. The model of Selection, Optimization, and Compensation, developed by Paul Baltes, Margaret Baltes, and Alexandra Freund, is used as a means to conceptualize and index intentional self-regulation in adolescence. The relation between intentional self-regulation and positive development of youth is examined.

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People live in complex physical, social, cultural, and historical contexts that constantly require them to make decisions about how to act in a way that satisfies both personal and environmental demands [Brandtstädter, 1998; Demetriou, 2000]. Arguably, these adaptational requirements are especially salient during the adolescent period, when pressures for adjustment have to be accomplished in the midst of

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major changes in the neurological, physiological, cognitive, emotional, somatic, and behavioral characteristics of youth, and in the context of changes in family, peer group, and school, as well as vocational transitions. When one is moving towards ends that are as yet uncertain, how does one select the best means to get there? This is the fundamental adaptive challenge of adolescence.

While adolescents, like people at all points within the lifespan, are products of their environments, they simultaneously select, create, and change their contexts, thereby becoming important producers of the contexts in which they are embedded [Bandura, 2000; Demetriou, 2000; Grolnick, Deci, & Ryan, 1997; Lerner, 1982, 2002; Lerner & Busch-Rossnagel, 1981]. However, the fundamental adaptive challenges of the adolescent period make such self-regulation crucial and, sometimes, problematic for the person, and influence his or her developmental trajectory.

Humans have an adaptational advantage compared to other species in that they can adjust to practically every environment in the world; the environment and people's own actions have co-shaped human development throughout evolution [Demetriou, 2000; Gottlieb, 1997; Gould, 1977; Lewontin, 2000]. For instance, environmental pressures have fostered changes such as an upright posture and use of tools and, at the same time, these abilities have enabled people to change their contexts in ways that allow them to adapt to a variety of situations, ranging from diverse geographical areas to new social and cultural contexts [Bandura, 2001; Gould, 1977]. The ontogenetic expression of these evolutionarily based abilities are vital in adolescence, when changes in social relationships (e.g., with parents and peers), institutional linkages (e.g., moving from elementary to middle to high school), and – in contemporary society – the pace of technological change require efficacy in self-regulation.

Definitions of Self-Regulation

Within developmental system models of human development, the dynamic (i.e., mutually influential) process of people acting on their contexts and contexts acting upon people has been labeled developmental regulation [Brandtstädter, 1998, 2006]. These models hold that each person is a part of a multilevel system, involving biological, psychological, social, cultural, and historical (temporal) levels, all forming an integrated system between an individual and his or her environment [Bronfenbrenner, 2001; Lerner, 2002]. Accordingly, developmental regulation involves mutually influential relations among all the levels of the context in which the person is embedded, i.e., there exist individual ↔ context relations.

The attributes involved in and the means through which the individual contributes to developmental regulations may be termed self-regulation. Self-regulations are individual-level characteristics that link the individual and the context and constitute the means through which children, adolescents, and adults contribute to and shape their own development. When working from a conceptual framework where the person is a key mediator of change, self-regulation becomes a central process of human functioning [Karoly, Boekaerts, & Maes, 2005] and Posner and Rothbart [2000] have stated that 'understanding self-regulation is the single most crucial goal for advancing an understanding of development' (p. 427).

Self-regulation is, then, a summary term that encompasses multiple forms of functioning, ranging from physiological functions to complicated, intentional

thought processes. As such, self-regulation pertains to all aspects of adaptation, as people alter their behaviors, as well as thoughts, attention, and emotions, to react to different contexts and modulate their reactions to their contexts [Shonkoff & Phillips, 2000]. Definitions of self-regulation frequently differentiate between the abilities to regulate emotion, attention, and behavior [see e.g., Raffaelli, Crockett, & Shen, 2005; Shonkoff & Phillips, 2000], as reflected in Moilanen's [2007] comprehensive definition: 'Self-regulation is the ability to flexibly activate, monitor, inhibit, persevere and/or adapt one's behavior, attention, emotions and cognitive strategies in response to direction from internal cues, environmental stimuli and feedback from others, in an attempt to attain personally-relevant goals' (p. 835).

Intentional and Organismic Self-Regulation

Theoretical and empirical work on self-regulation has suffered from the use of diverse and inconsistent definitions that involve variation in the explicit or implicit assumptions about the construct [Károly, Boekaerts, & Maes, 2005; McCabe, Cunningham, & Brooks-Gunn, 2004; Raffaelli, Crockett, & Shen, 2005]. We propose that to better understand the different features of the individual that contribute to self-regulation, and especially to understand some of the differences between self-regulation within and across developmental periods, a distinction can be made between two related means of regulation through which people influence their context: intentional¹ and organismic self-regulation (fig. 1).

Intentional self-regulations are contextualized actions that are actively aimed towards harmonizing demands and resources in the context with personal goals in order to attain better functioning and to enhance self-development. Intentional self-regulation is characterized by goal-directed behaviors. However, although intentional self-regulations are always actively goal directed, we will argue that some instances of intentional self-regulatory behaviors may not be conscious or, at the least, may happen so automatically in some circumstances that they occur before the person is aware of them.

However, despite variations in a person's level of awareness regarding the functionality of such behaviors, processes of intentional self-regulation are more readily available to consciousness than processes and structures of *organismic regulation*, which are broad, consistent attributes of a person that involve biologically based, physiological structures and functions that contribute to the relationship an individual has with the environment. Such organismic characteristics (e.g., hypothalamic control of body temperature, circadian rhythms, pubertal timing, and temperamental attributes such as threshold of responsivity or quality of mood) are under no or limited control of the person, and do not involve intentional efforts of the person to regulate his or her individual ↔ context exchanges. These characteristics tend to show relative continuity through the lifespan and contribute to consistencies in behavior across situations and over time (fig. 1) [Hooker & McAdams, 2003; Lerner, 2002; Shonkoff & Phillips, 2000; Susman & Rogol, 2004].

¹ Labels other than 'intentional' self-regulation, such as 'effortful' and 'voluntary', may also be used to depict the processes to which we are pointing.

