



HHS Public Access

Author manuscript

Res Hum Dev. Author manuscript; available in PMC 2016 January 01.

Published in final edited form as:

Res Hum Dev. 2015 ; 12(3-4): 319–326. doi:10.1080/15427609.2015.1068039.

Contribution of Adolescence to the Life Course: What Matters Most in the Long Run?

John Schulenberg and
University of Michigan

Julie Maslowsky
University of Texas at Austin

Abstract

Our wish is for more long-term longitudinal studies specifically designed to demonstrate the importance of adolescence in the life course. Specifically, we wish for our science to document as rigorously as possible the individual and contextual characteristics and experiences that matter the most during adolescence for long-term adult health and well-being. Recent research has shown the early childhood effects on adult outcomes, including effects from intervention programs, bringing needed scientific evidence to inform social policy about the importance of optimizing early development. In most of these efforts, there is little emphasis on adolescence, and thus there is little understanding about the effects of adolescence over and above the effects of childhood on adult outcomes. Our view is that adolescence matters a great deal for long-term health and well-being and we summarize what it will take to make our wish come true.

Keywords

adolescent development; long-term longitudinal studies; sensitive periods

The first author was teaching an advanced undergraduate seminar on adolescent development when a student had an epiphany. In the class we were talking about key milestones of biological, cognitive, and social development, and how it is important for parents and teachers to have these in mind when doing their jobs. All of a sudden, this bright, earnest student blurted out, “It would be so awesome if social policy was based on what we know about adolescent development!” All of us in the field can smile about this, welcoming another newly blossoming mind to the club, to the seemingly simple idea of merging science and social policy; and to the challenge of actually trying to connect our complex probabilistic science with often simple-answer-seeking social policy efforts (Supplee & Metz, 2015). This student was right though; it would be awesome.

But as researchers, how well are we prepared to inform social policy regarding what is important about adolescence? In particular, how well do we know what matters most during

Correspondence concerning this article should be addressed to: John Schulenberg, Institute for Social Research, University of Michigan, Ann Arbor, MI 48106. schulenb@umich.edu.

John Schulenberg, Institute for Social Research and Department of Psychology, University of Michigan; Julie Maslowsky, Department of Kinesiology & Health Education and Population Research Center, University of Texas at Austin.

the second decade of life in terms of long-term outcomes? Or more appropriately put, how well do we know for whom, under what conditions, and for what adult outcomes adolescence matters the most? Not very well, not yet. Thus, our wish is for more long-term longitudinal studies specifically designed to document the importance of adolescence—that is, to pinpoint, as rigorously as possible, the individual and contextual characteristics and experiences that matter the most during adolescence for long-term outcomes. For purposes here, we will consider adult outcomes broadly, such as health difficulties, alcohol and substance use disorders, educational and economic success, and overall well-being.

In this short commentary, we first set the stage conceptually for how to consider adolescence and the transition to adulthood in the context of the life course. We then consider what we know already regarding the overarching topic. We describe the research needed to make our wish come true and then conclude with thoughts on what theory, intervention, and social policy could look like if/when they are informed by a deeper understanding of the role that adolescence plays in shaping adult outcomes.

Conceptualizing the Importance of Adolescence in the Life Course

Imagine two simple models of development across the life course. The first one is the “shot out of a cannon” model, whereby one’s lifelong trajectory is largely determined by initial ingredients and especially the aim of the cannon. This model reflects ontogenetic continuity, giving attention to early sensitive periods and the power of developmentally distal effects on adult outcomes (Schulenberg, Maslowsky, Patrick, & Martz, in press). This first model is consistent with the Barker Developmental Origins of Adult Disease Hypothesis, whereby adult coronary health is thought to be due to intrauterine development and early childhood nutrition (Barker & Osmond, 1986); this work has been extended to consider more broadly the very early origins of adult health and well-being (Barker, 2005). The second model is the “contact sport” model, whereby one’s lifelong trajectory is a function of the ongoing interaction between an active self-constructing individual on the one hand and a powerful changing context on the other hand. This model reflects ontogenetic discontinuity, giving priority to more developmentally proximal effects which can serve to augment, negate, or reverse distal effects on adult outcomes (Schulenberg, et al., in press). This second model is consistent with systems and interactional perspectives regarding life span development now common in developmental science (Lerner, 2006; Sameroff, 2010).

