



Adolescent Development in Context

Social, Psychological, and Neurological
Foundations

Dave Hansen, Brandon L. Bretl, and Bahaur Amini

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Preface

Increasingly, there is a tendency to characterize the teenage years as a time of general moral degeneration and deviance. This is unfortunate because the teenage years represent a key developmental period of the typical human lifespan, and from an evolutionary point of view, the actual characteristics that define adolescence represent critical learning opportunities. The increased sensitivity to social influences, identity formation, and social-emotional skills are just a few of such opportunities that require appropriate environments and contexts for optimal, healthy outcomes. Research in the field of adolescent development has not been immune to the negative stereotypes surrounding adolescence, and it is common to see researchers, either implicitly or explicitly, refer to adolescence as a high-risk, anomalous developmental stage that must be controlled, managed, or simply endured until adult-level abilities emerge spontaneously as a result of having survived an intrinsically tumultuous developmental time. More enlightened views of adolescence recognize that all biological adaptations have a cause and a purpose, and that the purpose of adolescence can be discerned from understanding the complex evolutionary history of humans as a group-based, family-based, highly social, sometimes competitive, abstract-thinking species.

Understanding the biological foundations of adolescence is meaningless if one does not also consider how biology and environment interact. In humans, these interactions are highly complex and involve not only immediate physical realities, but also social, cultural, and historical realities that create complex contexts and webs of interactions. Therefore, this textbook seeks to reconcile the biological and neurological foundations of human development with the psychological and sociological mechanisms that formed and continue to influence human developmental trajectories. To this end, we have divided the textbook into three main sections. The first, Foundations of Adolescent Development, introduces the historical science of studying adolescence and the biological foundations of puberty. The second section, Contexts of Adolescent Development, considers the primary contextual factors that influence developmental outcomes during adolescence. These include work and employment, peers, in-school and out-of-school contexts, leisure time, and the family. The final section, Milestones of Adolescent Development, addresses the primary psychological milestones that represent healthy adjustment to adult roles and responsibilities in society. The domains of these milestones include cognition and decision-making; identity, meaning, and purpose, moral development, and sexuality.

From an educational point of view, the objective of this textbook is to provide a resource that is capable of fostering advanced conceptual change and learning in the field of adolescent development in order to go beyond stereotypical portrayals of adolescence as a pathological condition. Organized in a manner designed to scaffold increasingly complex ideas, the textbook redefines adolescence a sensitive period of development characterized by phylogenetically derived experience-expectant states and complex interactions of biological, psychological, and social factors. The textbook draws from the latest advances in neuroscience and psychology to construct a practical framework for use in a wide range of academic and professional contexts, and it presents historical as well as contemporary research to accomplish a radical redefining of an often misunderstood and maligned developmental period.

Section 1:

Foundations of Adolescent Development

1

The Social Construction & History of Adolescence

Objectives

- Identify the historical and societal construction (meaning) of ‘adolescence’
- Recognize your beliefs about adolescence
- Link your beliefs about adolescence to historical and societal contexts

“They think they know everything, and confidently assert it”
(Aristotle, Rhetoric II.12)

Overview

This chapter examines the meaning of ‘adolescence’—how past and present societies have constructed its meaning. Society creates cultural meaning for the myriad concepts we use every day. Our current understanding of adolescence is no different. The first section of this chapter offers a brief introduction to what it means to socially construct reality. We then examine past understandings of adolescence and how they influence contemporary meanings of adolescence.

Social Construction of Different “Realities”

Adolescence is a socially-constructed “reality.” It does not exist independent of its socially-constructed meaning. Adolescence is but one of a myriad of socially-constructed categories we use daily. These categories provide an efficient means to transmit cultural expectations for a category, e.g., how to act, think, and feel. Social categories are always being constructed and revised, so they are dynamic, not static, entities. While the meaning of adolescence today is different from past meanings, its present meaning has been shaped by past historical constructions of adolescence. Adolescence is an “organized set of expectations closely tied to the structure[s] of adult society” (Modell & Goodman, 1990, pp. 277-307). Understanding these expectations and how the structures of a society shape and have shaped conceptions of adolescence is an important first step in the scientific study of adolescence.

The idea that society constructs reality is attributed to Berger and Luckmann (1991). They argued that society is created by humans through their interactions, which they call *habitualization*. Habitualization describes how “any action that is repeated frequently becomes cast into a pattern, which can then be ... performed again in the future in the same manner and with the same economical effort” (Berger and Luckmann 1966). Not only do we construct our own society but we also accept it as it is because others have created it before us. Thus, society is, in fact, a collection of “habits” that serve as our operating reality.

An example might help make the idea of habits more tangible. Your school exists as a ‘school’ and not just as a building because you and others agree that it is a school; hence you pay tuition to be educated at the university or college you attend. If your school is older than you are, it was created by the agreement of others before you. In that sense, it exists by consensus, both prior and current. This is an example of the process of *institutionalization* (institutionalizing habits), which is the act of implanting a convention or norm into society. Bear in mind that the institution, while socially constructed, is still quite real. Adolescence, then, as a socially constructed or fabricated category is real—it is a reality because we make it so.

The concept of socially constructing reality (or realities) is not simply theoretical or philosophical musings of academics. The realities we construct have real consequences/impacts, positive and negative, on our present and future lives. You might have heard of the dictum: “If men define situations as real, they are real in their consequences” (Thomas and Thomas 1928), or perhaps the modern day version, “perception is reality.” This simply means that our behavior

¹ Parts of this paragraph derived from: Introduction to Culture by OpenStax: OpenStax, Introduction to Culture. OpenStax CNX. Mar 13, 2015 <http://cnx.org/contents/8a8ed60b-fb85-463f-a002-b48af257f894@5> and OpenStax, Social Constructions of Reality. OpenStax CNX. Feb 5, 2015 <http://cnx.org/contents/d06ad985-cecb-48b4-b222-197d04abc6a1@2>.

can be determined by our subjective construction or perception of reality rather than by objective reality.

Our perceptions (collective and individual) come from interacting with our world, from the physical to the social to the symbolic. Through these interactions we learn the rules for how to function in our world; rules here refers to the full range of shared beliefs, values, practices, expectations, norms, standards, etc. in society. We all adhere to various rules that are created and maintained in the culture of a society.

To illustrate, what are the rules when you pass an acquaintance at school, work, in the grocery store, or in the mall? Generally, we do not consider all of the intricacies of the ‘greeting’ rules. We may simply say, "Hello!" and ask, "How was your weekend?" or some other trivial question meant to be a friendly greeting. These greeting rules have meaning and come with expectations, and there are ways in which you may violate this negotiation. Consider what would happen if you stopped and informed everyone who said, "Hi, how are you?" exactly how you were doing that day in detail. You would more than likely violate rules of culture and the cultural greeting rules and people may start avoiding you. These rules can be *context-specific*. Perhaps in a different culture the “Hello, how are you?” question would be more literal, and it may require a more literal response. Or if you are having coffee with a good friend, perhaps that question warrants a more detailed response.

Bringing this back to adolescence, how have present and past societies constructed adolescence? What are the socially-constructed “rules” of adolescence? In the next section, we will trace the historical construction of adolescence as a social category including with the forces (e.g., economic) that shaped its construction.

Historical Construction of Adolescence

Age of Vulnerability and Potential

The concept of adolescence (socially-constructed) is not a recent invention. Ancient Greek philosophers Plato (428 to 347 B.C.) and Aristotle (384 to 322 B.C.) recognized a transitional period between childhood and adulthood as a time for the growth of reasoning (the term for this period is translated as ‘youth’). One of the earliest recorded uses of the Latin word ‘adolescere—meaning ‘to grow up’—from which we derived the English word ‘adolescence’ was used by the Roman playwright Plautus in 193 B.C; for comparison, the Latin word ‘adultus’ means ‘to have grown up’ or to have completed adolescence (Graham, 2004).

What did adolescere mean in Greek and Roman times, that is, how was it socially constructed? To understand its meaning we need to understand the historical context at the time. The concept of adolescence occurred within the context of philosophical discussions about the necessity of socializing (educating) adolescents in order to avoid the corrupting influences of the external, material world. These corrupting influences, it was thought, could derail attainment of maturity (i.e., adultus) or keep adolescents from realizing their full potential. Plato thought children should spend time studying music and sports, while adolescents should study science and mathematics, which is consistent with his view of adolescence as a time of reasoning. Aristotle argued that the most important task of adolescence was developing the ability to choose or make decisions in the sense of making adultus (mature) decisions. As can be seen from Aristotle’s writing in Rhetoric II (below excerpt), adolescence (he used the term youth) was a time of instability and impressionability, and the outcome of adolescence, positive or negative,

depending on exposure to socializing or corrupting forces (Sisson, Hersen, & Van Hasselt, 1987).

²Chap. 12. [2] ... *The ages are youth, the prime of life, and old age....*

[3] *The young, as to character, are ready to desire and to carry out what they desire. Of the bodily desires they chiefly obey those of sensual pleasure and these they are unable to control. [4] Changeable in their desires and soon tiring of them, they desire with extreme ardor, but soon cool; for their will, like the hunger and thirst of the sick, is keen rather than strong.*

[5] *They are passionate, hot-tempered, and carried away by impulse, and unable to control their passion; for owing to their ambition they cannot endure to be slighted, and become indignant when they think they are being wronged.*

[6] *They are ambitious of honor, but more so of victory; for youth desires superiority, and victory is a kind of superiority. And their desire for both these is greater than their desire for money, to which they attach only the slightest value, because they have never yet experienced want, as Pittacus said in his pithy remark on Amphiaraus.*

[7] *They are not ill-natured but simple-natured, because they have never yet witnessed much depravity; confiding, because they have as yet not been often deceived; [8] full of hope, for they are naturally as hot-blooded as those who are drunken with wine, and besides they have not yet experienced many failures. For the most part they live in hope, for hope is concerned with the future as memory is with the past. For the young the future is long, the past short; for in the morning of life it is not possible for them to remember anything, but they have everything to hope; which makes them easy to deceive, for they readily hope.*

[9] *And they are more courageous, for they are full of passion and hope, and the former of these prevents them fearing, while the latter inspires them with confidence, for no one fears when angry, and hope of some advantage inspires confidence. [10] And they are bashful, for as yet they fail to conceive of other things that are noble, but have been educated solely by convention.*

[11] *They are high-minded, for they have not yet been humbled by life nor have they experienced the force of necessity; further, there is high-mindedness in thinking oneself worthy of great things, a feeling which belongs to one who is full of hope.*

[12] *In their actions, they prefer the noble to the useful; their life is guided by their character rather than by calculation, for the latter aims at the useful, virtue at the noble.*

[13] *At this age more than any other they are fond of their friends and companions because they take pleasure in living in company and as yet judge nothing by expediency, not even their friends.*

[14] *All their errors are due to excess and vehemence and their neglect of the maxim of Chilon, for they do everything to excess, love, hate, and everything else.*

² From, <http://data.perseus.org/citations/urn:cts:greekLit:tlg0086.tlg038.perseus-eng1:2.12>

And they think they know everything, and confidently affirm it, and this is the cause of their excess in everything.

[15] If they do wrong, it is due to insolence, not to wickedness. And they are inclined to pity, because they think all men are virtuous and better than themselves; for they measure their neighbors by their own inoffensiveness, so that they think that they suffer undeservedly.

[16] And they are fond of laughter, and therefore witty; for wit is cultured insolence. Such then is the character of the young.

Aristotle, Rhetoric II.12, 335–322 BC

Thus, philosophers and probably most adults in early Greek and Roman times had a socially-constructed view of adolescence that emphasized both potential and vulnerability: a potential for attaining a high level of maturity but also susceptible to society's corrupting influences. How then did early Greek and Roman societies address with this potential and vulnerability? The solution was to create social structures (e.g., schools) that limited/regulated adolescents' exposure to the corrupting material world influences but which also provided adolescents the necessary discipline and educational experiences to achieve full 'adultus' (maturity). Can you see early Greek and Roman socially-constructed views of adolescence (period of vulnerability and potential) in today's society? How is this early view reflected in today's structures?

Dark Ages—Adolescence Forgotten

For the relatively advanced views of adolescence in early Greek and Roman societies, this early view was apparently not carried over into the Middle-Ages (~500-1500 A.D.), often referred as the "Dark-Ages." How do we know this? We get a sense of societies views



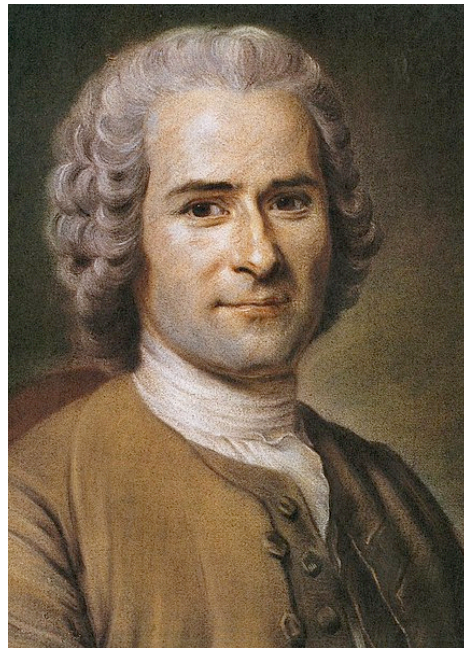
Salus Populi Romani icon, overpainted 13th but underlying painting dates to 5th or 6th century. PD-Italy. PD-1923

on adolescence from existing sources of information for this period, such as from writings and art. In the Middle-Ages, children were viewed (literally and figuratively) as mini-adults—tiny renditions of adults (e.g., dressed like adults; Sisson et al., 1987). For example, childhood as a theme did not appear in artwork until the 12th century (Ariès, 1962).

It is safe to conclude that adolescence was not a prominent social category, and perhaps a non-existent one, in the Middle-ages since individuals were simply at a different degree of being a ‘mini-adult’ from the point in childhood where they did not need constant adult care. As such, children (including their conception of adolescents) were subject to the same the harsh discipline as adults (e.g., stockades), as well as adult work responsibilities. As an interesting aside, there were harsh disciplinary or “pillory” laws in the Unites States, even as late as the 1900’s (c.f. Spruill, 1972).

The “Age of Reasoning”

A shift in thinking about childhood and adolescence slowly emerged toward the end of the Middle-Ages, with marked changes by the 1700’s. First, over time the church in Europe promoted the idea that infants and children were “innocent” (reflecting a pure divine nature) and as yet uncorrupted by the world; the phrase “age of innocence” emerged in reference to childhood during this period. With this shift in thinking about the nature of the child, schools were needed to meet children’s unique needs. Schools, then, were one of the earliest institutions exclusively devoted to children.



Rousseau by Maurice Quentin de La Tour, 1753. PD-France, PD-1923

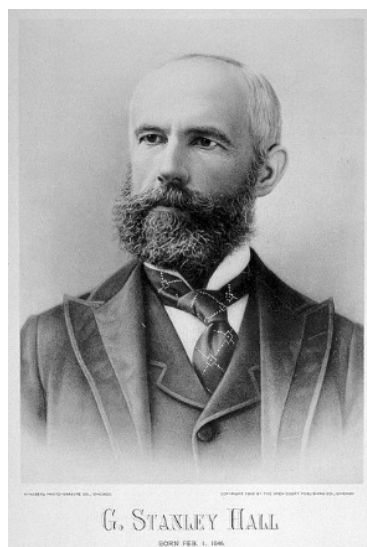
Second, changing views on adolescence as a distinct category emerged, and again a philosopher was influential in changing the society’s understanding. French philosopher, Jean-Jacques Rousseau (1712-1778), believed that reasoning emerged in adolescence—similar to Plato and Aristotle. He argued that children and adolescents were not miniature versions of adults. He also argued that ages 12-15 were a time to explore and thus he thought society should

encourage curiosity during this age span. For Rousseau, 15-20 year olds were emotionally mature and that this period in which there was a shift from self-interests to other's interests. Rousseau published the highly influential, and controversial, book *Emile* (1762), a treatise on education. In *Emile*, Rousseau espoused the “innocence” or basic good nature of a child, and that this nature becomes corrupt by the evils of society (this should sound a little like the philosophy of Aristotle). However, unlike views of education in early Greek and Roman times, Rousseau proposed that education should try to foster children's good nature, not by imposing strict discipline and society's ideas, but by allowing children to develop ideas themselves (Doyle & Smith, 2007). Advocating for minimal interference by society in children's education, including religion and government, made his ideas controversial among religious educators and politicians. In essence, his idea was to let children grow into their good nature. Education's role, in his view, was to keep out the corrupting influences (adults included) and let children make sense of their own world—you might see similarities to Montessori educational approaches in Rousseau's ideas.

While we can credit Rousseau with reviving the belief in distinct stages of development in the lifespan, the idea of stages of development did not gain traction and widespread acceptance until well after Darwin published his theory *On The Origin of Species* (1859). In fact, stage theories of human development did not begin to appear until the 1900's. These stage theories represent another historical shift in the social-construction of adolescence—the birth of the scientific study of adolescence.

The “Birth” of the Scientific Study of Adolescence

During the late 1800's and into the early-to-mid 1900's, there was a major movement among numerous psychologists, urban reformers, educators, religious leaders, and youth workers to re-conceptualize adolescence through scientific study. G. Stanley Hall (1844-1924) and Margaret Mead (1901-1978) were prominent leaders in this movement, and Hall is commonly credited with founding the scientific study of adolescence.



1. Stanley Hall. Photogravure by Synnberg Photo-gravure Co., 1898

G. Stanley Hall. In 1904 Hall published a two volume set called *Adolescence* (1904) in which he drew heavily on Charles Darwin's theory of evolution and epigenetics to develop his theory. He proposed that adolescence is controlled by genetically determined physiological factors and that the environment plays a minimal role in development, although it plays more of a role in adolescence than in childhood. For Hall, adolescence began around age 12 (beginning of growth spurt) and continued through the early 20's. Keeping in mind the influence of Darwin's evolutionary theory, Hall also borrowed the idea from embryologist Earnest Haeckel that human "ontogeny recapitulates phylogeny," which means that the stages of evolutionary development (e.g., Neanderthal) gets expressed at specific stages of human development, from birth through adulthood.

Hall forcefully argued that adolescence was a time "storm and stress" because it mimicked a past evolutionary period characterized by irrational, impulsive, and instinct-driven human life. Accordingly, for healthy development to occur—i.e., to reach adulthood—these impulses and drives needed to be expressed. Thus, Hall believed that adolescence 'recapitulated' our human barbarian past. Practically, this meant that adolescence *should* be a turbulent time of storm and stress.

While Hall's recapitulation idea may sound farfetched today, society at the time was primed to accept Hall's theory and its explanations for perceived and real problems that involved adolescents. The United States at the time was undergoing rapid social and economic changes, e.g., industrialization (Modell & Goodman, 1990). These societal changes strained many institutions, such as family, and new social problems and challenges emerged, including an influx of immigrants. Society, then, was ripe for ideas that would help it make sense of the changes and perceived problems.

It is important to understand the impact of Hall's (erroneous) idea of recapitulation on our modern views of adolescence. At the time, Hall's idea of storm and stress convinced most of society that adolescents' behaviors, including lust, love, anger, etc., were a necessary and essential part of normative adolescence. If adolescents were not allowed to fully express their primitive past, Hall believed they would be ill-prepared to enter adulthood. Thus, Hall's idea that ontogeny recapitulates phylogeny became an easy explanation for adults' stereotypes of adolescence/adolescents—conflicts with parents, authority, and society, awakened primal drives and impulses, and self-centeredness.

What did Hall's theory mean for how society should view adolescence? Hall thought society should relax pressures on adolescents to become adults, and allow adolescents to express a primal past. That is, he argued that society should excuse them from the responsibilities of adult activities until the recapitulation is complete—an extended "time-out." During this time-out, adolescents could prepare for maturity (adulthood) by putting themselves in situations that tested their character because this would help them build the character and personality (e.g., valor, respect) that adults had or should have. Essentially he was saying that society should allow adolescents to engage in 'safe' adult-character building activities in order to develop an appreciation for and the characteristics (norms, values) of adults. Curiously, Hall argued that adolescents should not learn these character traits from actual adult activities, such as employment, rather that they should learn them in 'safe' settings that were separate from actual adult life.

While we arguably owe the beginning of the scientific study of adolescence to Hall, his theory is no longer accepted in scientific communities. Yet his ideas still influences society's current views; his ideas are also evident in some of the literature on adolescent brain

development. For example, there is a pervasive belief in the United States that adolescents should be protected from adult responsibilities and activities; there are strict labor laws that limit the types of jobs adolescents can and cannot have, as well as restrictions on the number of hours they can work. Many parents still dread the adolescent years because they believe it is a time of storm and stress—rebellious against parents, other adults, and society. G. Stanley Hall was not the only person to influence the social construction of adolescence, but his theory was by far one of the most influential ones.

[Margaret Mead](#). Margaret Mead was an anthropologist who became famous for her study of adolescents on the island of Samoa. As a later contemporary of Hall, Mead provided a stark contrast to Hall's ideas on adolescence. Mead proposed that adolescence was not about a process of biological maturation leading to inevitable storm and stress (Sisson et al., 1987). Rather she proposed adolescence was a socially constructed process surrounding transition to adulthood—it was simply a socio-cultural invention. Adolescence as an invention, then, could be smooth and relatively stress free, or fraught with pitfalls and stressful.

Margaret Mead's publication, *Coming of Age in Samoa* (1928), gave a vivid descriptive account of adolescence within the South Pacific territory of American Samoa. In this publication Mead concluded that adolescence was not a particularly stressful time for girls because of Samoan cultural patterns and, in particular, because of clear cultural norms and a continuity of roles during adolescence. In Western societies, she argued, adolescence is characterized as a difficult period because there is a discontinuity of roles between childhood and adulthood due to rapid socio-cultural changes (Reed Larson & Wilson, 2004). Societies in greater flux, then, were more apt to see adolescence as a turbulent time. Mead championed cultural factors, such as a rapid social change, economic change, and the institutional structures



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in a society (e.g., age-graded schools, laws) as primary contributors to how a society views adolescence.

Overall, Mead's work was instrumental in providing an alternative view to Hall's theory. This is not to say Mead did not have her critics; some have criticized her work as overly naïve and have suggested she ignored signs of conflict in the Samoan community she studied. Criticisms aside, however, her work helped focus research attention on the role of society and culture, and its contributions to the construction of adolescence (as well as other constructions such as childhood). While Mead's work has stood the test of time better than Hall's (Hall's theory is all but discredited), Hall ideas still seem to overshadow Mead's, at least outside of the scientific community.

Golden age of stage theories. During the early and mid-1900's approximately through 1970, lifespan stage theories of human development became popular. As the name implies, stage theories break human development into distinct periods, including adolescence. There are too many stage theories to review them all, but three are particularly worth mentioning as they had a significant influence on our understanding of adolescence.

Sigmund Freud. Sigmund Freud (1856-1939) was a medical doctor who was among the first to systematically study and theorize the workings of the unconscious mind in the manner that we associate with modern psychology. Freud believed that personality develops during early childhood. He also proposed that childhood experiences shape our personalities and behavior as adults. Freud viewed development as discontinuous; he believed that each of us must pass through a series of stages during childhood, and that if we lack proper nurturance and parenting during a stage, we may become stuck, or fixated, in that stage. Freud's stages are called the stages of psychosexual development. According to Freud, children's pleasure-seeking urges are focused on different areas of the body, called an erogenous zones, during each of five stages of development: oral, anal, phallic, latency, and genital.

Adolescence was included in Freud's genital stage, but this stage also covered puberty through adulthood. In this stage, Freud believed individuals experience is a sexual reawakening in which the incestuous urges of the phallic stage resurface. However, Freud thought the young person redirected these urges to other, more socially acceptable partners (who often resemble the other-sex parent). People in this stage have mature sexual interests, which for Freud meant a strong desire for the opposite sex. While most of Freud's ideas have not found support in modern research, he was instrumental in drawing attention to the role of sex and sexuality in everyday life, a subject that was certainly not openly discussed in his time.

Erik Erikson: Erik Erikson (1902-1994) proposed a psychosocial development theory that emphasized the social nature of our development rather than its sexual nature. While Freud believed that personality is shaped primarily in childhood, Erikson proposed that personality development takes place all throughout the lifespan. Erikson suggested that how we interact with others is what shapes our sense of self, or what he called the ego identity. In his theory, adolescence was a particularly important stage (Identity versus Confusion) to solidify one's role as an individual within society. (Note that we will cover his theory in greater depth in a later chapter.)

Erikson's ideas on identity development during adolescence are still influential in the United States and in Europe. For example, the idea of a 'gap year' at the end of high school or during college has roots in Erikson's idea that adolescents need time to explore and try on

different social roles (identities) before making a commitment to a particular identity. We have also incorporated many of Erikson's terms into popular language, for example, "identity crisis." There is a research field in social science focused solely on identity development, with separate peer-review scientific journals. In many respects, Erikson's theory helped normalize identity development within society as an adolescent milestone.

Jean Piaget. Like Freud and Erikson, Piaget thought development unfolds in a series of stages associated with distinct age ranges. Jean Piaget (1896–1980) proposed a theory of cognitive development that unfolds in four stages: sensorimotor, preoperational, concrete operational, and formal operational. He believed that thinking is a central aspect of development and that children are naturally inquisitive but that they do not think and reason like adults. His theory of cognitive development holds that our cognitive abilities develop through specific stages, which exemplifies a discontinuity approach to development. As we progress to a new stage, there is a distinct shift in how we think and reason.

Piaget said that children and adolescents develop schemata to help them understand the world. *Schemata* are concepts (mental models) that are used to help us categorize and interpret information. During adolescence, Piaget proposed that individuals develop formal logic schemata and by the time they have reached adulthood they have created schemata for almost everything. Piaget's theory continues to heavily influence the fields of cognition and education.

Stage theories conclusions. Stage theories have cemented the idea that we develop in orderly phases, at least up to adulthood. One extension of this idea is the need for age-grading in education, when socializing, at work, etc. Age-grading means grouping individuals of roughly the same age. Age-grading defines what we think is 'normative' for a given age. For example, for many of us we might be suspicious if a 13 year old and a 25 year old regularly socialized together. Why? Because we have socially constructed views based on age groups and have assigned meaning to them, including what is 'appropriate' and 'inappropriate'. Currently in the United States, individuals are age-graded in education at least through age 18 and more frequently through the end of college.

The age of adolescent brain research. While stage theories continue to impact our understandings of adolescence, relatively recent advances in neuroimaging are leading to additional changes in our notions about adolescence; refinements might be a better descriptor here. The field of adolescent brain research began to rapidly expand in the late 1990's and early 2000's. There are now literally thousands of peer-review articles on topics related to brain development during adolescence. The idea of a 'teen brain' that is not yet mature (some researchers call it 'immature') is a relatively new addition to the field, and one that is quickly becoming popularized in the United States and Europe—an example of how the social construction of adolescence is ever evolving. As you will read in a later chapter, much of the neuroscience research is based on a medical model that is relatively uninformed by social science research on adolescence (and vice versa).

In many ways the neuroscience literature on adolescent brain development is a modern version of G. Stanley Hall's "storm and stress" model. For example, some researchers (based on neuroimaging studies) promote the idea that adolescents have a 'hyper-sensitive' emotional brain that overwhelms the immature reasoning and decision-making parts of the brain as a way to explain risk-taking behaviors. So far, neuroscience research on adolescent brain development has

ignored the contributions of experience and context to development, although this may be changing (c.f., David M Hansen & Jessop, 2017).

Conclusions

So what is the point of reviewing the social construction of adolescence across time? Hopefully you will begin to see how some of these historical views have shaped contemporary meanings of adolescence. We cannot truly understand adolescence and adolescent development if we are unaware of the forces that have shaped its meaning. Today, many treat adolescents as incapable of adult thinking and behaviors (treat them as children), and hence, in need of protection. This view did not emerge from a well-thought-out plan but rather from ever present social forces that embed adolescence with meaning. Our current views are no less influenced.

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2

Foundations of Ethnicity, Race, & Social Class

Objectives

- Define the key elements of culture and how it is transmitted
- Define and differentiate ethnicity and race
- Understand the historical roots and construction of race, particularly within the United States
- Explain the relationship between the socio-cultural four contexts and societies allocate access to resources
- Formulate your position on the use of race as a construct in research
- Understanding of the word culture and cultural context
- Identify ethnocentric tendencies in science and yourself

Overview

This chapter lays a foundation for understanding four important cultural contexts of development for adolescent that will be examined in subsequent chapters. These contexts are

ethnicity, race, social class, and minoritized status. This chapter assumes you read Chapter 1, the “*Historical Context of Adolescence*,” and understand the concept of socially-constructed realities (if you need a refresher on this concept see Chapter 1). The aim of this chapter is to (1) learn the motivation behind differentiating people based on race/ethnicity and (2) to learn the influence race, ethnicity, social class, and minoritized or non-minoritized status has on our development and the development of others with an emphasis on adolescence.

Cultural Context

Culture is the most significant system within which human development occurs (Lee & Walsh, 2001). Understanding the concept of culture is fundamental for understanding other concepts that emerge within a cultural context, including those covered in this chapter: ethnicity, race, and socioeconomic standing, and minoritized status. We often describe groups of people as having their own “culture,” and these cultures can differ in numerous ways. Culture provides the script for “how to be” and for how to participate as a member in good standing in one’s cultural community and in particular social contexts (Schweder et al., 1998). A classic definition of *culture* is that it is the sum of “knowledge, belief, art, morals, law, custom, and any other capability and habits acquired by man as a member of society” (Tylor, 1871/1958, p. 1). A key idea that modern scholars add to this classic definition is that culture involves humans “inventing meanings” from symbols (e.g., language) and then we behave as if the invented meanings are true (Carneiro, 2003; Dillingham & White, 1973; Harris, 2001; Smedley & Smedley, 2005). Thus, culture represents all of the invented meanings and their particular manifestations (e.g., laws) in a society.

Culture is learned through socialization (interaction with others). We are not born with a biological propensity toward any particular culture; rather we have biological structures (e.g., brain) that give humans the capacity to learn and create culture (Smedley & Smedley, 2005). Culture is transmitted through the *socialization* of thoughts, traditions, emotions (e.g., how to feel), and behaviors (Harris, 1998). Culture’s power in its ability to shape our thinking, feelings, beliefs, and behavior should not be underestimated! Thus, how you think, feel, believe, and behave is all based on your culture; no one escapes the molding power of culture.

Socialization occurs from the moment of birth (e.g., newborns wrapped in blue or pink depending on gender), and perhaps in vitro. Early on, it happens unconsciously without our awareness. By the time we have capacities to consciously think about accepting a cultural norm (e.g., what is appropriate dress), we have internalized a myriad of norms that guide our decision to accept or reject a norm. That is, we have already adopted foundations for how we perceive, feel, and interact with our world and what seems ‘normal’ to us. Because we assume our way of doing things is the “norm,” it is natural to assume that how we think, feel, etc., is the way others think, feel, etc. However this is not true for everyone. Individuals vary on a continuum on how much they assume others are like them. Exposure to other cultural contexts provides the ability to think differently and understand there are different ways of doing, thinking, and believing. Unless we were exposed to many cultural contexts, for example growing up in different parts of the world, we may lack information from contrasting cultural contexts on which to experience different ways of thinking, feeling, etc. Thus, without contrasting cultural contexts it is easy to believe that our own culture is superior or inherently better than other cultures we have not experienced in a meaningful way.

The belief that our particular culture-(e.g., how we do things) is better than other cultures is called *ethnocentrism*. Ethnocentrism can be a natural by-product of growing up in a particular cultural context; we may know individuals who are ethnocentric. Ethnocentrism, however, is not an automatic growing up in a particular cultural context. There are many ways to intentionally avoid succumbing to ethnocentrism (e.g., experiences of different cultures). However, ethnocentrism becomes a roadblock for individuals when it inhibits their understanding of other culturally developed ways of thinking, feeling, behaving, etc.

What does ethnocentrism look like? If you have traveled to a foreign country or even another state, you may catch yourself thinking “the way we do things back home is better than...” or “why would they do it this way,” or “the people here are so different and weird.” Exposure to something different than what we are conditioned to makes people who have not experienced differences uncomfortable. Someone who has grown up in a busy city like atmosphere where there is constant activity may think differently from individuals who live in small towns with a lot of land and space. Ethnocentrism can also be as simple as judging or thinking differently of the person next to you who dresses differently based on their culture (e.g., wearing hijab). The point is that we all engage in ethnocentrism at some point, none of us are immune to it—including researchers. In subsequent sections we will explore how researchers often unwittingly engage in culturally biased science.

Summary

Culture is not simply out there and observable through behaviors and customs, nor is it just inside the head and composed of beliefs and ideas. Culture is described more accurately as both symbolic and behavioral inheritances. Culture is not an entity with a clear-cut boundary. Instead it is framed as shared meaning systems. Cultural psychologists see culture as a “custom complex” comprised of both what people do and think in their local contexts. It has a narrative-like quality that consists of shared meanings and morality (Lee & Johnson, 2007).

Ethnicity

Ethnicity is a cultural context that influences all parts of our lives. We define ethnicity as a group or cluster of people who share common cultural experiences, including common practices, values, beliefs, geographic origins (e.g., Norwegian), geographic locations (e.g., rural), traditions, food habits, language, and importantly, consider themselves as part of an ethnic group (Cameron & Wycoff, 1998; Dillingham & White, 1973; Harris, 1998; Smedley & Smedley, 2012). Ethnicity is commonly used in society to distinguish differences in cultural values, beliefs, and traditions among groups from different geographical and/or national origins. The values, beliefs, and traditions that define ethnicity are passed between generations and create unique characteristics of that ethnic group, setting it apart from other groups (Marcelo & Huynh, 2013).

We find that ethnic groups are often viewed as practicing the same culture. It follows the notion that “to be a member of a group is to think and act in a certain way, in the light of particular goals, values, pictures of the world; and to think and act so is to belong to a group” (Berlin 1976, p. 195 as cited in Shweder et al., 1998, p. 866). However, while ethnic groups often have their own culture, it is important to note that individuals can adopt cultural traits from various ethnic groups —sometimes easily so, such as the widespread adoption of western dress (jeans and tee shirts) found all over the world, and the contemporary manifestation of industrial culture globally” (Smedley & Smedley, 2005, pp. 17-18). Ethnicity, then, can be as fluid as it is

socially constructed; it represents the ‘invented meanings’ (see above) people assign to shared experiences. However, we often still see ethnic groups hold their own history, cultural heritage, and status within contemporary society (Phinney and Chavira, 1995). For example, a second generation Chinese American may follow some of their ethnic cultural traits like the celebration of Chinese New Year and also American holidays in the U.S.

