

# **A Life-Course Perspective on Physical Activity Promotion: Applications and Implications**

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This article illustrates how a life-course perspective can be infused more fully into the research field of physical activity promotion. A life-course perspective is particularly promising in connecting, organizing, and supplementing current knowledge and can potentially stimulate and direct future research and intervention efforts by using a time-sensitive, opportunistic, and developmental approach. The first section summarizes this approach into five key life-course principles including human agency, linked lives, time and place, life-span development, and timing. The second section takes a closer look at three time-based components: trajectories, transitions, and turning points. The final section highlights some of the implications of a life-course perspective for research methods and interventions, especially among children and older adults.

Despite widespread recognition of the physical and psychological benefits of regular physical activity, more than half of American adults are not physically active at levels that promote or even maintain health (Centers for Disease Control and Prevention, 2005a). Surprisingly, the outlook today is actually somewhat better than it was two decades ago (e.g., Centers for Disease Control and Prevention, 2005b; Steffen et al., 2006). But these high levels of inactivity, coupled with the obesity epidemic and the prevalence of inactivity-related diseases, are highly problematic for individuals, families, and societies. There is much to be done to combat these problems.

The emergence and maturation of the life-course perspective is one of the most significant social science developments of the last quarter century. The purpose of this article is to illustrate how a life-course perspective, if it were infused more fully into the study of physical activity, carries the potential to revolutionize scholarship, policy, and intervention efforts. The first section of this article describes some of the key concepts and principles of the life-course perspective and connects them to topics related to physical activity promotion. The second section turns to three specific time-based components: trajectories, transitions, and turning points. The final section further highlights some of the implications of

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## **Toward a Life-Course Perspective on Physical Activity Promotion**

The majority of theories applied to physical activity promotion focus on psychosocial aspects (e.g., beliefs, values, attitudes, expectations, motivation, and goals) that influence an individual's decision to be active (King, Stokols, Talen, Brassington, & Killingsworth, 2002). Recent research efforts have been extended to an ecological perspective that considers multiple levels of influence including intrapersonal, interpersonal, institutional, community, and policy, with the premise being that programs will be the most effective when intervening on multiple levels (for discussion, see J. P. Elder et al., 2007; Fleury & Lee, 2006; King et al., 2002; McLeroy, Bibeau, Steckler, & Glanz, 1988; Sallis et al., 2006; Satariano & McAuley, 2003; Spence & Lee, 2003). The life-course perspective (e.g., Elder, Johnson, & Crosnoe, 2003; Mayer, 2004; Settersten, 2003b) often incorporates the strengths of each of the psychosocial and ecological perspectives, but it also adds unique emphases that hold much promise for study of physical activity promotion. As will be seen, one consistent emphasis relates to time and change; a life-course approach is always focused on understanding long-ranging developmental trajectories—dimensions of physical, psychological, or social development over time, or of educational, work, and family histories, or of the interactions between them. Another consistent emphasis relates to social spaces; specifically to the ways in which those trajectories or pathways are structured by social settings near to and far from individuals.

Indeed, because the life-course perspective has especially grown out of the discipline of sociology, it has emphasized the legacies of large, distal social forces—such as welfare states and policies, the economy and labor markets, population structure, and historical events and changes—on the life-course (for illustrations, see Settersten, 2005). Some macro-oriented scholars even study the life-course in ways that do not involve individuals and families, but instead conceptualize the life-course at institutional and cultural levels (e.g., Kohli, 2007). Similarly, life-course scholars often do not focus on individual trajectories or pathways, but rather on the shared, *collective* life-course patterns of groups.

The life-course perspective is a meta-theoretical framework that can facilitate coordinated research hypotheses across studies and communication among researchers. It provides a flexible, comprehensive, and socially relevant framework for understanding changing lives in changing environments (George, 2003). Extended from ecological models, a life-course perspective intertwines individuals and contexts, always with a cross-cutting emphasis on time—connecting segments of a trajectory to what came before or to what comes after, connecting the action on one trajectory to action on others, connecting action to social phenomena and especially embedding them in historical contexts.