In the “shot out of a cannon” model, adolescence may not matter much at all – it is simply a pass-through time, either partially mediating the continuous trajectory established earlier or serving as a developmental disturbance (i.e., opposite of a sensitive period, during which characteristics and experiences do not have long-term effects) (Schulenberg et al., in press). In the “contact sport” model, adolescence matters a great deal, as do all periods along the way, in whether the ongoing trajectory remains continuous or becomes discontinuous via a turning point. Of course, both models are incomplete. No doubt, early elements are critical and set a foundation for some continuity across life; at the same time, ongoing and new characteristics and experiences no doubt create discontinuity (e.g., by reversing early effects) as well as continuity (e.g., by potentiating early effects, by encompassing cumulative effects). We understand the allure of the first model, given its simplicity and its

more straightforward answers for social policy; but we think the second model is more accurate and ultimately more hopeful for social policy despite its complexity.

What We Know About Long-Term Effects and the Importance of Adolescence

Of course what happens in adolescence matters in the long run—how can it not? But it is very difficult to prove scientifically. There is no counterfactual; there is no possible “control group,” randomly assigned or otherwise, for which adolescence is excluded. The possibility remains that early child effects govern what happens in both adolescence and adulthood, thus relegating alleged adolescence effects to the list of covariates or at best partial mediators. For a study to be convincing about long-term effects of adolescence, it also needs to include a wealth of upstream indices representing earlier effects.

Developmental science is beginning to amass numerous child effects studies. Not inconsistent with the “shot out of a cannon” model, recent long-term longitudinal studies have shown child effects on adult outcomes. Heckman and colleagues (e.g., Heckman & Kautz, 2012; Heckman, Pinto & Savelyev, 2013) have shown how child cognitive skills and psychosocial characteristics set the stage for life success in adulthood. Similarly, Moffitt et al. (2011) found the lasting effects of childhood self-control on adulthood health and wealth. In regard to childhood adversity, there are several long-term studies linking, for example, child maltreatment and victimization to numerous indices of adulthood difficulties (e.g., Takizawa, Maughan, & Arseneault, 2014; Widom, White, Czaja, & Marmorstein, 2007). Long-term effects have also been demonstrated in experiments of high-quality early childhood education and preschool programs including the HighScope Perry Preschool program (Schweinhart, 2013) and the Carolina Abecedarian Project (Campbell et al., 2008). A recent meta-analysis of nine experimental early childhood interventions (including the two programs just mentioned) revealed long-term effects on adult educational and occupational outcomes and, to a lesser extent, adult crime (Dekovic et al., 2011). This research documenting positive long-term effects of early childhood programs has gained significant policy traction, including over \$1 billion in increased funding for early childhood education nationwide (Office of Management and Budget, 2015).

But what is the place of adolescence in these long-term effects? A growing body of research is beginning to document that long-term intervention-based outcomes are mediated by adolescent mechanisms. Muennig (2014) highlights three categories of adolescent factors that are impacted by early childhood interventions: higher attainment, beneficial social connections, and fewer behavioral risk factors. Specifically, adolescent factors found to mediate the early childhood-to-adulthood connection include delayed onset of substance use (e.g., Muennig et al., 2011), reduced teen births (e.g., Campbell et al., 2008), and greater educational attainment (e.g., Reynolds, Temple, Robertson, & Mann, 2001). These results support Moffitt’s (1993) “snares” hypothesis, which posits that continuity of delinquent lifestyle is maintained by events such as an arrest or school dropout that ensnare a young person into a lifestyle of delinquency. Might it be that the effect of early childhood programs is to help adolescents to avoid such snares, and that the snares themselves (or avoidance thereof) are what matters? If so, might it be equally or even more effective to intervene in

adolescence to ensure avoidance of such snares? More generally, can adolescence do more than simply mediate earlier effects and add in new variance in explaining long-term effects? We cannot yet answer such questions; thus, our wish for more long-term longitudinal studies that have testing adolescent contributions built in as an explicit goal rather than as an afterthought.

Making Our Wish Come True

Ideally, for our wish to come true, we would start a large-scale, multi-wave, longitudinal study that follows young people from pre-birth far into adulthood. Our wish has a series of sub-wishes, most of which include the weaving together of breadth and depth, an essential strategy for large-scale, multi-level studies (Falk et al., 2013). We wish for breadth in samples in terms of large, nationally representative multi-cohort samples to help us consider sociodemographic and historical variation in course and mechanisms (e.g., see Jager, Schulenberg, O'Malley, & Bachman [2013] regarding cohort variation in substance use etiology); depth would come from over-sampling those representing at-risk individuals and understudied groups. We wish for breadth and depth in measurement, permitting multi-domain and in-depth measurement as well as cultural and developmental appropriateness; in fact, we would want multi-level assessment to consider mechanisms that span molecular and biological to contextual and cultural levels. We wish for breadth and depth in the longitudinal design, including multiple measurement waves at standard intervals as well as measurement bursts during times of major life transitions. We also wish for an intervention component in the larger study to test for childhood and adolescent mechanisms in a stringent manner that attends to selection effects (and to get and keep young people closer to an optimal trajectory). And because any serious attempt to understand long-term connections across the life course must cross numerous levels of explanation and disciplines, we wish that this multi-faceted study be conducted from the beginning by an interdisciplinary research team. Imagine the possibilities, what our science could say about what matters most during adolescence in the long run and about the best way to intervene during the second decade of life to improve adult health and well-being.