The understanding and application of the term ethnicity is inconsistent. Ethnicity is often used interchangeable with race or culture, which confounds the meaning of these terms. As a result, there are inaccurate interpretation and generalizations that have shaped how we view the world and individuals in it. Ethnicity reflects learned cultural practices and, as such, it is inaccurate to include physical characteristics (e.g., skin color) as part of definitions of ethnicity or ethnic groups. Simply put, ethnicity has a broader meaning and refers to connectedness based on common factors. As we will see next, as with ethnicity, race is also misunderstood.

Race

A second context that strongly influences our lives is race. Race is socially constructed—not biological. There are negligible biological or genetic differences that represent a particular race of people (Graves Jr & Graves, 2003; Omi & Winant, 2014; Smedley & Smedley, 2005). At most, genetics account for 0.01% of differences among races (Littlefield et al., 1982). Nonetheless, race has been socially constructed across time based on a belief that racial differences are due to genetic and biological characteristics, which has led to a socially constructed and accepted understanding of differences between racial groups. The idea of race has emerged over time to refer to various *physical differences*, such as skin color, facial form, or eye characteristics among groups of people. It has been described as a way to categorize individuals and population groups without any biologically valid distinctions between differently identified races. Importantly, however, while we emphasize that race is not biological but is socially constructed to hold such a meaning, we acknowledge that there are some socially constructed connotations of the term that are meaningful. Thus, race continues to be an important context that impacts our daily lives.

History of the Term “Race” and it's Utility in Science

To better understand race and its impact, we need to understand the historical context in which the concept/term of race emerged. Historians have traced the word race and its usage, and most conclude that the concept of race emerged between the 16th and 18th centuries (Allen, 1994; Smedley, 1998; Smedley & Smedley, 2012). Race was used as a category and was commonly synonymous with a breed, species, or a ‘type’ that represented a category. Toward the 17th century race became increasingly associated with populations, including Europeans, Africans, and Native Americans [Indians] (Smedley & Smedley, 2005). By the Revolutionary war (early-to-mid 18th century), the term race increasingly appeared in written records (e.g., official government documents) taking on a standardized usage to refer to Indians, Blacks, and Whites (Allen, 1994; Omi & Winant, 2014; Smedley & Smedley, 2012). To be clear, these *race-based categories were not neutral terms*. Rather they reflected a new ‘racial’ ideology that increasingly sought to rank humanoids, e.g., rank some races as more/less ‘evolved’ than others (Mills, 2014; Smedley & Smedley, 2005).

For better and for worse, science has played a role in conceptualizing race. In the United States, the prevailing view of humanity in the late 17th and into the 18th centuries was that of equality, freedom, and justice, which were foundations of its constitution. This prevailing view

created a moral problem for a “Christian” nation in which the enslavement of Africans and the exploitation and genocide of Native Americans were part of the economic and social fabric of the country (Haller Jr, 1971; Omi & Winant, 2014; Smedley & Smedley, 2012). One way to ease the moral contradiction of slavery and exploitation/extermination, apart from abolishing it, was to capitalize on notions of racial differences, which led to distinguishing some races—Africans and Native Americans—as subhuman; the imagery of “savages” or “primitives” was often invoked (Fredrickson, 1987, 2005; Mills, 2014; Smedley & Smedley, 2012). To illustrate, at the time of the founding of the United States consider that Thomas Jefferson, often referred to as a “founding father,” published a book in which he rationalized the enslavement of the biologically inferior “Negro” (Jefferson, 1785).

Sadly, science took on the role of trying to authenticate, but not disprove, the burgeoning belief in the United States (and elsewhere) that there were biological differences among races; few scientists even questioned the veracity of the premise of racial differences (Smedley & Smedley, 2005). Science, then, played a key role in creating racial classifications and it supported a belief that certain races—Whites—were engendered with genetic traits that were superior to Non-Whites (Degler, 1971). How did scientists investigate race-based differences (recall that genetics research did not flourish until relatively recently)? One way scientists tried to document race differences in the late 18th century and into the 19th century was through phrenology—a pseudoscience that attributes variations in skull shapes and sizes to differences in intelligence (De Giustino, 2016). Another way was through intelligence testing that emerged in the 20th century and it was quickly co-opted to document racial differences in “intelligence quotient” (IQ), with Whites invariably having higher IQ’s than Non-Whites (e.g., Black, African American; Barnett, Camilli, & Fish, 2002).

Science’s uneasy relationship with race continues presently as it grapples with how, and even if, ‘race’ should be included in scientific endeavors. In the medical field. For example, there is controversy over what is called the “medicalization of race”—simply using race as a variable in medical research tends to legitimize what is a deeply “flawed social construct” (Witzig, 1996). The field of neuroscience faces similar issues. For example, should brain scans (e.g., MRI’s) be analyzed by race, and if so what does it mean if differences are found? The choice to separate brain imaging results by race suffers the same problem faced in the medical field—the choice reinforces and legitimizes the idea that race is real when science fails to find biological evidence for race. While the social sciences (e.g., psychology) tend to be more aware of pitfalls of using race in research, its use still continues.

Research on the role of ethnicity and minority status in socialization stemmed from the widespread recognition that much of the literature on socialization had been based on white, middle-class samples. As the numbers of ethnic minority children in the U.S. increased and researchers learned that: adolescents from other cultural and ethnic backgrounds face different developmental issues and conclusions from research that did not include them could not be generalized. It is still common in social science research in the United States to collect data on research participant’s race and use it as a ‘control variable’; a statistical method to try and control its statistical influence on the relationships of interest. The problem here is that race is frequently included with little or no rationale for using it, which *defacto* legitimizes a 'flawed construct'.

Given the lack of evidence for the systematic, biological existence of races, as well as its historical role in justifying privileged treatment for the dominant group (White), does the concept of race have a valid role in society and science? Some have called for abandoning the use of race-based classifications in science (and government) all together because it legitimizes and

reinforces a construct that has no biological basis (Witzig, 1996); in some European countries, for example, researchers are not allowed to even collect data on participant's race. However, others argue that as long as government and science fails to recognize racial inequalities, race (in the United States) will continue to matter, so abandoning its use would risk blinding society to its social reality and to the ways it permeates our social institutions (Smedley & Smedley, 2005).

So, should researchers use race as variable in research? The answer 'depends' on the reason for its inclusion. At a minimum, when researchers include race in their studies there should be an explicitly stated and justifiable rationale for why it should be used; this however is not yet a common practice. Using race as a 'control' variable should similarly be justified, since including it without justification only serves to legitimize a belief that racial differences exist, that is that race is a biological reality. Perhaps a better approach is to only include race as a variable when the aim of the research is to explicitly examine issues of inequality associated with being a member of a racial group. Scholars do not yet agree on 'best practices' for how to approach race in research, suffice to say that there needs to be greater intentionality and thought given before it is included or excluded in a study.

In summary, race has been used as a fundamental organizing principle of human affairs that a particular society at a particular time in history has found 'useful' or expedient for granting privileged access to resources for some racial groups but not other groups. To reiterate, there are *negligible biological bases* for making racial distinctions, but this does not mean race is not a meaningful social construct. Presently, most social science organizations, including the American Psychological Association, American Sociological Association, and American Association of Anthropologists, explicitly reject biological explanations of race. However, the meaning society assigns to race continues to impact science and daily life (e.g., government, laws). Racial identity (covered later in the course) can be fluid. How one perceives their racial identity can shift with experience and time, and not simply for individuals who are multiracial. The issue remains however, that the social, political, and economic meanings of race, or rather belonging to particular racial groups has made little to no progress. Race—a social construct defined by markers such as skin color, hair texture, eye shape, ancestry, identity performance and a given name—continues to have negative effects on society, even when the intention is positive.

Socioeconomic Status

Another context that influences our lives is our social standing, alternately called socioeconomic status or social class. Socioeconomic status (SES) is a social-category that identifies families and households based on their shared levels of education, income/wealth, and occupational prestige. SES exists because society has created it, just as society has created adolescence. The United States operates on an informal social class system, meaning simply that social classes exist but it is not explicitly acknowledged or formally promoted (e.g., in the Constitution). Socioeconomic status is a socially-constructed reality with real impacts on those in a strata as we will see in a later section (Brooks-Gunn & Duncan, 1997). As a socially-constructed reality, *socioeconomic status represents who society grants access to and use of resources*, including political, educational, and economic resources (Oliver & Shapiro, 1995; Ostrove, Feldman, & Adler, 1999; Power, 1991; Rank, 2000).

Conceptualizing socioeconomic status around who is granted access to what resources and under what conditions makes some people uneasy because it implies some groups may benefit more than others since they have greater access to resources (possibly at the expense of others), or because who is granted access may be beyond individual's control. This uneasiness

often stems from an ideological belief that every person in the United States has fundamentally the same and equal access to resources, and thus social strata exist because of how hard individuals work to leverage those resources. Individuals who are in the upper strata then are the ones who have worked harder than those in lower strata—at least that is the logical conclusion of this underlying ideological belief. This belief is ensconced in the mantra of the “American Dream,” which is constantly communicated in a myriad of subtle and not-so-subtle cultural messages that reinforce it. For example, here are some quotes that capture this message, some are from historical and some from present day persons:

"The road to success is not easy to navigate, but with hard work, drive and passion, it's possible to achieve the American dream."

Tommy Hilfiger (American fashion designer)

"Things may come to those who wait, but only the things left by those who hustle."

Abraham Lincoln (16th president of the United States)

"Talent is cheaper than table salt. What separates the talented individual from the successful one is a lot of hard work."

Stephen King (American author)

"I'm a greater believer in luck, and I find the harder I work the more I have of it"

Thomas Jefferson (3rd president of the United States)

"There are no secrets to success. It is the result of preparation, hard work, and learning from failure."

Colin Powell (Statesman, retired four-star general, United States Army)

"I can say the willingness to get dirty has always defined us as a nation, and it's a hallmark of hard work and a hallmark of fun, and dirt is not the enemy."

Mike Rowe (Host of TV show “Dirty Jobs”)

"When it comes to the American dream, no one has a corner on the market. All of us have an equal chance to share in that dream."

J. C. Watts (American politician, clergyman, athlete)

The American Dream—that anyone regardless of where they originated from or what strata they were born into can find economic success through hard work—is an theoretical ‘ideal’ (hence an ideology), something society strives for. While perhaps a ‘good’ ideal for a society to strive towards, an underlying assumption of the American Dream is that society’s polity, economic rules, educational systems, legal systems, property ownership regulations, etc. (i.e., structural components of society), are equally and equitably accessible to all citizens without regard for factors such as wealth, race, religion, or education (Acker et al., 2006; Beeghley, 2015; Gilbert, 2017). This ideal has not been, nor is it currently, a ‘reality’ for all. Instead, society’s structural components (e.g., polity) privilege some groups resulting in a systematic ‘un-privileging’ of other groups, including social classes (Gilbert, 2017; Power, 1991; Rank, 2000). Thus, the very nature of social stratification is about *inequitable access to resources*.

At this point it may sound like there are nefarious, well-orchestrated groups of people intentionally making up the rules for who gets what in the United States. However, this is not the case; no individual, rich or poor, can be blamed for social inequalities. Social stratification as it currently exists is the result of a long history of socio-cultural construction and struggle to control access to resources. The structural components (e.g., laws) of society in the United States reflect this history, including the exploitation of resources and people. But as bleak as this may sound, society's structural components have also been and can be changed to ensure more equitable access and distribution of resources.

Adolescence—Ethnicity, Race, and Social Class

How does being an adolescent in a particular ethnicity, race, or other minoritized groups, and social class in the United States affect development? There are no simple answers to this question and researchers have struggled to study, in a meaningful way, how these factors shape adolescent development. Most commonly in quantitative research, ethnicity, race, minoritized status, and social class, are used as a 'control variable' to account for potential between-social class/race/ethnicity influences on the findings. Qualitative research (e.g., in-depth interviews) has generally done a better job trying to understand the how adolescents develop within the context of their ethnicity, race, minoritized status, or social class. However, some research fields, such as adolescent development and cultural psychology, have begun exploring the impact race, ethnicity, culture, and SES on development to better understand the implications of this socially constructed term. While this chapter provides a foundation for these concepts in adolescent development, these cultural constructs will be covered in further detail in subsequent chapters as it relates to the topics specifically.

Impact of "Race" on adolescents today: Racism and Discrimination

Adolescence is a time in which issues regarding race and ethnicity become more salient. Several factors indicate that adolescence is a period of particular importance for issues pertaining to race and ethnicity. These factors include increased exposure to others of differing backgrounds, stage-specific concerns such as puberty and dating, and the emerging salience of group identity (e.g., racial/ethnic) in processes of self-understanding (Dubois, Burk-Braxton, Swenson, Tevendale, & Hardesty, 2002).

Developmentally, adolescents begin to explore identity issues generally, and ethnic identity in particular (Phinney & Chavira, 1995). Identity will be covered in more depth in subsequent chapters, however what is important to note is that youth of color and minoritized youth start examining the meaning of their ethnicity and minority status since adolescence is a time in which they may be more aware of racism and prejudice as they are introduced to a wider world through jobs, sports, and other various activities (Phinney & Chavira, 1995).

Cultural norms and biases about race develop over the course of childhood and adolescence and are maintained through our experiences (Telzer, Humphreys, Shapiro, & Tottenham, 2013). Children from diverse ethnic and racial backgrounds living in similar geographical areas are exposed to similar messages about race throughout their environment (Averhart & Bigler, 1997). By 6 years of age, some children demonstrate implicit biases about race (Baron & Banaji, 2006), and by 10 years, children internalize the social and moral norms of their culture, demonstrating increased knowledge regarding racial stereotypes and cultural norms (Apfelbaum, Pauker, Ambady, Norton & Sommers, 2008).

An intriguing neuroimaging study examined the neurodevelopmental trajectory of the

amygdala in response to race across childhood and adolescence (Telzer, Humphreys, Shapiro, & Tottenham, 2013). The amygdala structure is involved in nonconscious processing of stimuli that have an acquired emotional significance based on previous experience, and plays a role in sensitivity to the salience of environmental cues (Cunningham & Brosch, 2012). Thus, the amygdala plays a key role in learning about socially constructed values placed on social groups, such as those about race. Telzer et al (2013) examined differences in amygdala response to race to test whether the pattern of amygdala response to African American and Euro American faces that is observed in adulthood is present in early childhood or whether it emerges across development. Results suggest that differential amygdala response to African-American faces does not emerge until adolescence, reflecting the increasing salience of race across development, which may reflect learned cultural knowledge, such as implicit and explicit stereotypes. In addition, greater peer diversity was associated with attenuated amygdala response to African American faces, suggesting that intergroup racial contact may reduce the salience of race (Telzer et al., 2013).

What are some of the implications of race for adolescents? Race related stress has been linked to greater levels of emotional and behavioral problems in adolescence (Dubois et al., 2002). Prejudice/discriminatory events, as well as race-based daily hassles make a significant contribution to overall level of stress reported by young adolescents. (Dubois et al., 2002) Perceived prejudice or discrimination is directly linked to poorer mental health in the form of emotional problems. Mechanisms through that account for this type of association include (1) internalized feelings of anger stemming from incidents of perceived racism, (2) the context in which these incidents occur, (3) lack of support in efforts to deal with situations that involve perceived victimization or unfair treatment on the basis of race. For example, prejudice or discrimination that occurs in a school context in which the student has limited access to cross-race friendships and support are more likely to experience emotional problems (Dubois et al, 2002). The problem is that many types of events and situations involving prejudice or discrimination may exacerbate levels of stress in other areas. For instance, unfair treatment on the basis of race in a particular setting (.e.g., school) may create significant additional obstacles to adaptation within that same context.

Racial identification relates to an individual's way of perceiving and responding to the environment (Thompson, 1990). It is strongly influenced by system forces, parental attitudes, physical characteristics, and self-perceptions (Helms, 1990). Racial identification has shown to be most commonly influenced by the age at which racism is confronted, the belief that race is important, the level of involvement in groups and organizations of that race, as well as racial composition of the environment during adolescence (Thompson, 1990).

Conclusions

All of this is important to consider in context when we consider adolescent development. As you will learn in this book, experiences vary depending on the cultural context of the adolescent and that these cultural concepts (race, ethnicity, SES, and status in society) are strong factors that shape our experiences. In each chapter in this book, there will be specific sections devoted to examining ethnicity, race, and socioeconomic status in relation to a chapter's topic (e.g., identity). For some topics, there may be minimal research to report and will be noted. As you will most likely note, there is much work to be done to understand how ethnicity, race, and socioeconomic status intersect with adolescent development.

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3

Puberty

Objectives

- Identify the three main endocrinological events associated with puberty.
- Identify the primary somatic changes that occur during puberty.
- Explain how variations in the onset and duration of puberty impact various groups.
- Describe the social implications of puberty.

Overview

Puberty is a developmental period in which hormonal changes cause rapid physical alterations in the body, culminating in sexual maturity. Pubertal maturation is the one change that all adolescents will experience (universal). However, the timing and social significance of pubertal maturation varies across time and culture. In this chapter we will examine how the brain is involved in puberty, the somatic changes that accompany puberty, variations in the timing of puberty, and the social implications of puberty. In and of itself puberty has no socio-cultural meaning. However, societies both present and past have created particular meanings to puberty. As you read this chapter, ask yourself what meanings you have internalized about puberty. If you find that a particular meaning (understanding) is different from what the research implies, ask yourself why it differs or how the interpretation of the research reflects a particular meaning.

The Endocrinological Process of Puberty

Puberty is controlled by the [endocrine system](#) through complex interactions within several endocrine system [axes](#). The endocrine system is involved in a wide range of functions, but here we focus on its regulation of the reproductive system.

What are the functions of the endocrine system? The endocrine system produces hormones that function to control and regulate many different body processes, and it coordinates with the nervous system to control the functions of the other organ systems. Cells of the endocrine system produce molecular signals called [hormones](#). These cells may compose endocrine glands, they may be tissues, or they may be located in organs or tissues that have functions in addition to hormone production. Hormones circulate throughout the body and stimulate a response in cells that have receptors able to bind with them. The changes brought about in the receiving cells influence the functioning of the organ system to which they belong. Many of the hormones are secreted in response to signals from the nervous system, thus the two systems act in concert to effect changes in the body.

Cellular processes, such as the building and breaking down of complex molecules, occur through stepwise chemical reactions. Some of these chemical reactions are spontaneous and release energy, whereas others require energy to proceed. Just as living things must continually consume food to replenish their energy supplies, cells must continually produce more energy to replenish what is used by the many energy-requiring chemical reactions that constantly take place. Together, all of the chemical reactions that take place inside cells, including those that consume or generate energy, are referred to as the cell's *metabolism*.

Three Endocrinological Events of Puberty

The brain controls puberty through the endocrine system. Thus, the brain gives the orders to start and regulate puberty, as well as to regulate 'sex' hormones once sexual maturation (adulthood) is attained. Puberty involves three overlapping endocrinological events: adrenarche, gonadarche, and growth axis activation (Brooks-Gunn & Reiter, 1990; Dorn, Dahl, Woodward, & Biro, 2006; Petersen & Taylor, 1980). The physiological aim of puberty is attainment of reliable reproductive capabilities characteristic of adult members of a species (L. A. Rosenblum, 1990). Although puberty's aim is physiological maturation, it also initiates psychological and neurological changes.

Adrenarche

Adrenarche is the first stage of sexual maturation among humans and, it involves the activation of the *hypothalamic-pituitary-adrenal* (HPA) axis. The adrenal gland produces several hormones, one of which is the sex hormone called adrenal *androgens*. Androgens are a chemical “precursor,” which is simply a substance from which more potent or active forms of a hormone are derived. The active forms of hormones derived from, but not by, the HPA are *testosterone* and *estrogen*. Although testosterone gets associated with males, it is present in all persons but males tend to have higher levels of testosterone than females. Similarly, estrogen gets associated with females, but males also produce estrogen, although typically at lower levels than females. One function of adrenal androgens is to regulate “[libido](#)” and sexual arousal.

In childhood, adrenal androgens are produced in small amounts, but with the onset of puberty there is an increased production of adrenal androgens in both boys and girls—we refer to this endocrinological event as *adrenarche*. The onset of adrenarche, and subsequent increase in androgens, begins among girls between the ages of 6-9 and among boys between ages 7-10, building to a peak approximately ten years later (S. J. Blakemore, Burnett, & Dahl, 2010; Dorn et al., 2006). Adrenarche contributes to the development of *secondary sex characteristics*, including development of pubic and axillary hair, slightly accelerated rate of bone growth, and changes to sweat glands with a resulting change in body odor (Cutler & Loriaux, 1980; Spear, 2000). Curiously, adrenarche is not commonly associated with puberty per se, rather the endocrinological event of gonadarche is.

Gonadarche

Gonadarche is a second stage of sexual maturation and it involves the *hypothalamic-pituitary-gonadal* (HPG) axis. Note that referring to gonadarche as a ‘second stage’ does not mean it occurs after adrenarche is finished. Rather it overlaps with adrenarche; thus technically, the onset of gonadarche occurs after the onset of adrenarche. The HPG axis is associated with periodic, recurring increases/decreases of gonadotropin hormones (cycle)—testosterone and estrogen (Spear, 2000). Testosterone and estrogen (the active forms of the adrenal androgens) are produced in the male testes and female ovaries, respectively. The end of gonadarche occurs with attainment of reproductive competence (S. J. Blakemore et al., 2010), meaning a reliable ability to reproduce.

It is important to understand how the HPG axis (indeed the endocrine system) determines when and when not to produce hormones, because there is a major change in HPG activation during adolescence. The easiest way to explain how the HPG functions is to think of how a thermostat in your room or house works. It is constantly assessing the ambient room temperature and if the temperature falls below (or above) a set point, it signals the heating or cooling system to activate in order to raise or lower temperature accordingly. The heating/cooling system in this example represents the hypothalamus and pituitary gland (the ‘H’ and ‘P’ of HPG). The hypothalamus either inhibits or stimulates the pituitary as needed depending on the signals it receives about hormone levels in the blood. The pituitary, in turn, sends signals to the gonads to increase production of hormones. Subsequently, information about levels of hormones in the blood feed back to the hypothalamus, which then adjusts its signal to the pituitary, and so on. Hence we refer to this as an axis or feedback loop.

Prior to birth in the fetal period of development (9 weeks to birth), gonads develop in males and begin to secrete hormones, which after a series of events results in the male internal

and external sex organs and the establishment of the HPG axis (Brooks-Gunn & Reiter, 1990). Importantly, if this process occurs it result is a boy and if not the result is a girl. After this relatively short period of a spike in hormone production in the fetal period, the HPG axis slows after birth and results in a low level of hormone activity until middle childhood when the HPG axis begins to “reactivate” (Reiter & Grumbach, 1982). After birth, then, the HPG axis (thermostat in the above example) is set to a low level of hormone production (set point). However, with the onset of gonadarche, the set point gets altered and a new set point occurs, resulting the increased production of testosterone and estrogens. The change in set point is not as sudden or drastic as it might sound. The process of change can take several years before the final stable set point is attained (maturation attained), and once reached the HPG axis continues to operate to maintain this level in adulthood.

Gonadarche begins around age 11 for girls, with a range of 8 to 13, and around age 13 for boys, with a range of 9 to 15 (Tanner, 1990). Early sign of gonadarche in girls—breast budding referred to as *thelarche*—before the age of 8 is considered “precocious” (early) and if it occurs after age 13 it is considered “late” (delayed); for boys, early signs of gonadarche—testicular enlargement and thickening and reddening of scrotum—before the age of 9 is precocious and if after age 14 it is late (Rogol, Roemmich, & Clark, 2002). Be aware, however, that the average age of gonadarche onset differs depending on factors such as race, nutrition, etc., which we discuss in a subsequent section on variations in the timing of puberty. As you might have guessed, gonadarche in girls relates to menarche—menstrual period. Gonadarche in boys is called spermarche, although this term is less commonly used.

Gonadarche results in an increase in lutenizing hormone (LH) and follicle-stimulating hormone (FSH) from a [pulsatile](#) gonadotropin secretion. Early in puberty, LH production “surges” at night leading to elevated levels in the morning and then dissipates throughout the day. However, as the HPG axis matures in middle-to-late adolescence, the increased pulsatile production occurs during the day also, resulting in more stable, but elevated (compared to childhood) levels of gonadal hormones (Rogol et al., 2002). Finally, increased LH and FSH levels lead to the further development of secondary sex characteristics, including breast development for girls, testicular development for boys, and axillary hair for both.

Growth Hormone Axis

Coinciding with gonadarche is the dramatic activation of the growth hormone (GH) axis; it can be difficult sometimes to distinguish gonadarche from GH in the literature but they are more commonly now treated as distinct events. Thus, it is best to think of GH and gonadarche as distinct but closely interacting events. Note also that researchers may refer to this as the growth hormone/insulin-like growth factor-1 (GH/IGF-1) axis (Loche, Casini, & Faedda, 1996), which is technically more accurate but wordier and why here we refer to it as GH. During puberty, there is a substantial, albeit time limited, increase in growth hormone (GH) production, with some research suggesting this axis operates at its maximum capacity for a time during puberty (Martha, Gorman, Blizzard, Rogol, & Veldhuis, 1992). By the end of pubertal development and the stabilization of HPA and HPG axes, the HG levels return to their prepubertal levels (Rogol et al., 2002).

As the name ‘growth hormone’ indicates, the GH axis is responsible for rapid body growth during puberty, known as a “growth spurt.” The rate of growth is astounding, equivalent at its peak to the growth rate in infancy. That said, estimating an average growth in height (e.g., inches) does not make sense since an individual’s final height is heavily controlled by genetics,

but also other factors, such as nutrition and health. Instead, we examine “peak height velocity” (PHV), which is calculated from measurement of an individual’s standing height taken every three months during puberty. PHV is simply the point of greatest incremental growth during puberty for a given 12 month period (Sanfilippo & Jamieson, 2008), which you can see depicted in Figures 1 and 2.

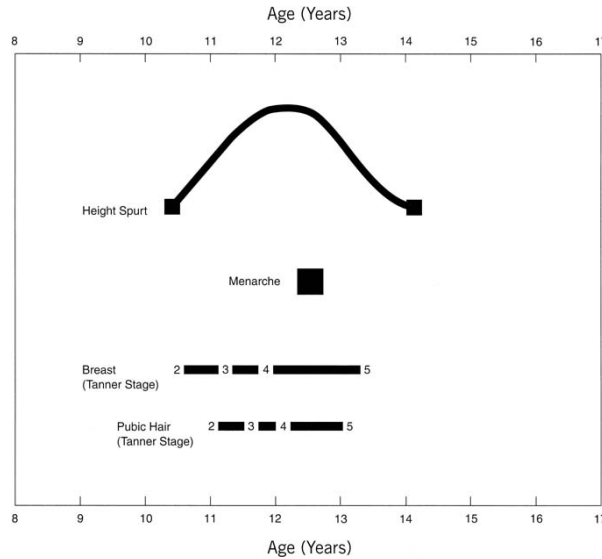


Figure 1. Sequence of pubertal events in the average American girl. (Tanner JM: Growth and endocrinology of the adolescent. In Gardner LI [ed]: Endocrine and Genetic Diseases of Childhood and Adolescents, p 14. 2nd ed. Philadelphia, WB Saunders, 1975.)

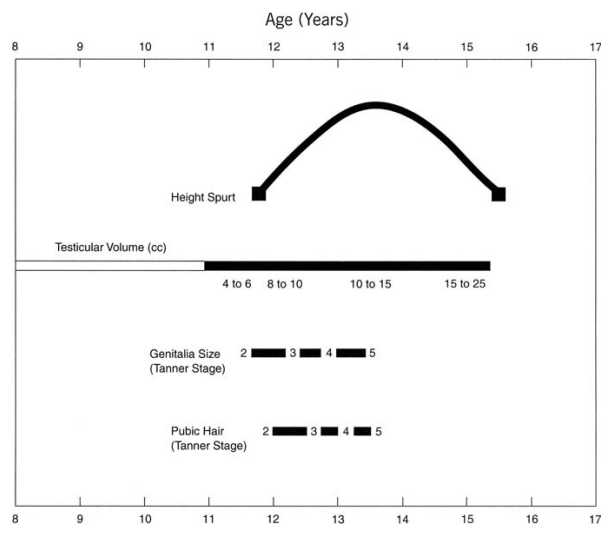


Figure 2. Sequence of pubertal events in the average American boy. (Tanner JM: Growth and endocrinology of the adolescent. In Gardner LI [ed]: Endocrine and Genetic Diseases of Childhood and Adolescents, p 14. 2nd ed. Philadelphia, WB Saunders, 1975.)

The adolescent growth spurt occurs around age 11.69 for girls and age 13.74 for boys in the United States and Europe (Abbassi, 1998). The average centimeters of growth during PHV in United States and European girls is 8.14 cm/year and 9.14 cm/year for boys (Abbassi, 1998). By age 14.30, 95.1% of girls in the United States have achieved PHV, whereas only 70.7% of boys have achieved PHV (Granados, Gebremariam, & Lee, 2015). Note that estimates for age of PHV can vary depending on the country of origin, race/ethnicity, and the method used to compute estimates.

Somatic Changes of Puberty

As already noted, puberty initiates a host of somatic (physical) changes—the development of *secondary sex characteristics*, the development of *sex glands and organs*, as well as a *rapid acceleration of growth* in height. There are two additional somatic changes that occur during puberty as well: changes in *body composition* and changes in the *respiratory/circulatory system*.

Body Composition Changes

Overall, both males and females experience an increase in muscle and fat during puberty but the relative ratio of muscle-to-fat differs between males and females (Brooks-Gunn & Reiter, 1990). Lean body mass (e.g., muscular parts), bone mass, and body fat are similar between

prepubertal boys and girls, that is, before the onset of gonadarche and activation of growth hormone axis (Archibald, Graber, & Brooks-Gunn, 2003). By the time puberty ends (postpubertal), boys have approximately 1.5 times lean body mass (muscle) compared to girls, while girls have 2.0 times the body fat of boys (Loomba-Albrecht & Styne, 2009). Much of this difference in muscle/fat between boys and girls we attributed to endocrine factors, although the degree to which we can attribute exercise/active lifestyle patterns, gender-expectations, and other social factors to this difference is unknown and could have an impact.

Respiratory/Circulatory Changes

Overall, puberty initiates a volumetric increase in the respiratory and circulatory systems. This increased capacity, however, is not due to growth of new lung or other circulatory tissue. Instead, the increased capacity is due to thoracic growth (trunk of upper body) and physical growth. Changes in respiratory and circulatory systems occurs approximately 1-2 years after the adolescent growth spurt (e.g., peak height velocity; Rosenthal & Bush, 2002). The change can appear sudden. For example, both adolescent boys and girls in one study had greater lung function than children—on average, 153 cm³ greater capacity (Dickman, Schmidt, & Gardner, 1971). There are also differences between adolescent males and females in respiratory and circulatory changes. Overall, adolescent males experience a greater increase in capacities than females. Most, if not all, of this difference is attributable to males' growth in the depth of their thoracic (trunk), which changes less so for females (DeGroot, Van Pelt, Borsboom, Quanjer, & Van Zomeren, 1988).

A word of caution is in order at this point. While there are notable differences in the somatic impact of puberty between sexes, this should not lead to the conclusion that one somatic difference is superior/inferior to the other. Instead, these differences emerged over long periods of time and are of a particular evolutionary advantage for each sex. Importantly, although societies have constructed meanings around these differences, the differences do not place limits on the capacities of one sex or the other as some of societal meanings imply.

Variations in the Onset of Puberty

There can be considerable variation in the timing of the endocrinological events of puberty. In this section we will summarize some of these variations.

Sex variations

As you probably noticed in the previous sections, girls tend to start puberty earlier than males, between 1-2 years sooner. The onset of andrenarche for girls is between ages 6-9 and 7-10 for boys; the onset of gonadarche for girls is around age 11 and around age 13 for boys; activation of the growth hormone axis occurs for girls around age 12.5 and around age 13.8 for boys. While girls start puberty earlier, once puberty has started for either sex the sequence of events is the same.

Intra-individual Variations (within the individual)

Although the sequence after the onset of puberty is relatively consistent, there are marked differences across individuals in the 'tempo' of puberty (Archibald et al., 2003); tempo refers to the rate at which a person progresses through the endocrinological events (you could also refer to this as the duration of puberty). Researchers generally attribute differences in the tempo of

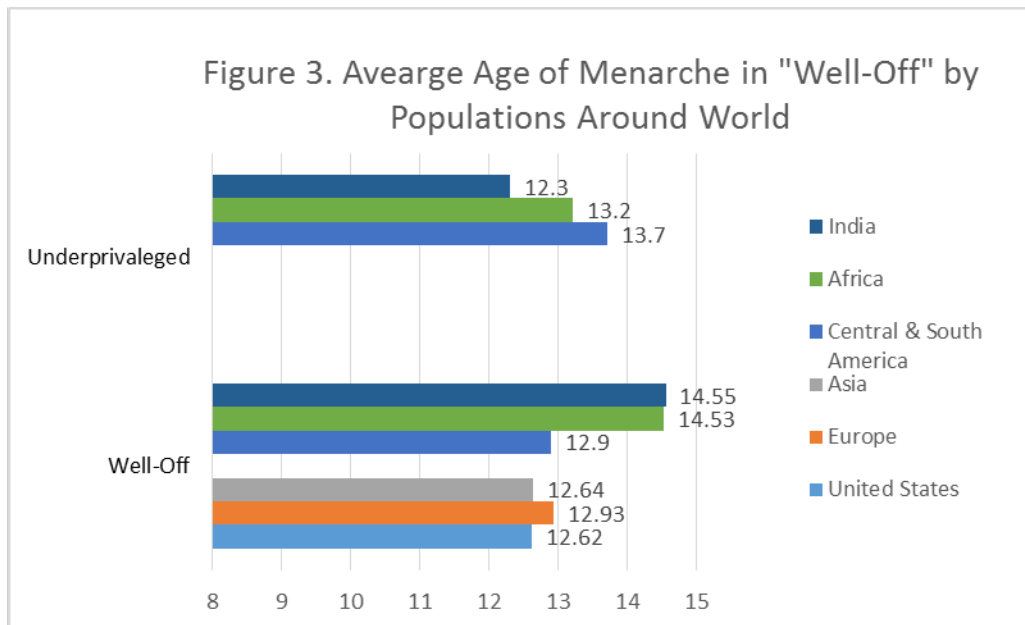
puberty to inherited genetic factors (Marshall & Tanner, 1986), but they have yet to fully understand how these genetic factors interact with an individual’s environment to collectively impact puberty’s tempo. For example, health and nutrition are factors known to affect puberty but exactly how they interact with an individual’s genetic make up to achieve such affects is still not fully understood.