Although life-span and life-course are sometimes used interchangeably, the two approaches are fundamentally different, but potentially supplementary in understanding human development (see Settersten, 2005, for discussion). Life-span

psychology focuses more on genetic, cognitive, volitional, and emotional factors, while life-course sociology focuses more on “social facts” such as social constraints, opportunities, and incentives. While the primary emphasis of this paper is to introduce the potentials of a life-course perspective for the field of physical activity promotion, it does not disregard the importance of psychological processes. But the field already emphasizes psychological processes, and it is precisely their coupling that holds so much promise for the future.

## Applying Core Principles of a Life-Course Perspective to Physical Activity Promotion

There are many elements to a life-course perspective (for a complete discussion, see Settersten, 2003c). Here, we focus on five core paradigmatic principles that have especially been promoted in the writings of Glen Elder and colleagues (e.g., G. H. Elder et al., 2003), and which have evolved in the 30+ years since the publication of Elder’s now classic *Children of the Great Depression* (1974; 1999). These are the principles of (1) human agency, (2) linked lives, (3) time and place, (4) life-span development, and (5) timing.

### Human Agency

The principle of *human agency* reflects, to some extent, many of the theories already described, in that they presume that individuals actively make their own lives and choices, but that this is done within a set of opportunities *and* constraints that come with one’s history or that exist in one’s environments. Individuals’ choices or adaptive strategies have important implications for their participation in physical activity. For example, psychosocial theories such as the theory of planned behavior (Ajzen, 1991) in the context of physical activity can be applied to individual with disabilities (Kosma, Ellis, Cardinal, Bauer, & McCubbin, 2007) as well as individuals without disabilities. However, choices and decisions are limited by the opportunity structure such as the extent of accessibility to fitness facilities for individuals with disabilities (Cardinal & Spaziani, 2003; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004).

### Linked Lives

The principle of *linked lives* refers to the interdependence of lives—that the lives of individuals cannot be understood in isolation from others but are intimately bound to the lives of others. Like environments, these ties bind in ways that are positive and negative, in ways that bring opportunities and constraints. These relationships must also be understood in temporal terms, for their histories affect how they are at present and how they will be in the future. For instance, married adults were found to exercise less than unmarried adults, and having children under the age of five was negatively associated with exercising (Nomaguchi & Bianchi, 2004). These temporal events could have substantial impacts on physical activity participation among linked individuals. Interpersonal relationships are a common point of emphasis in psychological and sociological models.

Where health behaviors and physical activity are concerned, these relationships are important intervening units for affecting individuals—as part of couples, as members of families, and through networks of friends. For example, a physical activity and nutrition intervention for couples has been shown to be effective in improving health behaviors and potentially reducing the risks of lifestyle-related diseases (Burke, Giangiulio, Gillam, Beilin, & Houghton, 2003).

## Time and Place

The principle of *time and place* emphasizes that the life-course is embedded in and shaped by historical time and geography; times and places leave their imprint on how the life-course goes (or is supposed to go). Historical events and changes can prompt common experiences for all members of a population, but they can also bring differential effects for subgroups of the population. Life-course studies search systematically for the distinct legacies of historical changes on specific cohorts and age groups. The study of physical activity participation will benefit from more careful attention to these kinds of phenomena.

One example in the domain of physical activity is the well-known impact of Title IX of the Education Amendments of 1972 (“Title IX of the Education Amendments of 1972,” 1972), which states that “no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance.” It has provided increasing opportunities for women in the United States to participate in physical activity (e.g., Stevenson, 2007). In compliance with the law, institutions are required to meet a part of the three-pronged test including 1) equal sport participation rates between male and female students, 2) demonstrating a history of expansion of the female athletic programs, and 3) meeting the demand of female students (Stevenson, 2007). In the early 1970s, 294,000 high school girls and 3,700,000 high school boys participated in varsity sports, while the numbers increased to 2,856,358 for girls and 3,988,783 for boys by the year 2002 (Carpenter & Acosta, 2005).

Together, these three life-course principles address multiple levels of influence, which are also hallmarks of ecological models. In contrast to ecological models, though, a life-course perspective brings time-related matters “front and center” into the inquiry. It emphasizes that human development is a *lifelong* process that starts at birth and continues throughout the whole of adulthood, including old age (the principle of *life-span development*), and that the determinants and impacts of life events and transitions vary as a function of when they occur—at what age or in what life stage (the principle of *timing*).