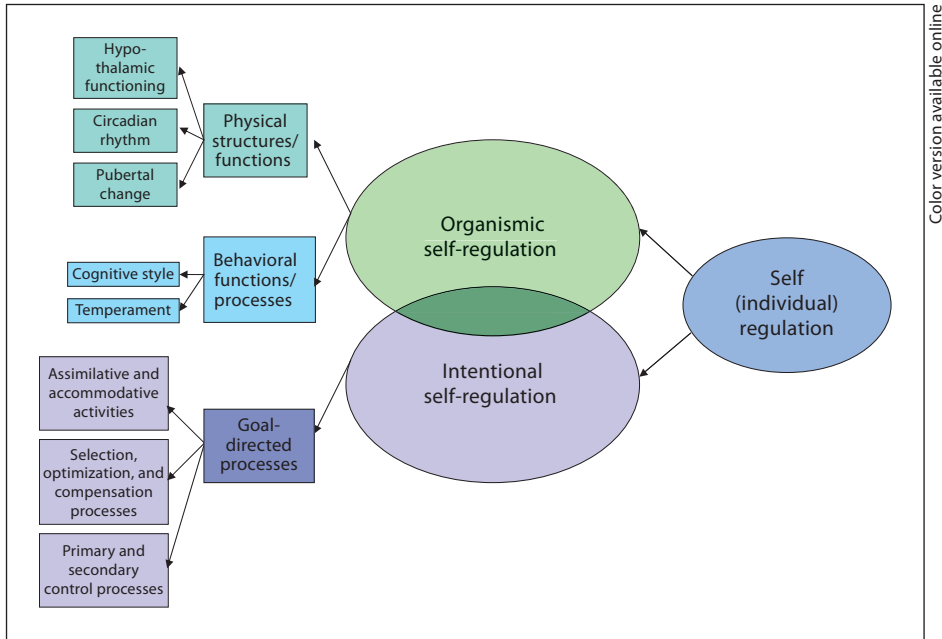


Fig. 1. Examples of manifestations of the organismic and intentional components of self-regulation.

Several behavioral aspects of organismic regulation have been well documented. Temperament, or behavioral styles, and cognitive styles, which are consistent, prototypic ways of thinking, may be the major instances of behavioral functions that influence how a person interacts with his or her environment; these are completely or largely independent from the goal setting and action strategies that are the hallmarks of intentional self-regulation (fig. 1) [Chess & Thomas, 1999; Demetriou, 2000; Keating, 2004].

Changes in self-regulation through infancy and childhood have been well documented elsewhere [see e.g., Kopp, 1982; McCabe, Cunnington, & Brooks-Gunn, 2004; Rothbart, Sheese, & Posner, 2007; Shonkoff & Phillips, 2000]. However, before we explain our conception of intentional self-regulation and how it develops in adolescence, we will examine some aspects of self-regulation in the first decade of life that have been prominent within the self-regulation literature, and that we believe will lay the foundation for the more internal, focused, and intentional forms of self-regulation that are characteristic of later developmental periods.

The Foundations of Intentional Self-Regulation

Changes in self-regulation in the years prior to adolescence center on controlling emotion, attention, and behavior, as well as on self-monitoring and response inhibition. These changes closely follow changes in the brain and cognitive develop-

ment [Demetriou, 2000; Rothbart et al., 2007; Shonkoff & Phillips, 2000]. The frontal lobe is involved in the control of novel responses and is therefore crucial to the development of self-regulation. As the frontal lobe develops through childhood, mental representations necessary for goal selection, monitoring of progress, and problem-solving strategies, and thus, for intentional regulation, also develop [Demetriou, 2000; McCabe, Cunningham, & Brooks-Gunn, 2004; McClelland et al., 2007b; Shonkoff & Phillips, 2000]. In addition, a child's developing theory of mind, or the child's understanding of the organization and functioning of his or her own thinking, structures how he or she believes his or her goals can be reached without coming in conflict with other people and socially accepted norms, thereby contributing to increased self-regulation in the toddler years and in childhood [Demetriou, 2000].

'Delay of gratification,' i.e., a child's self-imposed delay for a preferred stimulus or state of being, is a well-documented indicator of self-regulatory behavior that develops during the toddler years [Mischel, Shoda, & Peake, 1988; Shoda, Mischel, & Peake, 1990] and that involves some of the fundamental processes of intentional self-regulation. The child must use rational, planful behavior to divert attention from the preferred stimulus (e.g., candy), be able to mentally represent the more attractive but not present state of being (e.g., being given a chance to play with an attractive toy), and show goal-directed perseverance [Mischel, Shoda, & Peake, 1988]. Delay of gratification can be seen in later, more complex, and long-term forms of intentional self-regulation, such as when an adolescent decides to study, instead of going to the movies, to receive a good grade on a future exam.

Organismic and intentional self-regulations are expected to overlap (fig. 1). However, we believe that organismic self-regulation, such as emotionality, is especially important in infancy and childhood, when the child faces developmental tasks related to physiological and emotional regulations, and when the cognitive structures and functions that may optimize intentional self-regulation are not fully present. Our conception is consistent with the findings of Murphy, Eisenberg, Fabes, Shepard, and Guthrie [1999], who found that, while emotionality decreased between ages 4–6 to 10–12, more intentional aspects of regulation, such as the control of attention and inhibition, increased over time, beginning in the adolescent years.

Effortful control, which refers to a child's ability to inhibit a response, has been viewed as a temperamental basis for self-regulation and, as such, it has been seen as a stable characteristic of the person that predicts later positive and negative development outcomes [Kochanska & Knaack, 2003; Kochanska, Murray, & Harlan, 2000; McClelland et al., 2007a; Posner & Rothbart, 2000]. However, as compared to some regulatory tasks and behaviors of prior developmental periods (such as regulating sleep), there is a clear intentional component to effortful control, as it involves foresight and control and, as such, can be regarded as an instance of intentional self-regulation. Effortful control develops rapidly in the toddler and preschool years and a young child's difficulty in stopping a dominant response may partly be due to an immature frontal lobe; but as the brain matures through childhood and adolescence, the person becomes better at controlling attention, inhibiting behaviors, and self-monitoring [Kochanska & Knaack, 2003; Kochanska, Murray, & Harlan, 2000; McCabe, Cunningham, & Brooks-Gunn, 2004; Rothbart, Sheese, & Posner, 2007].

Clearly, the regulation of emotion, as well as temperament-based regulation, are relevant to later, more mindful, forms of regulation. However, executive functioning,

which refers to processes necessary for goal-directed activity, such as the control of attention, memory, and action, seems most relevant to intentional self-regulation [McClelland et al., 2007a, b; Shonkoff & Phillips, 2000]. Executive functioning overlaps with some of the self-regulatory constructs that we have already discussed, such as delay of gratification and effortful control, as processes of executive functioning are necessary for the successful regulation of behavior and emotions. It may be that executive functioning does not develop fully until the brain growth prototypic of adolescence occurs but, in any case, studies of the development of executive functions in childhood have only been conducted over the last 10–20 years. Nevertheless, this research does indicate that intentionality and means-ends behaviors, precursors to executive functions, begin to develop in the first year and that executive functions continue to develop throughout childhood [McClelland et al., 2007b; Shonkoff & Phillips, 2000].