Inter-individual Variations

There are differences in the onset of puberty between individuals, which also implies differences in the end of puberty. The average ages of pubertal onset noted in the prior sections could give the impression that the onset is relatively that same for most individuals given their sex. However, that impression is somewhat misleading. The age ranges for the onset of puberty give a better sense of potentially large differences between individuals. Researchers often use the terms “on-time,” “early/precocious,” and “late/delayed” to describe these inter-individual differences. We noted above, for example, that researchers consider a girl who has yet to experience the onset of gonadarche after age 13 as “late” and “early/precocious” if it occurs before age 8. These designations (early, on time, late) are relative to current pubertal trends rather than to historical trends (discussed next). Importantly, the meaning of being early, on-time, or late for an adolescent is relative to the onset of puberty among her or his peers. Thus, the impact of pubertal onset relates to being in/out of sync with one’s peers rather than out of sync with adolescents in a population. We discuss this impact in a subsequent section.

Intergenerational Variations

There are between-generation differences in the timing of puberty. We refer to these intergenerational variations as a *secular trend*. In general, the onset of puberty has dropped by



Estimates in Figure 3 calculated from: Parent, A.-S., Teilmann, G., Juul, A., Skakkebaek, N. E., Toppari, J., & Bourguignon, J.-P. (2003). The timing of normal puberty and the age limits of sexual precocity: variations around the world, secular trends, and changes after migration. *Endocrine reviews*, 24(5), 668-693.

about four months per decade, depending on living conditions. Between the mid-19th century and the mid-20th century, the average age of menarche (similar trend for boys) decline precipitously in the United States as well as in some European countries; it declined three years over a 100 year period, from age 17 to age 14, and continued to decline in these countries until the 1960's (Parent et al., 2003). As a result, you most likely experienced puberty earlier than your parents, grandparents, etc. This decline is associate with improved living conditions, including health care and nutrition. The secular trend for puberty has essentially leveled-off in affluent countries (Figure 3). Some researchers suggest that high living standards have allowed humans to reach the evolutionarily 'optimal' age of puberty, the age at which puberty happens under favorable environmental conditions (Gluckman & Hanson, 2006).

In "underprivileged" countries, average age of menarche differs depending on access to higher/lower living standards. Among adolescents in underprivileged counties with access to high living standards, the age of menarche has declined and continues to decline, while the age of menarche among those experience lower living standards is higher (Figure 3). A similar pattern is often observed when comparing the timing of pubertal events between rural, urban, suburban populations. In regions that are underprivileged in terms of resources (e.g., health care access, nutrition), onset of puberty may be higher than in more privileged regions. Thus, access to health and wellness promoting resources is a key explanation for differences in the timing of puberty.

Race/ethnicity Variations

There are possible variations in the timing of pubertal events depending on race/ethnicity. In the United States, some studies indicate that the age of the onset of puberty may be lower for African-American girls compared to White, non-Hispanic girls, although this depends on if researchers use breast development as a measure of puberty or menarche. If breast development is used, the median age for African-American girls is 9.5 and 10.4 for White girls. When menarche is used as the measure of puberty, race differences are minimal, 11.4 compared to 11.5, respectively (Wattigney, Srinivasan, Chen, Greenlund, & Berenson, 1999); African-American girls experience puberty the latest, on average, followed by White, Hispanic, and African-American girls (Weir, 2016). Given the research literature at this point, we cannot definitely conclude there are variations in puberty among girls due to race or ethnicity. Instead, the 'safest' conclusion at this point is that variations based on race or ethnicity in the United States could be due what indicator/measure of puberty is used by researchers.

Social Implications of Puberty

The timing of puberty in both boys and girls is important because it can have a significant psychological impact. The impact, however, differs by sex and race/ethnicity. A key distinction to keep in mind is that the impact of variations in the timing of puberty for an individual are relative to an adolescent's peer group—early, on-time, or late. Most of the research on the impact of the timing of puberty have been based on White, non-Hispanic, middle-class samples in the United States. Thus, it is important to keep in mind what population the findings are based on.

In general, early maturing White, non-Hispanic females—compared to on-time and late maturing females—experience greater problems with this social transition, including experiencing greater stress and emotional problems, a lower self-image, and higher rates of depression, anxiety, and eating disorders, and earlier sexual behavior (Ge, Conger, & Elder, 1996; Mendle, Turkheimer, & Emery, 2007). Although African-American girls are typically the

first to develop (depending on how measured, e.g., breast development), they are appear less likely to experience negative consequences of early puberty when compared to European-American girls (Weir, 2016). Late maturing White, non-Hispanic females, compared to on-time and early maturing females tend to experience fewer adjustment problems.

In contrast to early maturing females, boys who mature earlier may attain a social advantage because they are taller and stronger and, therefore, often more popular, confident, and channeled into sports (Graber, 2013; Lynne, Graber, Nichols, Brooks-Gunn, & Botvin, 2007; Mendle et al., 2007). At the same time, however, early-maturing boys are at greater risk for delinquency and are more likely than their peers to engage in antisocial behaviors, including drug and alcohol use, truancy, and precocious sexual activity (Mendle et al., 2007). Late maturing males may also experience adjustment problems in the form of decreased self-esteem, enhanced risk of depression, and problems in dating relationships.

Conclusions

Although it is tempting to view puberty from a sterile biological lens, biological changes of puberty interact with the societal understandings and structures (e.g., laws) that shape how we think and feel about sexual maturation and sexuality. We introduced this chapter by asking you to think about how your understandings of puberty align or misalign with research—asking you to become aware of the socially constructed meanings you have internalized. Society embeds puberty meaning. Sometimes these meanings are useful and sometimes not, but they always impact the ways societies react to individuals experiencing puberty. Make a point then to become aware the embedded meanings (messages about) and how they influence how society treats pubertal individuals.

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4

Brain Development

Objectives

- Name the various parts of a neuron.
- Explain how neurons develop and transmit signals.
- Explain the role of several key neurotransmitters and how they influence brain function.
- Provide an evolutionary argument for the modular structure, function, and development of the brain.
- Explain how neuroimaging is used to define functional networks and brain systems.
- Describe the stage wise progression of human development in terms of structural, neuroanatomical changes and functional connectivity changes.

Overview

Neuroscience is where biology and psychology meet. The brain and the nervous system compose the most complex parts of the human body, and their interactions and development have profound implications for understanding thinking, motivation, emotion, and behavior. A basic understanding of neuroanatomical structures and functions is an essential part of contemporary psychological theory. This chapter provides an overview of how our brains are organized, how they function, and the distinct changes that occur to the brain during adolescence, including the implications for thinking and behavior that these changes initiate.

Neuroanatomical Foundations

An adult human brain is composed of about 100 billion [neurons](#) and about 1 trillion [glial cells](#). Neurons have a specific type of anatomy that allows them to communicate with other neurons by chemical and electrical means at junctions known as [synapses](#). Synapse creation and elimination is a critical component of brain development, network formation, and learning. Network pathways (a conglomeration of connected neurons that serve a specific function) can be enhanced (faster impulse transmission) and made more efficient through a process known as [myelination](#), as well as various neurotransmitter chemicals that can alter signal strength between neurons. During adolescence, there are distinct patterns of network formation (e.g., new networks), changes to existing networks, and myelination. An understanding of neurons and how they communicate is needed to appreciate the importance of the brain changes that occur during adolescence. Thus, that is the focus of the next section.

Neurons

Anatomy of a Neuron. Neurons are single cells consisting of a [soma](#) with branched extensions (dendrites) that receive signals from the [axon terminals](#) of other neurons. [Dendrites](#) and axon terminals meet at [synapses](#). Neurons sending a signal are [presynaptic cells](#) and neurons

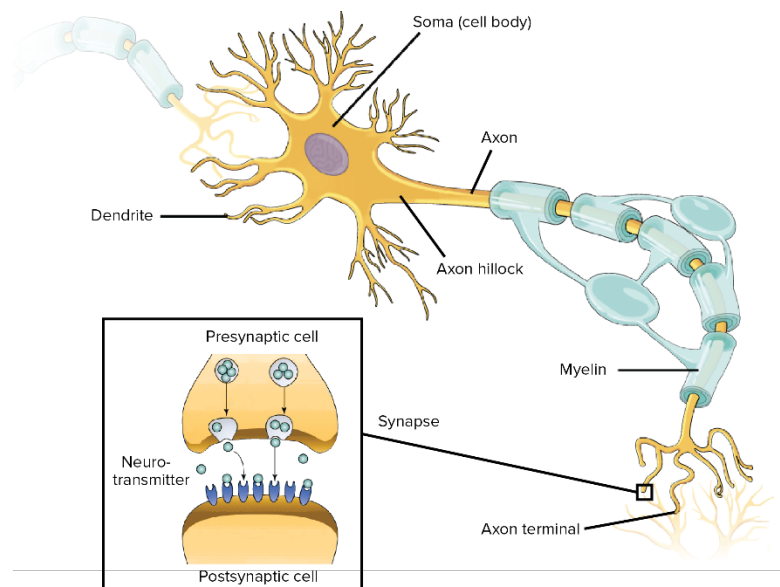


Figure 1. Neuron, presynaptic cell (signal sending neuron), neurotransmitter, and postsynaptic cell (signal receiving neuron)

receiving a signal are [postsynaptic cells](#). [Myelin](#) is a fatty tissue that forms a whitish insulating sheath around the axon, which facilitates faster, more efficient [action potential](#) transmission.

Neuronal Signaling. In simplified terms, neurons function via an [electrical potential gradient](#) caused by differing [ion](#) concentrations across their [cell membranes](#). The inside of the neuron has a net negative charge and the outside has a net positive charge, thus giving it a resting membrane potential of about -70 millivolts (mV). A single neuron may receive inputs from many presynaptic neurons and have connections with many postsynaptic neurons via different axon terminals. Neurotransmitter reception (signals received from another neurons' axon terminals) can have an [excitatory](#) or an [inhibitory](#) effect on the postsynaptic potential of the neuron. These excitatory and inhibitory inputs [summate](#) at the axon hillock. If there is enough excitatory input, the neuron will reach its action potential threshold (about -55 mV) and release an action potential that peaks at about +40 mV and travels down the axon and stimulates the release of neurotransmitters from its own axon terminals.

At most synapse junctions, signals are transmitted via chemical messengers known as [neurotransmitters](#). Action potentials along the axon are an all or nothing signaling mechanism, however, increasing or decreasing the amount of neurotransmitter released and/or altering the number of receptors on the receiving cell can alter synaptic signaling. Such changes can strengthen or weaken communication between particular synapses and thus strengthen/weaken neurons. Variations in neurotransmitter synthesis, breakdown, release, reception, uptake, and the degree of similarity between neurotransmitters and other chemicals play a key role in many psychological and behavioral phenomena including mood and addiction.

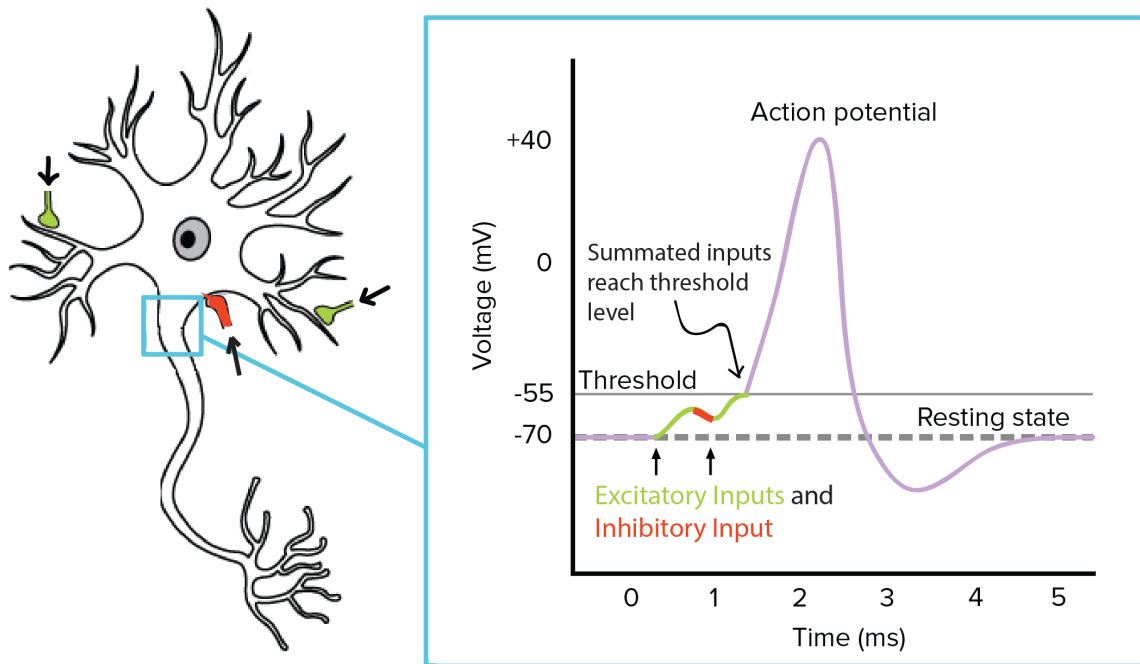


Figure 2. Illustration of excitatory and inhibitory inputs on dendrites and cell body graph of summated inputs reaching action potential threshold.³

³ _Image modified from "Neurons and glial cells: Figure 2" and "Synapse," by OpenStax College, Biology (CC BY 3.0)._

Neurotransmitters. Neurotransmitter function is complex and highly dependent on context. For example, the neurotransmitter [acetylcholine](#) has an excitatory effect on [neuroreceptors](#) in skeletal muscle but an inhibitory effect on neuroreceptors in heart muscle. Another neurotransmitter, [serotonin](#), helps regulate mood in the brain, appetite and digestion in the gut, and, as the precursor to melatonin (a hormone), serotonin helps regulate the body's sleep-wake cycles. Neurotransmitters and hormones often interact, and some neurotransmitters can act as hormones themselves depending on context. For example, oxytocin can enter the blood as a hormone via the posterior pituitary gland but it also functions as a neurotransmitter at a number of central synapses. Below is a table of a few of the most common neurotransmitters:

Neurotransmitter	Abbreviation	Behaviors or Diseases Related to These Neurotransmitter
Acetylcholine	ACh	Learning and memory; Alzheimer's disease' muscle movement in the peripheral nervous system
Dopamine	DA	Reward circuits; Motor circuits involved in Parkinson's disease; Schizophrenia
Norepinephrine	NE	Arousal; Depression
Serotonin	5HT	Depression; Aggression; Schizophrenia
Glutamate	GLU	Learning; Major excitatory neurotransmitter in the brain
GABA	GABA	Anxiety disorders; Epilepsy; Major inhibitory neurotransmitter in the brain
Endogenous Opioids	Endorphins, Enkephalins	Pain; Analgesia; Reward

Figure 3. Table of common neurotransmitters.⁴

Highly relevant to adolescent development is how neurotransmitters can be affected by various means, including [endogenous](#) hormones and [exogenous](#) chemicals. For example, [tetrahydrocannabinol](#) (THC), the primary psychoactive chemical in marijuana, has a psychoactive effect because of [cannabinoid receptors](#) of the [endocannabinoid system](#) throughout the brain and body. In the brain, these receptors are found predominantly in the [hippocampus](#), [cerebellum](#), and [striatum](#). Through a relatively complex series of physiological processes, psychoactive cannabinoids increase the activity of [dopaminergic neurons](#) in the [ventral tegmental/mesolimbic pathway](#) (a key network involved in rewarding and reinforcing effects). In later chapters, it will become apparent how neurotransmitters can have major influences on learning, behavior, and long-term outcomes by disrupting networks such as the ventral tegmental/mesolimbic pathway during their formative stages.

⁴ Image credit: modified from *Communication between neurons: Figure 2* by OpenStax College, Anatomy & Physiology, CC BY 3.0 and *Action potential* by tiZom, CC BY-SA 3.0; the modified image is licensed under a CC BY-SA 3.0 license

Neurogenesis and Synaptic Pruning. [Neurogenesis](#) is the growth and development of nervous system tissue. In the brain, neurogenesis starts with the proliferation of a vast number of undifferentiated brain cells. These cells then migrate toward predetermined locations in the brain and begin differentiating into the specific types of cells appropriate for that location. These similar types of cells then aggregate into distinct regions of the brain. In a human [fetus](#), this process is very fast. At about 12- to 14-weeks of gestation, nerve cells proliferate at a rate of about 15 million per hour! Next, the differentiated neurons begin forming synaptic connections within and across regions, resulting in about 100 trillion synapses. Finally, competition among these connections stabilizes some connections while eliminating others. After about 18 months of age, the rate of neuron production slows dramatically and all of the structures/regions (i.e., and the aggregation of cell types into distinct regions) is almost complete. From then until puberty, the brain develops primarily through the creation and pruning of the excess synapses and through the myelination of axons. With the onset of puberty, however, there is a resurgence of neurogenesis (generation of neurons) and synaptogenesis (generation of synapses) in *key areas*; the rate of neuron and synapse production parallels that before 18 months of age. Similarly, during adolescence there is a dramatic rate of pruning, upwards of 30,000 per second. This neuronal and synaptic growth along with pruning during adolescence implies there is a particular evolutionary aim for the growth, something we will return to later.

Myelination (Grey/White Matter). The vast majority of soma, dendrites, and axon terminals are located in the [grey matter](#) areas of the brain. The appearance of [white matter](#) is caused by the myelination of axons that connect various brain regions. These axons often travel long distances in the brain and connect specialized functional areas via white matter tracts.

White matter is formed via the myelination of axons. Myelination protects axons and allows for faster and more efficient movement of the action potential along the axon. Thus, myelination is built in (process) response to neuronal connections that are used frequently. The human brain shows a relatively standard trajectory for grey and white matter formation from birth to adulthood, but variations do occur as a result of genes, environment, and experience. For example, the following illustration shows the average grey matter volume differences in children from low, medium, and high [socio-economic status](#) (SES). The differences in white matter formation by SES categories is likely attributable to systemic advantages that higher SES confers via enhanced opportunities and experiences (e.g., education, environmental enrichment, etc.).

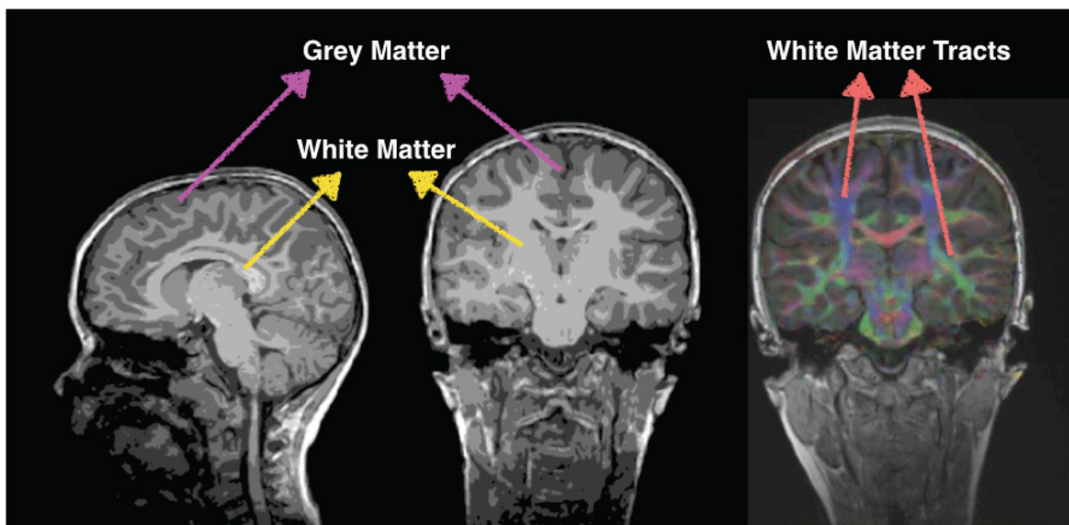


Figure 4. MRI showing grey and white matter locations.⁵



Figure 5. Top view, white matter tracts obtained via MRI tractography.⁶

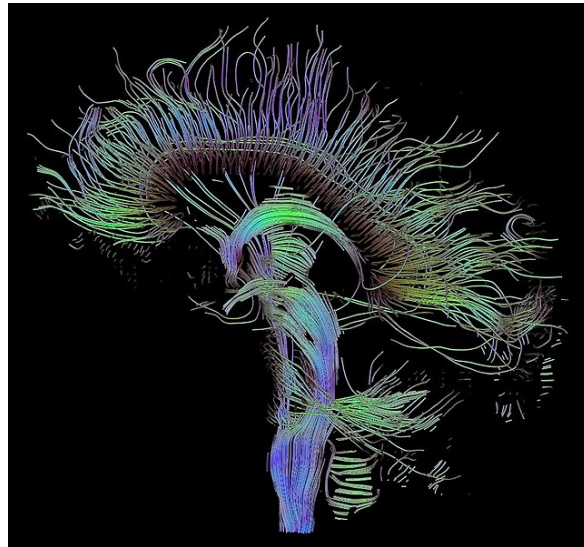


Figure 6. Side view, white matter tracts obtained via MRI tractography.⁷

⁵ Vertebrate-brain-regions_small.png. Provided by: Wikimedia Commons. Located at: https://commons.wikimedia.org/wiki/File:Vertebrate-brain-regions_small.png. License: Public Domain: No Known Copyright

⁶ Matejko A (2014) White Matter Counts: Brain Connections Help Us Do 2 + 2. *Front. Young Minds.* 2:19. doi: 10.3389/frym.2014.00019

⁷ Gigandet X, Hagmann P, Kurant M, Cammoun L, Meuli R, et al. (2008) Estimating the Confidence Level of White Matter Connections Obtained with MRI Tractography. *PLoS ONE* 3(12): e4006. doi:10.1371/journal.pone.0004006

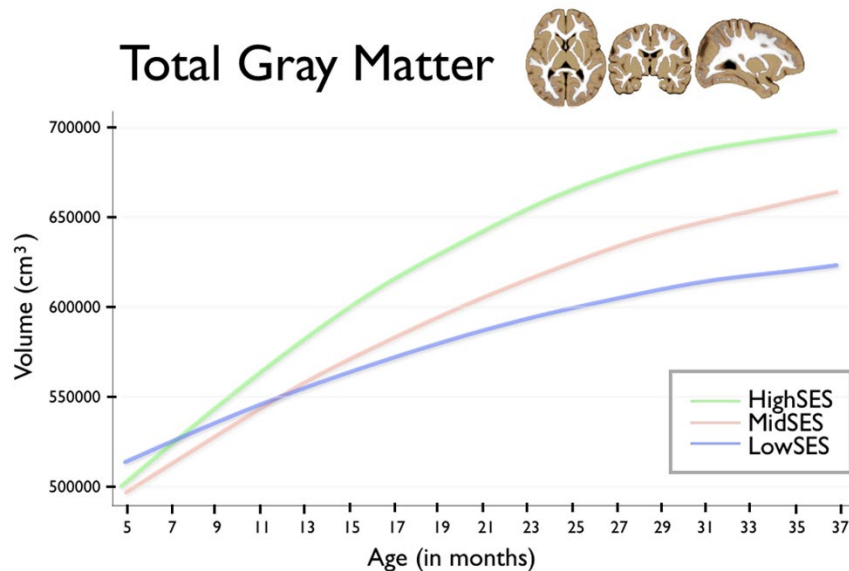


Figure 7. Total grey matter volume by age and SES. ⁸

Grey matter volume peaks at about age 11 in girls and 12 in boys (about the same time as puberty) while white matter volume peaks at about age 10.5 for females and 14.5 for males, but white matter continues to linearly increase across adulthood depending on many factors including sustained learning and new/novel experiences. There are many significant differences in the rate and regions of grey matter and white matter formation between boys and girls. Later chapters will look at how the varying rates at which certain regions of the brain develop can have developmental, psychological, and behavioral impacts.

Modularity of the Brain

Hundreds of millions of years of evolution have left humans with a brain highly capable of unique skills such as language, creativity, and complex problem solving. Through processes of [natural selection](#), various parts of the brain inherited from our ancestors have become specialized to carry out specific functions (e.g., process visual information), while other parts have been adapted or coopted to carry out functions never intended by the natural selective pressures that originally formed them. Thus our evolutionary history has left us with a modular and highly flexible brain.

Early human-like species and subsequently humans evolved in the contexts of groups (families, tribes, clans, communities, etc.). Thus, the human brain is by nature social, and highly biased towards the special demands placed on an organism having to survive as a member of a group of other highly social individuals. By thinking of the human brain as an organ of a [hyper-social](#) species and understanding the way various regions of the brain function, interact, and develop, we can get a better understanding of why people behave the way they do in various social and cultural circumstances. And in later chapters, we will look more closely at how the

⁸ Open Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0080954>

functional networking of distinct brain regions plays a key role in human development and can help explain many often misunderstood aspects of the adolescent experience.

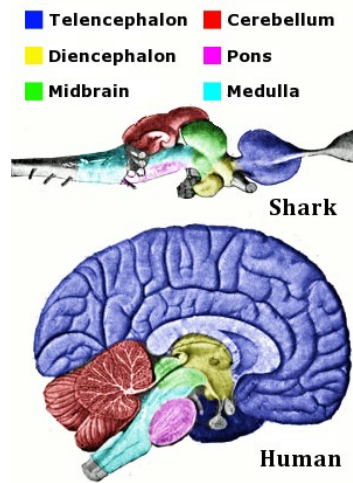


Figure 8. Human and shark brains: The shark brain diverged on the evolutionary tree from the human brain, but both still have the “old” structures of the hindbrain and midbrain dedicated to autonomic bodily processes.⁹

Basic Structural Anatomy.¹⁰ Neuroscience terminology for brain regions is not standardized and there is often variation and overlap in the many ways of talking about regions or collections of regions. Here we’ll focus more on the structural aspects of the brain as they correspond to function as opposed to a comprehensive taxonomy for all neuroanatomical structures and regions.

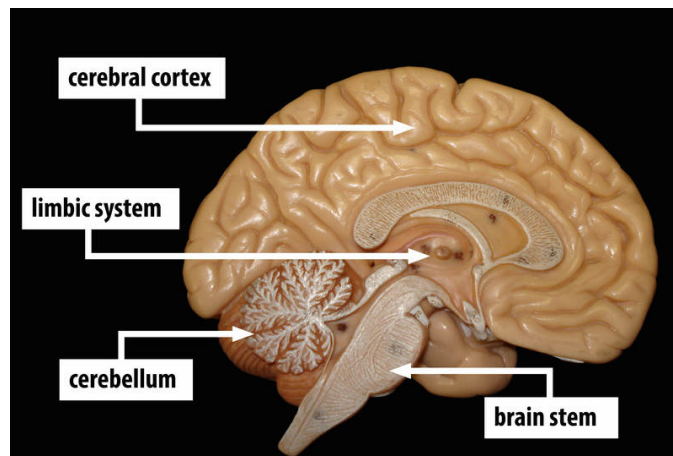


Figure 9. 4 major structural divisions of the brain.¹¹

Roughly, the brain can be divided into four main structures: the cerebral cortex, the limbic system, the cerebellum, and the brain stem. Note that there are many ways to divide up

⁹ https://commons.wikimedia.org/wiki/File:Blausen_0614_LimbicSystem.png

¹⁰ The following sections and images on brain structure are from The Brain by Diane Beck and Evelina Tapia is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Permissions beyond the scope of this license may be available in our Licensing Agreement.: <http://nobaproject.com/modules/the-brain?r=LDUyNjM1>

¹¹ Psychopharmacology by Susan Barron is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Permissions beyond the scope of this license may be available in our Licensing Agreement.

the brain; here we use four divisions. Each structure is composed of various sub-structures and can contain different types of neurons that facilitate its function.

Brain Stem. The [brain stem](#) is sometimes referred to as the “trunk” of the brain. It is responsible for many of the neural functions that keep us alive, including regulating our respiration (breathing), heart rate, and digestion. If a patient sustains severe damage to the brain stem he or she will require “life support” (i.e., machines are used to keep him or her alive). The brain stem includes the [medulla](#), [pons](#), [midbrain](#), and [diencephalon](#) (which consists of the

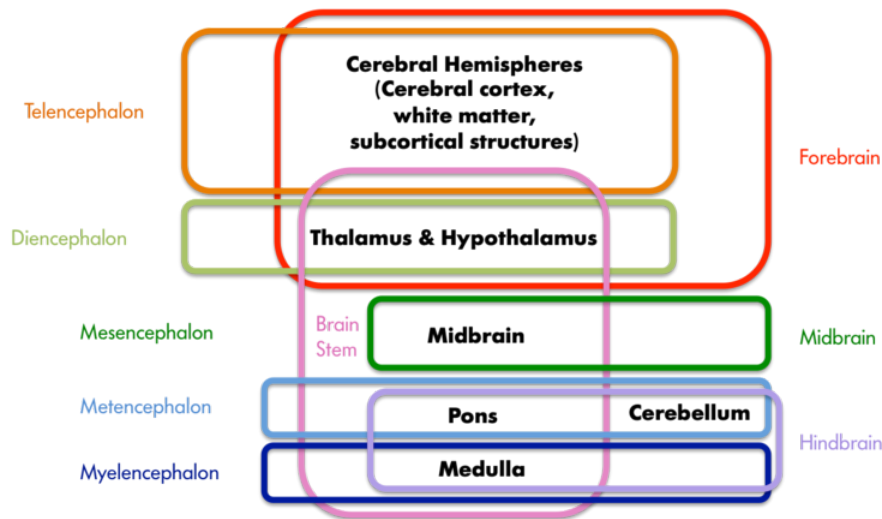


Figure 10. Colored boxes indicate various groupings of the seven structures printed in black. Labels match the colors of the boxes. The terms forebrain, midbrain, and hindbrain are used to describe the development of all vertebrate species' brains.

[thalamus](#) and [hypothalamus](#)). Collectively, these regions also are involved in our sleep–wake cycle, some sensory and motor function, as well as growth and other hormonally regulated behaviors.

The [cerebellum](#) is the distinctive structure at the back of the brain. The Greek philosopher and scientist Aristotle aptly referred to it as the “small brain” (“parencephalon” in Greek, “cerebellum” in Latin) in order to distinguish it from the “large brain” (“encephalon” in Greek, “cerebrum” in Latin). The cerebellum is critical for coordinated movement and posture. More recently, neuroimaging studies have implicated it in a range of cognitive abilities, including language. It is perhaps not surprising that the cerebellum’s influence extends beyond that of movement and posture, given that it contains the greatest number of neurons of any structure in the brain. However, the exact role it plays in these higher functions is still a matter of further study.

Cerebral Cortex, Cerebral Hemispheres, and Limbic System.

The [cerebral hemispheres](#) are responsible for our cognitive abilities and conscious experience. They consist of the [cerebral cortex](#) and accompanying white matter (“cerebrum” in Latin) as well as the [subcortical](#) structures of the basal ganglia, amygdala, and hippocampal structures. The cerebral cortex is the largest and most visible part of the brain, retaining the Latin name (cerebrum) for “large brain” that Aristotle coined. It consists of two hemispheres (literally two half spheres) and gives the brain its characteristic gray and convoluted appearance; the folds and grooves of the cortex are called [gyri](#) and [sulci](#) ([gyrus](#) and [sulcus](#) if referring to just one), respectively.

The two cerebral hemispheres can be further subdivided into four lobes: the occipital, temporal, parietal, and frontal lobes. The [occipital lobe](#) is responsible for vision, as is much of the temporal lobe. The [temporal lobe](#) is also involved in auditory processing, memory, and multisensory integration (e.g., the convergence of vision and audition). The [parietal lobe](#) houses the [somatosensory \(body sensations\) cortex](#) and structures involved in visual attention, as well as multisensory convergence zones. The [frontal lobe](#) houses the [motor cortex](#) and structures involved in motor planning, language, judgment, and decision-making. Not surprisingly then, the frontal lobe is proportionally larger in humans than in any other animal.

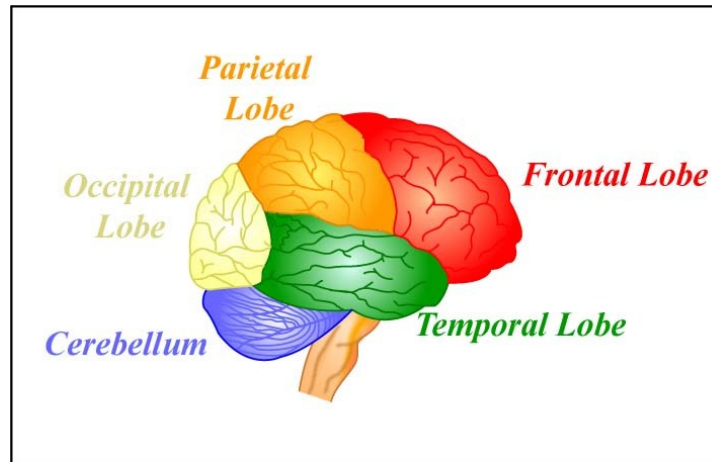


Figure 11. Major lobes of the cerebral cortex and the cerebellum.

The subcortical structures are so named because they reside beneath the cortex. The [basal ganglia](#) are critical to voluntary movement and as such make contact with the cortex, the thalamus, and the brain stem. The [amygdala](#) and [hippocampal formation](#) are part of the [limbic system](#), which also includes some cortical structures. The limbic system plays an important role in emotion and, in particular, in aversion and gratification.

The Limbic System

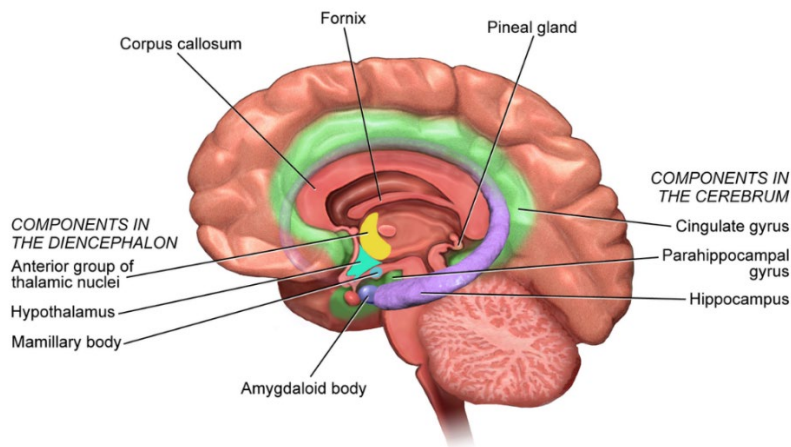


Figure 12. The limbic system.¹²

¹² The Brain and Nervous System by Robert Biswas-Diener is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Permissions beyond the scope of this license may be available in our Licensing Agreement.