## Life-Span Development

In line with these principles, some research has examined the effects of earlier physical activity experience on later participation, and how predictive earlier participation is of future participation (e.g., Hallal, Wells, Reichert, Anselmi, & Victoria, 2006; Telama, Yang, Laakso, & Viikari, 1997; Telama et al., 2005). For instance, physical activity of children at the age of four was inversely related to sedentary behavior among adolescents at age 10–12 years rated by their mothers

in the Pelotas prospective birth cohort study (Hallal et al., 2006). In the Cardiovascular Risk in Young Finns Study, physical activity of children aged 3–18 was first measured in 1980, and repeated measurements were taken in 1983, 1986, 1989, 1992, and 2001. The Spearman's rank order correlations between physical activity in 1980 and physical activity in 2001 ranged from .33 to .44 for males and .14 to .26 for females (Telama et al., 2005). Telama and colleagues (2005) also found that 3-year and 6-year of continuous physical activity participation (i.e., one type of physical activity trajectory) in the past could also predict whether participants were active or not in their adulthood.

Consistent with the practice of preventive medicine, evidence from these longitudinal cohort studies (Hallal et al., 2006; Tammelin, Näyhä, Hills, & Jarvelin, 2003; Telama et al., 2005) suggested that early intervention is crucial to the prevention of later physical inactivity. Some recently developed randomized control trials such as the Infant Feeding Activity and Nutrition Trial (Campbell et al., 2008) and the Healthy Beginnings Trial (Wen et al., 2007) are examples of early interventions that target physical activity as one of the means to prevent childhood obesity.

General theories of cumulative advantage and disadvantage (Crystal & Shea, 1990; Ross & Wu, 1996), as well as conflict theories of health promotion (Resnicow & Vaughan, 2006), also point to the importance of an initial condition (or early experience) in setting the stage for the later conditions, and of positive or negative conditions early in life promoting, respectively, the accumulation of advantage or disadvantage throughout life. Where physical activity trajectories are concerned, individuals who are physically active may accumulate more resources and opportunities for future or continued participation (e.g., physically active children who have better fitness may be more likely to engage in sports, which in turn increases the likelihood to connect with other resources and opportunities such as social network, knowledge, and skills that benefit continued participation), while individuals who are not physically active may develop an early onset of functional limitation (Hillsdon, Brummer, Guralnik, & Marmot, 2005) and hence be further disadvantaged to the access of resources and opportunities (e.g., Cardinal & Spaziani, 2003).

Age is also considered as a *leveler* (i.e., certain kinds of advantage earlier in life may lose their power in late life) with respect to functional capability and related resources that promote physical activity. For instance, a population-based study in the United States showed that most of the people over the age of 90 would have acquired mobility disability, 81% for men and 57% for women, respectively (Leveille, Penninx, Melzer, Izmirlian, & Guralnik, 2000). With this high prevalence of disability in advanced age, one may conclude that it is inescapable and the early life advantage of being physically active may be reduced or minimal. However, Nusselder et al. (2008) showed that physical activity was still found to extend the disability-free years by 3.1 for men and 4.0 for women between 50 and 80 years of age.

## Timing

There may be ideal times for intervening, depending on the issue at hand. Indeed, the importance of *timing* underlies the logic of most kinds of interventions, in

which pleas are made to intervene as early as possible to ward off negative outcomes or to intervene immediately after negative outcomes emerge to diminish their effects. For instance, during the transition of college graduation, college graduates may be exposed to increased risk of sedentary behaviors because they have less unstructured time available and reduced opportunities such as physical activity classes and low-cost and convenient fitness facilities. Hence Project GRAD (Calfas et al., 2000) was developed to prepare students in the senior class of one university in advance of their graduation to mitigate these potential risks (for more examples, see the time-based component of *transition*).