In sum, despite the emergence and development of abilities for intentional self-regulation in infancy and childhood, many of the capacities necessary for intentional self-regulation, especially in the form of regulating behavior in accordance with long-term goals, may for the most part be acquired and developed in adolescence [Demetriou, 2000; Kopp, 1982; Raffaelli, Crockett, & Shen, 2005]. The growth in internalized control, one of the most central and significant achievements of childhood and adolescence, has received limited attention and resulted in a developmental picture of self-regulation that is fragmented and incomplete, especially insofar as the adolescent period is concerned [Brandtstädter, 1998; Demetriou, 2000; Kopp, 1982; Raffaelli, Crockett, & Shen, 2005]. Accordingly, in the following sections, we elaborate on our conception of intentional self-regulation and focus on how it develops in adolescence.

Developmental Features of Intentional Self-Regulation

Theories of self-regulation share the central belief that individuals are important producers of their own development, but theoretical approaches vary in regard to how they view and explain the regulation process [Brandtstädter, 1999; Lerner, 2002]. However, Kopp [1982] maintains that it is generally agreed that self-regulation demands an understanding and internalization of socially approved behaviors and that self-regulation can be defined in terms of ‘the ability to comply with requests, to initiate and cease activities according to situational demands, to modulate the intensity, frequency, and duration of verbal and motor acts in social and educational settings, to postpone acting upon a desired object or goal, and to generate socially approved behavior in the absence of external monitors’ [Kopp, 1982, pp. 199–200].

In turn, Demetriou [2000] argues that ‘self-regulation involves both individuals’ ability to set goals about their own functioning or about the environment and direct their mental and physical functioning so that these goals can be attained’ (p. 214). Demetriou’s [2000] conception is consistent with our definition of intentional self-regulation, as it involves actions that are aimed to change a part of a developmental system (e.g., a person) towards a particular, predetermined goal. A person must have the ability to form representations of himself or herself and of others that inform the person of past experiences, offer self-evaluations, and provide directions for future

actions. Only by having such representations can he or she set and attain goals. Self-regulation must also include self-monitoring, which informs the person about his or her present state and that compares the present state and a set goal. Self-regulation must involve, then, self-modification or self-correction skills that can guide the person toward a chosen goal when there is a discrepancy between the present state and the goal [Demetriou, 2000]. In short, such regulatory processes help people make choices, plan actions that are appropriate to reach their goals, and regulate the execution of their actions [Bandura, 2001; Brandtstädter, 1998].

Baltes [1997] argues that successful development takes place when a person maximizes the relative number of desirable goals or outcomes in his or her life and minimizes undesirable outcomes by carefully selecting appropriate, achievable goals, by finding successful ways to reach those goals, and by committing to a goal in the face of lost means to achieve a goal [Baltes, 1997]. Whether a goal is reached or not has important implications for future goal-directed behavior and for a person's developmental trajectory. Depending on whether a person manages to reach his or her goals, he or she forms working models of himself/herself and of the context, which will shape his or her future actions [Brandtstädter, 1998; Lerner et al., 2001]. Accordingly, when intentional self-regulation is adaptive, people foster their personal development and well-being [Freund & Baltes, 2002]. Indeed, the relationship between adaptive self-regulation and developmental outcomes has been documented across the lifespan [Caspi et al., 1995; Eisenberg et al., 1994; Freund, Li, & Baltes, 1999; Garmezy & Rutter, 1988; Mischel, Shoda, & Peake, 1988; Perkins & Borden, 2003; Raffaelli & Crockett, 2003; Raffaelli, Crockett, & Shen, 2005].

The Role of Intentionality and Consciousness

The intentional nature of self-regulation implies that such self-regulatory processes can be actively selected and controlled by the person, and as such, are available to consciousness. Processes of intentional self-regulation typically refer to how people make thoughtful, intentional plans within domains such as academic or occupational functioning, and to how people make choices, how they select and utilize strategies, and how they monitor their progress towards a given goal. Nevertheless, goal-directed behaviors that fall under intentional self-regulation do not always involve well-thought-out strategies or conscious decisions. Goal selection, goal pursuit, and self-corrections can all function at an unconscious or, at least, at an automatic level.

For instance, in pursuit of the goal of driving home after work a person may automatically take an alternative route when an initially preferred one is too traffic laden, and the person may brake automatically to attain the goal of avoiding people or obstacles on the road. These intentional processes occur regularly among drivers, but rarely reach beyond a level of automaticity that could be labeled fully conscious.

Nevertheless, intentional self-regulation does involve actions that are at least partly under reflective, conscious control, that have been selected from alternative actions, and that aim to transform situations in accordance with desired future states [Brandtstädter, 1998]. Moreover, intentional self-regulations have the quality of easy

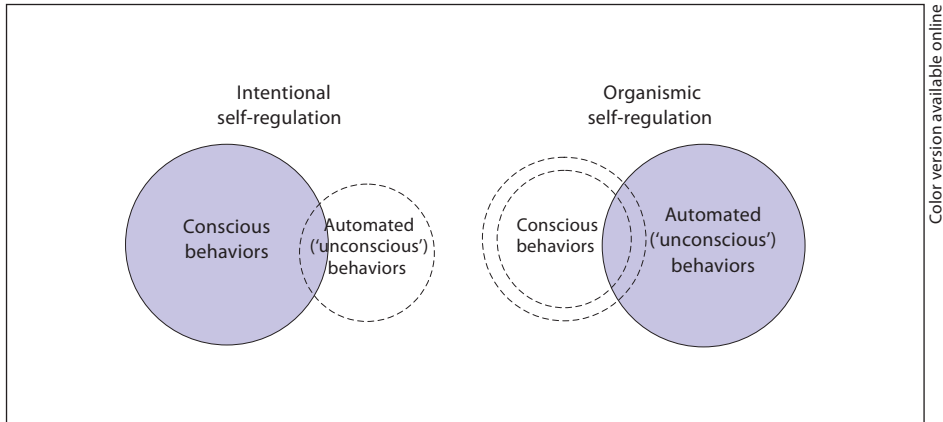


Fig. 2. Both intentional self-regulation and organismic self-regulation involve behaviors that may be conscious or ‘unconscious’ (automated). In the former type of self-regulation there is ready (easy) permeability between conscious and automated behaviors, and conscious behaviors are the modal type of behavior in this instance of self-regulation. In the latter type of self-regulation there is a low permeability between conscious and automated behaviors, and automatic behaviors are the modal type of behaviors in this instance of self-regulation.

permeability between consciousness (and ‘reflectability’) and automaticity, as for example, when the driver becomes stuck in traffic.