Brain Imaging

One of the most daunting tasks for anyone new to neuroscience is learning the highly specialized vocabulary used by neuroscientists. This extends to neuroimaging and interpreting neuroimaging results. Here we provide a few key terms and some of the most basic concepts to get you started interpreting and learning from neuroimaging data.

Some Basic Vocabulary. Neuroimaging data will usually present a cross-sectional view of the brain cutting either the [sagittal plane](#), the [horizontal plane](#), or the [coronal plane](#); and it will refer to brain regions as either [dorsal](#), [ventral](#), [anterior](#), [posterior](#), [lateral](#), or [medial](#) (or some combination thereof). For example, the ventral posteromedial nucleus refers to an area that corresponds to a lower, rear-middle area of the [thalamus](#).

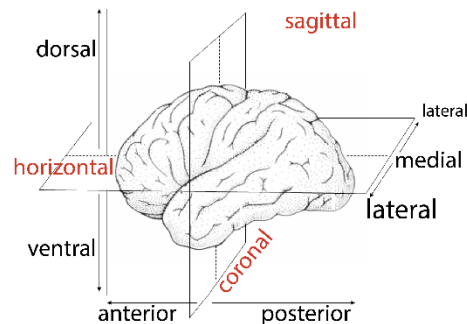


Figure 13. Sagittal, horizontal, and coronal cross-sectional planes.¹³

Functional Magnetic Resonance Imaging (fMRI). [Functional magnetic resonance imaging](#) (fMRI) takes advantage of the magnetic properties of hydrogen and oxygen. In an MRI scanner, an extremely powerful magnetic field is induced to align the magnetic fields of hydrogen atoms in water in tissues. The MRI machine then intentionally disrupts this field by sending a radio pulse in a different direction than the field the hydrogen atoms are aligned with. This knocks the hydrogen atoms out of alignment, and in the process of realigning, the hydrogen atoms emit low energy, radio frequency photons, which are then detected and interpreted by the MRI machine. The time and amount of realignment is a function of how thick or hard the tissue being measured is.

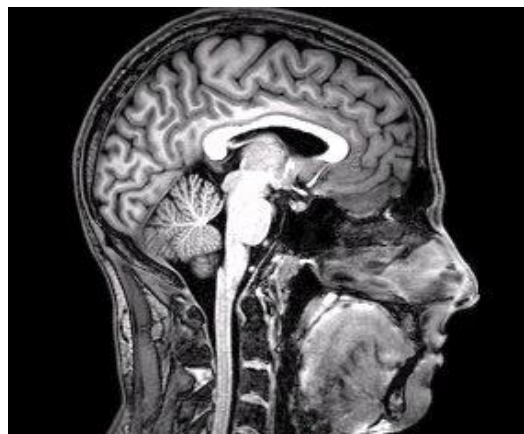


Figure 14. An MRI image of a human head showing various tissue densities.¹⁴

¹³ This work has been released into the public domain by its author, Albert Kok at Dutch Wikipedia. This applies worldwide.

¹⁴ WikiCommons: A High Quality T3 fMRI scan of my brain produced using the University of Birmingham's Medical school fMRI machine from 2012

Oxygen levels in tissue can also influence the magnetic response of the hydrogen atoms because the electrons from the oxygen molecules in effect block the hydrogen from the applied magnetic field. The brain will increase blood flow to activated areas, and fMRI can measure the relative increase and decrease of oxygen in the blood, thus producing an image of brain activation sites during tasks. fMRI that detects blood oxygen level changes is known as “Blood Oxygen Level Dependent” (BOLD) imaging. When fMRI data is collected without a specific task, i.e., subjects are just resting, it is known as [resting state fMRI](#) (RS-fMRI). RS-fMRI data can be used as a reference in identifying task specific activation and in identifying functional networks such as the [default mode network](#).

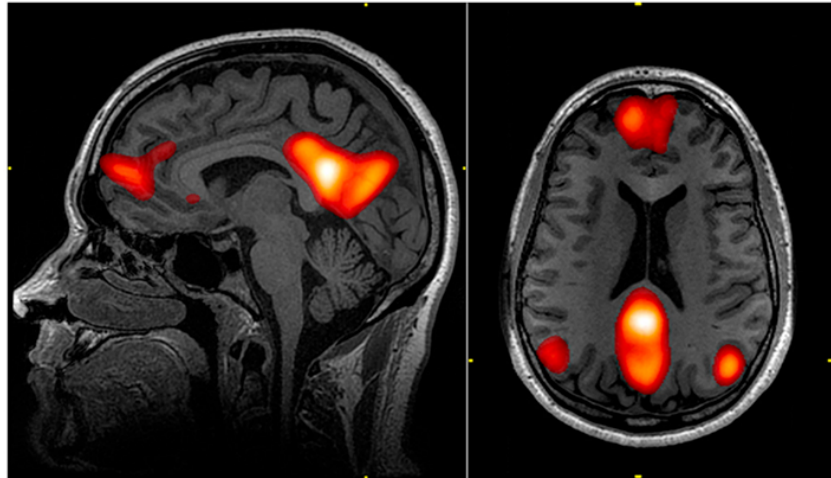


Figure 15. RS-fMRI images showing the Default Mode Network activation sites in an adult human.¹⁵

Adolescent Brain Development

Adolescent brain development is an extremely complex process. Interactions between genes, hormones, childhood experience, environment, trauma, exogenous chemicals, social context, learning, and even cognition itself can impact the physical structure and behavioral-psychological outcomes of adolescent brain development. Each of these interactions is looked at in context in a different section of this textbook, so, for now, we will focus on the [functional network](#) changes that occur during adolescence. As mentioned, these functional changes can have many complex causes, e.g., interactions of genes, experience, learning, etc., but what makes the study of functional network changes so relevant is that they provide the clearest links between biological realities of the brain and psychological and behavioral outcomes in individuals.

Functional Networks

The human brain is networked via intrinsically linked synapses and white matter tracts that act as “hardwired,” structural circuits. In childhood, these structural networks have a large impact on brain function, and functional networking occurs primarily between intrinsically networked regions based on location in the brain, i.e., functional networks function locally, i.e., brain regions communicate with nearby regions. Functional network development progresses

¹⁵ John Graner, Neuroimaging Department, National Intrepid Center of Excellence, Walter Reed National Military Medical Center, 8901 Wisconsin Avenue, Bethesda, MD 20889, USA.

through a process of moving from local to distributed networks, i.e., functional networks are created based on function and might not correlate directly with the structural networks they are composed of. Below is an illustration showing the functional network development from about 8 to 24 years old. You'll notice, for example, the four pink-outlined nodes of the cerebellum go from isolated, local network function to highly integrated, cross-regional function.

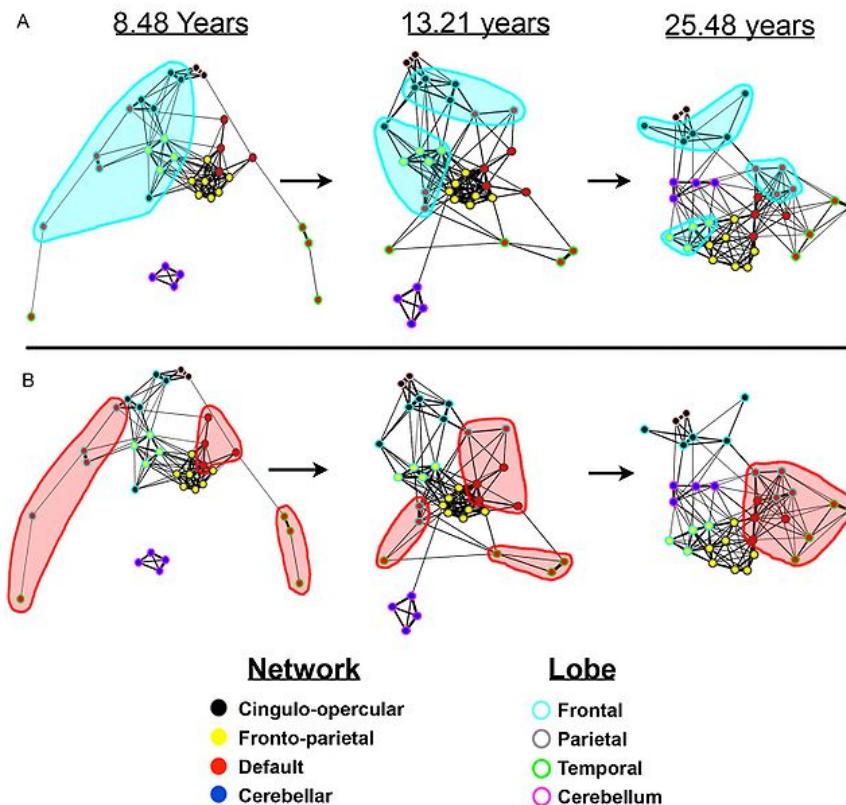


Figure 16. These images were created using fMRI and correlating regions that function simultaneously. The correlations then were weighted, and connections between nodes were simulated by assigning that weight to the connection as a force applied by a spring. The entire networks was then allowed settle to its natural position.

Watch one of the researchers explain this research here
<https://www.youtube.com/watch?v=7L5mOqUAKbc&t=2349s>¹⁶

"...Over age the graph architecture matures from a "local" organization to a "distributed" organization. In this figure we show the dynamic development and interaction of positive correlations between the two task control networks, the default network, and cerebellar network using spring embedding. The figure highlights the segregation of local, anatomically clustered regions and the integration of functional networks over development. A and B represent individual screen shots (at average ages 8.48, 13.21, and 25.48 years) of dynamic movies (Video S1) of the transition in the network architecture from child to adult ages. Nodes are color coded by their adult network profile (core of the nodes) and also by their anatomical location (node outlines). Black – cingulo-opercular network; Yellow – fronto-parietal network; Red – default network; Blue – cerebellar network; Light blue – frontal cortex; Grey – parietal cortex; Green – temporal cortex,

¹⁶ Figure 2 (doi:10.1371/journal.pcbi.1000381.g002) of: Fair DA, Cohen AL, Power JD et al. (2009). "Functional brain networks develop from a 'local to distributed' organization". PLoS Comput Biol 5 (5): e1000381. DOI:10.1371/journal.pcbi.1000381. PMID 19412534. PMC: 2671306.

Pink – cerebellum, Light pink – thalamus. Connections with $r \geq 0.1$ were considered connected. (A) In children regions are largely organized by their anatomical location, but over age anatomically clustered regions segregate. The cluster of frontal regions (highlighted in light blue) best demonstrates this segregation. (B) In children the more distributed adult functional networks are in many ways disconnected. Over development the functional networks integrate. The isolated regions of the default mode network in childhood (highlighted in light red) that coalesce into a highly correlated network best illustrate this integration. Over age node organization shifts from the “local” arrangement in children to the “distributed” organization commonly observed in adults...”¹⁷

While there are likely many functional networks, three consistently correlate most prominently with behavioral and psychological phenomena. The [default mode network](#) (DMN) is a network activated by “default” when a person is not engaged in a specific task. The [central executive network](#) (CEN) is engaged during goal-directed, purposeful behavior. And the [salience network](#) (SN) coordinates switching between networks based on salience cues.

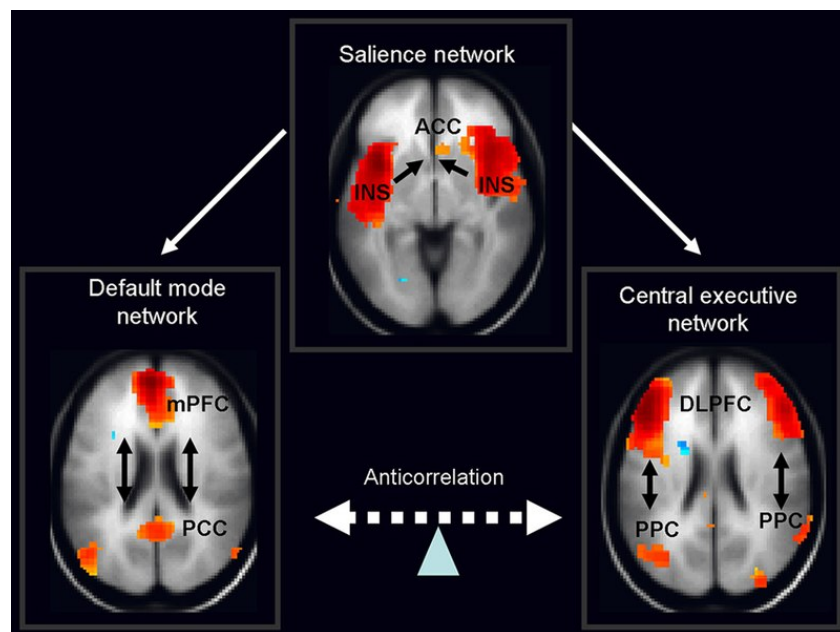


Figure 17. Default mode network, salience network, and central executive network.¹⁸

Default Mode Network

The DMN is a ‘large-scale’ network (i.e., multiple regions functionally interconnected) with two dissociable subsystems linked by a core hub that is involved in self-referential and interpersonal representations (Andrews-Hanna, Reidler, Sepulcre, Poulin, & Buckner, 2010; S. Blakemore, 2012; Spreng, Mar, & Kim, 2009). It is responsible for representing ‘present’ aspects of self, such as reflecting on one’s preferences, feelings, and emotions, as well as representing aspects of one’s ‘future-self’ projected from past autobiographical and episodic memory. These default network self-representations also play a role in constructing complex social

¹⁷ Figure 2 (doi:10.1371/journal.pcbi.1000381.g002) of: Fair DA, Cohen AL, Power JD et al. (2009). "Functional brain networks develop from a 'local to distributed' organization". PLoS Comput Biol 5 (5): e1000381. DOI:10.1371/journal.pcbi.1000381. PMID 19412534. PMC: 2671306.

¹⁸ WikiCommons: Nekovarova, Fajnerova, Horacek, Spaniel; <https://commons.wikimedia.org/wiki/File:Fnbch-08-00171-g002.jpg>

representations, such as inferring the mental states of others, theory of mind, social dynamics, and judgments about others perspectives. Interestingly, this network is implicated in processes related to thinking about others and thinking about one's self, remembering the past, and planning for the future. It is also known as the "social brain" (S. Blakemore, 2012) because it is composed of regions that have to do with identity, identifying one's status in a group, and engaging in social cognition.

Central Executive Network

The central executive network (CEN) is a cognitive control network involved in executive functions and decision-making within the context of pursuing a goal (Crone, 2009; Dumontheil, 2016; Menon, 2015; Uddin, Supekar, Ryali, & Menon, 2011; Zelazo, Craik, & Booth, 2004). The functions of the CEN include inhibition (e.g., the ability to suppress reflexive responses), working memory, shifting (e.g., ability to switch tasks). Executive control abilities play an important part in a host of self-regulatory abilities, such as effortful control and behavioral regulation. It is perhaps not surprising then that the CEN is highly connected with other cortical and subcortical networks.

Overall, executive control abilities develop early in childhood (preschool) with steady improvements throughout childhood, although the particular pattern of development depends on the complexity of the executive task assessed (Dumontheil, 2016). For example, there are rapid improvements in inhibition abilities before age five followed by steady increases at least through age eight (Romine & Reynolds, 2005). Neuroimaging research also indicates a shift from diffuse and broad activation across CEN regions in childhood to more centralized and distinct activation of regions during adolescence (Best, Miller, & Jones, 2009). Major changes to the CEN also occur during adolescence, particularly in regions associated with planning. For tasks requiring complex planning abilities, adolescents attain adult levels of performance around age 15; for simpler tasks, adult levels of performance can be reached in childhood.

Practically, development of the CEN during adolescence can result in greater abilities to formulate complex plans for achieving a goal; for example, making flexible plans with multiple built-in contingencies (Friedman, Scholnick, & Cocking, 1987). However, practical skills associated with executive functions, including complex planning, depend on experience conducive to developing these skills in order for them mature. Thus, executive-related skills are not an automatic result of a developing CEN.

Salience Network

The salience network (SN) is a recently identified large-scale control network that appears to play a pivotal role in switching between the CEN and the default network, and in coordinating other relevant functional networks (Chen, Cai, Ryali, Supekar, & Menon, 2016; Fair et al., 2007; Uddin et al., 2011). The SN is involved in the detection of behaviorally salient stimuli and the cross-network, flexible coordination of other neural networks in order to guide goal-directed behavior. The SN dynamically engages the default network and the central executive control network based on salience in order to maintain and initiate behavioral and cognitive attention on a goal-centered task, including detecting and anticipating 'errors' (e.g., feedback) that threaten goal attainment (Menon, 2015). Practically speaking, the SN generates salience maps based on experience to prioritize and weight stimuli and behaviors perceived as purposeful and meaningful.

Conclusions

What do these changes mean for adolescent's thinking and behavior? The net impact of changes across these three networks (as well as the motivation network discussed in a separate chapter) is the integration of self, social, motivational, and executive systems into a coherent unit that adolescents deploy for conscious and purposeful goal-directed action. Thus, adolescents' behavior/thinking increasingly becomes self-directed and imbued with personal and social purpose, meaning, and intention.

A Deeper Look at the Salience Network

The SN undergoes major structural and functional development during adolescence (Fair et al., 2009; Liu, Angstadt, Taylor, & Fitzgerald, 2016). There are three fundamental changes. First, there is a shift from left to right in preferential activation of the anterior insula (AI) pathway during tasks that require intense focus. The most common activation site in children is on the left side, which is preferentially involved in parasympathetic activity commonly associated with positive feedback, such as reduced tension. The most common activation site in adolescents is the right side, which is preferentially involved in sympathetic activation commonly associated with negative feedback, such as elevated heart rate or stress responses (Allman et al., 2010). Also, disproportionately concentrated in the right AI, as well in other SN regions, are a unique type of neuron (spindle neuron) that facilitates rapid communication between brain regions. Practically, this shift reflects a key transition during adolescence characterized by the increased influence of ‘negative’ feedback on cognitive control, including the detection and anticipation of behavioral, emotional, and social errors, such as personal embarrassment or empathy (e.g., prosocial error detection).

A second SN change is the maturation of the pre-secondary motor area (pre-SMA) to AI pathways. The pre-SMA is involved in resolving competition between complex motor-sequence plans, i.e., selecting from among numerous possible goal-directed motor actions (Nachev, Wydell, O’Neill, Husain, & Kennard, 2007). During adolescence, the connectivity between the pre-SMA and AI *increases*, while pre-SMA activation during complex executive control tasks *decreases* (Liu et al., 2016). This increased connectivity greatly enhances the functional efficiency and integration of this pre-SMA-AI pathway in the SN, which enables less activation of the pre-SMA in executive control tasks while simultaneously achieving the same or increased levels of performance. Thus, children rely on greater activation of the pre-SMA to engaged executive control, while adolescents and adults can achieve better executive control with less activation.

A third change in the SN during adolescence is a temporary suppression of anterior cingulate cortex (ACC) activation (Liu et al., 2016). The ACC is involved in direct, reflexive motor/behavioral responses based on encoded salient stimuli from sensory, sub-cortical (emotional), and cognitive processes. The temporary suppression of reactionary behavioral processes may be an evolved mechanism that balances out the temporarily enhanced influences of inputs to ACC from salience detection and heightened reward, social, and emotional sensitivity. That is, the temporary suppression of ACC may be a built-in mechanism to mute reactionary and potentially harmful behaviors spurred on by enhanced ACC and reward influences—e.g., it ‘buys time’ for the rapid functional mapping of salience pathways.

Overall, then, during adolescence the SN undergoes major development for the apparent aim of creating salience-based functional maps (e.g., heuristics, algorithms) that integrate self, social, emotional, and executive systems into a coherent unit for conscious and purposeful goal-directed action. This development allows adolescent’s behavior/thinking to increasingly become imbued with personal and social purpose, meaning, and intention, as salience-based maps are constructed within the context of input from simultaneously developing motivational, social, and cognitive networks. As with the other networks, the salience maps are constructed within the contexts of adolescents’ daily lives, thus, their utility will reflect what is functionally relevant within these contexts.

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5

Motivation, Emotion, & Reward

Objectives

- Differentiate reward, motivation, and emotion
- Explain the inter-relationship of rewards, motivation, and emotion
- Describe the functions of rewards, motivations, and emotion
- Describe changes in motivation, emotion, and reward during adolescence
- Examine the contexts of adolescent emotional and motivational development
- Describe two interpretations of the purpose/function of adolescent heightened emotional and motivational sensitivity

“Thought by itself moves nothing”
(van Duijvenvoorde, Peters, Braams, & Crone, 2016)

Overview

As any adult who interacts with adolescents on a regular basis has experienced, adolescence is a time of changes in ‘motivated-behavior’ (c.f., van Duijvenvoorde et al., 2016)—changes in what they find motivating and changes in the motivational, emotional, and reward value of behaviors and thoughts. This chapter addresses why adolescence is a time of changing motivation and emotion and, more importantly, what is the developmental purpose and function of these changes.

What Is Motivation, Emotion, and Reward?¹⁹

Motivation, emotion, and reward are all distinct dimensions related to various affective (non-cognitive), subcortical brain systems and processes. Affect is a high-order term used here to collectively refer to motivation, emotion, and reward. Affect is essential for learning, thinking, problem solving, seeking goals, etc., and affect provides a ‘richness’ to our lives, without which there would be no excitement, pleasure, or enjoyment. Affect evolved before cognitive structures and processes but it did not abdicate its central and pervasive role in thinking and behaving. We are thus *emotional (affective) beings who think, rather than thinking beings who feel*. Although we are born with intact affective brain systems, these systems also develop during the lifespan and particularly during adolescence.

Both terms, motivation and emotion, have the same underlying Latin root, meaning “to move.” In contrast to cognitive processes devoted to perceiving and making sense of our experiences and environment, *emotions and motivations arouse and incentivize behavior and thinking*. Emotions and motivations, then, “charge,” “drive,” “move” and “initiate” our behavior and thinking.

When we experience emotions or strong motivations, we feel it. This feeling comes from the *sympathetic nervous system*, which provides us with energy to respond to our environment: the liver puts extra sugar into the bloodstream, the heart pumps more blood, our pupils dilate to help us see better, respiration increases, perspiration increases to cool the body, and the stress hormones epinephrine and norepinephrine are released. We experience these responses as arousal—preparation for action.

Emotion

An *emotion* is a mental and physiological *feeling state* that directs our attention and guides our behavior. Whether it is the thrill of a roller-coaster ride that elicits an unexpected scream, the flush of embarrassment that follows a public mistake, or the horror of a potential plane crash that creates an exceptionally brilliant response in a pilot, emotions have evolved as a mechanism for moving us to action, behaviorally or mentally. Emotions, then, serve an *adaptive* role, unless problems occur: we care for infants because of the ‘love’ we feel for them, we avoid making a left turn onto a crowded highway because we fear that a speeding truck may hit us. Emotions can also be counter-productive (not adaptive), such as when a frustrating experience leads us to lash out at others who do not deserve it.

¹⁹ Some parts of this section adapted from “Beginning Psych”

There are at least seven basic emotions, each tied to a particular brain system (Panksepp, 2005); the emotional systems appear in all capital letters. There is the SEEKING emotion that incentivizes behavior toward exploration and inquisitiveness (e.g., look for new information), which we experience as a positive sensation; FEAR emotion is a negative feeling sensation (e.g., bodily tension) that prepares us to avoid a threat; RAGE can involve a mixture of positive and negative sensations intended to incentive behaviors to neutralize a threat; LUST involves a positive craving sensation toward receptive other, similar to idea of sex drive; CARE emotion involves positive sensations from gentle touch, which promotes closeness and attachment; PANIC is a negative sensation that emerges from separation from emotionally close other (e.g., developed through CARE) and if separation occurs long enough grief is experienced; PLAY is an incentivizing positive emotion that promotes active interaction with others. From these basic emotions, more complex emotions probably emerge, such as happiness, intrigue, etc.

Researchers have differentiated three aspects in the study of emotion: emotional states, emotional experience, and emotional expression (Lewis, 2012; G. D. Rosenblum & Lewis, 2006). Emotional states refer to a given physiological change that also results in some behavioral change in response to some stimuli, such as a behavioral fear response. Emotional experience refers to our interpretation and appraisal of an emotional state—“Emotional experience requires a concept of self, because by experiencing an emotion we mean being able to reference the self as having that state” (G. D. Rosenblum & Lewis, 2006, p. 270). Emotional expression is the possible observable changes we exhibit, such as alterations in voice and facial expressions we make when fearful. The development of these three aspects and their contribution to emotional competencies are examined in a subsequent section in this chapter.

Motivation

A *motivation* is a driving force that initiates and directs behavior (Lawrence, Carver, & Scheier, 2002). Motivations are classified as either physiologically-driven or psychologically-driven. Physiological motivations are called *drives* that push us to act to address basic ‘[appetitive](#)’ needs/goals, such as hunger, thirst, temperature regulation, physical touch, and sexual drive (libido). Drives operate based on the homeostatic principal in which a given drive has a natural set point or range in which it operates—this is called a *drive state*. When there is a physiological imbalance (e.g., hormone depletion, blood sugar drop), and hence a disruption in the drive state, a drive will motivate us to engage in behaviors that help restore a homeostatic balance, e.g., motivated to eat. When we restore homeostatic balance, we have ‘satiated’ (satisfied or relieved) a drive or need.

Psychologically-driven motivations are learned, complex motivational patterns (rather than innate drives) we develop over time in the process of attaining a goal. For example, when we feel lonely we may be motivated (aroused, incentivized) to find and be around other people to ‘socialize’ (e.g., alleviate feeling of loneliness). As you might have guessed, the ‘feeling’ of loneliness is an unpleasant (negative) emotion that emanates from an imbalance, perhaps from the PANIC system, which focuses our attention on the emotion and pushes us to act to satiate a need for human interaction. Psychologically-driven motivations, then, represent the complex motivational habits we have develop from interaction of our drives, emotions, and experience.

We may or may not be aware of our emotions and motivations at any given point. Unless the intensity of an emotion or drive raises to some threshold, we are not consciously aware of them. However, even if we are not aware of an emotion or motivation, they still help guide our behavior: they help positively bias our attention and thinking to quickly focus on relevant

information (Bechara, Damasio, Tranel, & Damasio, 1997; Freud, 1922; Hassin, Bargh, & Zimerman, 2009; Williams, Bargh, Nocera, & Gray, 2009).

Reward

Rewards are defined as any object or goal that we seek to attain through allocation of time, energy, or effort (Arias-Carrión, Stamelou, Murillo-Rodríguez, Menéndez-González, & Pöppel, 2010; Delgado, 2007). Without rewards, our emotion and motivation would simply propel us toward behavior but we would unlikely learn much in the process. Rewards, then, reinforce behaviors via classic stimulus-response conditioning (e.g., habit formation) through feedback on the outcome of our incentivized behaviors (Delgado, 2007; Schultz, 2015). Dopamine is the primary neurochemical associated with reward (Berridge & Robinson, 1998; Galvan, 2010) and we experience it as positive; it ‘feels’ satisfying and draws us toward future action. Our brains use previous stimulus-response reward information to predict subsequent responses and positively bias a future decision (Delgado, 2007); that is, reward helps us “decide advantageously before knowing the advantageous strategy (Bechara et al., 1997).

To illustrate, when we meet someone for the first time we must decide whether or not to trust them. Through our interactions with this person over time (stimulus-response) we develop trust (you can think of this as a schema of trust for this person), assuming no information tells us otherwise. While trust involves trial and error experience with the person in each interaction, we do not simply ignore the previous reward. Instead, the previous reward experience is used to bias/predict subsequent ‘trust’ information. If the prediction does not match a subsequent interaction, this mismatch alerts us that something is not right—to pay attention and make adjustments. Thus, emotion, motivation, and reward interact to help us adapt and learn quickly and efficiently; all three are always operating across all settings, including school.

Changes in Emotion, Motivation, and Reward-Sensitivity During Adolescence

Society harbors many stereotypes of adolescents as overly emotional, motivationally defiant (unmotivated), and driven by hedonic rewards (pleasure). Disentangling reality from fiction can be a challenge because some of these fictions are so deeply rooted they are difficult to recognize. Neuroscience research is beginning to provide a more nuanced understanding of emotional, motivational, and reward sensitivity changes during adolescence, which is leading to a view that these changes serve to promote emotion regulation, learning, and interpersonal and social affiliation. Note that although we differentiated reward and motivation above, neuroscience tends to treat reward and motivation as distinct but inseparable processes (i.e., they co-occur) so we use the term motivation network in this section to refer to both, but also each term separately when appropriate.

Changes in emotion and motivation brain networks

There are distinct changes during adolescence in the brain’s emotion and motivation networks. The emotion and motivation networks become *hyper-responsive/sensitive* to emotional, motivational, and reward information (Galvan, 2010; Peper & Dahl, 2013; Somerville, Jones, & Casey, 2010; Spielberg et al., 2014). As a result, this hyper-responsivity amplifies the intensity (magnitude) of emotion and rewards (reward or anticipation of reward motivates behavior), magnifies the valuation (estimated value) of emotion and reward, and

amplifies positive emotions (e.g., pleasure, excitement) that rewards elicit (Urošević, Collins, Muetzel, Lim, & Luciana, 2012).

What causes heightened emotional and motivational sensitivity? The sensitivity is linked to a temporary increase in dopamine and dopamine receptors, as well as increases in other neurochemicals (e.g., serotonin, gamma-aminobutyric acid—GABA; Galvan, 2010). Peak sensitivity occurs in early adolescence followed by a decline in mid-to-late adolescence (B. Casey & Jones, 2010); quite literally, early adolescents may never feel the same overall emotional and motivational intensity as they do during this period. Thus, there is evidence that adolescents, at least early on, experience an increase in emotional and motivational responsiveness.

Emotional development

To understand emotional development during adolescence it is first necessary to briefly examine what has developed emotionally prior to puberty. Within the first year of life, infants display the basic emotions (see above) but it is not until childhood and the development of self-awareness, around the age of two, that complex ‘self-conscious’ emotions emerge, such as embarrassment, pride, envy, and shame (Lewis, 2007). By then end of children’s third year of life, they have a fairly complex and well defined emotional life. Between early child and puberty few, if any, new emotions emerge. Rather, with growing cognitive abilities during childhood, children continue to refine their emotion repertoire (build nuanced representations) and build an impressive database of emotional skills before puberty, e.g., empathy (G. D. Rosenblum & Lewis, 2006). These emotional skills learned in childhood, then, become the foundation for emotional development during adolescence.

As we have already pointed out in previous chapters, puberty initiates major brain development that results in developing more advanced cognitive skills (see Cognition and JDM chapter). Adolescents’ emotional development keeps pace with their cognitive development. A summary of adolescent emotional development is presented in *Table 5.1*. Overall, adolescents develop more sophisticated emotional understandings of self, others, and society. This sophistication promotes developing emotional skills that more closely reflect those used by adults. Thus, puberty initiates brain development that allows adolescents to learn the emotional (and cognitive) skills used by adults.

Motivational Change and Development

Enhanced motivational/reward sensitivity appears to reciprocally promote adolescents’ evaluation and questioning of the motivational relevance (e.g., purpose) of everyday experiences, including learning, events, social roles, and behaviors. For example, adolescents may question how the content taught in a classroom is relevant or important for their lives. Enhanced reward sensitivity may also motivate adolescents to engage in behaviors that are ‘rewarding’ (e.g., exciting) but carry risk, such as substance use (Albert & Steinberg, 2011; Spear, 2000).

Ultimately, *what* adolescents find rewarding, and hence, what rewards they find valuable and enjoyable, (worth devoting time and effort to pursue) is not predetermined by a hyper-responsive reward network. Rather, it emerges from the self-driven process of evaluating motivational relevance based on experience within the settings of adolescents’ everyday lives. Thus, heightened motivational sensitivity appears to promote a process in which adolescents actively seek to embed motivational relevance (e.g., purpose) into their behaviors, thinking, and learning.

Table 5.1. Summary of Emotional Development During Adolescence

- Increase reliance on personal information about other persons to predict what emotions they might be having
- Greater control over emotional expression, e.g., feel one thing but express another feeling
- Emotions can now be triggered by abstract thought, anticipating future events and outcomes, recall of past events
- Can be more introspective, tied to metacognitive development, and reflect on their own emotional lives
- Mood states (negative, positive feeling state) fluctuates more and greater frequency of more intense high and low feelings compared to adults
- More sensitive/reactive to emotions of past and future events than current event compared to children who attribute emotion to immediate activity
- Greater frequency, duration and intensity of negative, self-directed emotions for adolescent girls than boys
- Can articulate having mixed, conflicting emotions (negative and positive) from same event
- Refine, adjust emotional display rules to account for mixed emotions
- Inexperienced use of ‘adult emotional signaling’ (expression) rules early in adolescence and become more proficient by late adolescence; requires social modeling of rules to learn
- Increased empathy: better at attending to emotional experience of others and more accurate at matching self’s emotional experience with experience of others
- Develop abstract empathy at broader level of groups, society, ‘earth’ (environment), etc. for the first time; can promote activism

The Contexts of Adolescent Emotional and Motivational Development

What could be easy to overlook in examining emotional and motivational development is the influence of the contexts in which these changes occur. Developing emotional skills and infusing motivation into daily life do not occur in a vacuum, and neither can they be learned vicariously from a book. Rather, they develop through experience, and thus the context of that experience exerts influence on development. Adolescents are especially ‘in-tune’ to emotional and motivational information in these contexts because their rapidly developing brain has temporarily enhanced the sensitivity of emotion and motivation producing networks. There are three points worth examining.

First, the focal development of emotion and motivation networks in the brain is an evolutionary adaptation that supports adolescents’ transition into adulthood. This mechanism evolved in such a way to maximize flexibility in learning the emotional and motivational rules implicit in adult society. This flexibility allows ‘normal’ (normal in the sense of detecting what is needed for adulthood) emotional and motivational development across constantly changing and diverse contexts.

Second, emotional and motivational development occurs within whatever contexts adolescents happen to occupy at a given moment in historical time. Historically, adolescents spent substantially more time in contexts that adults occupied and more time interacting with

adults in these contexts, e.g., work. In a post-industrial world, extensive age-grading has emerged as the norm, which limits children, adolescents, and now a majority of young adults (e.g., college students) access to normative adult life. Thus, the available emotional and motivational information integral to emotional and motivational development occurs within same-age peer contexts to a greater extent it has across human history; this not necessarily or automatically detrimental to adolescent's development but it is certainly different from what is evolutionarily expected.