The principle of *timing* implies that a particular age (or life stage) at which an experience occurs is likely to be experienced and interpreted in unique ways. “Normative” events that are expected or experienced at normative times, even if they are difficult, are often experienced more easily than those experiences that are atypical or that happen at unusual times (Settersten, 2003a). For example, the diagnosis of a life-threatening disease is surely difficult at any age, but it will be experienced and interpreted in dramatically different ways depending on whether it is happening to a child, a young adult, a middle-aged person, or an older adult. It may therefore lead to different patterns of physical activity. For example, Ganz and colleagues (2002) showed that older disease-free breast cancer survivors were less likely to report positive impacts of cancer on exercise activities than their younger counterparts.

## **A Closer Look at Time and its Implications for Physical Activity Promotion**

We now further illustrate the usefulness of the time-based principles for studying physical activity promotion by focusing on three concepts that are central to the study of the life-course—trajectories, transitions, and turning points.

### **Trajectories**

As noted earlier, the concept of a life trajectory, or pathway, is similar to that of a career. A trajectory is long in scope, charting the course of an individual’s experiences over time. Life trajectories are comprised of biological, behavioral, psychological, and social states. These states can be described, and related to one another, on the basis of their (1) timing (the age at which they occur), (2) sequencing (the order in which they occur), (3) duration (how long they last), (4) spacing (the amount of time between experiences), and (5) density (the number of experiences in a bounded period of time; for more detailed descriptions, see Settersten, 2003b).

The pattern of physical activity that a person participates in over time can be summarized as a behavioral trajectory. Common behavioral patterns may show periods of being physically active or inactive, or increasing or decreasing activity levels over time. These states of physical activity patterns converge with the transitional shift pattern of physical activity idea, which suggests five common patterns of physical activity behaviors including “stable active,” “stable sedentary,” “activity adopter,” “activity relapser,” and “perpetual preparer” (Levy & Cardinal,

2006). The transitional shift patterns afford the possibility of examining common patterns of change as longitudinal behavioral outcomes, which are essential in identifying their determinants and can inform intervention development targeted on patterns such as adoption and relapse. In addition, relationships between these physical activity patterns and health outcomes need further exploration. For instance, interestingly, being physically inactive in late life did not predict physical decline among older adults, but physical inactivity in both midlife and late life (i.e., “stable sedentary”) was predictive of physical decline (Pluijm et al., 2007), which is consistent with Telama et al.’s (2005) findings that continued physical activity (i.e., “stable active”) predicts future participation.

Within the segments of trajectories, some behavioral patterns may be characterized by inertia (Wethington, 2005); that is, the behavioral trend is rather resistant to disruption. Physical activity seems especially likely to be one of the most difficult categories of behaviors to change. For instance, Lees and colleagues (2005) conducted focus groups with older adults and found that inertia was one of the most frequently mentioned barriers to exercise. In a sample of women with a history of breast cancer, both lack of time and inertia were also found to be the most important barriers to exercise (Leddy, 1997). Similarly, social-cognitive studies have shown that prior physical activity behaviors predict future participation directly and indirectly through psychosocial factors (Hagger, Chatzisarantis, & Biddle, 2001; Jackson, Smith, & Conner, 2003), which suggests that a habituation effect may occur. As a result, it often takes more than the simple initiation of activity to achieve physical activity promotion; it requires breaking longstanding habitual behavioral patterns.

## Transitions

In contrast to the continuity that can occur within segments of trajectories, transitions naturally involve change. This change, however, need not happen abruptly. Indeed, many transitions are gradual processes that evolve over time. Transitions refer to changes from one state (or role) to another, which compose the inflection points on trajectories—along with other life events and more significant turning points, in which a trajectory takes a marked and distinct direction. Sociologists often use the term “transition” to describe shifts that individuals experience as they take on or relinquish social roles and responsibilities or move into or out of social settings (Settersten, 2003b). The meanings of life transitions are also socially constructed and interpreted. Transitions typically involve qualitative shifts in the individual’s experiences, such as making the transition from school to work, the transition from being single to getting married, or the transition from being married to becoming a parent.