Given the immense funding needed to start the study we envision, and given we would like our wish to start to come true in our lifetimes, we note that there are numerous long-term studies on which to draw that can provide the foundation for the new study we envision. As mentioned above, some of the existing studies and interventions that follow young people from childhood into adulthood include adolescent assessments, allowing for further consideration of adolescent effects in future analyses. Such secondary data analyses can be quite effective, but such studies often have inadequate samples, measures, and measurement spacing given the research questions under consideration. The ongoing long-term studies mentioned above were not explicitly designed to test long-term adolescent effects, and thus, for example, must rely on incomplete measures or rough proxies when testing adolescent effects (high school completion as proxy for academic achievement, non-smoking as proxy for healthy lifestyle, etc.) and small non-representative samples. This brings to light the importance of replication. Finding similarities across studies that vary in samples, measurement, and design provides strong evidence of real effects (Duncan, Engel, Claessens & Dowsett, 2014). In passive longitudinal studies, gaining leverage on selection effects is

essential if we want to attempt to assign causality; some current analytic strategies include propensity score-matching and fixed effects regression, which can help control for unknown heterogeneity.

Three scenarios are possible when adolescent data are included in long-term prediction of child effects on adult outcomes (assuming appropriate controls for potential selection effects). First, the same constructs constituting child effects also constitute adolescent effects, but are more powerful during childhood such that adolescent effects are weaker echoes of child effects and thus wash out in prediction models, at best partially mediating the child effects on adult outcomes. Consistent with the “shot out of the cannon” model, this suggests that childhood, but not adolescence, serves as a sensitive period, a time when characteristics and experiences are fundamental in setting the stage for future trajectories. In the extreme case, what happens during adolescence may not really matter either way because adolescence serves as a developmental disturbance, a time of instability that is not predictable in advance and is not predictive of future functioning and adjustment (Schulenberg et al., in press). That is, consistent with the notion of homeorhesis in systems theories of developmental psychopathology (Sameroff, 2010), after adolescence individuals would return to the original ongoing trajectory initiated in childhood. For example, in examining the intergenerational transmission of parenting practices, Hofferth, Pleck, and Veseley (2012) found that how G2 children were parented by G1 had a direct link to how G2 adults parented their G3 children; furthermore, none of the effect was mediated through G2 adolescent problem behaviors or positive adjustment indicating that the direct link of parenting styles between G1 and G2 occurred over time regardless of what happened during G2 adolescence. In such cases, adolescence is not needed in terms of predicting long-term outcomes, and prevention efforts during adolescence may not be particularly useful.

Second, with similar childhood and adolescent predictors of adult outcomes, adolescent effects prove to matter more than child effects. This would be consistent with the “contact sport” model and with typical findings in longitudinal studies that the closer the two measurement waves, the higher the associations. In such cases, we would expect child effects to wash-out in the context of (or to be fully mediated by) stronger adolescent effects in prediction models, and that adding both child and adolescent constructs would not add much variance accounted for in adult outcomes (compared to adolescent constructs alone). This second scenario suggests the importance of intervening during adolescence, though strong correlations between child and adolescent constructs would still suggest that intervening early could have benefits as well.

Third, both childhood and adolescence matter because they build cumulatively on each other and/or because different characteristics and experiences matter more in each developmental period, such that each time brings unique prediction of long-term outcomes. It could be that indices of optimal development during childhood contribute to or are correlated with the different indices of optimal development during adolescence, reflecting what are considered cascading effects in the developmental psychopathology literature (Dodge et al., 2009; Masten & Cicchetti, 2010). Or child and adolescent predictors may be domain-specific, such that child predictors are more associated with, say, later cognitive and socioemotional outcomes and adolescent predictors are more associated with health outcomes. Either way,

consistent with merging the two simple models, including predictors from both times could add to the success in predicting adulthood outcomes. Such findings would suggest the advantage of intervening during both times, that intervening during adolescence on top of childhood might provide stronger long-term outcomes, particularly if interventions are tailored to the domains in each period that are found to be most predictive of adulthood functioning. We believe this third scenario constitutes the most likely one.