Third, social modeling (e.g., Bandura, 1986) is an important source of information for learning emotional and motivational skills. Humans are social beings; we learn through social interactions. Others serve as models for how to manage and use emotion and motivation. We incorporate and adapt information from these models to generate our own emotion and motivation skills

What does this imply for how the current contexts of adolescent's lives impact their emotional and motivational development? Unfortunately, research cannot yet answer this question. Instead, we pose this question to provoke your ideas. Here are additional questions that can help you formulate and answer:

- How would the emotional developments listed in Table 1 be the same or different for adolescents 100 or even 200 years ago?
- Are there motivational and emotional skills needed today that were not needed in the past?
- How might the timing of learning emotional and motivational skills change depending on historical context?
- Were adolescents in the past (e.g., 100 or more years ago) more or less emotionally and motivationally mature than today's adolescents? Why, why not?

What is the Purpose/Function of Heightened Affective Sensitivity?

What is the ontogenetic (developmental) purpose or reason that adolescent's experience a period of heightened motivational and emotional awareness? Is it simply a 'by-product' of brain changes with little developmental benefit or is it something that has serves a specific function in development? These are not easy questions to answer, and answers that researchers often ignore and fail to consider. Although many researchers ignore this issue, each researcher's implicit answer can be seen in how they interpret research findings in this area. There are two perspectives on this issue evident in the research literature, which we briefly examine in this section.

Heightened Sensitivity as a Liability?

Many researchers point to adolescents' heightened sensitivity to rewards as a causal explanation for their engaging in risky behaviors that have serious health implications. Here is a predominant (stereotypical?) view in the research literature on the link between adolescents' heightened sensitivity to rewards and engagement in risky behaviors (emphasis added):

“Adolescence is a developmental period *characterized by* suboptimal decisions and actions that are associated with an increased incidence of unintentional injuries, violence, substance abuse, unintended pregnancy, and sexually transmitted diseases” (B. Casey, Jones, & Hare, 2008, p. 111).

(It is worth noting that the quote comes from research sponsored by federally funded agencies in the United States: National Institute of Drug Abuse and the National Institute of Mental Health.) An underlying assumption of this predominant perspective is that heightened sensitivity does not have a developmental purpose; rather it is a by-product of brain changes with few adaptive benefits. As such, a primary aim that emanates from this perspective is to ‘protect’ adolescents (and society) from the negative effects of this tendency until it returns to normal; a ‘ride it out’ strategy.

Heightened Sensitivity as an Adaptive Advantage?

A growing number of researchers view adolescents’ heightened reward sensitivity as an evolved, adaptive function intended to promote adolescent learning and support their transition into adult society (David M Hansen & Jessop, 2017; Eva H. Telzer, 2016; Eva H Telzer, Ichien, & Qu, 2015; Wahlstrom, Collins, White, & Luciana, 2010):

“Rather than promoting risk taking and psychopathology, recent evidence reveals that heightened striatal reactivity may actually motivate adolescents to engage in more thoughtful, positive behaviors, facilitating improved cognition, and ultimately protect them from developing depression and engaging in health-compromising risk-taking behavior” (Eva H. Telzer, 2016, p. 59)

As is evident in the quote, the adaptive advantage perspective provides stands in stark contrast to the liability perspective. From this perspective, increased dopamine receptors underlying the heightened sensitivity (recall we experience dopamine as a positive sensation) promotes adaptive action, or what is often referred to as ‘approach-motivation’ (Wahlstrom et al., 2010).

Importantly, the positive motivational push emanating from heightened reward (dopamine) sensitivity can be directed toward motivated behaviors that are either adaptive (e.g., strive for achievement) or maladaptive (e.g., strive to engage in risky behaviors). The difference, then, lies in what is the target of the positive motivational push.

What determines the target of a motivational push from heightened reward sensitivity? Stated alternatively, what determines if an adolescent directs the motivated action towards adaptive rather than towards maladaptive targets? The answer is both simple and complex. What adolescents direct their motivated actions toward (target) is a result of present and past personal and social interests that interact with available opportunities in the daily settings of their lives. Both the adolescent and the settings in which they experience daily life (e.g., school), then, interact. When interests and opportunities align, e.g., a good fit, there is an increased likelihood that positive motivation will lead to adaptive learning and behaviors; poor alignment on the other hand may increase likelihood that positive motivation will lead to less adaptive or maladaptive learning and behavior (Eva H. Telzer, 2016).

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Section 2:

Contexts of Adolescent Development

6

Adolescent Employment

Objectives

- Summarize the history of adolescent work in the United States
- Describe historical and recent trends in adolescent work
- Assess the contexts and impacts of adolescent work

Overview

If you conduct a search for adolescent employment in a scholarly search engine you might get the impression that working during adolescence results in a wide range of serious negative outcomes: delinquency, criminal behavior, psychological costs (e.g., less time with friends), poorer grades and academic performance, physical injury, or experience of sexual harassment and bullying (Brame, Bushway, Paternoster, & Apel, 2004; Evensen, Schulman, Runyan, Zakocs, & Dunn, 2000; Fineran & Gruber, 2009; Greenberger & Steinberg, 1986; Johnson, 2004; Leventhal, Graber, & Brooks-Gunn, 2001; Schoenhals, Tienda, & Schneider, 1998). The view that adolescent employment is “bad” emerged relatively recently; for example, an influential publication by Laurence Steinberg and Dornbusch (1991) captured a budding sentiment among some research—“*Negative Correlates of Part-time Employment During Adolescence*.” Despite this negative perception of adolescent employment, the research literature indicates there are many benefits of adolescent employment and, importantly, that the negative outcomes touted in some studies may be due to preexisting factors rather than employment (Apel et al., 2007; David M Hansen & Jarvis, 2000; Mortimer, 2010; Zimmer-Gembeck & Mortimer, 2006).

In this chapter we examine adolescent employment, focusing on the ‘purpose’ of work, labor and work restrictions, what is and is not learned from work, and how work during adolescence carries over into adulthood (trajectories). What will become quickly evident is that a ‘good/bad’ perspective of adolescent employment is too simplistic to capture its developmental value. Instead, its value as a context for development is shaped in large part by economic, societal, and historical factors.

What is the Purpose and Meaning of Adolescent Employment?

Worker or student. In the United States prior to 1930, especially before 1900, adolescent employment was associated with social-class. Full-time employment among working-class adolescents was the norm (Kett, 1971); children and adolescents were often an integral part of their family’s economy, especially in agricultural areas. Even as the United States and other countries industrialized, child and adolescent full-time employment remained the norm, often with entire families working in mills and factories (Hareven, 1993; Smelser, 2013). Additionally, the level of schooling required for adult work (among working-class adults) was less than a high school degree, with work experience and the knowledge gained from experience being important for employability in adulthood (Mortimer, 2003); to illustrate, only 5% of the population reached high school graduation in 1890 (Snyder, 1993). Thus, adolescent employment was an extension of economic contributions that began in childhood and was tied to the economic viability of the family.

Among the middle- and upper-class, adolescent employment was less common as it was a sign of being from a ‘lower’ class. Full-time education among adolescents from middle- and upper-class families was the norm. Extensive public and compulsory education was not yet in place in the United States. Thus, education was a luxury that only middle- and upper-class families could afford. In essence, adolescents during this period of history in the United States were either *full-time workers* or *full-time students* but not both. The primary purpose of adolescent work, then, was to contribute to the family economy.

The disappearing adolescent worker. Between 1870 and 1930 in the United States the socio-cultural meaning of childhood and adolescence began to shift, from being viewed as a time to assume adult labor and economic responsibilities to a time for developing the ‘person’ who

had distinct social, emotional, and physical needs (Zelizer, 2004). As a result, within approximately 10 years, between 1930 and World War II, adolescents were effectively forced out of the labor force.

There were several factors that contributed to this shift. First, the United States experienced waves of immigrants, primarily European, which taxed cities' resources and made the 'problem' of unsupervised youth visible. Second, there was a growing social consciousness about the working conditions that children and adolescents faced; this was particularly evident for urban, immigrant youth who were viewed as needing to be assimilated into society and for rural youth working on a farm where physical harm from machinery was a present threat (Zimmer-Gembeck & Mortimer, 2006). Both groups faced long working hours and often harsh working conditions. Third, there was a burgeoning scholarly focus on child and adolescent development, spurred by a host of emerging stage-theories of human development and education (see Chapter 1; e.g., G. Stanley Hall). Finally, there were economic and labor market changes that increased competition for jobs; the Great Depression occurred during this period as well.

Amid this new emerging social consciousness and the economic changes, two new sets of laws were enacted that *de facto* meant adolescents could no longer work full-time (part-time work was not readily available). As early as 1878, 28 states had passed laws to regulate child labor but initial attempts to pass federal child labor laws were unsuccessful (1918, 1922) as the United States Supreme court ruled these laws were unconstitutional (Moehling, 1999). Then, in 1938, Congress passed the Fair Labor Standards Act, which was upheld by the courts, prohibiting child labor and set the minimum working age to 16 during the school year, 14 year olds could only work certain jobs during non-school hours and you had to be 18 years old to engage in 'dangerous' or 'hazardous' (Fried, 2014; Seavert, Cordero, & Cross, 1990). What was considered hazardous work speaks volumes about society's view of adolescents' vulnerability. For example, hazardous work include operating a tractor over 20 horsepower, operating any mechanized equipment or vehicles, working on a ladder at a height over 20 feet, or handling toxic agricultural chemicals, such as fertilizers (Seavert et al., 1990).

Around the same time early attempts by Congress to pass child labor laws in the United States were underway, individual states passed compulsory education laws, also known as compulsory attendance laws. Massachusetts was the first to pass a compulsory education law in 1852 with Mississippi being the last state to pass such a law in 1917 (Kotin & Aikman, 1980). It is important to keep in mind that these laws have undergone numerous revisions and they varied greatly by state. "Compulsory attendance laws specified a minimum and a maximum age between which attendance was required and the minimum period of attendance. They also provided penalties and procedures for noncompliance and listed the conditions under which individuals could be exempted from attending school" (Lleras-Muney, 2002, p. 403). Most laws required school attendance for individuals ages 8-16, although ages 6-16 was common too. Exemptions were made to these laws, the most relevant here being to allow adolescents to attain a work permit if they met certain criteria, for example if a child completed at least 6 years of education (Lleras-Muney, 2002). Local schools and educators may have also 'overlooked' or relaxed attendance requirement for youth whose labor was needed on the family farm during harvest months, although this tended not to be a formal policy.

The net effect of labor and education laws was that adolescents were unable to work full-time as they had in the past. Child labor laws restricted employers from hiring adolescents of a certain age (children were not allowed to work). Compulsory education laws 'confined' adolescents to the education space during typical 'adult' working hours. Adolescents, then, had

little choice but to be a *full-time student*, although they could work (within the confines of labor laws) during the summer and to a limited degree during non-school hours. An often overlooked effect of these laws was that they increased adolescents' financial dependency on the family; families also felt this economic strain. These laws profoundly altered the purpose of adolescent work. It became viewed as optional and as a potential detriment to the 'real job' of adolescence—being a student.

Emergence of the 'hybrid' worker—the student-worker. After World War II, the United States, and most of the rest of the world, began to rebuild its economic and social fabric. There was a post-war economic boom that resulted in an expanded middle class. A steep rise in childbirth accompanied the economic boom; we refer to the generation born during this time as the 'baby-boomer' generation, roughly those born 1946-1964. The economic boom bolstered incomes, leaving a greater portion of money to spend beyond basic needs, which supported a growing service sector. To gain a sense of this economic impact, the retail industry expanded by 96% and the fast food industry increased by 170% during this time.

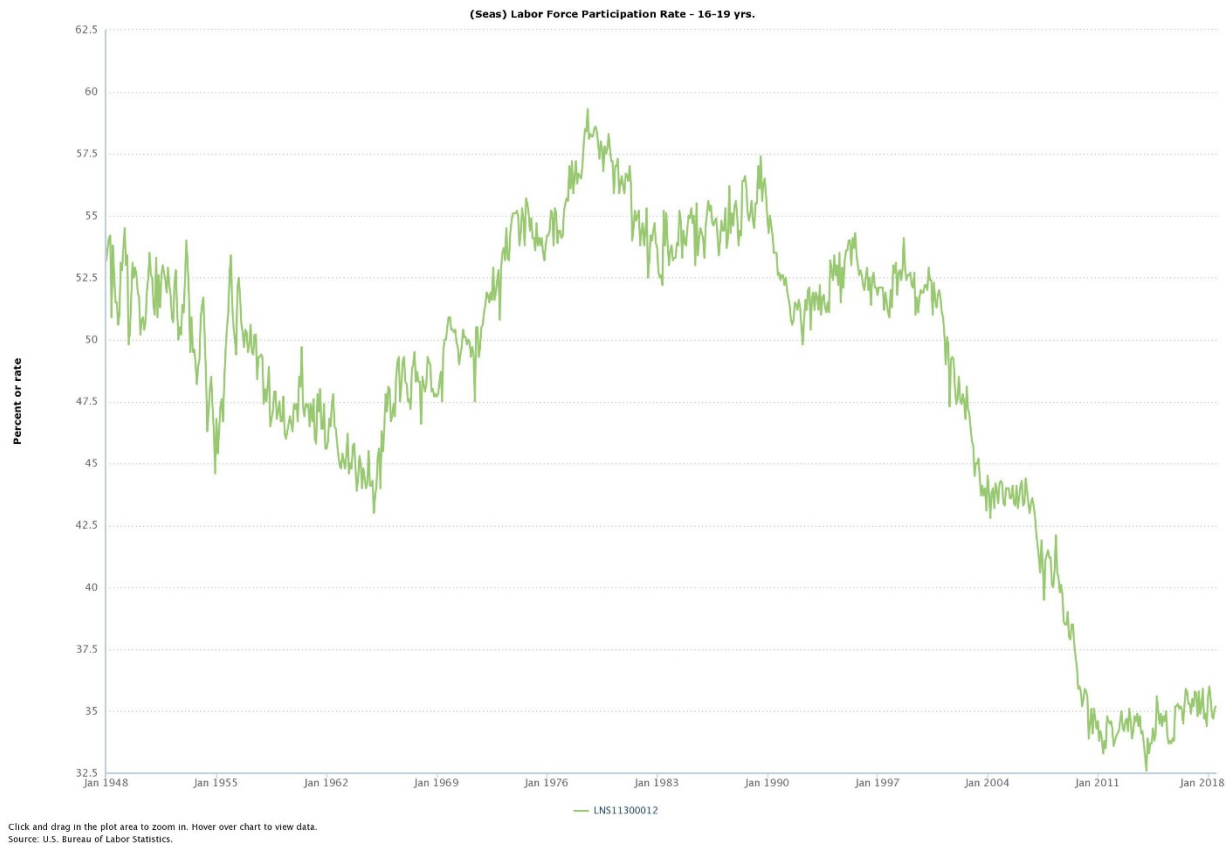
There was also a shift in residential patterns in which families, mainly middle-class White families, moved away from urban locations into rapidly expanding suburbs. Adult's work was still located in urban centers but workers began to commute to work; there was accompanying infrastructure (e.g., roads and railway lines) expansion to support a commuter workforce. These changes increased the demand for services that paralleled adult's work schedules and gave commuters access to services during non-business hours. Importantly, the demand for services resulting in a new type of worker—one who could work part-time, in late afternoons and evenings, and for lower wages. These forces created a niche' market for adolescent part-time employment in the United States, and hence, there emerged the *student-worker*. To give you a sense of the dramatic changes that occurred, consider that in 1940 approximately 3% of teenagers worked but by 1997 nearly 80% of teenagers worked; this percentage of teens who work during high school has not changed until recently.

As you can imagine, the purpose and meaning of adolescent work changed during this period. It provided adolescents with a degree of economic freedom and money that could be spent on 'discretionary' goods, such as clothes, food, music, etc., or saved to cover college costs; part-time work, however, is no longer sufficient to cover college expenses and thus the value of part time work may be changing. Additionally, adolescent part-time work became further detached from a career. Thus, the purpose of adolescent work became primarily about generating income for immediate consumption and preparation for the expenses of post-secondary education.

Adolescent Employment Trends

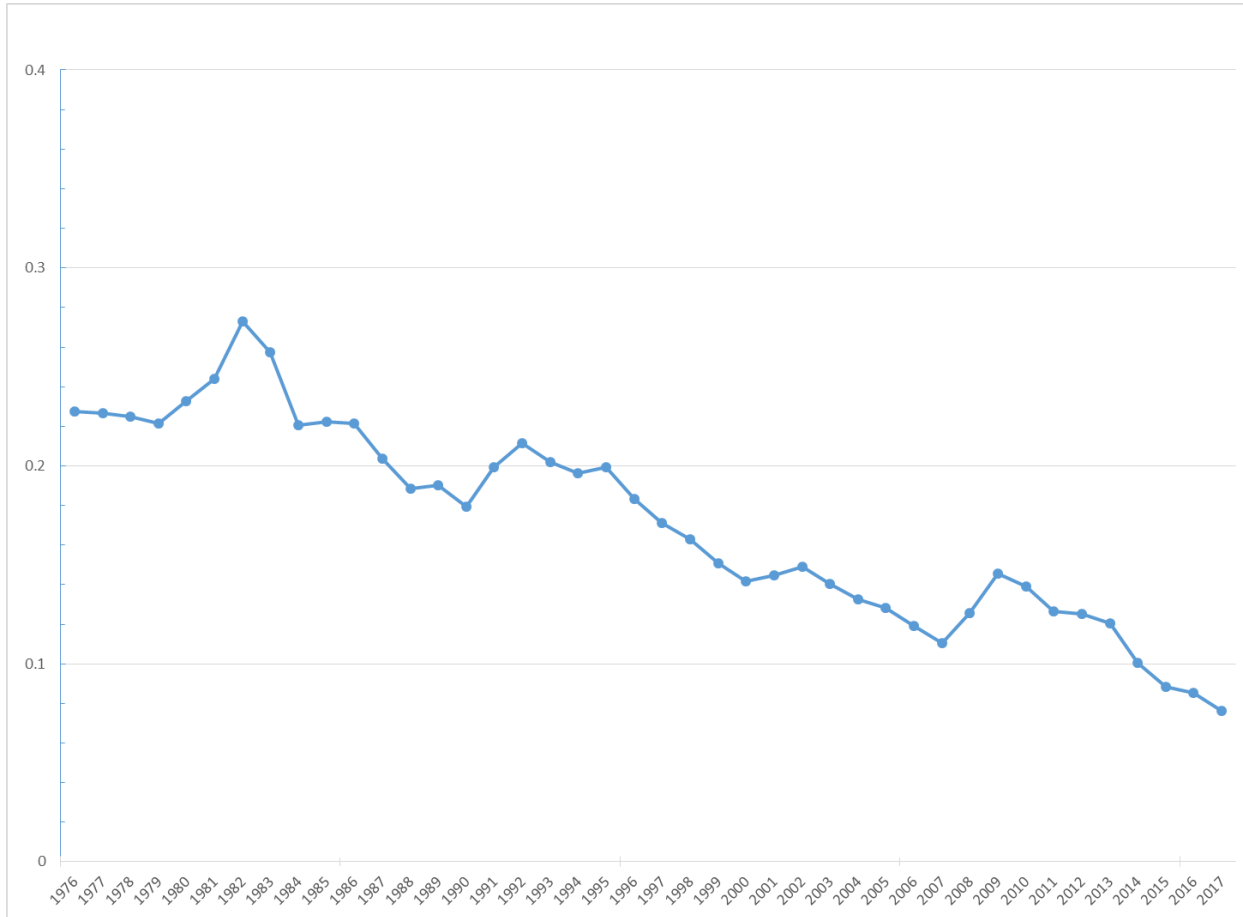
Overall Rates. Starting in 2001, adolescents age 16-19 years participation in the labor force has dropped dramatically (Aaronson, Park, & Sullivan, 2006; Sum, McLaughlin, & Khatiwada, 2008). In the first quarter of 2001 (January-March) 51.6% of adolescents were in the labor force but by the second quarter of 2018 (April-June) the rate was 34.9%; the lowest rate of participation occurred in the first quarter of 2014 with 33.2% of adolescents in the labor market (from Bureau of Labor Statistics data). You can see this precipitous decline in Figure 6.1 that presents labor force participation rates for workers 16-19 years since 1948.

Figure 6.1. Percent of 16-19 Year Olds Working, 1945-2018



The demand for part-time workers, however, remains strong in today's economy. While adolescents continue to be a source of workers, there has also been an increase in adults 65 or older and an increase in adults working the equivalent of full-time work by working multiple part-time jobs (Mosisa & Hipple, 2006; Purcell, 2000). Some of this recent change can be attributed to more baby-boomers reaching retirement age, health care costs, a reduction in full-time jobs that pay benefits in favor of part-time jobs that do not, and the 'great recession' that occurred between 2007 and 2010 (Juhn & Potter, 2006). This trend indicates that adolescents are less likely to be working while in school (Aaronson et al., 2006). But does this mean that adolescents do not want to work? The answer is a qualified 'yes.' The percentage of adolescents who are not currently working and looking for work has decline compared to trends in years past (Morisi, 2017), suggesting adolescents themselves may view employment as optional or less important (See Figure 6.2).

Figure 6.2. Percent 16-19 Year Olds Not in Labor Force Looking for Work, 1976-2017
Source: U.S. Bureau of Labor Statistics, Current Population Survey



Although too early to know if these patterns are the ‘new norm’ for adolescent employment, it most certainly could signal a change in the socio-cultural meaning of part-time work among adolescents. To speculate, it may signal that adolescent employment is coming to be viewed as a discretionary activity with minimal implications for future education or occupational goals, or it could simply reflect competition for part-time employment. The perceived value of adolescent employment, then, seems likely to change in the next 5-10 years, especially if current patterns continue.

Rates by gender and race/ethnicity. Adolescents’ participation in the labor force (for those who choose to work) is not equally distributed by gender or race and ethnicity. Historically, adolescent males have been more likely to be in the labor force than females. However, this sex difference has dissipated, and rates were essentially equal by 2005 (Mosisa & Hipple, 2006); in 2017, the rate was 34.6% for males and 35.9 for females (Bureau of Labor Statistics, 2017, Current Population Survey).

Labor force participation rates among adolescents varies considerably by race and ethnicity. As displayed in Figure 6.3 below, participation rates for 16-17 year old White adolescents are consistently and considerably higher than rates for the same age Black/African American, Asian, and Hispanic/Latino(a) adolescents. There are many reasons for this

variability, including access to employment opportunities, parental and cultural norms about a child’s employment, and individual motivation employment.

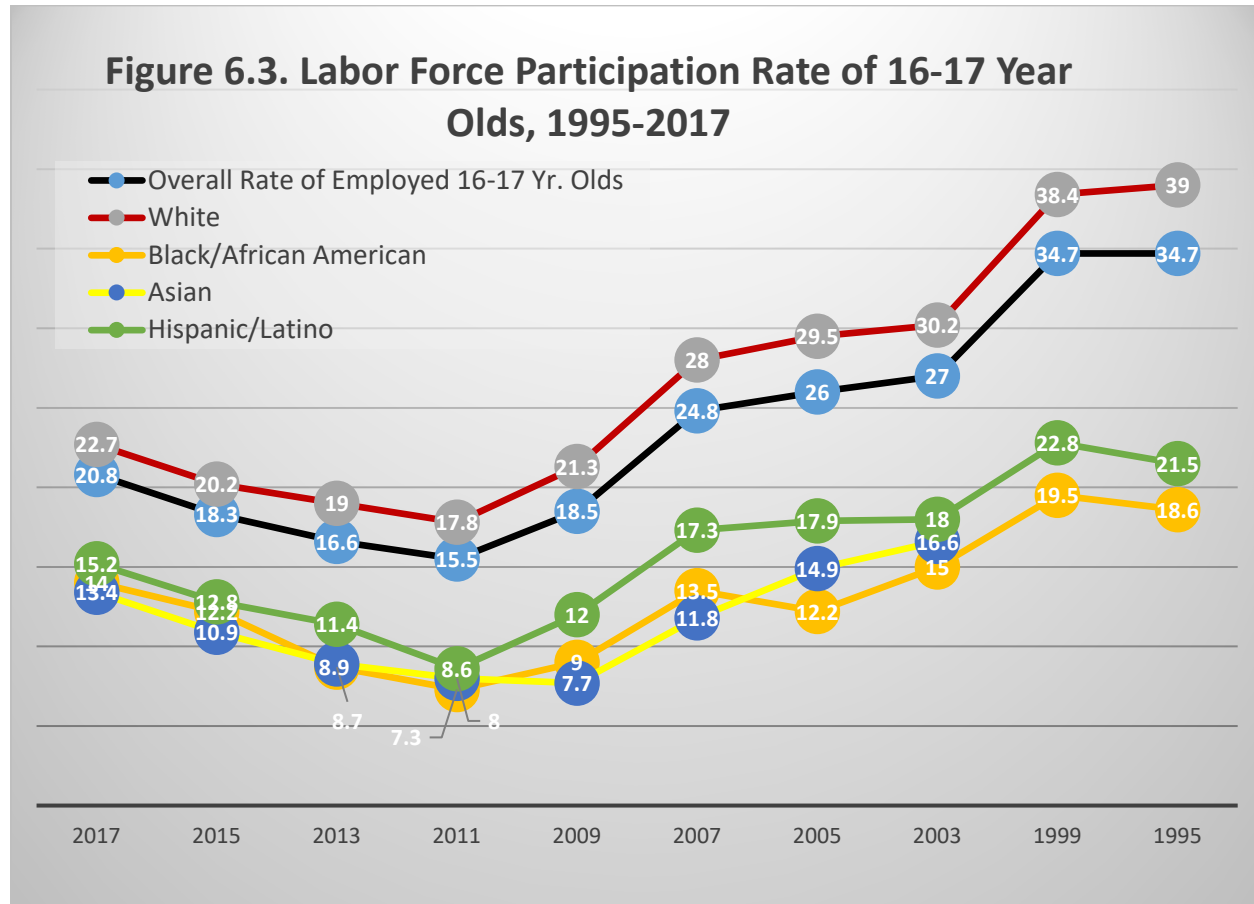
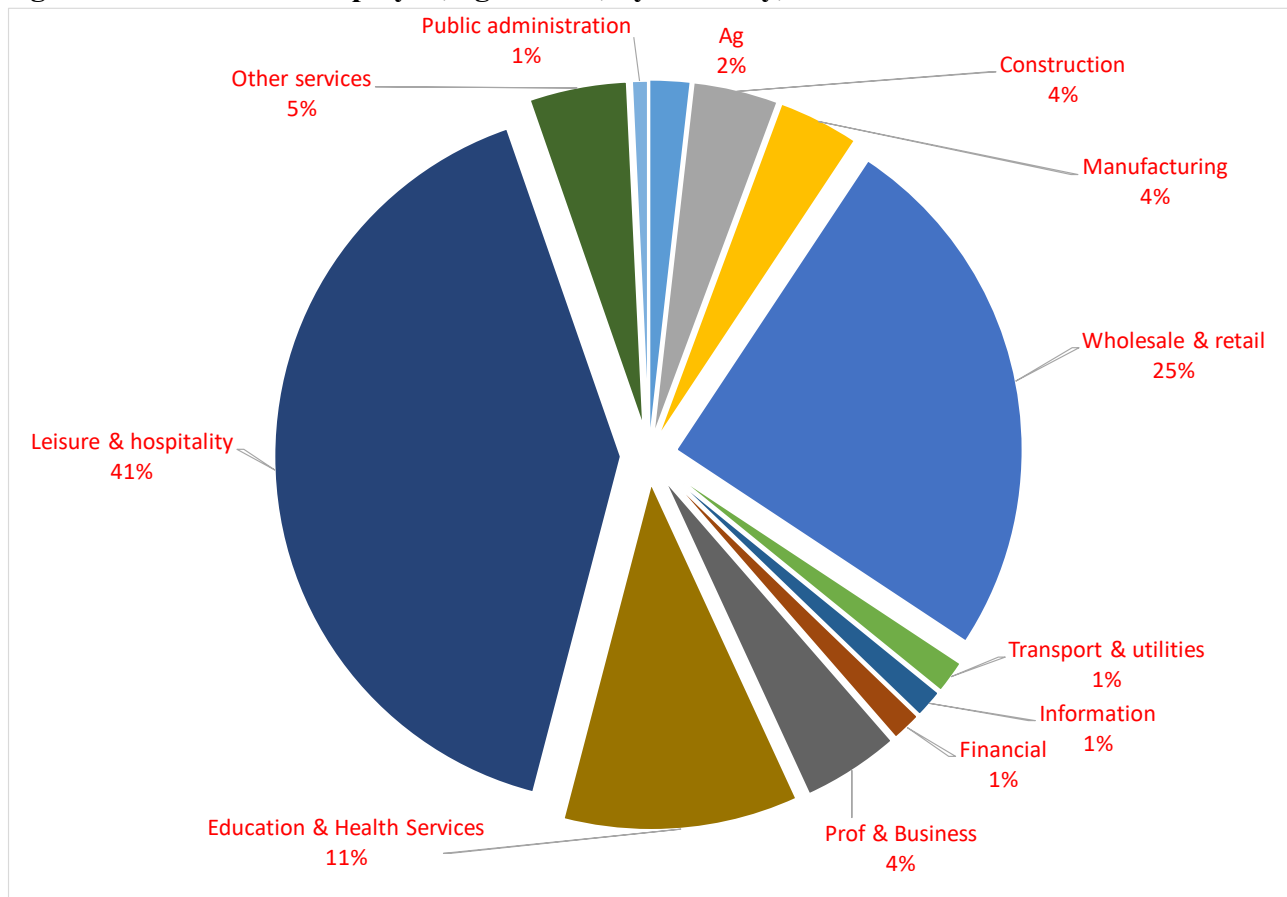


Figure 6.3. Labor Force Participation Rate of 16-17 Year Olds, 1995-2017
 Source: U.S. Bureau of Labor Statistics, Current Population Survey

Where Adolescents Work. There has been little change over the past 50 years in which industries adolescents are employed. As you can see from Figure 6.4, the vast majority of employed adolescents (ages 16-19) work in service industries—retail, hospitality (e.g., restaurants), and health and education (e.g., day care); note that separate statistics for each age are not available from the Bureau of Labor Statistics, thus some of these statistics include workers who have graduated from high school. There are numerous reasons that adolescents find employment in the retail, hospitality, and health and education sectors. A big reason, as noted in the early section of this chapter, is that there is a demand for part-time labor in these sectors, which allows teens to work outside of school hours. Another reason is that labor laws restrict the type of work that adolescents can do. For example, an employee must be 18 years old before operating an automated meat slicing machine at a fast food restaurant. Finally, compulsory education laws further limit the time adolescents can work. As a result of these and other factors, adolescent work in the United States is seldom related to career goals, rather it provides a means to an end, such as spending money.

Figure 6.4. Percent of Employed, ages 16-19, by Industry, 2017



Source: U.S. Bureau of Labor Statistics, Current Population Survey

The Impact of Adolescent Part-time Work

Work intensity

By far, the most commonly researched area of adolescent employment focuses on the number of hours worked, primarily during the school year. A consistent finding across cross-sectional and longitudinal studies is the relation between working long hours (per week), also referred to as intensity, and problem or risky behaviors, such as alcohol use or school truancy (Bachman & Schulenberg, 1993; H. W. Marsh, 1991; Laurence Steinberg & Dornbusch, 1991). The threshold for how many hours is “too many” before problems emerge is around 20 hours per week during the school year. For example, in a longitudinal study, adolescents working long hours reported using more alcohol and their alcohol use increased more rapidly during high school (McMorris & Uggen, 2000). Importantly, however, the pattern between work intensity and negative outcomes does not appear for those who work less than 20 hours per week. Indeed, research further indicates that the relation between working long hours and problem behaviors is due in large part to ‘self-selection’. That is, there are preexisting differences (e.g., disengaged from school to begin with) that influence adolescents self-selecting into work. When those differences have been statistically controlled for in a study, the association between work

intensity and problem behaviors disappears (Paternoster, Bushway, Apel, & Brame, 2003; Zimmer-Gembeck & Mortimer, 2006).

There are similar self-selection issues in play for other ‘negative’ outcomes. For instance, adolescents who are academically disengaged or have lower grades and educational aspirations before they started working tend to work longer hours once they start rather than the other way around (Mortimer, 2003; Laurence Steinberg, Fegley, & Dornbusch, 1993). Thus, the impact of work intensity is not simply that working longer hours leads to negative outcomes. Instead, those who work long hours tend to do so because they are disengaged in academic settings, or are leaning toward risky/problem behaviors to begin with; for these adolescents, work provides a means to engage in problematic behaviors.

Are there any benefits associated with work intensity? The simple answer is yes. Adolescent work intensity has been associated with a range of more positive experiences including vocational self-efficacy, occupational values, work motivation, autonomy, self-concept, dependability, and self-esteem (Barling, Rogers, & Kelloway, 1995; Creed & Patton, 2003; Finch, Shanahan, Mortimer, & Ryu, 1991; Mortimer, Finch, Shanahan, & Ryu, 1992; Mortimer, Finch, Ryu, Shanahan, & Call, 1996). Self-selection effects are also likely to influence these associations, although there is relatively less research or concern about self-selection when the outcome is something ‘positive’.

So what is the main message about relation between work intensity and various outcomes? First, work intensity alone is neither ‘good’ nor ‘bad’. Its impact depends on a host of other factors, especially those that exist prior to entering the work world. For some adolescents work intensity (e.g., long hours) may reinforce and provide greater opportunity to engage in problem behaviors, for others it may detract from time spent in other activities, and for some it seems to make little impact. Second, there is a threshold for work hours beyond which work seems to interfere with what adults consider the main occupation of adolescents—‘education’. You can see this in research examining adolescent work intensity. There is little research examining the potential impact of work intensity during the summer months when adolescents are not in school. Thus, the “problem” of work intensity only seems to be a problem during the school year.

Patterns of work experience across time

While work intensity has received the bulk of research attention, there are other ways to examine the impact of adolescent employment. An important source of information on adolescent employment comes from an ongoing longitudinal study, the Youth Development Study (YDS), led by Jeylan Mortimer at the University of Minnesota (Mortimer, 2003). The YDS began in 1988 and included a cohort of 1,000 adolescents, 75% of whom have remained in the study since. Based on the YDS study, there were clear patterns of adolescent employment with “distinct precursors and likely consequences” (Mortimer, 2010, p. 3).

Four patterns emerged for the YDS cohort: highly invested, sporadic, steady, and occasional workers (Mortimer, 2003, 2010). The highly invested workers were employed most months during high school and worked over 20 hours per week—longer duration of work and higher work intensity. Highly invested workers tended to have parents with lower educational attainment, and adolescents who valued work experience, had lower educational aspirations, and were less invested in school in 9th grade; these adolescents described their work as more adult-like with greater learning opportunities and supervising responsibility, but also more stressful. Sporadic workers, similar to those highly invested, worked over 20 hours per week when they

were employed but they worked about half of the months (lower duration); this group was more strongly oriented towards their peers at the start of high school and displayed the most problem behavior of all of the groups.