Some life transitions have been shown to influence physical activity. For instance, the “freshman 15” (i.e., a weight gain of 15 pounds during the first year of college) and “post-wedding weight gain” are considered the result of a deterioration in diet and eating habits coupled with physical inactivity during the transitions from high school to college and from single to married, respectively (Burke

et al., 2003; Lowe et al., 2006; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Decreases in physical activity between the ages of 15 and 29 may also be at least partially attributed to the decrease in the availability of team sport activities after graduation from high schools and colleges (Zick, Smith, Brown, Fan, & Kowaleski-Jones, 2007).

Transitions may not necessarily impose a negative influence on physical activity behaviors. For instance, a cancer diagnosis has been found to enhance the participation in physical activity for some individuals (e.g., cancer survivors in a fund-raising event; Humpel, Magee, & Jones, 2007) and could be considered a “teachable” (Demark-Wahnefried, Aziz, Rowland, & Pinto, 2005) or “changeable” moment in terms of intervention.

## Turning Points

Turning points are similar to transitions, but are even more significant in that they clearly mark a trajectory in “before” and “after” terms. Turning points signal a time in which the trajectory takes a distinct form or direction, and a time that often changes the probability of future outcomes (Settersten, 2003b; Wheaton & Gotlib, 1997). Individuals may make such evaluations subjectively as they describe their own lives; researchers, too, may make such judgments as they examine a trajectory.

Shifts in identity can often be turning points in prompting health behavior change (e.g., Kearney & O’Sullivan, 2003). Identity shifts are initiated by the successful experience of a small behavior change and small behavior changes are triggered by a value conflict in response to accumulating distressing evidence about one’s health. Likewise, the health belief model (Becker, 1974) and protection motivation theory (Rogers, 1983) also suggest that the perceived threat or the threat appraisal may induce a motivation to take action in health behaviors. On the contrary, worry about one’s health may inhibit physical activity participation among older adults, which, in turn, may expose them to higher risk of developing walking difficulty (K.-K. Li, Cardinal, & Vuchinich, 2009). These seemingly contradicting findings suggest that people may respond very differently with the same life events and, hence, the trigger point (possibly turning point) is an interesting and important time for further investigation. Although turning points seem to have important implications to behavior change, research on turning points in the physical activity promotion literature are rare. One turning point for physical activity behavior that receives considerable attention is the diagnosis of cancer, which is also regarded as a teachable moment, in oncology (Demark-Wahnefried et al., 2005; Sabatino et al., 2007). On the one hand, cancer survivors are more receptive to recommendations on healthy behaviors (Demark-Wahnefried, Peterson, McBride, Lipkus, & Clipp, 2000). On the other hand, fatigue, de-conditioning, and other affected systems in the body by the condition or its treatments may reduce physical activity participation (for review, see B. M. Lynch, Cerin, Newman, & Owen, 2007). For instance, Blanchard et al. (2003) showed that, among adult cancer survivors, about 16% exercised more while 31% exercised less.

## Discussion and Directions

The life-course perspective evolved out of early longitudinal studies and later commitments to gathering longitudinal data. Longitudinal studies demanded new theories and methods for understanding development, including changes in physical activity participation, in lifelong terms. In this sense, the life-course perspective also evolved out of research on aging, as gerontologists, too, realized that they could not fully understand old age without accounting for the many decades of life before it. The result was that new and difficult questions were raised about continuity and change in adult lives over time, the social settings that structure movement through adulthood, and connections between lives, time, and place (Settersten, 2006). These remain the most important challenges for understanding human development and promoting lifelong regular physical activity in the 21st century. Opportunities and new directions grow out of challenges; some methodological issues, implications for interventions, and new directions are discussed below.

### Methodological Issues

Advancing analytic models and statistical techniques, especially longitudinal ones, is critical to progress. Two general analytical models, in particular, have been discussed in the life-course literature—an “outcome-oriented” model, which starts with later outcomes and moves backward in time in a search for important precursors and chains of events and processes that bring about the outcome of interest; and an “event-oriented” model, which begins with an event of interest earlier in life and follows a more complete expression of its effects over time, but also searching for the processes through which it produces a full range of outcomes (Elder & Pellerin, 1998; Settersten, 2003b). Event-oriented models are generally viewed as preferable to outcome-oriented models.