These attributes of processes of intentional self-regulation may be discriminated from organismic processes (fig. 1), in that the latter functions are, at best, under limited control by the person, because of low permeability from automaticity to consciousness. Figure 2 illustrates the distinction we are drawing between intentional self-regulation and organismic self-regulation, insofar as the permeability between conscious and automated behaviors are concerned. By analogy, the easy permeability between conscious and automated behaviors that are characteristic of intentional self-regulations, which are predominantly conscious and ready targets of reflection, is consistent with horizontal *décalages* [Flavell, 1963; Piaget, 1950] that involve the presence of sensorimotor circular reactions within an overall modal pattern of formal operational functioning.

People can use unconscious self-regulation to control attention, emotion, and behavior. An example of unconscious processes of intentional self-regulation involves goals that can subconsciously direct selective attention, i.e., that focus attention on what is relevant to a particular goal without the awareness of the person. In the driving example, the car brake is depressed before the person is cognizant of enacting the goal of slowing the car. In this way, self-regulatory behaviors that aim at achieving a previously conscious goal can be activated without a person’s awareness, making intentional self-regulation partly automatic, or ‘both active and automatic’ [Fitzsimons & Bargh, 2004, p. 165]. In short, developing intentional self-regulation is important for the development of all areas in the lives of children and youth, both for their present functioning and for their future.

The Relation between Organismic and Intentional Self-Regulation

Bidirectional influences between organismic and intentional self-regulations are expected, as the two forms of self-regulation coact to influence a person's interaction with the context (fig. 1). An example of how these two facets of self-regulation interact occurs in regard to how a person approaches problems (cognitive style), and the impact of this style of thinking on the way a goal is selected and pursued. Nietfeld and Bosma [2003] focused on one cognitive style, 'impulsivity versus reflectivity.' They studied adults who were highly impulsive (act without much forethought), highly reflective (intent upon correctness and accuracy), or who fell in between the two extremes, and assessed how they regulated the use of academic strategies. Participants that did not have an extreme cognitive style (the 'middle group') demonstrated the most flexibility in self-regulation, i.e., they showed an ability to produce both accurate and rapid answers on an academic task. The authors suggest that the 'middle' group had the best ability to select appropriate strategies for the task requirements, but that having either a strong impulsivity or a strong reflectivity style of thinking may have hindered the ability for successful regulation of strategy use.

Such studies demonstrate how features of organismic regulation, which show low permeability between automatic and conscious levels, and thus are under the control of a person only to a limited degree, can moderate the functioning of more intentional aspects of self-regulation. On the other hand, the more highly permeable processes of intentional self-regulation can be expected to impact processes of organismic regulation. For instance, conscious dieting behaviors (intentional self-regulation) among adolescents can impact pubertal changes (an attribute of organismic regulation), such as the onset or continuation of menstruation [Brooks-Gunn & Warren, 1987].

While both intentional and organismic regulations constitute self-regulation throughout ontogeny, our assumption is that the role of these facets of self-regulation undergo developmental change. Other scholars agree [e.g., Aksan & Kochanska, 2004]. Raffaelli, Crockett, & Shen [2005] explain that 'research has not examined whether specific components of self-regulation are especially salient at particular developmental periods' (p. 7).

What may such developmental change look like? As we have explained, we believe that organismic regulation may be particularly relevant in infancy and childhood, when developmental tasks related to physiological and emotional regulations are especially important [Kopp, 1982; Raffaelli, Crockett, & Shen, 2005], and when the cognitive structures and functions that may optimize intentional self-regulation are not fully present. In turn, while organismic regulation will continue to contribute to the relationship that a person has with his or her environment throughout the lifespan, it may be that intentional self-regulation will undergo significant developmental change in adolescence, when key changes occur in brain development as well as the social context (e.g., the increased selection of time spent with the peer group, transitions to different types of school structures), when society expects youth to select goals (e.g., setting on a path towards post-high school education or obtaining vocational training) and attain the necessary means to successfully (to optimally) pursue the selected goals [Lerner et al., 2001].

Theoretical Problematics in the Study of Adolescence and Intentional Self-Regulation

Despite the theoretical burden that may be placed on the development of an increased role for intentional self-regulation in the adolescent period, Brandtstädter [1998; see also Gestsdottir & Lerner, 2007; Zimmerman, Phelps, & Lerner, 2007] explains that the development of the processes of intentional self-regulation and a specification of their importance to adolescent development have not been adequately documented. Much of the previous work on how levels of self-regulation change with age has focused on quantitative changes in self-regulation, and not on qualitative transformations on such functioning; in addition, most research has involved infants and children [see e.g., Cameron, McClelland, Jewkes, McDonald Connor, Farris, & Morrison, in press; Demetriou, 2000; Kochanska & Knaack, 2003; Kopp, 1982; McCabe, Cunningham, & Brooks-Gunn, 2004; McClelland et al., 2007a; Shonkoff & Phillips, 2000].

However, Brandtstädter [1998] notes that a major difference between infancy and early childhood on the one hand, and later developmental periods on the other hand, is that the intentional actions of young children do not involve an intention of promoting their development. This notion of personal future and the intentional actions that result from such a conception begin to formulate in adolescence. Brandtstädter [1998] explains that

[d]uring the transition to adolescence ... the individual's conceptions of self and of personal future become articulated enough to guide intentional activity. External ... demands originating in the familial and larger social context become increasingly internalized and integrated into the process of self-regulation and self-evaluation; with the progression from a ... external mode of developmental control to an increasingly intentional and autonomous mode of intentional self-development, a new and higher level in the regulation of ontogeny is reached. This reflexive-intentional mode has been given rather short shrift in developmental research. (pp. 826–827)

Moilanen [2007] makes a similar argument when she differentiates between short-term self-regulation and long-term self-regulation, which she believes to be characteristic of adolescence and represent a developmental shift in functioning. To exhibit long-term self-regulation, the young person must control impulses and direct effort over longer periods of time, which may involve substantial planning, and is for the most part acquired in adolescence [Moilanen, 2007].

In the following section, we describe how self-regulation develops in adolescence and, especially, how such regulation becomes more internalized, cognitive, goal directed, and intentional. We review societal and ontogenetic changes that contribute to increasing intentional self-regulation. We also describe a theoretical model, Selection, Optimization, and Compensation (SOC), which depicts processes of intentional self-regulation. We believe this model is useful for understanding and indexing changes in self-regulation in adolescence [Baltes, 1997; Baltes & Baltes, 1990; Freund & Baltes, 2002]. Accordingly, we discuss how the successful enactment of the SOC processes of intentional self-regulation may promote positive development among youth.