In the YDS (Mortimer, 2003, 2010), steady workers were employed for about the same number of months as those highly invested but regulated their work intensity, keeping their weekly hours to 20 hours or less. Occasional, or ‘sporadic’, workers were employed considerably fewer months (low duration) and also limited their weekly hours to 20 or less. Steady and occasional workers tended to come from higher socioeconomic families (e.g., middle class) and were more oriented to school, including being more intrinsically motivated at the start of high school and likely to see school and good grades as valuable for their future educational plans.

Conclusions

What can we conclude from research on adolescent employment? First, adolescent employment is not random or arbitrary (Mortimer, 2010), that is, adolescents appear to exercise intention and volition over when and how much they work. This does not, however, mean that adolescents are in complete control over their work experiences. Second, there are many factors that explicitly or covertly sway their employment decisions—selection to work factors. Adolescents from lower socioeconomic statuses may experience work as an occupational or vocational building block for future employment and become more invested in it. Those from middle and upper socioeconomic statuses may be more invested in school and future educational plans and therefore limit the role working at a job. Thus, selection to work factors clearly influence adolescents work history and experience.

Third, well designed, longitudinal studies dispel simple interpretations of the findings between work intensity and outcomes. When selection to work (self-selection) factors are accounted for in research, the association between working long hours and negative outcomes essentially disappears. Finally, society (U.S.) places limits (e.g., legal restrictions) on adolescents’ job opportunities and investment in work. By default, these restrictions suppress linkages between high school employment and adolescents’ future occupational and vocational objectives. In essence, US society actively promotes delaying adolescents’ development of occupation or vocational interests in favor of promoting educational pursuits. While this may seem ‘normal’ to those who have grown up in the United States, disconnecting adolescent employment and education is not the norm in many countries; many have clearly defined paths that blend adolescent education and work (e.g., apprenticeship systems in Germany); for comparison of German and United States see (David M Hansen, Mortimer, & Krüger, 2001; Mortimer & Krüger, 2000). Thus, the meaning of adolescent employment is also situated within a nation’s particular cultural and historical view of the value of education and work.

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7

Peers

Objectives

- Identify the primary social influences affecting development during adolescence
- Explain the major distinctions researchers have created to study adolescent peer interactions
- Explain the primary psychological mechanisms by which peers influence development in both physical and online (social media) environments

Overview²⁰

As children become adolescents, they usually begin spending more time with their peers and less time with their families, and these peer interactions are increasingly unsupervised by adults. Adolescents within a peer group tend to be similar to one another in behavior and attitudes, which has been explained as a function of *homophily*—that is, adolescents who are similar to one another choose to spend time together in a “birds of a feather flock together” way. Adolescents who spend time together also influence each other’s behavior and attitudes.

Peers can serve both positive and negative functions during adolescence. Negative peer pressure can lead adolescents to make riskier decisions or engage in more problematic behavior than they would alone or in the presence of their family. For example, adolescents are much more likely to drink alcohol, use drugs, and commit crimes when they are with their friends than when they are alone or with their family. One of the most widely studied aspects of adolescent peer influence is known as deviant peer contagion (Dishion & Tipsord, 2011), which is the process by which peers reinforce problem behavior by laughing or showing other signs of approval that then increase the likelihood of future problem behavior. However, peers also serve as an important source of social support and companionship during adolescence, and adolescents with positive peer relationships are happier and better adjusted than those who are socially isolated or have conflictual peer relationships.

Studying Adolescent Peer Relationships

Children’s notions of friendship often focus on shared activities, whereas adolescents’ notions of friendship increasingly focus on intimate exchanges of thoughts and feelings. During adolescence, peer groups evolve from primarily single-sex to mixed-sex groups.¹ Friendships provide unique socialization opportunities. They also provide contexts well suited for the acquisition of essential skills necessary for healthy social adjustment. Throughout adolescence, friendships require more sophisticated notions of openness, affection, empathy, loyalty, reciprocity, and equality. Varying rates of maturation can cause rapid changes in interests and expectations. Thus, friendships become proving grounds for expressing and regulating affect in these value-laden contexts. Intimacy, self-disclosure, and trust emerge and grow in step with the changing interests and increasing expectations of dyadic friendships (Weiner, Tennen, & Suls, 2012).

Cliques commonly range from about 3 to 10 members with an average of about 5 or 6 members. Cliques are often comprised of the same gender, although they tend to become increasingly cross-gendered with age. Cliques are dynamic groups of peers that are defined by their formation, maintenance, and dissolution (Weiner et al., 2012).

Crowds are an emerging level of peer relationships in adolescence. In contrast to friendships, which are reciprocal dyadic relationships, and cliques, which refer to groups of individuals who interact frequently, crowds are characterized more by shared reputations or images than actual interactions (Brown & Larson, 2009). These crowds reflect different

²⁰ Lifespan Development: A Psychological Perspective (PSY 220) View the Lifespan Development: A Psychological Perspective Textbook (PDF) This Open Education Resource (OER) textbook was funded by a grant from the College of Lake County Foundation and supported by the Business and Social Sciences Division. This publication is licensed under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 unported license. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/> or send a letter to Creative Commons, 171 Second Street, Suite 300, San Francisco, California, 94105, USA. Creative Commons (CC) License BY NC SA Any questions about an Open Education Resource textbook can be sent to psychology faculty members Martha Lally mlally@clcillinois.edu or Suzanne Valentine-French svfrench@clcillinois.edu.

prototypic identities, such as jocks or brains, and are often linked with adolescents' social status and peers' perceptions of their values or behaviors.¹

The Functions of Peers and Friends

Adolescents learn about themselves and others in the contexts of peer interactions. Through membership in peer groups, adolescents internalize common goals, learn about cooperation and the complex social dynamics of groups, and acquire the skills required to flourish within groups. The drama of peer groups provides opportunities for adolescents to learn about social structures, model social attitudes and behaviors, establish autonomy from adults, learn about collective rather than individual goals, learn about leading and following others, and begin to benefit from controlling hostile impulses towards others while at the same time, for better or for worse, mobilizing aggression in the service of group loyalty by directing it toward outsiders (Weiner et al., 2012).

Dynamic Interactions

Adolescents are influenced by their peers and friends. At the same time, adolescents influence their peers and friends. This dynamic relationship is often overlooked, but it is important to keep in mind that an adolescent and her peers are not independent actors. Individual dispositional characteristics and choices of the adolescent will bear on the type and quality of peer experiences. For example, temperamentally shy children tend to display less social competence and fewer prosocial behaviors. They may have less positive coping strategies and are more likely to develop anxiety. Temperamentally sociable children who lack emotional regulation competencies tend to be disruptive and aggressive toward peers. Conversely, peer experiences will influence the social competencies of the adolescent. It is typically during adolescence that people first choose which particular peers to associate with and whom to befriend. Also, adolescents can increasingly choose the types of contexts in which they interact with peers and friends. For example, choosing to participate in sports brings with it a particular set of peers, experiences, and learning opportunities (Weiner et al., 2012).

Engaging in social group interactions changes a person. Adolescents tend to be particularly receptive to peer influence. Peer characteristics have strong correlates with positive and negative behaviors including academic commitment, sexuality, and substance abuse. Peers constitute the primary influence on social cognition during adolescence and therefore motivation and engagement in positive behaviors (e.g. academics) are heavily mediated by peer influences. The psychological import of the desire to belong influences these motivations especially during adolescence. Through their social interactions, adolescents experience validation, acceptance, and affirmation. This desire to belong and find social acceptance can have positive or negative influence depending on context, and at the same time, peer rejection correlates with greater externalizing problems such as delinquent behaviors.

Popularity

A widely studied aspect of peer dynamics is popularity. Early studies of popularity tended to categorize children and adolescents as either popular, rejected, neglected, average, or controversial based on the frequency with which they were nominated by their peers as liked or disliked (Brown & Larson, 2009). These studies have several shortcomings when it comes to studying adolescent populations. Primarily, adolescents tend to have their own definition of

popularity that is different than the definition used by researchers. For adolescents, a popular peer is someone with high status, prestige, and power in the teenage social system, but may not necessarily be well liked (Brown & Larson, 2009).

As a result, researchers now prefer to consider two types of popularity: *sociometric popularity* and *perceived popularity*. Sociometric popularity refers to the degree to which individuals are well liked or sought out as activity partners or friends. Perceived popularity indicates the amount of status or prestige assigned to the person. Sociometric and perceived popularity sometimes correlate, but the correlations have been shown to decline between grades 4 and 9, especially for girls, to the point that by 9th-grade girls no longer showed a significant correlation between the two (Brown & Larson, 2009; Cillessen & Mayeux, 2004).

One explanation for this increased distinction between sociometric and perceived popularity is that as the peer system becomes more complex, the peer groups/cliques themselves become organized along status or prestige. For example, there is often a high status group known as the “populars,” but this group is not necessarily well liked. Further distinctions of the popular groups have been made between “prosocial populars” (described as friendly, helpful, social, and academically engaged) and the “populists” (described as arrogant, cocky, aggressive, and antisocial) (Brown & Larson, 2009).

*Peers and Social Media*²¹

Media play a important role in the lives of today’s youth, who grow up with tablets and smartphones, and do not remember a time before the internet, and are hence called ‘digital natives’. The current generation of the adolescents lives in a media-saturated world, where media is used not only for entertainment purposes, such as listening to music or watching movies, but is also used increasingly for communicating with peers via software applications such as WhatsApp, Instagram, SnapChat, Facebook, etc. Taken together, these media-related activities comprise roughly 6–9 hours of an American youth’s day, excluding home- and schoolwork. Social media enable people to share information, ideas or opinions, messages, images and videos. Today, all kinds of media formats are constantly available through portable mobile devices like as smartphones and have become an integrated part of adolescents’ social life.

Given that brain regions involved in many social aspects of life are undergoing such extensive changes during adolescence, it is likely that social influences—which also occur through the use of social media as the internet connects adolescents to many people at once—are particularly potent at this age and coalescence with their media use. Also, subcortical brain regions undergo pronounced changes during adolescence. There is evidence, for example, that the density of grey matter volume in the amygdala, a structure associated with emotional processing, is related to larger offline social networks, as well as larger online social networks (Von Der Heide, Vyas, & Olson, 2014). This suggests an important interplay between actual social experiences, both offline and online, and brain development.

Experiencing acceptance or rejection when communicating via digital media is an impactful social experience. Extensive research, including large meta-analyses, has demonstrated

²¹ Modified from: Media use and brain development during adolescence; Eveline A. Crone & Elly A. Konijn; <https://doi.org/10.1038/s41467-018-03126-x> **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third party material in this article are included in the article’s Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article’s Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <http://creativecommons.org/licenses/by/4.0/>.

that social rejection in a computerized environment can be experienced similarly as face-to-face rejection and bullying (Kowalski, Giumetti, Schroeder, & Lattanner, 2014), although the prevalence of cyberbullying is generally lower (and studies vary widely: prevalence rates depend on how cyberbullying is defined and measured). In all, cyberbullying peaks during adolescence and a large overlap has been found between victims and bullies. In part, this overlap could be explained by victimized adolescents seeking exposure to antisocial and risk behavior media content. The next subsections will describe recent discoveries in neuroscience on the neural responses to online rejection and acceptance.

Neural Responses to Online Social Rejection

The emotional and neural effects of being socially excluded have been well captured by research involving the Cyberball Paradigm (<https://cyberball.wikispaces.com/>). Cyberball is a virtual ball-toss game in which the study participant tosses a ball with two simulated players (so-called confederates) via a screen. After a round of fair play, the confederates, who only throw the ball to each other, exclude the participant in the rejection condition. This results in pronounced negative effects on the participants' feeling to belong, ostracism, sense of control, and self-esteem. Even though the paradigm was not designed to study online rejection as it occurs today on social media, the findings of prior Cyberball studies may provide an important starting point for understanding the processes involved in online rejection. In fact, inspired by Cyberball, a Social Media Ostracism paradigm has recently been developed by applying a Facebook format to study the effects of online social exclusion.

Using functional MRI (fMRI), researchers have observed increased activity in the orbitofrontal cortex and insula after participants experienced exclusion, possibly signaling increased arousal and negative affect. In addition, stronger activity in the dorsal anterior cingulate cortex (ACC) is observed in adolescents and young adults with a history of being socially excluded, maltreated, or with an insecure attachment style, whereas spending more time with friends reduced ACC response in adolescents to social exclusion. This may possibly protect adolescents against the negative influence of ostracism or cyberbullying, although all these studies are correlational. Therefore, it remains to be determined whether environment influences brain development or vice versa. Moreover, ACC and insula activity have also been explained as signaling a highly significant event because the same regions are also active when participants experience inclusion. Furthermore, studies with adolescents have observed specific activity in the ventral striatum, and in the subgenual ACC when adolescents were excluded in the online Cyberball computer game, the latter region is often implicated in depression. Thus, being rejected was associated with activity in brain regions that are also activated when experiencing salient emotions. These studies may indicate a specific window of sensitivity to social rejection in adolescence, which may be associated with the enhanced activity of striatum and subgenual ACC in adolescence.

Social rejection has also been studied using task paradigms that mirror online communication more specifically. In the social judgment paradigm, participants enter a chat room, where others can judge their profile pictures based on first impression. This can result in being rejected or accepted by others in a way that is directly comparable to social media environments where individuals connect based on first impression (for example, 'liking' on Instagram). A developmental behavioral study (participants between 10 and 23 years) showed that young adults expected to be accepted more than adolescents. Moreover, these adults, relative to adolescents, adjusted their evaluations of others more based on whether others accepted or

rejected them, possibly indicating self-protecting biases. Neuroimaging studies revealed that, being rejected based only on one's profile pictures resulted in increased activity in the medial frontal cortex, in both adults and children, and studies in adolescents showed enhanced pupil dilation, a response to greater cognitive load and emotional intensity, to rejection.

Taken together, these studies suggest that adolescents show stronger rejection expectation than adults, and subgenual ACC and medial frontal cortex are critically involved when processing online exclusion or rejection. In the next section, we describe how the brain of adolescents and adults respond to receiving positive feedback and likes from others.

Neural Responses to Online Social Acceptance

The positive feeling of social acceptance online is endorsed through the receipt of likes, one's 'cool' ratio (i.e., followers > following; Business Insider, 11 June 2014: <http://www.businessinsider.com/instagram-cool-ratio-2014-6?international=true&r=US&IR=T>.) or popularity, positive comments and hashtags, among other forms of reward. Neuropsychological research showed that being accepted evokes activation in similar brain regions, as when receiving other rewards such as money or pleasant tastes. Most pronounced activity was found in the ventral striatum, together with the ventromedial prefrontal cortex and ventral tegmental area, which is consistently reported as a key region in the brain for the subjective experience of pleasure and reward, including social rewards. Likewise, being socially accepted through likes in the chat room task resulted in increased activity in the ventral striatum in children, adolescents and adults. This response is blunted in adolescents who experience depression, or who have experienced a history of maternal negative affect. Apparently, prior social experiences—such as parental relations—are an important factor for understanding which adolescents are more sensitive to the impact of social media. In this regard, media research showed that popularity moderates depression and that attachment styles and loneliness increases the likelihood to seek socio-affective bonding with media figures.

Interestingly, several studies and meta-analyses using gambling and reward paradigms have reported that activity in the ventral striatum to monetary rewards peaks in mid-adolescence. These findings may suggest general reward sensitivity in adolescence such that reward centers that respond to monetary reward may also show increased sensitivity to social reward in adolescence. Social reward sensitivity may be a strong reinforcer in social media use. A prior study in adults has shown that activity in the ventral striatum in response to an increase in one's reputation, but not wealth, predicted frequency of Facebook use (Meshi, Morawetz, & Heekeren, 2013). In a similar vein, adolescents showed sensitivity to "likes" of peers on social media (Sherman, Greenfield, Hernandez, & Dapretto, 2018). In a controlled experimental study, adolescents showed more activity in the ventral striatum when viewing images with many vs. few likes, and this activation was stronger for older adolescents and college students compared to younger adolescents (Sherman et al., 2018). Thus, the same region that is active when being liked on the basis of first impression of a profile picture, is also activated when viewing images that are 'liked' by others, especially in mid-to-late adolescence, possibly extending into adulthood. These findings suggest that heightened reward sensitivity in mid-adolescence that was previously observed for monetary rewards may also be present for social rewards, such as likes on Instagram. However, further research is needed to examine whether this is a specific sensitivity in early, mid or late adolescence, or perhaps this social reward sensitivity emerges in adolescence and remains in adulthood.

Neural Responses Related to Retaliation and Emotion Regulation

Neuroscience studies can potentially provide more insight in the moral leniency following adolescents' anger. Neuroscience research on adolescent development has shown that the development of the prefrontal cortex, an important region for emotion regulation, matures until early adulthood. A better understanding of the interactions between brain regions that show direct responses to emotional content, and brain regions that help to regulate these responses can possibly clarify how adolescents regulate their behavior related to media-based interactions.

Several studies examined this question by focusing on anger following rejection. Rejected-based anger often leads to retaliatory actions. Several paradigms have shown that adolescents are more aggressive after being rejected online. For example, researcher participants gave longer noise blasts and shared less of their resources with people who previously rejected them in an online environment (Will, Crone, van Lier, & Güroğlu, 2016). More activity in dorsolateral prefrontal cortex (DLPFC) after rejection was also associated with less subsequent aggression and more giving, possibly indicating that increased activity in the DLPFC helps individuals to control their anger following rejection. Other research has shown changes in neural coupling of anger and rejection when young men played violent video games (Zvyagintsev et al., 2016). Thus, social rejection can evoke anger, however, some adolescents may be better at regulating these emotions than others. Adolescents who regulate these emotions better show stronger activity in DLPFC, a region known to be involved in self-control. Applying adaptive emotion regulation strategies (e.g., putting into perspective, refocusing, reappraisal) may require enhanced demands on DLPFC. Possibly, the late maturation of the DLPFC, together with heightened emotional reactivity, may make adolescents more likely to be influenced by media content.

Neural responses to online peer feedback

Neuroimaging studies of adolescents has shown that peer feedback influences adolescents' behavior. Neural correlates may provide more insight in the specific parts of the feedback that drives these behavioral sensitivities. One way this is demonstrated is by having individuals rate certain products, such as music preference or facial attractiveness. After their initial rating, participants received feedback from others, which was either congruent or incongruent with their initial rating. Afterwards, individuals made their ratings again, and the researchers analyzed whether behavior changed in the direction of the peer feedback. Indeed, both adults and adolescents adjusted their behavior towards the group norm (Berns, Capra, Moore, & Noussair, 2010), demonstrating general sensitivity to peer influence. Furthermore, when receiving peer feedback that did not match their own initial rating, participants showed enhanced activity in the ACC and insula, two regions involved in detecting norm violations (Campbell-Meiklejohn, Bach, Roepstorff, Dolan, & Frith, 2010). More specifically, increased ACC activity was associated with more adjustment to fit peer feedback norms in adolescents (Berns et al., 2010).

Peer feedback effects are not only found for how individuals rate products, but may also strongly influence how they view themselves. Girls may be especially sensitive to pressure for media's thin-body ideal, and peer feedback supporting this ideal has been associated with greater body dissatisfaction (Veldhuis, Konijn, & Seidell, 2012, 2014). A recent study showed that norm-deviating feedback on ideal body images resulted in activity in the ACC-insula network in young females (18–19-years), which was stronger for females with lower self-esteem (van der Meulen et al., 2017). Interestingly, the girls in this study also adjusted their ratings on what they

believed was a normal or too-thin looking body in the direction of the group norm. Together, these findings suggest that peer feedback through social media can influence the way adolescents look at themselves and others.

Conclusion

Adolescents are especially sensitive to social influences and social learning opportunities. Often, through logistic realities, these social contexts consist primarily of groups composed of similarly aged, interested, and motivated peers. Positive peer relationships are a critical component of adolescent development. Through peer interactions, adolescents learn complex relationship skills, and they learn about themselves in the process. The ubiquitous use of online social media by teens has encouraged a lot of research on the effects of peer acceptance and rejection. These online, virtual experiences often elicit emotional and neurological responses that are just as strong as real-life experiential responses, with, likely, equally important and impactful developmental relevance.

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8

Out-of-School and Leisure Contexts

Objectives

- Identify the main characteristics that define out-of-school activities
- Identify the different taxonomies for studying out-of-school activities
- Explain the limitations of the different taxonomies used to study out-of-school activities
- Recognize the different patterns of adolescent's out-of-school activity participation
- Describe what adolescent's learning in out-of-school activities

Overview

Children's and adolescent's in the United States spend a large portion of their 'free' time participating in "discretionary" or leisure activities outside of normal school hours. For example, R. W. Larson and Verma (1999) reported that school-age youth in the United States spend on average 40%-50% of their time in discretionary activities outside of school, that is, they can spend nearly half of their waking hours in these activities. Historically, society has commonly downplayed the importance of out-of-school activities for youth's development. However, research over the past 25 years has led to a major societal shift such that now participation in out-of-school activities is viewed as positive, if not essential, for youth's development (J. L. Mahoney, Larson, & Eccles, 2005).

Defining Out-of-School Activities

Out-of-school activities refer to organized or structured activities that occur outside of the formal school day. Out-of-school activities also involved some degree of adult supervision or leadership. Thus, activities that are unstructured with no adult supervision are not included in the 'out-of-school' category; for example, time spent "hanging out with friends" is not considered an out-of-school activity. There are other terms used for out-of-school activities: organized youth activities/programs, after-school activities, extracurricular activities, and community- or school-based activities.

Although structured with adult supervision, most researchers consider adolescents' participation in out-of-school activities as voluntary. Thus, adolescent's voluntary participation is a key element that differentiates the out-of-school activity context from formal education. It should be noted that for children, participation in out-of-school activities may be somewhat less voluntary and more controlled by a parent; parents often used out-of-school activities to meet childcare needs in the hours between the end of the school day and around 5-6 pm when working parents get off work.

Youth-Serving Organizations

Out-of-school activities are tied to particular youth-serving programs/organizations. These can be local, grass roots organizations to long-established national and international organizations (e.g., YMCA). What an organization does (the activities it offers) is guided by the organization's philosophy and perception of what youth need. Because of this, organizations and the activities they offer can vary widely, which is reflected in the range of activities available to adolescents. For many adolescents, then, they can choose activities from a wide 'menu' activities that fit their particular interests, although the range of available activities correlates with the economic conditions of the communities in which an adolescent live.

Approaches to Studying Out-of-school Activities

Researchers have created several activity taxonomies in order to study out-of-school activities—a taxonomy represents the particular way a researcher classifies activities into meaningful units. These units are then used understand how learning differs across these units.

One common taxonomy is to group activities by their *type*. Sport, performance and fine arts, academic clubs and organizations, community-oriented programs, service programs, and faith-based groups are common types of activities (D. M. Hansen, Larson, & Dworkin, 2003; R. W. Larson, Hansen, & Moneta, 2006). Depending on the particular research question being

addressed, researchers may use more or fewer categories of activity types. Sport, for example, may be further divided into team and individual sports (David M Hansen, Skorupski, & Arrington, 2010). What is the rationale for grouping activities by type? The idea is that similar activities should provide similar experiences and thus impact participant's learning in similar ways.

Grouping by *organization* is another common taxonomy. The idea for this classification is that particular organizations (e.g., YMCA) have distinct learning aims and goals that guide a site or location's activities. Thus, this similarity in purpose across program locations becomes the rationale for the organization as the unit. Because most organizations have multiple aims and purposes, the goal of using the organization as a unit is to assess the overall impact of a program on participants and not of learning related to a specific purpose. Finally, out-of-school activities can be grouped by their *purpose*. For example, organizations that aim to support adolescent's leadership skills may be grouped together. Common purpose-based groupings include, those focused on academics, enrichment, physical/sport, visual art, culinary, or specific occupation-related skills.

The main point of this section on taxonomies is that "the choice of a particular taxonomy has implications for understanding what participants' learn in out-of-school activities—it provides a lens through which to view learning" (D M Hansen, 2018, p. 1190). As with any unit used to study a phenomenon, there are limitations. Using a given taxonomy necessarily overlooks some information beyond its focus. For example, focusing on types of activities may overlook differences in the quality (e.g., how adult relates to youth) between activities. Thus, when you read research in this area ask what a given taxonomy can and cannot tell us.

Out-of-School Activity Participation Patterns

How much participation in out-of-school activities is needed to experience benefits? "Dosage" is a useful way to conceptualize how much participation (e.g., exposure to the learning opportunities of the activities) is needed (David M Hansen & Larson, 2007; J. L. Mahoney, Harris, & Eccles, 2006; H. Marsh & Kleitman, 2002). There are different ways to conceive of dosage: dichotomous 'yes/no' participation, *intensity* (number hours in a given period), *frequency* (number of days in a given period), *duration* (participation in same activity/program over time), *breadth of participation* (number of different types of activities), and *total number of activities*

Using a dichotomous 'yes/no' definition of dosage, research indicates that a vast majority (> 75%) of adolescents participate in at least one activity during a given period (e.g., over three months). While this percentage of out-of-school activity participation indicates it is common, this level of dosage measurement overlooks important differences in the patterns of participation. A more fine-grained way of looking at dosage is using *intensity* or *frequency* of participation as the unit. As you might expect, the number of hours or days adolescents participate in an activity can vary greatly depending on the type of activity (H. Marsh & Kleitman, 2002; H. W. Marsh & Kleitman, 2003). For example, team sports typically require more frequent and a greater number of weekly hours of participation than, say, chess club or a faith-based youth group. Research estimate that, averaging across all activity types, adolescents participate between 2-5 hours per week and attend at least once per week. In general, greater intensity and frequency of participation are both generally associated with more positive outcomes and experiences, although participating more than 20 hours per week may not be (Feldman & Matjasko, 2005).

Greater over time participation in an activity—greater *duration*—has also been associated with increased positive academic and psychological (e.g., self-worth) outcomes (H. Marsh & Kleitman, 2002). However, this pattern of association may not be as strong for some types of activities. *Breadth* of activity participation—the range of different types of activities a child or adolescent participates in has been associated with more positive outcomes (Bohnert, Fredricks, & Randall, 2010). Closely related to breadth of participation is *total number* of activities—a count of all activities participated in irrespective of their types. Similar to other dosage measures, a greater total number of activities has been associated with more positive outcomes.

Participation in out-of-school activities also differs by important socio-cultural factors, including indicators of socioeconomic status, race, and sex. Higher parental income, education level, and occupational prestige (e.g., indicators of socioeconomic status) are associated with higher rates of child and adolescent activity participation (D M Hansen, 2018). Research has also found differences in activity participation by race, with lower rates of participation among minority children and adolescents compared to their White counterparts. Part of this difference, however, is due to activity availability associated with income disparities; lower income, urban communities and schools tend to have fewer activities than middle and upper income, suburban communities. Finally, research findings regarding sex differences in out-of-school activity participation do not allow for decisive conclusions, although there is some evidence that females may participate in a greater number of activities.

Learning in Out-of-school Activities

What do adolescents learn in out-of-school activities? (Council, 2000; J. L. Mahoney et al., 2006). The answer to that question can be as varied as the different types and aims of the activities in which they participate. Below is a summary of learning within general domains (e.g., academics) rather than on more nuanced findings (e.g., math grades). Participation in out-of-school activities has been associated with a range of socioemotional competencies. Here we group these competencies into three domains cognitive, inter-personal, and intra-personal.

Adolescents participation in out-of-school activities has been associated with gaining *cognitive competencies*, including learning to engage in systems-level thinking to address complex, real-world problems, increased creativity, and increased content-specific skills, such as technology (Durlak & Weissberg, 2007; Eccles & Gootman, 2002; R Larson & Angus, 2011; R Larson, Hansen, & Walker, 2005; J. Mahoney, Larson, Eccles, & Lord, 2005). Participation has also been associated with learning *inter-personal competencies*, including learning teamwork, leadership, communication, and social skills (D. M. Hansen et al., 2003; R. Larson, 2007). Similarly, research indicates that youth learn *intra-personal skills* from participation, such as initiative, self-direction, time-management, as well as enhanced psychological well-being (R. W. Larson et al., 2006).

Research in general indicates that participation in out-of-school activities is positively correlated with academic achievement and engagement, but the association may be attributable to pre-existing differences (e.g., those doing well academically may be more likely to participate) (H. Marsh & Kleitman, 2002). Finally, participation in out-of-school activities has been associated with reduced problem- and risk-behaviors, such as lower delinquency rates and substance use but this association is connected to the quality of the youth programing (Durlak, Weissberg, & Pachan, 2010).

Conclusions

There are several things to keep in mind regarding the research summarized above. First, research has not examined how the specific aims and goals of a youth program/activity directly impacts participants learning. The majority of research has simply assessed the correlation between participants learning and factors such as how often they attend; linking the aims of a program to learning has yet to be assessed, partly because this requires research designs that are expensive and difficult to carry out. Second, it may be better to focus on the set of learning opportunities in an activity rather than any single one type of learning. For example, researchers have created ‘profiles’ of learning experiences associated with participation in a specific type of program (e.g., sport). By far the majority of research is based on cross-sectional designs, which are unable to assess change, such as change in teamwork skills. Finally, youth program quality is increasingly recognized as a key predictor of learning, but at present there are no published studies evaluating this prediction.

The scientific study of out-of-school activities in the United States is just starting to emerge from its infancy. There is much work to be done in order to understand the potential and real impact of adolescent’s participation in youth activities on their learning. Over the next 10-15 years the research field should make steady progress in understanding this important developmental context.

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9

School

Objectives

- Recognize the extreme disparities that exist between various school contexts
- Identify the primary methods related to measuring school contexts in academic research of students' experiences and outcomes
- Identify key resources and initiatives for researching school contexts in the United States
- Recognize some special considerations related to studying diverse populations and youth development

Overview

This chapter describes issues in measuring school contexts with an eye toward understanding students' experiences and outcomes. It begins with an overview of the conceptual underpinnings related to measuring contexts, briefly describes the initiatives at the National Center for Education Statistics (NCES) to measure school contexts, and identifies possible gaps in those initiatives that if filled could provide valuable new data for researchers. Next, new approaches and opportunities for measurement, and special considerations related to diverse populations and youth development are discussed. The chapter concludes with recommendations for future research opportunities.

Researching School Contexts²²

For over half a century, education researchers have recognized the importance of school contexts for many aspects of education, from teaching and learning to the hidden curriculum that reproduces social inequality. Harnessing the prosocial power of school contextual effects on students' development, either directly or indirectly by enhancing the work of school professionals, is valuable because elements of the school context may be responsive to carefully crafted education policy. However, assessing and determining successful policy depend on adequate data and models to estimate effects. In contrast to the physical or financial resources of a school or district, many of the school contexts that contribute to academic outcomes are inherently social and depend on social relationships, both potential and realized. Furthermore, any particular context may impact different people differently, and students inhabit multiple contexts simultaneously. Consequently, schools have many contexts under one roof, with the social nature of the school context presenting challenges to measurement over time and space.

Students, Schools, and Their Social Contexts

Over the course of childhood and adolescence, students spend many hours in classrooms, extracurricular activities, summer programs, jobs, parent outreach events, and other opportunities for interaction of peers, friends, and their families. These settings typically change as students grow and gain capacity to handle more independent and complex academic challenges and social relationships. Through these ongoing and at times intense interactions from sharing so many hours of the day over the years of childhood and adolescence, the school can emerge as a venue to define a community.

The Student in the School Context

Beginning with the individual, school community contributes to a student's identity development. From Cooley's (1902) classical looking-glass self or a more updated version from the popular 1985 film *The Breakfast Club* (see Barber, Eccles, & Stone, 2001), social scientists have recognized the crucial role of others in shaping identity, and of identity in shaping behavior and other outcomes. Indeed, the notion that a student defines oneself in relation to others highlights that different student's experience a school context differently.

²² Modified from: Measuring School Contexts by Chandra L. Muller, PhD

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Beyond identity, the intensity of social interaction and judgment that students experience through the school's contexts may heighten the impact of the hours spent in school on socio-emotional and academic development beyond the formal curriculum. Taken together, the school community provides opportunities for the emergence of important and valuable social relationships, norms, and reciprocated obligations that build trust, shared information, goals, values, interests, and motivation among members of the communities. These social processes within schools are of interest to a wide range of scholars, including developmental psychologists, economists, sociologists, anthropologists, and education scientists. Through the emergence and maintenance of these social processes we understand how status hierarchies and opportunities to learn are structured and reinforced, contribute to the development of personality and motivation, and shape the cultures that emerge in schools (Coleman, 1988).

In all, the social relationships and culture that develop within the school may affect students' learning, educational processes, educational attainment, adult earnings, and long-term health and well-being. As such, it may take on a larger role in the residential neighborhood or other collectives bound by the commonality of experiences. In addition to discussing the relevance for behavioral economics, Akerlof and Kranton (2002) provide an excellent description of the early studies about the school as a focal point of community and its role in identity development. From the standpoint of scholars of education and education policy makers, schools represent a major investment for every advanced and advancing society. The potential of school contexts to either amplify or undermine the investments made in curriculum, administration, teachers, and other personnel means that understanding the contexts of schools is a priority.

Also of interest to education researchers, policy makers, and public health professionals is that the social context of the school can be a setting in which antisocial development can occur. Recent events of school violence and bullying have heightened public awareness of the potential for rare but disastrous events to take place in schools. School fighting, substance abuse, negative body weight related pressures, and other health risk behaviors can both cause negative school climates and be a consequence of poorly functioning schools. These school safety issues stemming from the school's context are important yet challenging to measure for a number of reasons. First, the negative outcomes that emerge from the context are relatively rare events. And second, we know very little about how such negative events come about or emerge from a school's climate, or how to identify problem pockets within a school context. These challenges are complex; for example, efforts to disrupt a negative school environment, such as the use of metal detectors or visible mechanisms of social control or surveillance, may have their own negative consequences and exacerbate an already troubling situation (Arum, 2003).

The Multiple Contexts of Each Student Within a School

Schools are situated in communities and are composed of students and their families, who may reside in diverse neighborhoods. Just as the school may provide a venue for defining community through shared activities of students and families, the larger community, district, state, and region can shape the social and curricular activities and priorities within the school by reflecting the surrounding social, cultural, economic and political contexts. Scholars from multiple disciplines have recognized the value of measuring these elements of school context. For example, school and neighborhood factors are independently associated with academic progress (Catsambis & Beveridge, 2001). Yet these relationships may be complex in that both absolute levels of neighborhood resources and the relative resources of a student's neighborhood

compared with others in the school predict educational attainment (Owens, 2010). The Moving to Opportunity study (Moving to Opportunity Program, 2015), a randomized experiment designed to estimate neighborhood effects, highlights the value of experimental data for establishing causal relationships between contexts and students' outcomes.