Both models can be applied to studies of physical activity promotion. For instance, Bell and Lee’s (2006) study used an outcome-oriented approach to examine how transitions (e.g., stopping full-time education, having the first live-in relationship, and motherhood) and sequencing (i.e., in-order versus out-of-order such as getting married before finishing full-time education and becoming a mother before marriage) influence stress, smoking, and physical activity. A similar approach could be applied to older adults to examine the effects of normative/nonnormative life-course events such as retirement, grandparenting, or the death of a close friend, relative, or spouse on physical activity participation. On the contrary, Williams (2004) used an event-oriented approach to study how the transition to widowhood influenced health and health risk behaviors such as physical inactivity and sleeping insufficiency. The impacts of other transitional events on physical activity participation such as transition to parenthood, unemployment, divorce, and disability acquisition can be further explored using this event-oriented approach and the life-course perspective can possibly generate many more prominent research questions in the field of physical activity promotion.

With advances in statistical techniques and tools, multilevel analyses and latent growth models have become increasingly common in the area of human development, as well as the physical activity behavior literature (Duncan, Duncan,

Strycker, & Chaumeton, 2002; Nelson et al., 2007). Longitudinal studies of individual change reflect one type of two-level model, in which multiple time points are “nested” within a person. A model with three levels or more can estimate an individual’s growth within the larger social context. For example, physical activity trajectories of residents can be modeled within neighborhoods (i.e., measurement occasions nested within residents within neighborhoods; F. Li, Fisher, & Brownson, 2005). Most statistical software, such as Hierarchical Linear and Non-Linear Modeling (HLM), Mplus, Statistical Analysis System (SAS) and Stata, can now support analyses of two or more levels.

Although not commonly seen in the literature, piecewise growth curve analyses (Chou, Yang, Pentz, & Hser, 2004; Heping, 2004; F. Li, Duncan, Duncan, & Hops, 2001) match well with the conceptualization of the life-course perspective. The family of growth curve analyses includes different forms and functions of curves, such as linear, quadratic, cubic, and piecewise. A piecewise growth analysis consists of at least two pieces of growth curves with the same or different functions. Individuals’ trajectories and transitions can be better understood using this specific technique. This technique is suggested to suit the examination of changes that are associated with a particular event or critical period (Naumova, Must, & Maird, 2001). For instance, this technique can be used to model how the trajectories of participation in physical activity change before and after the loss of a spouse. Clearly with continued advances in statistical software packages and increased computer capability, many existing statistical analyses can be readily applied to research questions generated from a life-course perspective.

## Implications for Interventions

Two clear traditions exist in life-course research (George, 2003). One tradition takes the life-course itself to be the primary target of inquiry—for example, in describing the structure and content of the life-course, how it has changed over time or varies across place, or how it is reinforced or altered by the policies of the state or by historical events. The other tradition views the life-course as a framework of common elements meant to guide research. From the vantage point of this second tradition, the life-course is not a separate research topic as much as it is a set of principles and concepts (and, by extension, a set of methods) for understanding the many domains and dimensions of human life and functioning. As such, it is probably most effectively used in conjunction with other social and behavioral paradigms.

While both traditions bring important insights, it is the second tradition that offers greater promises for the field of physical activity promotion. Research on circumscribed topics in the field will be greatly enriched through the infusion of life-course approaches, as we have already suggested. For example, an increasing number of epidemiological studies have used the life-course perspective to understand the development of diseases (J. Lynch & Smith, 2005). A special issue of the *Journal of Nutrition Education and Behavior* in 2005 was similarly devoted to the potential use of a life-course perspective in the study of nutrition behaviors.

Behaviors at the time of transitional experiences seem to inherit a considerable malleability, which may result from the disruption of behavioral routines and the associated stress provided by these events or transition experiences (Wilcox et

al., 2003) as well as insights and cues (Humpel et al., 2007). From this perspective, events or life transitions may open up some opportunities for behavior change. It is also speculated that cognitive-based changes (e.g., weighing of advantages and disadvantages) may be less enduring than changes arising from transformational experiences (e.g., traumatic events; Resnicow & Vaughan, 2006). Focusing attention on transition experiences, such as changes in physical activity patterns before and after, offers an important supplement to the widely used psychosocial and ecological approaches in physical activity intervention. During this historical time and place, research on transportation and physical activity (Sallis et al., 2003), and active video games (Baranowski, Buday, Thompson, & Baranowski, 2008; Mhurchu et al., 2008), are also examples of physical activity interventions that apply a life-course perspective. There are still many possibilities, and even more creative work will further stimulate research on physical activity promotion.