Theoretical, Intervention and Social Policy Implications If/When our Wish Comes True

Theoretical advances will be extensive as we continue to conduct critical tests about what matters most during the second decade of life. We will learn more about the concepts of sensitive periods and developmental disturbances and how they can be applied in social policy. Assuming that evidence accumulates to conclude that the second decade matters a whole lot over and above the first decade in terms of adult outcomes, we will gain a better appreciation of the limits of continuity in our conceptualizations; we will learn more about what resilience and turning points look like and how to intervene to promote positive discontinuity during the second decade of life.

Knowing what experiences and events matter most during adolescence, over and above the experiences and events of childhood, for which groups of young people, and in reference to which adult outcomes sets the stage for efficient investment of resources to improve health and well-being at the population level. We know reasonably well that intervening in early childhood through high-quality early education, for example, can contribute to some increased health and wealth in adulthood. How much more does it help to also intervene in adolescence? Furthermore, given the recent attention given to the importance of the transition out of adolescence and into adulthood (IOM/NRC, 2014), how much more does it help to intervene during this transition? And can intervening in adolescence and/or the transition to adulthood compensate for not intervening in childhood? This is obviously a critical question, and its answer, which we believe will be yes, can provide fundamental optimism about life course corrections and help make it known that adolescence and the transition to adulthood are not “too late.”

We know intuitively that adolescence matters in the long run, and it is time we move our science beyond mostly folklore about what matters most during this assumed critical period in development. Let’s amass a wealth of findings from long-term, carefully controlled, longitudinal studies and high-quality intervention studies about the adolescent ingredients of long-term optimal development. Let’s be convincing for social policy efforts about what adolescent experiences should be reshaped, about what snares during the second decade of life should be avoided (Moffitt, 1993), and about what positive youth development experiences—curiosity, creativity, civic and academic engagement—should be championed (Larson, 2000). Imagine what optimal, population-based, long-term development could be like if the scientific literature on adolescence effects could catch up to the child effects scientific literature, and if both were used effectively to inform social policy.

Acknowledgments

The first author gratefully acknowledges grant support for long-term longitudinal studies from the National Institute of Drug Abuse (DA016575-12, DA037902-01) and National Institute on Alcohol Abuse and Alcoholism (AA022087-01). The second author gratefully acknowledges that the Population Research Center at the University of Texas at Austin is supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development Grant 5-R24-HD042849.

References

- Barker, DJP. The developmental origins of well-being. In: Huppert, FA.; Baylis, N.; Keverne, B., editors. *The Science of Well-Being*. Oxford: Oxford University Press; 2005. p. 59-74.
- Barker DJP, Osmond C. Infant mortality, childhood nutrition and ischaemic heart disease in England and Wales. *Lancet*. 1986; 1:1077–81.10.1016/S0140-6736(86)91340-1 [PubMed: 2871345]
- Campbell FA, Wasik BH, Pungello E, Burchinal M, Barbarin O, Kainz K, Ramey CT. Young adult outcomes of the Abecedarian and CARE early childhood educational interventions. *Early Childhood Research Quarterly*. 2008; 23(4):452–466.10.1016/j.ecresq.2008.03.003
- Dekovic M, Slagt MI, Asscher JJ, Boendermaker L, Eichelsheim VI, Prinzie P. Effects of early prevention programs on adult criminal offending: A meta-analysis. *Clinical Psychology Review*. 2011; 31:532–544.10.1016/j.cpr.2010.12.003 [PubMed: 21239100]
- Dodge KA, Malone PS, Lansford JE, Miller S, Pettit GS, Bates JE. A dynamic cascade model of the development of substance-use onset. *Monographs of the Society for Research in Child Development*. 2009; 74(3):1–120.10.1111/j.1540-5834.2009.00528.x
- Duncan GJ, Engel M, Claessens A, Dowsett CJ. Replication and robustness in developmental research. *Developmental Psychology*. 2014; 50(11):2417–2425.10.1037/a0037996 [PubMed: 25243330]
- Falk EB, Hyde LW, Mitchell C, Faul J, Gonzalez R, Heitzeg M, Schulenberg JE. What is a representative brain? Neuroscience meets population science. *Proceedings of the National Academy of Sciences (PNAS)*. 2013; 110(44):17615–17622.10.1073/pnas.1310134110
- Heckman JJ, Kautz T. Hard evidence on soft skills. (Adam Smith Lecture). *Labour Economics*. 2012; 19(4):451–464.10.1016/j.labeco.2012.05.014 [PubMed: 23559694]
- Heckman JJ, Pinto R, Savelyev PA. Understanding the mechanisms through which an influential early childhood program boosted adult outcomes. *American Economic Review*. 2013; 103(6):2052–2086.10.1257/aer.103.6.2052 [PubMed: 24634518]
- Hofferth SL, Pleck JH, Veseley CK. The transmission of parenting from fathers to sons. *Parenting: Science and Practice*. 2012; 12(4):282–305.10.1080/15295192.2012.709153
- Institute of Medicine/National Research Council. *Investing in the health and well-being of young adults*. Washington, DC: The National Academies Press; 2014.
- Jager J, Schulenberg JE, O'Malley PM, Bachman JG. Historical variation in drug use trajectories across the transition to adulthood: The trend toward lower intercepts and steeper, ascending slopes. *Development and Psychopathology*. 2013; 25(2):527–543.10.1017/S0954579412001228 [PubMed: 23627961]
- Larson RW. Toward a psychology of positive youth development. *American Psychologist*. 2010; 55(1):170–183.10.1037/0003-066X.55.1.170 [PubMed: 11392861]
- Lerner, RM. Developmental science, developmental systems, and contemporary theories of human development. In: Damon, W.; Lerner, RM., editors. *Handbook of Child Psychology: Volume I. Theoretical Models of Human Development*. Hoboken, NJ: John Wiley & Sons; 2006.
- Masten AS, Cicchetti D. Developmental cascades: Editorial. *Development and Psychopathology*. 2010; 22(3):491–495.10.1017/S0954579410000222 [PubMed: 20576173]
- Moffitt TE. Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*. 1993; 100(4):674–701.10.1037/0033-295X.100.4.674 [PubMed: 8255953]
- Moffitt TE, Arseneault L, Belsky D, Dickson N, Hancox RJ, Harrington H, Caspi A. A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*. 2011; 108(7):2693–2698.10.1073/pnas.1010076108