The School Contexts of a Student Across Time

Finally, the structure of schooling that groups similar age children together into classrooms, grade levels, and schools has implications for the study of school contextual effects on students' experiences and outcomes over the course of childhood, adolescence, and into early adulthood. From preschool through college, the educational system structures changes each academic year such that groups of students and their school contexts are reconfigured. For example, the transition between middle school and high school often involves a building change that may be accompanied by merging of students from more than one school, as when several middle schools feed into a single high school or, alternately, a middle school splits between two or more high schools (Schiller, 1999). Students also transfer between schools at non-institutionalized transitions (Sutton, Muller, & Langenkamp, 2013). The consequence of these changes—institutionalized and due to student or parental choice—is that students accumulate experiences in different contexts over the course of their school careers.

Current Approaches to Measuring Context With NCES Data

The NCES has several programs that involve measuring school context: (a) a major new initiative, the School Climate Studies, and two notable and established programs, (b) the Secondary Longitudinal Studies Program, and (c) various data on schools and districts.

The School Survey on Crime and Safety (SSOCS) has collected information about crime at school and discipline from a sample of school principals beginning in 1999–2000 and every other year from 2004 to 2010. This survey has been used by researchers to study a range of factors related to how schools function for students, from how school crime is related to school composition and climate (Chen, 2008) to student achievement (Sulak, 2014). Replacing the SSOCS is the School Climate Survey Compendia (SCSC) of tools to measure school climate. The website safesupportivelearning.ed.gov describes the background and topics related to the initiative to measure “engagement, safety, and environment.” As part of the initiative, survey instruments are designed for middle and high school students, staff (teachers, leadership, other staff), and school administrators to administer as an information gathering step to improve school climate. The survey responses can be benchmarked to a national sample. For research purposes, the SCSC has the potential to make new and important contributions, but also has some serious potential limitations. On the positive side, the SCSC brings together many indicators of school climate in a single survey instrument to provide the opportunity to understand school climate in a more nuanced way through the study of covariation among indicators of reports from multiple perspectives (e.g., teachers, students, administrators). However, without adequate measurement of within school variation, achieved only with large enough probability samples of students in schools, the potential for understanding crucial sources of variation within a school will be lost. The value of measuring within school variation is discussed below. Measuring within school variation should be a high priority for developing an understanding of engagement and safety. In addition, the current plans do not include any capacity to link to administrative records, retain student identifiers for longitudinal data collection, or link student responses or climate measures

to individual student outcomes. These shortcomings limit the potential value of the database if climate indicators cannot be observed in relation to diverse students' outcomes.

The NCES Secondary Longitudinal Studies Program is a centerpiece of the portfolio for research on effects of school context on student development. It includes five studies: the National Longitudinal Study of the High School Class of 1972, the High School & Beyond (HS&B) longitudinal study of 1980, the National Education Longitudinal Study of 1988, the Education Longitudinal Study of 2002, and the High School Longitudinal Study of 2009. Each database has had a major impact on the research infrastructure and on policy; for example HS&B alone has provided data for at least 800 peer-reviewed articles, books, doctoral dissertations, and major reports (see HS&B, 2015, for a list). Together they allow researchers to study students' academic progress over the life course and compare the processes across five decades. The emphasis of the program is on the academic development of students through high school and in the transition to adulthood. Unfortunately, these studies have limited capacity for analyzing within school heterogeneity. The studies are also limited in that they stop collecting data in early adulthood. The exception is a recent follow-up of the HS&B sophomore and senior panels (HS&B, 2015), which will allow researchers to study the long-run effects of school and education into midlife. Each study does include measures of school context from administrator reports on a range of topics (e.g., school attributes and resources, school climate, academic course offerings) and through the capacity to link school records to other school and district databases.

NCES collects information about schools and districts that provide rich indicators of school context. As with the SSOCS, these databases can be used to study climate, achievement, and other school factors related to context that are known to be important for students' outcomes. An excellent example is Fiel's (2013) analysis of trends in school resegregation. In contrast to the SSOCS, databases that cover all public schools or districts, such as those described below, are especially useful because they can be linked to the longitudinal studies of students, including those in the Secondary Longitudinal Studies Program (cf. Riegle-Crumb & Humphries, 2012) and local schools and districts (cf. Mickelson, 2015). Selected indicators have also been linked to the Adolescent Health and Academic Achievement Study (AHAA; cf. Langenkamp, 2010). Such approaches provide information for analysis of students' exposure to multiple contexts over time.

The NCES and the Office of Civil Rights (OCR) sponsor four programs that collect data from every school and/or district in the United States. The Common Core of Data (CCD) program has collected and makes available data from every public school and local education agency (LEA), or school district, and state annually since 1986. The range of topics is extensive, covering information "about students and staff, including demographics; and fiscal data, including revenues and current expenditures" (<http://nces.ed.gov/ccd/>). Complementing these databases are indicators from the School District Demographic System, which compiles demographic and geographical information from the U.S. census products about persons residing within the attendance boundaries of LEAs. The School Attendance Boundary Information System is a similar product available at the school level for many public school attendance boundaries for limited years (2009–2012) (www.sabins-data.org). Information on the universe of private schools is collected every two years under the Private Schools Study (PSS) program. Together, the CCD and PSS cover the vast majority of schools in the United States.

Finally, the OCR Civil Rights Data Collection gathers information from every public school and LEA in the United States. These censuses, rather than samples, are collected only in selected years, with increasing frequency over the past decade. The purpose of the data collection

is to provide information to help administer and enforce the civil rights statutes, so most programmatic indicators are disaggregated by race/ethnicity, sex, limited English proficiency, and disability (U.S. Department of Education, 2014).

As an increasing share of our population attends higher education, measuring postsecondary contexts is a priority in tracking students' contexts over time. Since the 1960s, NCES has collected the Integrated Postsecondary Education Data System each year; it includes all institutions that participate in any federal student financial aid program. More recently, data from the National Student Clearinghouse have the potential to provide contextual data and unit record data for many individual students (Dynarski, Hemelt, & Hyman, 2015).

Gaps and the Future of School Context Measurement²³

Many of the NCES school contextual databases described above include the same or similar repeated indicators over time to measure trends and to link to databases of individual students in schools. Such linkages provide much more analytic power for measuring school contextual effects over a students' school career. Yet subcontexts within a school may exhibit considerable heterogeneity, and it is also possible to estimate heterogeneous school effects due to differences in how an individual experiences a context. Schoolwide indicators typically do not capture this heterogeneity.

Researchers have long recognized the importance of structural variations within schools for understanding students' experiences and outcomes. For example, the practice of tracking to separate students into ability groups within a school was one of the first approaches to identify the powerful differences in opportunities to learn that could come about within schools (Gamoran, 1992; Gamoran & Mare, 1989). These unequal opportunities to learn were cause for concern (Oakes, 1985) and were followed by a call to detrack (Brewer, Rees, & Argys, 1995) such that few school administrators currently report that their schools track students. Yet many academic courses are still organized into sequences in which prerequisites lead to more advanced coursework. This is most common in mathematics and often results in students segregated into different courses, sometimes over the entire four years of high school (cf. Riegle-Crumb, 2006; Stevenson, Schiller, & Schneider, 1994). Similarly, sets of academic courses may be offered together, some in sequences and others as a result of scheduling constraints, resulting in effectively maintained inequalities in opportunities to learn within a single school (Lucas & Berends, 2002). Regardless of the exact definition of the differences in opportunities to learn, substantial evidence supports the claim that "second generation segregation" exists in many schools in the United States and results in inequalities in opportunities to learn (Mickelson, 2001).

Social and developmental psychologists and social network researchers have recognized that the tendency of people to form friendships according to homophily, or similarity of attributes, such as race, may shape peer contexts within a school (Moody, 2001). These friendship groups may exert powerful normative influences on students' behavior and identity. Differences in adolescent students' identity have long been recognized by researchers, and may even be characterized by their perceived connections to or position in the school (e.g., Barber et

²³ Modified from: Measuring School Contexts by Chandra L. Muller, PhD

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al., 2001; Coleman, 1961; Willis, 1977). Students may fine-tune their reference group to suit their self-perceptions and identity (Mueller, Pearson, Muller, Frank, & Turner, 2010), with consequences that must be understood in terms of the fit between the student and his or her context within the school. It is worth noting that this fit may have positive, prosocial consequences (Riegle-Crumb, Farkas, & Muller, 2006) or negative effects for adolescents who do not fit in (Wilkinson & Pearson, 2009), or place some students in contexts that promote negative behaviors (e.g., drinking—Crosnoe, Muller, & Frank, 2004; suicide ideation—Abrutyn and Mueller 2014). Each of these approaches underscores the value of recognizing heterogeneity within schools and how students' attributes interact with the context to shape their experiences and outcomes.

The heterogeneity of school contexts presents measurement challenges because (a) students are members of different contexts, in and out of schools and over time; (b) each school has a unique internal structure; (c) within a single school, different students may experience a similar structural position differently; and (d) schools include multiple actors—students, teachers, staff, and administrators—as well as parents and possibly community leaders, each of whom will have a unique and potentially valuable perspective. Ideally, any procedure to estimate the context would be empirically derived using data from the school and people within the school (students as well as other actors) so that the measures tap the uniqueness of the school and can be linked to students and other actors in the school and compared across schools. The recent events of school violence stemming from students' alienation underscore the value of recognizing that students may occupy different social positions in the school, and may experience the school and its contexts very differently. Instances of bullying or other forms of school violence may come about when a student becomes alienated and feels like an outsider, in part because of the (perceived) insiders in the school. A single school may have both insiders and outsiders within the same contextual spaces. It is only by analyzing the relationship between the internal structure of schools and the individual students within those spaces that we will be able to identify and understand how some schools might at once promote learning for some students and become unsafe spaces for other students.

To date, the NCES approach to measuring school context is strong for identifying nationally representative samples of schools and students and for evaluating trends over time. The extant school contextual databases measure some aspects of the structural elements within schools for analyzing between school variation, but they lack important detail. None of these surveys adequately measures the contextual heterogeneity within schools, nor can the different contexts in the school be linked to particular students in the school. Doing so is a crucial first step toward developing policies that serve the diverse needs of our nation's students. Enhancing our understanding of how school policies can impact structures of opportunities within schools for different students is an important priority. Data collection to understand how policies shape positive school contexts requires the capacity to measure within school contexts over time and would ideally allow for the estimation of effects of policy interventions.

New Opportunities for Measuring School Contexts

New approaches for measuring school contexts can capitalize on advances in technology and data availability to better capture the heterogeneity within schools and link context(s) to individual students. With the ability to link contexts to individual student data, such as that gathered through interviews or for administrative purposes, we can understand how the student experiences his or her context(s). These new data opportunities have the capacity to provide rich

empirical evidence at multiple levels to improve schools. This section begins by discussing network approaches for characterizing the structure of relations among students, then elaborates on measuring heterogeneity among students, describes the potential for considering multiple perspectives that include teachers, administrators, and parents, and concludes the section with a brief discussion of the implications of the advances for more strategic sampling.

Network methods offer promising tools for identifying clusters of students who share courses. A two-mode approach (Field, Frank, Schiller, Riegle-Crumb, & Muller, 2006) was developed using data from the National Longitudinal Study of Adolescent Health (Add Health). The longitudinal component of Add Health includes approximately 200 students per school and data from AHAA, which collected and coded their high school transcripts. The two-mode approach detects emergent clusters, called “local positions,” of students who take sets of courses together. Each school has a unique structure that represents a meso-level context, or set of local positions, in the school. These tap a source of within school heterogeneity that is more nuanced than tracks or sequence of courses. Local positions are defined by a set of courses that typically contain fewer students than a track, and they are derived empirically and are unique to each school. Attributes of students in the local position predict whether the student invests in demanding math courses in subsequent years (Frank et al., 2008), and the friendships that form in the later years of high school as some students prepare for postsecondary study (Frank, Muller, & Mueller, 2013).

Other network approaches using similar or enhanced data from administrative records or from teachers may offer important advances as well. Add Health did not contain information from teachers about themselves, their perspectives on their students, or what courses they taught. Indeed, it did not even identify which teachers taught the courses that were associated with the positions. Such data, which are possible to obtain from administrative records, would almost certainly provide an empirical foundation for further advances in estimating school structures, students’ positions in them, and the learning opportunities and social experiences of students in schools.

A comprehensive mapping of the within school structure as defined by the everyday lives of the students, such as that achieved with the local positions, can place a focal student in a specific context within a school. With information derived from representative samples of students in each school, the attitudes and behaviors of a focal student’s peers, such as in the local position, can be used to estimate peer effects. For example, it would be possible to develop nuanced models for the role of peers in adolescent girls’ progress in STEM fields. Incorporating information from teachers or even parents of the students could allow the researcher to measure or triangulate climate-related reports from multiple perspectives within the context or local position. Similarly, characteristics of the other students in a position could be based on indicators from administrative records (e.g., test scores, grades) and used to estimate contextual effects for different students (e.g., girls and boys, academically high- or low-performing students).

Administrative records of students’ addresses can provide information about the neighborhoods of students who attend the school. Beyond measuring aspects of social class (e.g., housing values, whether housing units are owned or rented, unemployment rates), neighborhoods vary in their crime and arrest rates, type of crime, adult (and parent) incarceration, the treatment of minors as adults in the criminal justice system, racial segregation, and other features of social organization that may have consequences for the everyday lives of students and for the functioning of the school. In addition to providing enhanced information about students’ peers,

such information would be valuable for comparing schools, for example, charter schools to comprehensive public high schools.

Other sources of data may provide rich portraits of students' lives. Medical records could provide information on child health, which is very poorly measured in most studies that do not explicitly focus on the topic. Information on parents' employment, available from state or federal data systems, would also greatly enhance our understanding of students and their peers. And parents' income tax records linked to student records make it possible to more accurately measure important concepts such as value-added by teachers and schools (Chetty, Friedman, & Rockoff, 2014).

New and rapidly changing technologies have powerful implications for gathering rich information about how students (and teachers and parents) live their lives. For instance, methods such as experience sampling methodology (ESM), which queries students about what they are doing and how they are feeling in the contexts of their lives throughout the day, are improving with technological advances and have potential for education research (Zirkel, Garcia, & Murphy, 2015). Moments in time are sampled and can be analyzed to estimate, for example, the level of challenge a student feels when engaging in activities in classrooms or at home watching television or doing homework (for description of the method, see Hektner, Schmidt, & Csikszentmihalyi, 2007; Moneta, 2012). Newer technologies have made possible the collection of biomarkers to gauge reactions to contexts or record real time behavior, such as activity level. Large amounts of data on biomarkers, such as heart rate and exercise, are collected with devices like Fitbit and are used in marketing; they could also provide a wealth of data for academic research, particularly if used in conjunction with techniques such as ESM. And students (or other actors) can be tracked using global positioning system (GPS) technology to place them in geographic proximity to one another, or to otherwise provide a more accurate and less intrusive strategy for placing them in contexts. Students also leave artifacts of their feelings and relationships online (e.g., Facebook, Twitter), which could be coded and analyzed. Nonetheless, indicators of attitudes, feelings, and perceptions of students, teachers, parents, and significant others are still valuable—possibly even more valuable with the supporting location and biomarker data—and must still be acquired from self-reports. These data from new technologies will likely spur advances in methodology, and also produce a much richer understanding of what happens in schools.

Along with rapidly changing technology are heated political debates about whether and how data artifacts from our daily lives should be maintained, retained, and used. What is technically possible may be politically complicated, and both landscapes are changing rapidly. For any new study design it would be helpful to work with experts who have not traditionally consulted on designs of education and social science databases, for example, technology experts from Silicon Valley or persons involved in marketing or analysis of big data who are already familiar with methods for compiling data into useable forms. These recommendations are part of a larger conversation about the potential to update indicators at relatively low cost with high return (Davidson, 2015). The point is that with the methodology in place to measure both school context and within school contexts—linking the individual student to contexts—rich possibilities to assess how schools impact students become possible.

Obtaining reports from multiple actors in a school is an additional source of heterogeneity that has proven valuable for tapping school context. The secondary longitudinal studies have parent components, teacher reports on sampled students, and administrator reports. Approaches to gathering data about multiple perspectives using multiple modes for collection

was refined on a large scale for the Measures of Effective Teaching study (Measures of Effective Teaching Project, 2014). Another notable application of measuring context through perspectives of multiple actors was employed in an implementation study of a program designed to increase social capital in schools (Gamoran, Turley, Turner, & Fish et al., 2012). Because the program was designed to improve the social context of the school, it was imperative to measure the context from the perspectives of all actors in the school. Furthermore, this approach allowed the researchers to gauge effects of context for diverse students.

New data sources also open up new possibilities for sampling. NCES and others have long used the CCD, PSS, and the Quality Education Data as sampling frames for two-stage designs that first sample schools and then samples students within schools from school rosters. In theory, the state administrative data systems could provide a much richer portrait of schools, their contexts, and students in the context. These censuses of schools and students in them can provide a sampling frame by providing indicators of structural features of the schools and variation between and within them. A limitation of state data systems is that they only include public schools. Using this information should make it possible to draw samples that are more closely tailored to the purposes of a study, and especially to provide information relevant for targeting oversamples. For example, state data systems provide rich information about students' learning and growth in learning, how students move and transition between schools, the courses that they take, and attributes of teachers, all by students' race and ethnicity, gender, and age. These possible indicators of opportunity to learn, school quality, and other aspects of the school process and context could be used in sample selection.

Special Considerations in Measurement

As suggested above, measuring the effects of school contexts is not only valuable but is best accomplished by considering the interaction of the contexts with the individual. Several additional issues are worth consideration.

First, a well-recognized source of variation in how a particular student responds to a context concerns the student's age and developmental stage. Barber et al. (2001) found that the stage-environment fit varies along racial and ethnic lines. As students age they are better able to handle more complex social arrangements, but this pattern also varies according to race and ethnicity, with African American students benefiting longer from the less complex social settings. A good example is in the transition from elementary to middle school, which for many students means transitioning to larger classes and classes taught by many different teachers. Although such an arrangement allows students to be taught by teachers with more specialized academic knowledge, it also places higher demands on the student to navigate more relationships and possibly more complex relationships with teachers who may form more superficial impressions of students if they have fewer opportunities to get to know them as individuals. African American students may face greater risk in navigating these transitions, at least in some settings. Thus, in measuring the context it is important to take into account the age, developmental stage, or other characteristics that might shape the way a student experiences a particular context.

It is also important to recognize that students select into contexts, and they are members of multiple contexts, in different spaces and across time. A failure to properly measure the selection or the effects of unmeasured contexts can result in the mismeasurement of the effects of a focal context. Although a full discussion of these measurement challenges is beyond the scope of this article, data generated from non-experimentally designed collections are better suited to

descriptive aims, theory building, and hypothesis generation, and are not adequate to determine a causal effect of a context on individual outcomes. It is especially important to remember that randomized experimental design is better suited to test the potential effect of a particular policy initiative.

Priorities for Future Measurement of School Contexts

The purpose of this article is to discuss approaches to measuring school contexts as they relate to students' experiences, development and outcomes, broadly defined. Structural features of the school context have important implications for students, yet they are often poorly measured in large-scale national studies. Rapid changes in technology and big data along with new methodologies for collecting and analyzing data, contemporary challenges to gaining cooperation for conventional data collection, and the changing nature of students' lives must all be considered in assessing priorities for future data collection. These technological advances and new challenges suggest that there would be a substantial benefit from rethinking the traditional models of data collection and analysis for measuring context. The following priorities take these considerations into account:

- Collect sufficient data about students within a school to systematically measure within school heterogeneity and to make it possible to locate a focal student's position relative to other students in the school.
- Collect data from other members of the school community, for example teachers, counselors, and parents, such that their data can be (a) linked to focal students and (b) used to characterize the subcontexts within the school.
- Rethink what information is necessary to collect directly from students and other members of the school community and what information can be collected through passive approaches. Information about how students feel about themselves and others, their identity, interests, moral and social development, and expectations and hopes for the future is important for designing successful education policy, and the student most likely must directly report this type of information. Yet, new technology has resulted in an ever-changing landscape for possibilities and costs of data collection and study design. Each new data initiative should reevaluate what is possible.
- Examine the potential of collecting and processing nontraditional sources of data, including but not limited to administrative records from various sources. These data may extend to nonschool contextual settings for the student, such as family or out-of-school activity, and to postsecondary and adult enrollment in schools, courses, and training.
- Explore innovative approaches to survey methods that use newly available technology and possibly involve passive cooperation of respondents, for example using wearable technology or administrative data.

School Contexts Video Examples

United States

US High School - 2018

https://www.youtube.com/watch?v=_f3qwKydPh4&t=155s

High Crime Rate, Urban US High School - 2013

https://www.youtube.com/watch?v=I9gT_Nc41s4

Rural US High School, Lawson, MO

https://www.youtube.com/watch?v=Vgz5_glzpWA

Finland

Finnish School System

<https://www.youtube.com/watch?v=4-DcjwzF9yc>

Africa

South African High School – 2018

<https://www.youtube.com/watch?v=QyWHMjQNIX0>

State of Congolese Education

<https://www.youtube.com/watch?v=x-XNOCJjYy0>

China

Typical Day of Chinese Student

https://www.youtube.com/watch?v=GxFEJNXz_rc

Two Highly Competitive Chinese High Schools

<https://www.youtube.com/watch?v=ulahm1s7ZVg>

Europe

Typical Day of German High School Student

<https://www.youtube.com/watch?v=9RKIMXNgcJY>

Alternative School Contexts

A.S. Neill's Summerhill, U.K.

<https://www.youtube.com/watch?v=ERQKi9fBRnw>

French Alternative School with no classes and no teachers

<https://www.youtube.com/watch?v=yIOmqt9klzk>

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10

Family

Objectives

- Identify patterns of changes in time spent with family
- Describe changes in conflict associated with adolescence
- Explain possible sources of conflict between parents and adolescents
- List parenting styles classifications and the criteria for each
- Identify the impacts of parenting styles on adolescent's development
- Describe the two common forms of parental monitoring
- Discuss the impact of parental monitoring on adolescent development
- Evaluate the direction of influence in the parent-adolescent relationship

Overview

The family in its various forms is a 'system' of intersecting relationships. These relationships provide important socialization of social, emotional, cognitive, behavioral, and culture norms/patterns. Among the many relationships in an individual's life (e.g., peers) the family is typically the most enduring agent of socialization. Thus, it will come as little surprise to most that adolescents' relationships with their parent(s) impacts development during the transition from childhood to adulthood. As such, the parent-adolescent (P-A) relationship has received considerable attention by researchers.

The P-A relationship as a Socializing Agent

While parents can be an important source of interpersonal support well beyond the childhood years, the nature of the relationship and the magnitude of its influence is transformed during adolescence (Laursen & Collins, 2009; Smetana, Campione-Barr, & Metzger, 2006). Many parents bemoan this change, believing it is an impending tumultuous period marked by conflict, rebellion, risk, and rejection of parental values (Buchanan et al., 1990). Despite many years of research to the contrary (David M Hansen & Jessop, 2017; Miller, Benson, & Galbraith, 2001; Smetana et al., 2006; Laurence Steinberg & Morris, 2001), parents and society in general still tend to view adolescence as a time of inevitable "storm and stress" (see Chapter 1 for information on how this idea emerged and who it is tied to). The reality is that only a small proportion of adolescents, roughly 5-15% depending on the sample for a study, experience the storm and stress stereotype (Collins & Laursen, 2004). This chapter examines transformations in the P-A relationship and the developmental impact of these transformations.

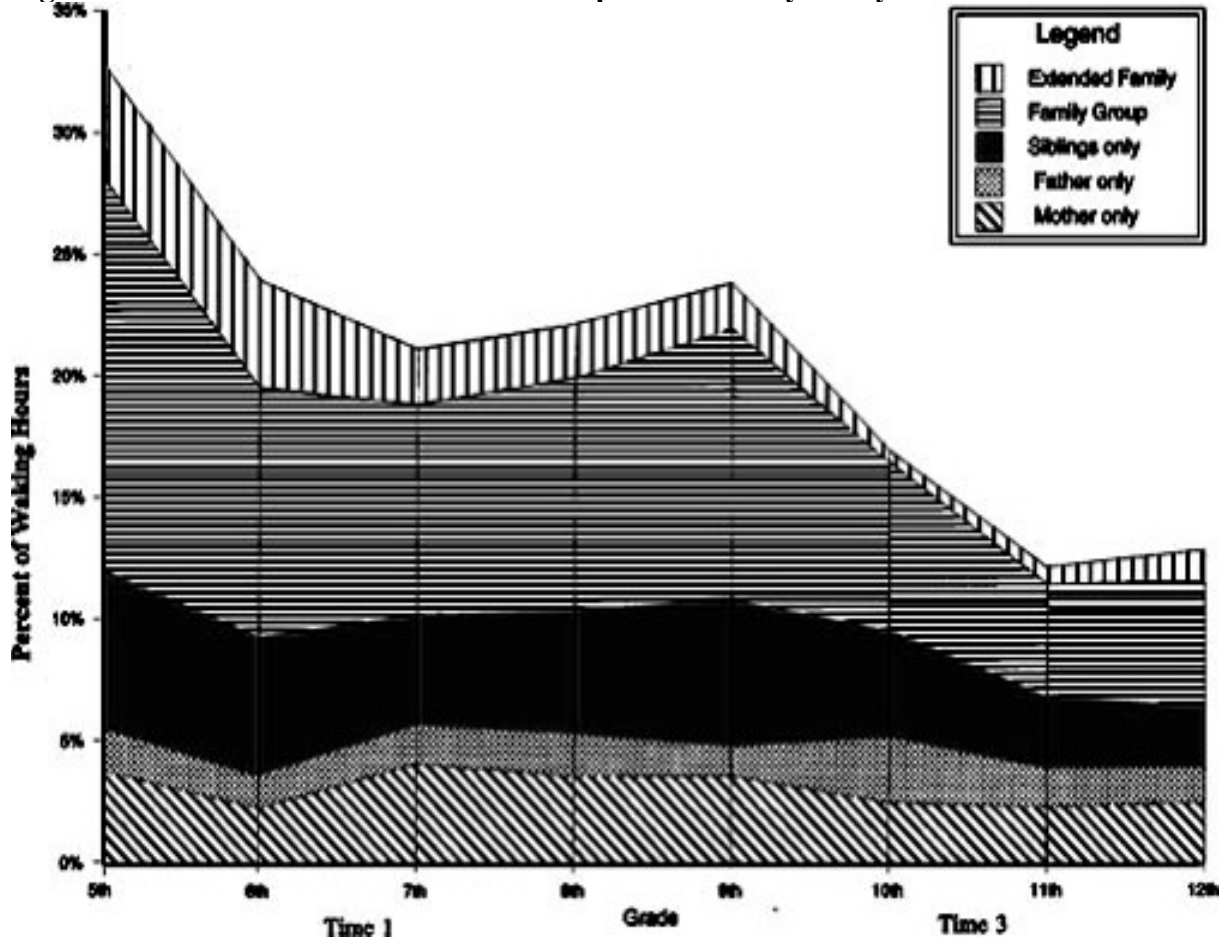
Transformations in P-A Relationship

How does the parent-adolescent relationship change over the course of adolescence? Researchers have addressed this question by looking at a range of different indicators: time spent together, conflict, emotional/psychological closeness, parenting styles, psychological control, and behavioral control. Much of the research in this area has been concerned with how parents influence the adolescent, but the source of change in the P-A relationship is reciprocal—adolescents influence pressures on parents to change as well as vice versa. There is, however, considerably less research on the impact on adolescents on parents. Thus, this chapter summarizes research that uses a 'parent→adolescent' direction of influence.

Time Spent with Family

Overall, adolescents spend increasing amounts of time with non-familial adults (e.g., co-workers) and peers (R. W. Larson, Richards, Moneta, Holmbeck, & Duckett, 1996) but this decrease depends on the type of activity (Dubas & Gerris, 2002). If we just look at total time adolescents spend interacting with family (percent of waking hours), including extended family, family as a group, siblings, father, and mother, there is a decline from approximately 33% of waking hours in 5th grade to approximately 13% in 12th grade (R. W. Larson et al., 1996). This decline averages to about a 2.7% reduction per year from 5th to 12th grades. While a relatively large decline, much of the decline occurs primarily in two family subsystems—time with extended family and time with the family as a group (e.g., family vacations). Time spent only with mother or father remains relatively stable, while time spent with siblings only declines slightly.

Figure 10.1. Percent of Time Adolescents Spend in Family Subsystems**



**Used by author permission. Author permission must be attained prior to subsequent uses. Source: Larson et al. (1996). Changes in adolescents' daily interactions with their families from ages 10 to 18: Disengagement and transformation. *Developmental psychology*, 32(4), 744.

Why the change in time spent with family and family subsystems? There are many contributing factors (Reed Larson & Kleiber, 1993; R. W. Larson, 1983; R. W. Larson et al., 1996; R. W. Larson & Verma, 1999). First, adolescents tend to increase their time spent in out-of-school activities, such as sports and other extracurricular activities, as well as work. Second, adolescents tend to have greater control over how they spend time as parents grant greater decision-making autonomy. Third, adolescents spend greater amounts of time with their peers. The net result of these factors is adolescents devote less time to family activities as they once did, but keep in mind that most of the reduction occurs within extended family and family group activities.

Conflict

A common belief among parents and adults in society as a whole is that adolescence is a time for an increased frequency of and more intense negative affect in conflicts and disagreements with parents (Buchanan et al., 1990). How much truth is there in this belief?

There are basically two ways researchers have studied conflict in the P-A relationship: frequency of conflict and the intensity (e.g., affective expressions) of conflict. There have been good meta-analyses of research studies on P-A conflict (Laursen & Collins, 2009; Shanahan, McHale, Osgood, & Crouter, 2007; Weymouth, Buehler, Zhou, & Henson, 2016); meta-analysis is a statistical method for summarizing research findings across studies and estimating the magnitude of a given association (e.g., conflict between parent and adolescent).

A consistent research finding is that the frequency (or 'rate') of conflict tends to increase in early adolescence (compared to middle and late adolescence), and the steadily decline from early to late adolescence (Laursen & Collins, 2009; Weymouth et al., 2016). Note that these meta-analyses patterns come from samples that are predominantly White. When looking at the rate of conflict by the mother-adolescent or father-adolescent dyad, there is an increase in the frequency of conflict for each dyad in early adolescence followed by a decline. But there is a difference in how big the decline in conflict is between dyads: the mother-daughter/son dyad tends to experience a moderate decline in magnitude of conflict frequency while there is a smaller decline in magnitude for the father-daughter/son dyad (Laursen & Collins, 2009; Weymouth et al., 2016). The mother-daughter dyad may also experience a greater frequency of conflict compared to mother-son or father-daughter/son dyads (Laursen, Coy, & Collins, 1998).

Research also indicates there is an increase in the negative affect (negativity) experienced in the conflict, such as hostility or anger felt/expressed. Research indicates there is greater conflict negativity during middle adolescence compared to early adolescence and it returns to early adolescence levels by late adolescence (Laursen & Collins, 2009; Laursen et al., 1998). However, much of this apparent increase in conflict negativity may be attributable to its increase in the father-son dyad, which is the only dyad among the four possible dyads (mother-daughter/son and father-daughter) to show a significant increase during middle-adolescence (Laursen & Collins, 2009).

When there is conflict or disagreement between a parent and their adolescent child, what is it about? Much of the conflict revolves around self-management issues, such as chores, homework, curfew, dating, and personal appearance (Ge & Conger, 1998). A reassurance for parents, most conflicts are not over their adolescent child abandoning their family's core moral or religious values/beliefs.

Overall then, research suggests some degree of increased conflict may be 'normative' in early adolescence; normative only in the sense that within a limited cultural setting it occurs. The frequency of conflict, then, temporarily increases during early adolescence and declines thereafter. Conflict negativity does not appear to be normative; it essentially increases only in the father-son dyad during middle adolescence.

A question you may be asking yourself at this point is who or what is responsible for the apparent increase in conflict during adolescence? Is the adolescent 'causing' the increase, does it result from the biological changes of puberty (e.g., cognitive development), or is a parent responsible? Although research has yet to fully address these source of conflict change, the most likely answer is that the change results from many sources, including what parents believe about adolescence, parents parenting capacities, societal norms and expectations, adolescent's desire to be considered an adult, etc. What is certain is that the onset of puberty starts a process of transformations in key relationships, including the parent-adolescent relationship.

Parenting

Parenting Styles

A popular approach to understanding the impact of parenting adolescent development is to focus on *parenting styles*. Diana Baumrind developed a classification system to assess parental "demandingness" and "responsiveness," which has subsequently been used extensively in research (Baumrind, 1991). Parental responsiveness refers to a style of responding to the psychological, emotional, social, and behavioral needs of the child in an accepting or supportive way (contrasting responding in a rejecting way). Parental demandingness refers to a style of having appropriate expectations (e.g., rules) for behavior and expression; appropriate meaning for given age and for cultural norms and expectations. Responsiveness is often conceptualized as emotional warmth or closeness in the parent-child relationship, while demandingness can be conceptualized as setting rules/boundaries and holding a child responsible to follow them (within reason).

The demandingness and responsiveness dimensions have been used to classify a style of parenting into one of four categories. Table 10.1 lists two assessment outcomes for each 'orthogonal' dimensions (i.e., each dimension is relatively independent of the other) and the style of parenting that both dimensions are associated with.

Table 10.1. Styles of Parenting

		Responsiveness	
		High	Low
Demandingness	High	Authoritative	Authoritarian
	Low	Indulgent	Neglectful

A consistent research finding across a large collection of studies is that an authoritative parenting style—high demandingness and high responsiveness—is associated with more positive adjustment for adolescents compared to any of the other three styles (Baumrind, 1991; Collins & Steinberg, 2008; Smetana, 1995; Smetana et al., 2006; Laurence Steinberg & Morris, 2001; Lawrence Steinberg & Silk, 2002). Having at least one parent with an authoritative style has been associated with a range of positive outcomes relative to other styles including, increased responsibility, autonomy, self-efficacy, academic competence, and socio-emotional competence (Collins & Steinberg, 2008; Fletcher, Steinberg, & Sellers, 1999; Smetana et al., 2006). By way of comparison, adolescents experiencing a predominantly authoritarian parenting style (e.g., rules with low responsiveness), compared to an authoritative style, tend to be socio-emotionally less mature, more dependent on parents and less able to behave autonomously (e.g., more passive), and less intellectually curious although they may perform well academically (Collins & Steinberg, 2008). As you might guess, adolescents experiencing a predominantly indulgent parenting style (e.g., emotional closeness but few rules) tend to be more socio-emotionally immature and irresponsible and more susceptible to peer pressure (Lawrence Steinberg & Silk, 2002). Experiencing a neglectful parenting style tends to be associated with greater impulsivity

and susceptibility to become involved in risky behaviors leading to deleterious outcomes such as substance abuse or unintended pregnancy (Lawrence Steinberg & Silk, 2002).