## **Other New Directions: Research on Physical Activity During Childhood and Late Life**

Early life experiences may have enduring or even magnifying effects on subsequent development. However, it is important to note that this proposition does not imply that changes in later life are not possible. Indeed, in the case of physical activity, later life interventions have been shown to be effective, e.g., increases in moderate-to-vigorous physical activity were resulted from *Active Choices* and *Active Living Every Day*, two evidence-based physical activity intervention disseminated to older adults in community settings (Wilcox et al., 2006). Intervention strategies to promote and maintain physical activity should be designed for all periods of life, but in ways that are sensitive to their unique challenges and experiences. Childhood and late life are the foci for this discussion because of their potential long-term implications and increasing needs with the aging population.

Recent longitudinal evidence from studies that used accelerometers have shown that moderate-to-vigorous physical activity decreased from about 3 hr per day at the age of 9 on both weekdays and weekends to about 49 and 35 min per day at the age of 15 on weekdays and weekends, respectively (Nader, Bradley, Houts, McRitchie, & O'Brien, 2008). The decreasing trend seems to extend to adolescence and adulthood, as suggested by population based cross-sectional study (Troiano et al., 2008). Consistent with the life-course perspective, early behavioral changes are considered to have long-lasting impacts on individual and population health (Campbell & Hesketh, 2007). Thus, early intervention should play an important role in the battle against physical inactivity. For example, a study protocol of a cluster-randomized controlled trial called *Infant Feeding Activity and Nutrition Trial (INFANT)* was shown to support first-time parents over the infant's first 18 months of life on developing positive diet and physical activity, and reducing sedentary behaviors in infancy (Campbell et al., 2008).

Early intervention can potentially set the stage for a positive and healthy future, while later interventions should be aimed to reverse some well-established at-risk behaviors (as described above that inertia is one major barrier of physical

activity for older adults). The life-course perspective has received increasing research attention in the area of aging (Settersten, 2003b). Relative to physical activity promotion among older adults, some highly prevalent life-events and transitions, such as retirement, diagnosis of life-threatening disease, acquiring a disability, and spousal loss, can become the foci of studies. These events or transitions can potentially change the behaviors of the individuals or provide opportunities for behavior change, and also the surrounding social context, such as the people in one's immediate social circle.

As discussed above, social events and transitions may provide the needs, risks, and opportunities to change. Older adults who have lived a longer time are more likely to experience more events and transitions than are their younger counterparts. This is consistent with the notion that older adults are a heterogeneous age group. The principle of life-span development points to the importance and influence of early development. The cumulative effects of the personal history of older adults can have substantial impact on behaviors. Thus, studies of physical activity among older adults have afforded many challenges as well as opportunities.

## Conclusion

Compared with psychosocial theories and ecological models of physical activity promotion, a life-course perspective introduces a unique temporal perspective that can potentially inform future research in understanding physical activity behaviors over the life-course, particularly the timing of interventions. Advances in statistical techniques, together with the accessibility of more longitudinal databases that have included physical activity measures (both self-reported and objective measures such as accelerometers), have created a platform from which further investigation of the patterns of physical activity over time and across various life events and transitions may be studied. However, studies using principles of the life-course perspective are not limited to quantitative methods. Qualitative studies that involve life reviews and life stories (Clausen, 1998) are also important as they are able to answer different research questions as well as verifying, triangulating, or integrating with the quantitative results (Laub & Sampson, 1998).

Physical activity participation is undoubtedly a lifetime pursuit. As demonstrated above, various stages and transitions in life at different times in the history may afford a completely different set of challenges and opportunities for being physically active. A life-course perspective, which can provide a time-sensitive, opportunistic, and developmental approach for research and practices, should be more fully infused into the extant body of knowledge in physical activity promotion, to advance intervention development, and to promote physical activity to every segment of the population at any given time in history.

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