Intentional Self-Regulation in Adolescence: Behavior and Development

Few age periods are characterized by as dramatic developmental changes as adolescence, a phase of life encompassing the second decade of life [Lerner & Steinberg, 2004]. Adolescence is marked by the emergence of new cognitive structures and social conceptions, the development of physical and sexual maturity, changing relationships with family, teachers, and peers, and the formulation of a more sophisticated self-identity, which influences all aspects of the young person's development. The individual-level changes that occur during adolescence and the changing world in which the adolescent is embedded means that the relationship between the young person and his or her context is changing as well, making it especially pertinent to study self-regulation in adolescence [Lerner, 1982; Lerner et al., 2001].

Intentional self-regulation may be conceptualized as a complex process that becomes elaborated simultaneously with other important developmental changes in adolescence (e.g., brain development [Keating, 2004]). At the same time, the young person experiences changing opportunities for action (e.g., he or she is exposed to new academic, social, and community settings and to chances in these settings to develop new competencies); challenges (e.g., peer pressure to engage in risk behaviors), and expectations of the social context (e.g., involving the selection of social roles or educational paths). These changes may increase abilities that are fundamental for successful intentional self-regulation, provide contexts wherein these abilities may be manifested or tested, and increase expectations that the young person is responsible for his or her own developmental path.

Raffaelli and Crockett [2003] point out that '[a]dolescence has been recognized as a critical developmental period during which long-term patterns of healthy or potentially harmful behavior are established' (p. 1046). Individuals come to know themselves by observing their own functioning and others in interactions with others, and these observations and inferences drawn from them may enhance the development of their self-regulatory skills. As adolescents internalize standards and mechanisms of those around them, they may transform external bases of regulation into more internal, mindful forms of self-regulation. Such internalization will enable them to make better interpretations, choices, and decisions depending on the environment they are in [Demetriou, 2000].

Cognitive and Brain Development

One of the most significant changes in adolescence involves the emergence of formal operational thought, and the capacity therefore to form abstract ideas, to think about hypothetical problems, and to formulate multiple hypotheses regarding an outcome of an event [Piaget, 1970]. Higher-order reasoning, problem solving, and symbolic thought develop, and memory, mental representations, and attentional focus grow. These abilities make it possible for the young person to use multiple rules to control behavior in different situations [Demetriou, 2000]. Future events can now be represented cognitively, thereby enabling the formulation of goals and motivating behavior [Bandura, 2001]. For instance, the young person understands that more difficult tasks require more effort and that, while effort may compensate for low ability, it only does so to a certain degree [Demetriou, 2000].

Much of the work that has been conducted on structural and functional changes in brain development in adolescence, and how such changes relate to cognition and behavior, is very recent. This research has demonstrated that the major changes that occur in the brain during adolescence include development in the prefrontal cortex, better connectivity organization, and synaptic pruning [Keating, 2004]. Recent studies that have focused specifically on the connection between brain development and adolescent self-regulation underscore how such development relates to the emerging capacity of the person to integrate thoughts, emotions, and behaviors in the service of attaining goals [Paus, Pausova, Abrahamowicz, Almerigi, Arbour, Bernard, et al., in press; Paus, Toro, Leonard, Lerner, Lerner, Perron, et al., in press; Urry & Poey, in press].

New or developing cognitive abilities make goal setting, identifying means to achieve goals, and self-evaluations and self-corrections more elaborate. The young person is more able to identify appropriate goals and successful plans, and is thus better able to control the relationship he or she has with the environment [Brandtstädter, 1998]. Brandtstädter [1998] explains that the 'transition toward a ... formal-operational mode of thinking is characterized by a growing capacity to hypothetically project alternative courses of future personal development, which is the key cognitive process that guides and motivates ... intentional self-development in adolescent and adulthood' (p. 839). The adolescent can consider many possibilities for a given situation and becomes capable of long-term, strategic self-regulation, or planfulness, where goals, subgoals, strategies, and actions can be developed and implemented [Demetriou, 2000].

Other changes in cognition and self-control, such as an increased ability to delay gratification, better planning skills, greater perceived self-efficacy, and more accurate self-evaluations, help the adolescent better understand the consequences of his or her actions and appreciate which actions are most appropriate to reach a certain goal [Lerner et al., 2001]. Furthermore, the young person acquires increased knowledge and understanding about the social and psychological mechanisms that are available to help him or her set appropriate goals and to achieve these goals (e.g., a person may know how one can ensure external help and understand the value of practice).

In sum, in adolescence, self-regulation becomes increasingly cognitive, focused, efficient, and intentional, and self-regulation begins to involve more elaborate long-term planning and goal-setting. As such, emotional, motivational, and behavioral functioning gradually come under the control of the individual rather than of the situation that the person is in at any given time [Demetriou, 2000; Kopp, 1982; Murphy et al., 1999; Raffaelli, Crockett, & Shen, 2005; Shonkoff & Phillips, 2000].

Socialization and Identity Development

Self-regulation, like any individual characteristic, functions within a social context that is defined by parents, peers, and the larger society [Brandtstädter, 1998; Raffaelli & Crockett, 2003]. Socialization is an important aspect of how self-regulation develops through at least the first two decades of life. Socialization refers to how individuals are shaped by people and institutions in the acquisition of the motives, values, and behaviors that allow them to function appropriately in society. Children

internalize social requirements so that they can comply with those requirements, but even more importantly, social values are transformed into personal values and self-motivations that allow youth to carry out these motives, values, and behaviors volitionally [Grolnick, Deci, & Ryan, 1997; Ryan & Deci, 2000].

In terms of self-regulation in adolescence, focus should be placed on how motivation and goal selection, that are more extrinsic in childhood, become increasingly internalized and voluntary, thus making behavior increasingly chosen or self-directed. As external motives and behaviors become internalized and as self-regulation increases, the adolescent becomes better at understanding and coping with environmental demands and develops a more flexible, volitional self-regulation [Grolnick et al., 1997]. In this way, socialization in adolescence makes self-regulation more self-initiated and provides each individual with control over the direction of his or her development.

Socialization takes on an especially important role in the development of self-regulation during the adolescent period in relation to identity formation. Adolescence has long been viewed as a time when young people begin to explore the psychological characteristics of the self and to examine how they fit in the social world in which they live [Steinberg & Morris, 2001]. Formulating an identity has significant implications for the development of key elements of intentional self-development, such as intentionality, motivation, and evaluations of self and others [Brandtstädter, 1998; Demetriou, 2000; Lerner et al., 2001]. As the young person gains increased understanding of the way others think, he or she is better able to locate himself or herself vis-à-vis societal norms or social categories, such as are reflected in sex role stereotypes. These developmental changes are not ordinarily identified before the age of 9; however, they are typically seen by about ages 13–14. The latter ages correspond ontogenetically to a period when Western adolescents typically start to think about what they would like to become in life [Demetriou, 2000].