- Muennig P, Robertson D, Johnson G, Campbell F, Pungello EP, Neidell M. The effect of an early education program on adult health: the Carolina Abecedarian Project randomized controlled trial. *American Journal of Public Health*. 2011; 101(3):512–516.10.2105/AJPH.2010.200063 [PubMed: 21233425]
- Muennig P. Can universal pre-kindergarten programs improve population health and longevity? Mechanisms, evidence, and policy implications. *Social Science & Medicine*. 2014; 127:116–123.10.1016/j.socscimed.2014.08.033 [PubMed: 25174771]
- Office of Management and Budget. Fiscal Year 2016 Budget Overview. n.d. Retrieved from <https://www.whitehouse.gov/sites/default/files/omb/budget/fy2016/assets/budget.pdf>
- Reynolds AJ, Temple JA, Robertson DL, Mann EA. Long-term effects of an early childhood intervention on educational achievement and juvenile arrest: A 15-year follow-up of low-income children in public schools. *The Journal of the American Medical Association*. 2001; 285(18): 2339–2346.10.1001/jama.285.18.2339 [PubMed: 11343481]
- Sameroff A. A unified theory of development: A dialectic integration of nature and nurture. *Child Development*. 2010; 81:6–22.10.1111/j.1467-8624.2009.01378.x [PubMed: 20331651]
- Schulenberg, J.; Maslowsky, J.; Patrick, ME.; Martz, M. Substance use in the context of adolescent development. In: Brown, S.; Zucker, RA., editors. *The Oxford handbook of adolescent substance abuse*. New York: Oxford University Press; in press
- Schweinhart LJ. Long-term follow-up of a preschool experiment. *Journal of Experimental Criminology*. 2013; 9(4):389–409.10.1007/s11292-013-9190-3
- Supplee LH, Metz A. Opportunities and challenges in evidence-based social policy. *SRCD Social Policy Reports*. 2015; 28(4):1–31. Retrieved from http://www.srcd.org/sites/default/files/documents/spr_28_4.pdf.
- Takizawa R, Maughan B, Arseneault L. Adult health outcomes of childhood bullying victimization: Evidence from a five-decade longitudinal British birth cohort. *American Journal of Psychiatry*. 2014; 171(7):777–784.10.1176/appi.ajp.2014.13101401 [PubMed: 24743774]
- Widom CS, White HR, Czaja SJ, Marmorstein NR. Long-term effects of child abuse and neglect on alcohol use and excessive drinking in middle adulthood. *Journal of Studies on Alcohol and Drugs*. 2007; 68(3):317–326.10.15288/jsad.2007.68.317 [PubMed: 17446970]