Based on prior interactions with the context and on the history of consequences of his or her own actions, an adolescent forms representations of himself or herself and of the context. Brandtstädter [1998, 2006] explains how people evaluate their actions and consequences to help them create representations about themselves, their actions, and their environment. Mental representations are a necessary foundation for self-regulation as they allow the individual to discriminate his or her own world from those of other individuals and to negotiate his or her goals and actions with those around him or her. Having mental representations also creates a foundation for self-understanding and for the creation of an identity. As formal operational thought is elaborated in middle and late adolescence, abstractions about oneself become increasingly integrated and realistic. As such, the young person can build a more tested sense of self and of a personal future and social values are integrated with his or her sense of self. These new concepts of actual, desired, and possible selves become a key motivation for regulation and intentional self-development [Brandtstädter, 1998; Demetriou, 2000; Ryan & Deci, 2000]. The reciprocal relationship that exists among a person's identity, his or her goals and goal-directed actions, and self-evaluations creates a dynamic system between identity and self-regulatory actions [Brandtstädter, 1998; Lerner et al., 2001].

Self-Efficacy and Self-Reflectiveness

Advances in thinking that occur during adolescence also make self-evaluative processes more important and refined [Brandtstädter, 1998]. Self-reflectiveness, the ability to think about oneself and one's actions, is at the core of both identity development and self-regulation. People have to believe that they can produce the outcomes they are trying to reach or else they have little incentive to take actions to reach their goals, making perceived self-efficacy an important facet of goal selection and pursuit [Bandura, 2001; Heckhausen, 1999]. Self-evaluations (e.g., deciding how likely one is to achieve a particular goal and how well that goal fits one's future plans) guide future selection of goals and inform the person of what kind of problems he or she is good at solving and how efficient he or she is at using certain cognitive functions (e.g., memory), thus guiding the means that will be used in pursuing that particular goal [Demetriou, 2000]. Self-observations and self-evaluations are based on a person's identity and directed back to the individual, thus adding to the adolescent's identity and providing direction to future self-development [Bandura, 2001; Brandtstädter, 1998].

Adolescents' reflections on their personal development impact their view of self-efficacy and have important implications for intentional self-regulation. If a young person can look critically at his or her own actions and effectiveness, he or she may then be able to make more accurate predications about which goals can be acquired. The accuracy of such predications provides realistic guidance about which actions are most appropriate to use to pursue a particular goal. An increased ability for accurate evaluations of oneself and of one's context may thereby contribute to the young person's belief about the control he or she has over his or her own functioning and over the environment [Bandura, 2001; Brandtstädter, 1998; Heckhausen, 1999; Steinberg & Morris, 2001]. In turn, a sense of control impacts one's sense of agency.

Although organismic self-regulation contributes to a person's functioning throughout the lifespan, we have described how intentional self-regulation may be expected to develop in adolescence. The SOC model [Baltes, 1997; Baltes & Baltes, 1990; Freund & Baltes, 2002] has been applied extensively to understand successful self-regulation in adult and aging populations, and has been proposed as a means to understanding self-regulation in adolescence [Lerner et al., 2001]. We believe the SOC model elucidates the multiple aspects of self-regulation, i.e., the regulation of attention, cognition, and behavior, and can be used to frame the understanding of the development of intentional self-regulation in adolescence.

The SOC Model

Baltes P.B., Baltes M.M., Freund A.M., and their colleagues created the SOC model to describe processes of goal setting and goal pursuit within a lifespan perspective [Baltes, 1997; Baltes & Baltes, 1990; Freund & Baltes, 2002; Wiese, Freund, & Baltes, 2000; see also Boerner & Jopp, 2007]. The SOC model is one of several key theoretical models in contemporary developmental science that frame the study of human goal-directed behavior, purpose, and attempts to control the direction of one's own development [Boerner & Jopp, 2007; Brandtstädter, 1998, 1999, 2006]. Throughout life people are presented with a blend of unexpected, controlled, and

uncontrollable events, making life a story of success, gains, defeats, and losses [Brandtstädter, 1998]. According to Baltes and Baltes [1990], a person's ability to negotiate between the resources he or she has available within himself/herself and in the context is what constitutes self-regulation. A person examines his or her own abilities and evaluates internal and external resources that are available and, based on these considerations, chooses appropriate goals and ways to maximize the use of his or her resources and minimize the effects of his or her deficits.

Selection, optimization, and compensation refer to goal-related strategies that people use to regulate their relationships with the context and manage their external and internal resources (e.g., time and energy) to promote successful development [Baltes, 1997; Freund & Baltes, 2002]. Goal selection can be defined as developing, elaborating, and committing oneself to personal goals. Goals can either be aimed at desired states (*elective selection*) or can entail reconstructing a goal in response to a decline in available resources (*loss-based selection*). Once goals are selected, they guide attention and organize behaviors into action sequences, thereby reducing the complexity of a given situation and facilitating efficient interactions within a setting.

Selection represents a first step toward successful self-regulation by constructing a goal system, but applying and refining appropriate goal-relevant means to achieve desired outcomes is also crucial. When confronted with multiple ways to reach a given goal, people use processes of optimization to seek strategies or resources that are compatible with personal and social values and abilities to pursue a particular goal, with the ultimate aim of succeeding at a higher level of functioning [Baltes, 1997; Baltes & Baltes, 1990; Freund & Baltes, 2002]. Furthermore, the person must constantly (consciously or unconsciously) monitor the discrepancy between a goal and a present state and apply and refine goal-relevant means to ensure goal achievement. The investment of time and energy through qualities such as persistence, focused attention, delay of gratification, and practice of skills are instances of optimization [Baltes & Baltes, 1990; Baltes, 1997; Freund & Baltes, 2002]. An example of optimization would be a person giving up a more immediate, positive experience, such as attending a good movie, in exchange for a distant, more attractive reward, e.g., studying for an exam relevant to obtaining a PhD degree.

People can use selection to adjust goals when there is a loss or decline in means to achieve a goal. For example, when a first-choice, post-doctoral position (a job in a highly prestigious university located in a desired geographical location) is lost, a decision is made to accept an equally attractive job in a less desirable location (or to accept a less prestigious job in the desirable location). However, if the loss of functioning or means is not too pervasive, goals can often be maintained by using the process of compensation. Compensation involves similar means to optimization, such as practice, but in contrast to optimization, compensation actions are aimed at counteracting or avoiding losses in the face of a loss of goal-relevant means, rather than at approaching positive states [Freund & Baltes, 2002; Freund & Riediger, 2003; Wiese et al., 2000]. For example, if there is a loss in means to achieve an outcome (e.g., a person was absent from school for a period of time due to illness), the individual can seek alternative means to create an acceptable outcome (e.g., achieve a high score on a college entrance test), usually by acquiring new internal or external means (e.g., taking an extra class) or by activating unused resources (e.g., seeking the help of others). The work of Baltes and colleagues [e.g., Baltes, 1997; Baltes & Dick-

son, 2001; Freund & Baltes, 2002; Wiese et al., 2000] provides a more detailed description of the SOC model.

Freund and Baltes [2002] explain that all three SOC processes are used throughout life. As an example, the ability to delay gratification, an early instance of intentional self-regulation described earlier, can be understood in terms of the SOC processes. The child must be able to form representations of two competing objects of concern (the presence of a tempting stimulus and the absence of a highly desired state of being), of the consequences of each choice, and of the operations that can be used to divert attention from the present temptation and instead focus on the absent reward [Demetriou, 2000]. Thus, the decision to wait to receive the more valued reward involves processes of selection; the child has to compare and prioritize goals into a goal hierarchy. Then the child has to focus his or her attention on the goal that is selected and employ strategies to resist the available stimulus (such as covering one's eyes or focusing on a mental representation of the absent reward) that can be understood in terms of optimization strategies. Children must use effective strategies, such as thinking about the absent, future reward abstractly or engage in distracting but pleasant thoughts, which are ways to optimize the chance of obtaining a goal [Posner & Rothbart, 2000]. Finally, to successfully delay gratification the child must self-monitor and may need to use corrective measures. Such behaviors involve compensation, e.g., when covering one's eyes is not sufficient to resist the available temptation, the child gives himself/herself verbal instructions not to touch the stimulus in front of him or her.

Nevertheless, SOC is a lifespan developmental construct that develops primarily in adolescence and adulthood [Freund & Baltes, 2002]. Freund and Baltes [2002] maintain 'that adolescence and young adulthood are the prime ages when SOC is acquired ... and that new constellations of SOC ... emerge as adults face new tasks of life' (p. 644). As individuals move toward adult functioning, they refine their knowledge of SOC-related behaviors and show increased preference for the use of SOC. This knowledge may make SOC strategies an increasingly larger part of the total behavioral repertoire of people across the adolescent and adult years. Furthermore, some strategies may be more salient in the regulation process during different developmental periods. As noted, loss-based selection and compensation may be processes that are more prevalent in the later periods of life, as people increasingly have to find new means to maintain previous levels of functioning. Freund and Baltes [2002] point out that 'longitudinal ... studies are needed to investigate individual age changes and to study how SOC evolves and which more specific mechanisms can be discerned that are the building blocks of SOC' (p. 658).

In short, then, there are individual (e.g., brain development and identity formation) and contextual (e.g., expectations that one chooses an occupational path, peer pressure to engage in risk behaviors) changes that typically occur during adolescence. These changes contribute to the emergence of intentional self-regulation and, therefore, to the development of SOC-related strategies. Although we believe that SOC processes cannot develop before these individual and contextual changes occur, we do not expect youth to have fully formulated SOC processes because, as described by the authors of the SOC model [Freund & Baltes, 2002], SOC strategies may not be fully formed and utilized until adulthood. We in turn expect that the use of intentional self-regulation and of SOC processes becomes increasingly predominant during the second decade of life, a development that should then continue into adult-

hood [Brandtstädter, 1998]. Nevertheless, as we have also described, the challenges and opportunities faced by youth make such regulation especially important as the young person has to make essential short-term and long-term choices during this developmental period.

Lerner et al. [2001] maintain that understanding how an individual controls developmental gains and losses will offer important insights into individual-context relations in adolescence, and thus, in adolescent adaptation. More specifically, Lerner et al. [2001] describe how the SOC model can be used to explain the formulation of identity, and therefore, contribute to understanding self-regulation in adolescence and adolescent functioning:

[I]dentity is the component of adolescent psychological functioning and social life that allows the individual to select the path he/she will pursue in life, to find the means to attain the goals that are chosen (optimization), and to cope with failures or losses in the means to reach goals (compensation). Accordingly ... we believe that SOC usefully extends the study of identity by depicting the changing relations youth have with their context as they act to define themselves during this period. (p. 34)

Lerner et al. [2001] illustrate how identity development can be understood in terms of the SOC model by giving an example of an adolescent who aims to gain increased popularity (selection). He or she may join a sports team (optimization) and, if that does not secure the outcome the young person is seeking, he or she may find other means, e.g., change his or her appearance, to reach the goal (compensation). In this way, the SOC model may be used to frame how the adolescent regulates his or her relationships with the social world, which is a fundamental feature of identity development.

SOC and Positive Youth Development

Theories of intentional self-regulation, such as SOC, are theories of successful life management, and empirical support has been provided for various forms of positive self-regulation and an associated absence of negative development. Although most of this research has involved the study of adult or aging groups [Freund et al., 1999], recent studies have documented the role of SOC processes in the positive development of youth [Gestsdottir & Lerner, 2007; Zimmerman, Phelps, & Lerner, 2007]. This research involves longitudinal assessment of young adolescents participating in the fifth, sixth, and seventh grade waves of the 4-H Study of Positive Youth Development (PYD) [Lerner et al., 2005] and has focused on the relations between SOC and positive and risk/problem behaviors in early adolescence.

Gestsdottir and Lerner [2007] found that SOC was structured as a global factor, rather than as three differentiated components, among fifth and sixth graders. Accordingly, an overall SOC score was used to predict, within and across time, scores related to indicators of PYD (i.e., competence, confidence, character, connection, and caring) and to depression, delinquency, and risk behaviors (e.g., smoking, drinking). Both within and across grades, SOC scores were positively related to all the indicators of PYD and were negatively related to all indicators of risk/problem behaviors. Zimmerman, Phelps, & Lerner [2007] extended the work of Gestsdottir and Lerner [2005] by using the 4-H study data set to study youth from grades 5, 6, and 7.

Zimmerman, Phelps, & Lerner [2007] found that SOC was again structured as a global factor across these grades, and that there were statistically significant but small and substantively minor differences among SOC scores across the three grades. Nevertheless, there were no predictive differences for SOC within or across grades. Accordingly, grade 5 SOC scores were used to predict grade 7 PYD and risk/problem behavior scores. As in the study by Gestsdottir and Lerner [2005], all relations between grade 5 SOC scores and grade 7 scores were in theoretically expected directions. That is, grade 5 SOC scores were positively related to grade 7 PYD scores and negatively related to grade 7 scores for all risk/problem behavior scores. No gender effects were found in regard to levels or changes in SOC scores in either study.

Moreover, Zimmerman, Phelps, & Lerner [2007] identified 5 trajectories of PYD change across grades and, in addition, 4 trajectories of change associated with indicators of youth contributions to their communities. In turn, 4 trajectories were found for depression, and 3 trajectories for indicators of externalizing problems. The results of multinomial logistic regression analyses indicated that youth with higher SOC scores were significantly most likely to be in the most favorable trajectory (i.e., the highest of the 5 PYD trajectories, the highest of the 4 contribution trajectories, the lowest of the 4 depression trajectories, and the lowest of the 3 externalizing problems trajectories).

Other, independent data confirm the links between SOC and positive development. Ziegelmann and Lippke [2007] suggest that the use of SOC strategies among young, middle-aged, and older adults (aged 18–80) are related to successful (domain-specific) development, regardless of age. Similarly, Baltes, Freund, and colleagues [e.g., Freund & Baltes, 2002; Freund, Li, & Baltes, 1999] report that SOC scores predict healthy and positive development across the adult and aged years.

Although not directly using the SOC measure [Freund & Baltes, 2002] as an index of intentional self-regulation in adolescence, other research indicates that characteristics of intentional self-regulation are linked to markers of PYD. For instance, Raffaelli and Crockett [2003] longitudinally examined the relationship between self-regulation and sexual risk taking in adolescence. Consistent with the description of optimization processes of Freund and Baltes [2002], Raffaelli and Crockett [2003] found that

self-regulation is a significant longitudinal predictor of whether young people will engage in sexual risk taking during their adolescent years. Self-regulation, conceptualized as the ability to regulate emotions, attention, and behavior, was significantly associated with overall sexual risk taking even after autonomous decision making ... and negative peer pressure, as well as multiple demographic factors, were controlled. (pp. 1036–1037)

Furthermore, SOC has repeatedly been linked to successful functioning in both younger and older adult samples, both in terms of general functioning and in domain-specific functioning. Wiese, Freund & Baltes [2000] found that participants that reported using SOC behaviors scored higher on indicators of overall successful life management and on measures of successful occupational and partnership functioning. Freund and Baltes [1998, 2002] found that self-reported SOC behaviors were positively related to various indicators of successful life management and well-being, such as life satisfaction, positive relations, and a sense of purpose in life. These studies are consistent with the theory of SOC-related behaviors as strategies of successful life management.

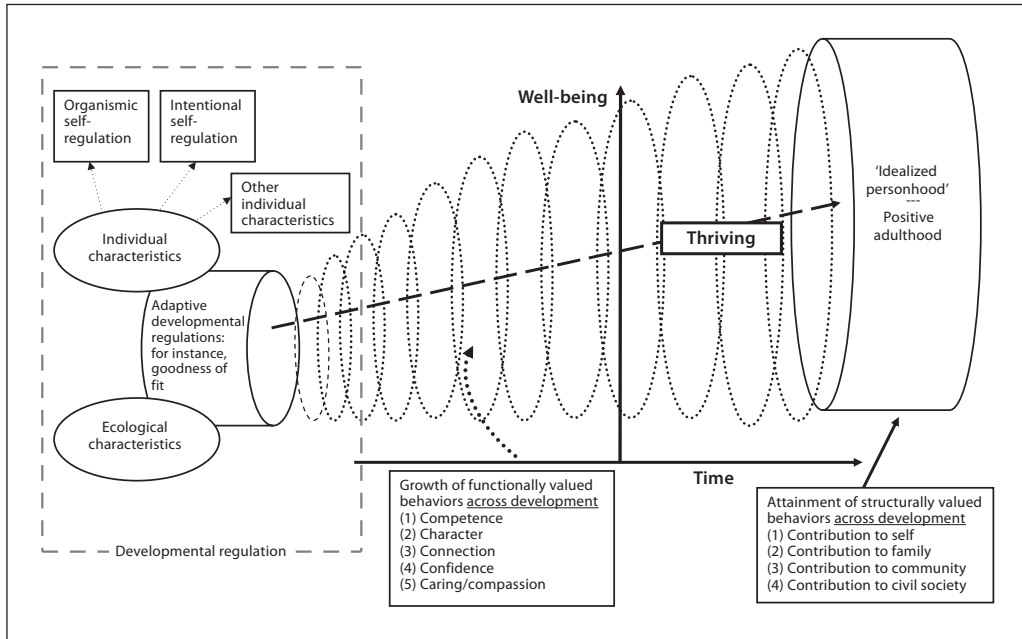


Fig. 3. Organismic and intentional self-regulation within a developmental contextual view of PYD.

In sum, the emergence of more developmentally mature self-regulation and intentional self-development in adolescence makes adaptive regulation crucial to healthy future development and creates a foundation for a person's developmental trajectory [Lerner et al., 2001]. As goal-directed development points behavior toward certain pathways (such as completing high school, making a contribution to one's community) and away from other pathways (such as delinquency and drug taking), such development becomes central in understanding positive development [De Stefanis, 2001]. An increased understanding of adaptive individual-context regulations will help identify ways to enhance self-regulation, thereby increasing the fit between a person and his or her context, and will provide scholars, practitioners, and policy makers with ways of supporting adaptive self-regulation and fostering a healthy future [Lerner, 1982].

Conclusions

The SOC theory is a generic model of adaptive self-regulation that is applicable to goal setting and goal pursuit across different domains of functioning and across the lifespan, and as such, fits well within a comprehensive theory of PYD. The ubiquity in life of the processes depicted within the SOC model means that every person has an ability to impact his or her context and his or her developmental trajectory.

Therefore, the potential for successful self-regulation resides within each person and can be seen as a fundamental feature of individual development [Baltes, 1997]. Indeed, successful self-regulation can be seen as a major instance of a developmental asset that contributes to beneficial individual ↔ context relations, as reflected for instance in a goodness of fit between the individual and the context. Such a fit would facilitate PYD. Consequently, as shown in figure 3, we have located self-regulation within the developmental contextual view of PYD as a major instance of an individual characteristic that contributes to such thriving.

In sum, this article represents a first step towards creating an understanding of how intentional self-regulation develops during the adolescent years and how it relates to the positive development of youth. Our conceptualization is consistent with the perspective of action theories [e.g., Brandtstädter, 2006] that, across the lifespan, people are both products and producers of their environment and thus, active agents in their own development. We see a strong theoretical basis for stressing the importance of the active role that adolescents play in their development through the use of intentional self-regulation. In future studies of the development of self-regulation during the adolescent period, researchers should identify the ecological and individual characteristics that, if supported, foster adaptive regulation and thriving among youth.

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