There are important differences in parenting styles and potential outcomes of parenting styles depending on socioeconomic status and ethnicity. In the United States, authoritative parenting styles are more prevalent among White, European-American families compared to ethnic minority families, as well as more prevalent among middle-class families than lower-income families (Lawrence Steinberg & Silk, 2002). Controversially, some researchers have concluded that an authoritative parenting style benefits adolescents from all socioeconomic and ethnic backgrounds, including youth from across the globe (e.g., Lawrence Steinberg, 2001). This may be an extreme conclusion, however, for at least two reasons. First, Western-based assessments of parenting style may not be valid outside of Western societies, e.g., they do not measure the same thing. Second, current conceptualizations of Baumrid's parenting styles tend to ignore indigenous, culturally relevant values (Smetana et al., 2006). For example, Chinese parenting may reflect a Confucian system in which strictness in training (Chao, 1994, 2001) but in the Western conceptualization of parenting styles it reflects an authoritarian style. The key idea here is that two dimensions of parenting and the resultant classifications were developed in a particular cultural context. The impact of these classifications, then, will also depend on the cultural context in which parenting occurs; an authoritarian style may be beneficial in some cultural contexts and not in other.

Parental Monitoring

Another dimension of parenting examined in relation to adolescent development is parental monitoring. There are two forms of monitoring: psychological control and behavioral monitoring. *Psychological control* refers to a parent's attempt to regulate or control their child's thoughts and feelings, and is typically assessed in terms of the intrusiveness of the control (Barber, 2002). In general, parents who are overly, psychologically intrusive undercut adolescent's psychological development (Barber, 1996, 2002). Additionally, perceived intrusive parental control over things adolescent's think should be under their control has been associated with adolescent's feeling psychologically controlled, which in turn has been connected to internalizing and externalizing issues (Barber, 1996, 2002; Conger, Conger, & Scaramella, 1997; Pettit, Laird, Dodge, Bates, & Criss, 2001; Smetana et al., 2006; Smetana & Daddis, 2002).

One of the hallmarks of adolescent development, at least in the United States, is increased autonomy over one's time and behavior. The ways that parents monitor their children's activities and behavior—referred to as *behavioral monitoring*—typically changes between childhood and adolescents. During childhood, parents have more direct control or regulation of their child's behavior as parents or other adults supervise their children's activities with in close proximity. During adolescence, parents monitor their adolescent child's behavior more indirectly, as adolescents spend greater amounts of without direct parent or adult supervision. Parents, then, must learn to balance their need to monitor their adolescent child's activities with the adolescent's growing need to behave more autonomously. The most common way to assess behavioral monitoring has been parents awareness or knowledge of their adolescent child's activities and location (Stattin & Kerr, 2000). Research indicates that parents who fail to provide 'adequate' monitoring of their adolescent child's activities has been associated with externalizing problems, such as delinquency and substance use (Lawrence Steinberg & Silk, 2002). Adequate parental monitoring on the other hand has been associated with positive development, including better psychological adjustment and academic outcomes (Pettit et al., 2001; Smetana & Daddis, 2002).

However, findings of a longitudinal study by Kerr and Stattin (2000) suggest that adolescent's willingness to disclose their behaviors and activities to their parents predicted engaging in negative behaviors.

What the findings on parental monitoring highlight is a tension among scholars in how to conceptualize the direction of influence in the P-A relationship. There is a tendency to favor the influence of parent's monitoring on their adolescent child's behavior and activities, perhaps reflecting an adult-centric bias. This is a strong case to be made for a 'bi-directional' influence in which an adolescent exercises agency to influence their own behavior and activities (and perhaps influence their parent's behaviors) while the parent does the same. A key question then is how does the direction of influence in the P-A relationship support or undermine adolescent's autonomy (Smetana, 1995; Smetana et al., 2006)? Unfortunately, this question has yet to be adequately addressed in research.

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Section 3:

Milestones of Adolescent Development

11

Cognition, Thinking, & Judgement & Decision-Making²⁴

Objectives

- Identify three ways of conceptualizing cognition and thinking in adolescent development
- Explain how executive functions influence cognition and thinking abilities
- Identify stage wise theories of reasoning abilities in development
- Explain how all these approaches contribute to a theory of expertise development in an adolescent context

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Overview

Puberty not only results in biological maturation so that an individual is capable of sexual reproduction but it also initiates a period of major changes/growth in brain structure and function, the likes of which have not occurred since early childhood. These structural and functional changes/growth in the brain during adolescence are covered in Chapter 4, but in this chapter we examine the profound impact of those changes/growth on adolescents' thinking, or what we formally refer to as *cognition*. We will examine the impact of brain changes/growth on adolescents' '*affect*' (e.g., emotion, motivation, feelings) and behavior other chapters.

Why is it important to understand changes in thinking that occur during adolescence, beyond the obvious fact that there are profound changes? As with sexual maturation that prepares the individual to participate as procreating member (i.e., adult) of society, changes in cognition during adolescence also prepare the individual to participate as a 'thinking' adult member of society—to understand and engage in thinking needed to function as an adult. Understanding how cognition develops during adolescence, then, and especially what supports or impedes its development, is important because it facilitates individuals' ability to function in adulthood.

Three Approaches to Studying Adolescent Cognitive Development

The scientific study of thinking, in its many forms, we refer to as cognition. Cognition includes processes involved in the perception, encoding, storage, and retrieval of information. As a field of study, cognition covers topics such as memory, problem-solving, perceptual processes (e.g., how we recognize shapes), language, and judgement and decision-making. The study of cognition has several theoretical traditions, what we refer to here as approaches. In this chapter, we will examine research on cognitive development during adolescence organized around these three approaches: the *executive function* approach, the *reasoning* approach, and the *expertise* approach.

Perhaps surprisingly, these three approaches operate somewhat independent of each other, although each may borrow ideas as needed. Part of the reason for three loosely related, but independent approaches to the study of adolescent cognitive development is that none has been able to identify a unitary the 'outcome' (e.g., ultimate aim of brain maturation) cognitive development during adolescence (Keating, 2004). In 2004, Daniel P. Keating (2004) proposed a possible unifying outcome for cognitive development during adolescence, which we will examine and build upon in the final section of this chapter to propose a specific aim of the cognitive changes. Importantly, specific experiences play an essential part in shaping adolescents' cognitive development to meet this specific '[ontogenetic](#)' aim—goal of adolescent brain development. (This chapter builds on the foundations of adolescent brain development chapter, so we recommend first reading that chapter if you have not).

Finally, no approach to understanding adolescent cognitive development is inherently 'best', and each has its strengths and limitations, although you may find one approach more interesting or applicable than another. You may also notice that emotion and motivation is often conspicuously absent in some approaches. Some of this absence reflects past attitudes of researchers towards emotion being something that is scientifically unobservable, while some of its absence can be traced to measurement limitations.

Approach #1: Executive Function/Information Processing

The first approach to understanding adolescent cognitive development we examine is the *executive functions* approach, which is rooted in the cognitive field of *information processing*. Executive functions are central to our ability to regulate or control our thoughts and actions, such as the ability to delay gratification. Thus, ‘executive’ functions are involved in the deliberate, conscious control of thoughts, actions, and behaviors to bring them in line with goals (Crone, 2009; Zelazo & Carlson, 2012). Executive functions relate to things such as efficiency and speed of processing, cognitive flexibility (the ability to switch from one mental task to another), inhibitory control (the ability to control automatic response or impulses), and perception (awareness), and short- and long-term memory storage.

Executive function is commonly broken down into three areas: working memory, shifting, and inhibition. All three of these functions seem to rely on the PFC, but with slight variations regarding areas and patterns of activation within the area and neural networks connecting to other critical areas (Huizinga et al., 2006; Miyake et al., 2000). More recently, research has begun to examine the role of emotion and motivation in executive function and in doing so, proposes that executive function can also be examined from the standpoint of what is referred to as hot and cold executive function (Zelazo & Carlson, 2012), which will also be covered in this section.

Working Memory

Working memory often refers to the cognitive processes that allow for the temporary retention of information in an accessible state that is needed for carrying out mental tasks (Baddeley & Hitch, 1974; Huizinga et al., 2006). This includes the coding, monitoring, and updating of revelation information as well as the replacement of no-longer-relevant information (Huizinga et al., 2006; Miyake et al., 2000). The replacement of old and irrelevant information requires active mental manipulation of information within working memory rather than basic passive maintenance of information (Miyake et al., 2000).

Neuroimaging research has found that tasks designed to measure working memory show evidence of cortical recruitment mainly from lateral regions of the PFC (Miyake et al., 2000; Narayanan, Prabhakaran, Bunge, Christoff, Fine, & Gabrieli, 2005). Narayanan et al. used fMRI to study event-related brain activation in healthy adults completing a verbal working memory task and found activation in both the ventrolateral and dorsolateral PFC areas during maintenance (2005). These authors also found the dorsolateral PFC to have significantly higher correlation with parietal and motor cortices, which seems to support the idea that the dorsolateral PFC is more tightly connected with preparatory motor responses (Narayanan et al., 2005).

One common behavioral measure of working memory is the Tic Tac Toe task (Huizinga et al., 2006; Milner, 1971). This two-phased paradigm requires participants keep visual information regarding the orientation of patterns of Xs and Os active in their working memory. During the first phase, the memorizing phase, participants are shown a visual representation of a grid with a specific pattern of Xs and Os (working memory load varies by the number of Xs and Os presented) and are required to memorize the pattern. In the second phase, the recognition phase, participants are shown a series of various Xs and Os patterns (number of patterns displayed accounts for variations in memory load) and are told to press a computer key as soon as they detect the previously memorized pattern. The number of correctly identified patterns serves as the main measure of working memory on this task (Huizinga et al., 2006).

Switching

Switching, also referred to as shifting, is the process of shifting back and forth between more than one task, operation, or mental set (Miyake et al., 2000). Switching requires the cognitive flexibility to both disengage from an irrelevant task set and the intentional engagement of a relevant task set and/or the ability to complete a novel operation in the face of a proactive inference or negative priming (Miyake et al., 2000). Tasks measuring switching are thought to measure one's capacity to adopt and change between task sets. Research on shifting is somewhat mixed, but overall suggests activation in the lateral and medial PFC and inferior frontal parietal regions (Crone, Wendelken, Donohue, & Bunge, 2005; Friedman & Miyake, 2016).

The Local-Global task is often used to measure sifting or switching. During this task participants are shown a series of Navon figures which are large geometric shapes or letters (global) of which the lines are made-up of smaller shapes or letters (local) (see Figure 11.1 for an example). The target stimuli are presented in a series of blocks typically consisting of 30 trials.

Participants are cued to respond to each trail (by pressing a keyboard key) to either the global figure or local figure. The cue changes between blocks forcing the participant to disengage from the strategy used to identify targets in the previous block while applying a new target strategy. Response times between and within blocks is often the main variable of analysis (Huizinga et al., 2006). Switch cost is of particular interest in these tasks and is measured in the increase in response time and/or commission errors (false hits between blocks).

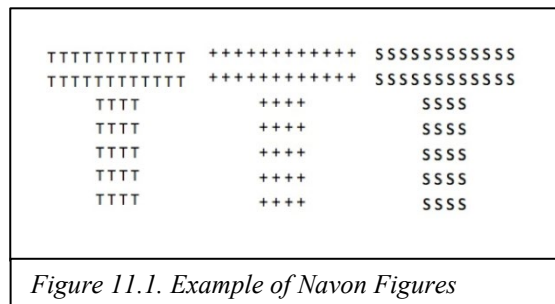


Figure 11.1. Example of Navon Figures

Inhibition

Inhibition is the “ability to deliberately inhibit dominant, automatic, or prepotent responses when necessary” (Miyake et al., 2000, p.57). This function is thought to be the earliest sub-component of executive function to come online and requires the mental ability to stop or override the tendency to produce an automatic response (Miyake et al., 2000). Tasks measuring inhibition also commonly require directed forgetting, motor control, and emotional regulation (Best et al., 2009). Measures of inhibition are sometimes distinguished by complexity based on whether working memory is needed to complete the task successfully (Best et al., 2009) While there is some lack of consensus in the literature, it appears as though the anterior cingulate cortex and dorsolateral and ventral (with age) PFC regions may play important roles in inhibitor action (Best et al., 2009; Friedman & Miyake, 2016; Wager, Sylvester, et al., 2005). Additionally, shifts in brain activation throughout development seem to show less diffusion of brain activity and more centralized activation (Best et al., 2009; Friedman & Miyake, 2016).

The Eriksen Flanker task that is often used to measure inhibition (Eriksen & Eriksen, 1974). The task requires participants to respond to target stimuli, typically an arrow (or fish when testing younger children) flanked on both sides by stimuli that are either congruent (e.g., ← ← ← → ← ← ←) with the target stimuli or flanked by incongruent, distractor stimuli (e.g., ← ← ← ← ← ← ←). The task serves to capture inhibition by measuring the increase in reaction time on trials with irrelevant or distractor flankers (Huizinga et al., 2006).

The Stroop task (Stroop, 1935) is one of psychology's most popular tasks and a common measure of inhibition (MacLeod, 1991). During this task participants are shown the names of printed in colored ink that either matches the color's name (congruent) or does not match the color's name (incongruent). See Figure 11.2 for an example of both types of lists. In the manually tested version of the task participants are asked to say the word as quickly as possible (congruent block) or to say the color of the word as quickly as possible (incongruent block). The latter is thought to require the active inhibition of the automatic or more dominant response which is to read the word presented. Differences in reaction times between the naming of colors and reading of words is thought to represent one's ability to inhibit the dominant response (Huizinga et al., 2006; Miyake, 2000). Stroop tasks vary in stimuli depending on the nature of the presentation (online vs in person) and the age of the participant (e.g., day-night task for young children).



Figure 11.2. Stroop Congruent and Incongruent Examples.

Complex Tasks

Research in executive function also employs common research paradigms or complex tasks that are believed to better capture the overall integrity of executive function and prefrontal functioning (Huizinga et al., 2006; Miyake, 2000). One such task is the Wisconsin Card Sorting Task (WCST) (Grant, & Berg, 1948) which seems to tap both switching and inhibition (Best et al., 2009). In this task four reference cards are placed in front of the participant followed by a series of target cards presented one at a time. The participant is told that their job is figure out the classification rule and to match each target card to a reference card. Cards may be matched by symbol, color, or number of symbols (see Figure 11.3 for an example). After each match the participant makes, feedback is given stating that the match was either correct or incorrect. Once the participant has made a specific number of correct matches (e.g., 8 or 10), the matching rule changes. The full tasks last until the participant has made a pre-specified number of category matches (e.g., six), or maximum number of trials is reached. Performance on the task is predominantly evaluated by the number of preservation errors (continued application of old matching rule) errors made (Miyake, 2000). While the WCST remains a popular task, research examining performance impairment with brain damaged patients (both those with and without damage specific to the frontal lobe(s)) has been mixed; therefore, researchers caution against using the task as the sole assessment of frontal lobe damage (Nyhus & Barceló, 2009).

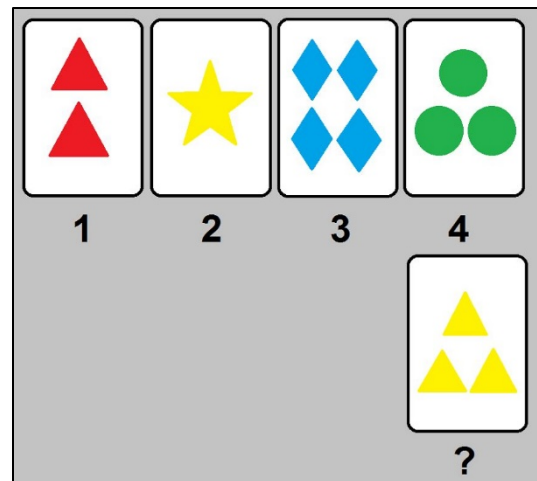


Figure 11.3. Wisconsin Card Sorting Task Cards.

Hot and Cold Executive Function

The role of motivation has been raised with regards to tasks that measure executive function and their generalizability to real-life behaviors. 'Cool' measures of executive function

are proposed to capture “abstract, decontextualized problems that lack a significant affective or motivational component” (Zelazo & Carlson, 2012, p. 355). The classic WCST, for example, would fall into this category. Hot executive function on the other hand, is thought to include top-down control processes that occur in emotionally and motivationally significant situations (Zelazo & Carlson, 2012). In contrast to the WCST, the Iowa Gambling task which, results in the actual loss or winning of money would be considered a hot task. Research in this arena has found that behavioral deficits in hot executive functioning does not necessarily also result in defects of cold executive functioning and vice versa (Zelazo & Carlson, 2012). Moreover, research has shown that patients with orbitalfrontal damage and who present with behavioral deficits in real life functioning in areas related to executive functioning may show defects when tested on hot executive function tasks but, not show deficits on cold tasks (Zelazo & Carlson, 2012).

Development of Executive Functions

During the first five years of a child’s life, the brain goes through an extraordinary amount of change. The overproduction of neurons paired with experience expectant and experience dependent synaptic connections, as well as pruning, leads to the development of a great deal of the brain’s foundational structure (Fuhrmann, Knoll, & Blakemore, 2015). Researchers; however, have started to consider adolescence as a “second period of heightened malleability” (Steinberg, 2014, p. 9) given the changes that occur to both brain structure and function during this period (Fuhrmann, Knoll, & Blakemore, 2015).

Neurologically speaking, executive function is largely reliant on the development of the prefrontal cortex (Best et al., 2009; Huizinga et al., 2006). Although areas outside of the PFC as well as complex neural networks are engaged in various executive function tasks, a meta-analysis by Yuan and Raz (2014) found that overall, larger PFC volume and greater PFC thickness was associated with better performance of executive functions. Interestingly, the development of the PFC is quite protracted in nature with full maturation not being reached until adolescence or early adulthood (Best & Miller, 2010; Huizinga et al., 2006). Moreover, it appears that many executive function skills often show an intervened-U pattern across the lifespan, demonstrating rapid improvement during preschool years often reaching adult leaves in adolescents and then declining as a part of the natural aging process (Zelazo, Craik & Booth, 2004). It is thought that during the years of the improvement, increased executive function skills is due to the reorganization and specialization of neural networks within or connected to the PFC (Zelazo, Craik & Booth, 2004). The decline seen in later adulthood is thought to be the results of decay in the integrity of the frontal lobe as well as the dopamine system (Zelazo, Craik & Booth, 2004).

During adolescence, the brain goes through what is thought to be a second period of rapid development, especially in the PFC. A number of longitudinal studies using brain imaging techniques haven shown various patterns of gray and white matter changes in the frontal lobe during the adolescent years (Poletti, 2009). Broadly speaking, the brain increases in white matter volume in a linear fashion across childhood and through adolescence, particularly in the frontal and parietal cortexes. (Blakemore, 2012). Increases in white matter are believed to indicate amplified myelination and thickening of axon terminals. These increases of white matter tracks can be seen both within and across various cortical and subcortical areas, essentially creating and refining neural networks that allow for more efficient communication and coordination across brain regions (Poletti, 2009). During the adolescent years, white matter tracks greatly increase specifically between the prefrontal cortex and limbic and paralimbic systems (including the

thalamus, basal ganglia and hippocampus) which is thought to produce better coordination between areas involved in executive functioning and the processing of emotional information (Poletti, 2009).

Another cortical pattern shift seems to appear around adolescence with regards to gray matter volume (i.e., synapses). Gray matter volume in the frontal and parietal lobes increases throughout childhood, peaking around 12 and then seems to rather sharply declining through adolescence (Blakemore, 2012; Giedd et al., 1999). The pattern for the temporal lobes does not seem to be as linear and peaks around age 17 (Blakemore, 2012; Giedd et al., 1999). The increase and then decrease of gray matter represents the potential over production of synapses followed by synaptic reorganizations and pruning or proliferation. Synaptic pruning both in childhood and adolescents is a cortical representation of the brain's ability to trim away unused or unnecessary connections in order to allow for the stronger and more efficient neural connections better suited to match experience and the environment. This pattern especially in adolescence, is hypothesized to represent use- or experience-dependent synaptic pruning and raises questions about the impact of various life exposure has the further development of an individual (Poletti, 2006). For example, how real-life experiences with behavioral inhibition may set the tracks for adulthood behaviors. It is important to point out that the refinement of neural networks appears to occur past the second decade, but at a much slower rate than is observed during adolescence (Poletti, 2009).

Broadly speaking, a pattern of an over-production of gray matter or synapses followed by pruning and increased white matter appears both in early childhood and during adolescence. The large distinguishing factor, however, is the adolescent brain changes seem to be more centrally focused on cortical regions related to cognitive control and emotional processing like the PFC and limbic system. Interestingly, Sowell et al., found that of all the cortical areas they examined, the dorsal prefrontal cortex showed both the sharpest decrease in gray matter and the strongest increase in white matter density between childhood and adolescence (2001). This again has the potential to raise questions about the role of experience during this last large phase of brain reorganization. It should be noted, however, that gray matter density loss and white matter increase have been observed to continue in the dorsolateral prefrontal cortex in a population of non-clinical adults up to age 60, although, again, the rate of change is much slower than during the adolescent years (Sowell et al., 2003). Again, the pruning of under used synaptic connections and the reinforcement and rewiring of connections between the PFC and other brain areas during adolescents appears to represent the fine tuning of behavioral displays of cognitive control.

Developmental Trajectory of the Sub-Categories of Executive Function

On the whole, behavioral and neurological data support the unity and diversity framework showing that executive function emerges in preschool and continue to be refined throughout adolescences and young adulthood. The sub-components of executive function, however, show some degree of variation in maturation.

Developmental Trajectory of Working Memory

Working memory, or the capacity to maintain and mentally manipulate information has demonstrated a linear pattern across preschool years and into adolescence in terms of performance on working memory tasks (Best et al., 2009). However, the trend and peak performance age seems to vary of different levels of complexity. Research with participants ranging from 9 to 20 years old showed no age-related improvements on a simple task, but

showed improved performance up until age 15 on more complex tasks that required higher memory load (Best et al., 2009). Additional research has also demonstrated the role of complexity as a variable to highlight developmental shifts in abilities. For example, Luciana and Nelson found that developmental shifts in performance were only seen post-preschool when the memory load required by the task was increased (1998).

Developmental research using neuroimaging techniques has produced evidence of developmental shifts with regards to both the amount and location of neurological activation associated with working memory tasks. These shifts show stronger working memory capabilities that align with advanced refinement of various prefrontal regions. Specifically, adolescent participants showed less activity in premotor areas than preschoolers and more activity in frontal areas including the dorsolateral PFC and the anterior cingulate (Best et al., 2009). Further, adults showed increased localized activation of the left dorsolateral PFC and a sharp increase in the anterior cingulate while showing less activation in the right dorsolateral PFC (Best et al., 2009). Taken as a whole, Best et al., suggests that the behavioral and neurological work shows linear development through the preschool years followed by qualitative changes throughout adolescence and early adulthood as the prefrontal network continues to reorganize (2009).

Developmental Trajectory of Switching

Switching or the ability to disengage from an irrelevant task set and intentionally engage a relevant task set also appears to improve with age (Miyake et al., 2000; Best et al., 2009). Research with young children has shown that preschoolers can shift between tasks but that their capacity to perform more complex tasks continues to improve through age 6. Interestingly, research looking at the switch cost calculated as both the decrease in accuracy and increase in reaction time showed less costs for 15 year olds than for 7 and 11 year olds, while research calculating separate switch costs showed an increase in reaction time and an increase in accuracy between preschool and adulthood which seems to suggest a speed-accuracy tradeoff that occurs later in development (Best et al., 2009; Davidson et al., 2006). This tradeoff is hypothesized to reflect the increased presence of metacognition through development.

Developmental neuroimaging research on switching is scarce but what has been published supports the notion that advanced capacity to perform complex task switching is associated with increased activation across the inferior frontal, parietal, and anterior cingulate cortical regions (Best et al., 2009). Additionally, higher switch cost with regards to reaction times has been associated with greater activation in the dorsolateral and medial PFC, but lower activation in the ventromedial PFC (Friedman & Miyake, 2016).

Developmental Trajectory of Inhibition

Inhibition is hypothesized to be the sub-category of executive function that is first to come “online,” in part because it is thought to be a prerequisite for the other components. In other words, inhibition must first be achieved in order for someone to not get distracted by the environment while trying to complete other cognitive tasks (Best et al., 2009; Boelesa, Harakeh, Ormel, Hartman, Vollebergh, & van Zandvoort, 2014). During the early childhood years, inhibition (typically measured with Go/No-Go task) shows rapid improvement; however, improvements with motor and ocular inhibition continue into middle childhood (Best et al., 2009; Best & Miller, 2010). Huizinga et al., also found that improvements in speed and accuracy on complex inhibition tasks continue until age 21 (2006). Similar to working memory and

shifting, developmental differences in later childhood, adolescence, and adulthood are thought to be reflective of the mastery of more complex tasks.

Research with neuroimaging techniques shows a developmental pattern in which cortical activation appears to shift from being broader to more centralized (Best et al., 2009). Compared to adults, children show more diffused activation in bilateral ventral and dorsolateral regions and parietal cortex inhibition tasks (Best et al., 2009; Best & Miller, 2010). Additionally, EEG measurements have shown patterns of frontal migration of activity with inhibition performance improvement and a shift in left to right-lateralization in orbitofrontal activity with both age and task performance (Best et al., 2009). Taken together these results support the idea that with increased age and ability the brain, particularly the frontal lobes, are both maturing and reorganizing in an effort to produce more effective and efficient inhibitory behaviors.

Approach #2: Reasoning

The human nervous system, which includes your brain, is capable of handling a constant stream of information. In order to organize this staggering amount of information, the brain has developed a filing system of sorts in the mind. The different files stored in the file cabinet are called *concepts*. Concepts are categories or groupings of linguistic information, images, ideas, or memories, such as information about a previous event. Concepts are, in many ways, big ideas that are generated by observing details, and categorizing and combining these details into *cognitive structures*. You use concepts to see the relationships among the different elements of your experiences and to keep the information in your mind organized and accessible. Our concept for blue, for instance, has been constructed through experiences in which labeling this hue was needed; adults teach the ‘blue’ concept by having children identify that color and differentiate it from other color concepts, e.g., red. Concepts can be complex and abstract, like justice, or more concrete, like types of birds.

Piaget developed a theory about how concepts develop in sequential stages, from basic concepts about relation between sensation and movement to abstract reasoning. Piaget believed that we are continuously trying to maintain cognitive equilibrium, or a balance, in what we see and what we know (Piaget, 1954). Children have much more of a challenge in maintaining this balance because they are constantly being confronted with new situations, new words, new objects, etc. All this new information needs to be organized. *A framework for organizing information is referred to as a schema*. We develop schemata through the processes of assimilation and accommodation

Schemata

A *schema* is a mental construct consisting of a cluster or collection of related concepts (Bartlett, 1932). There are many different types of schemata, but they all have one thing in common: schemata are a method of organizing information that allows the brain to work more efficiently. When a schema is activated, the brain makes immediate assumptions about the person or object being observed.

There are several types of schemata. A role schema makes assumptions about how individuals in certain roles will behave (Callero, 1994). For example, imagine you meet someone who introduces himself as a firefighter. When this happens, your brain automatically activates the firefighter schema and begins making assumptions that this person is brave, selfless, and community-oriented. Despite not knowing this person, already you have unknowingly made judgments about him. Schemata also help you fill in gaps in the information you receive from the

world around you. While schemata allow for more efficient information processing, there can be problems with schemata, regardless of whether they are accurate: Perhaps this particular firefighter is not brave, he just works as a firefighter to pay the bills while studying to become a children's librarian.

An event schema, also known as a *cognitive script*, is a set of behaviors that can feel like a routine or habit, and can be hard to change. Think about what you do when you walk into an elevator (Figure 11.4). First, the doors open and you wait to let exiting passengers leave the elevator car. Then, you step into the elevator and turn around to face the doors, looking for the correct button to push. You never face the back of the elevator, do you? And when you're riding in a crowded elevator and you can't face the front, it feels uncomfortable, doesn't it? It feels almost impossible to walk in and not face the door. This powerful event schema strongly influences our behavior in the elevator.

Interestingly, event schemata can vary widely among different cultures and countries. For example, while it is quite common for people to greet one another with a handshake in the United States, in Tibet, you greet someone by sticking your tongue out at them, and in Belize, you bump fists (Cairns Regional Council, n.d.).



Figure 11.4: What event schema do you perform when riding in an elevator? (credit: Gideon /Flickr)

Assimilation and Accommodation

Piaget proposed that we construct and expand our schemas through two processes: assimilation and accommodation. *Assimilation* is the process of fitting new information into an existing scheme; you can think of it as updating or expanding information in a schema but not fundamentally altering the schema. *Accommodation* is the process of creating a new schema or adapting an existing schema (fundamentally changing it) when new information does not fit into the existing one. New information essentially causes schema dissonance to some degree, thus, when the new information cannot be rectified with existing schemas we need to accommodate and generate a new schema. As adults we continually try and "make sense" of new situations by determining whether they fit into our old way of thinking (assimilation) or whether we need to modify our thoughts (accommodation); we are not necessarily or automatically aware of these changes.

According to Piaget, different schemas are *organized* or grouped together so that combined a group of schemas can serve some operation/function (e.g., categorize particular objects, reason). When groups of schemas become linked into a broad network that can be used to consistently solve a problem or to successfully function within a setting, *equilibrium* is achieved. For example, when we understood that pouring all of the water from one container into another that is taller or shorter does not change the volume or amount of water, we achieved equilibrium of what Piaget called the 'conservation' schema. Table 1 summarizes Piaget's stages of cognitive development (we could just as well call them stages of schemata development) and what he proposed as the major aims (schema equilibrium) of cognitive development at each stage. Note that proposing a major aim of development for each stage does not rule out the possibility there could be other aims for a stage, that is, other schema equilibriums; these are simply the one's Piaget proposed at the time.

Table 11.1. Piaget's Stages of Cognitive Development

Stage	Approximate age range	Characteristics	Major Cognitive Achievements (equilibrium)
Sensorimotor	Birth to about 2 years	The child experiences the world through the fundamental senses of seeing, hearing, touching, and tasting.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also start to see the world from other people's perspectives.	Theory of mind; rapid increase in language ability
Concrete operational	7 to 11 years	See the emergence of logical reasoning but it is limited by what has been experienced or to reasoning only when tangible object is present.	Conservation, Inductive reasoning, Learn rules and unit concepts
Formal operational	puberty to adulthood	Adolescents can think systematically, reason abstractly. Abstract thinking can be applied to understanding complex ideas, such as ethics.	Abstract logic, deductive reasoning

Development of Reasoning Abilities During Adolescence

The major aim of cognitive development during adolescence according to Piaget is the achievement (equilibrium) of formal operational thinking. To achieve formal operational thinking is to be able to reason abstractly and engage in hypothetical, deductive reasoning. Deductive reasoning is the ability to use a hypothesis and from it generate logical, necessary, and testable inferences. As a contrast, in the prior stage—concrete operations—reasoning was limited by being restricted to tangible content or experience (e.g., ‘concrete’), that is, it was tied to reality. Inductive reasoning—starting with observation and generate working hypothesis that can be tested with further observation—is the hallmark of concrete operations. An individual in concrete operations can solve problems using inductive reasoning but reasoning is restricted to what is observable (e.g., objects in front of them) and the person struggles to reason when objects are not present.

So, what changes occur during adolescence? Overall, research suggests there is a cognitive shift during adolescence (from a Piagetian perspective) towards the emergence of ‘hypothetico-deductive’ reasoning. *Hypothetico* refers to the abstract aspect of reasoning, or reasoning that is no longer limited to the tangible content of experience. Research indicates that adolescents are more likely to use deductive reasoning compared to children, use logical strategies to solve problems, and improve in the efficiency (e.g., fewer steps needed) of solving a problem (Kuhn & Franklin, 2006; Kuhn, Katz, & Dean, 2004; Morris & Sloutsky, 2001). While adolescents may be more likely to use deductive reasoning (i.e., formal operations), the research literature has been unable to find sufficient evidence to support Piaget’s idea of the universality of emergence of formal operations during adolescence, that is, formal operations emerge because of some pre-programmed ontogenetic intent. At present, it is most accurate to view formal operations as a ‘*potential*’ rather than some universal normative cognitive shift occurring across most adolescents (Keating, 2004), and whether or not it emerges depends on educational efforts to teach it. It is also accurate to also conclude that the ability to develop formal operational does not seem fully possible until adolescence; that is children seem incapable of fully developing this capacity due to certain brain-based constraints.

Judgment and decision-making (JDM). Assuming adolescents develop formal operational reasoning, what does it mean practically for their everyday thinking and behavior? One field of research that emanates from a reasoning approach to cognition focuses on adolescents’ judgement and decision-making (JDM) capacities. A prevalent model of JDM divides cognition into ‘analytic’ and ‘heuristic’ processes, this model is often referred to as a ‘dual-process’ model (Albert & Steinberg, 2011; Dansereau, Knight, & Flynn, 2013; Klaczynski, 2001). Although there are distinct variations in how JDM researchers define *analytic* processes, they all essential reflect some form of Piaget’s formal operations (e.g., deductive reasoning); researchers occasionally use the term “cold cognition” to refer to analytic processes. Heuristic processes refer to domain-specific, experientially-learn processes that can include automatic thinking (e.g., overlearned habits and skills for driving a car), ‘gist’ memory (e.g., intuition), and emotional aspects of thought; researchers might call this ‘hot cognition’. Heuristic thinking is faster, more efficient than analytic thinking, and we all frequently rely on heuristic thinking because it is an effective ‘short-cut’ for making judgements and decisions based on prior similar experience.

Research on JDM using a dual-processing approach demonstrates age-related improvements in analytic reasoning during adolescence (Albert & Steinberg, 2011). From early to middle adolescence there are improvements in statistical and conditional reasoning abilities

(deductive reasoning) as well as a decline in susceptibility to ‘outcome bias’ (type of heuristic process) where outcomes of previous events, rather than the processes that led to those outcomes, influence reasoning about a current outcome (Klaczynski, 2001). When decision-making and judgements occur within a social context, however, adolescents may be prone to favor more stereotypical information whereas they show gains evaluating information outside of a social context (Jacobs & Klaczynski, 2006). Overall then, “adolescents are capable of engaging both analytical and heuristic processing systems when making judgments and decisions, but in contexts that activate their increasingly rich and salient social schemas, heuristic processing appears to gain influence over the course of adolescent development” (Albert & Steinberg, 2011, p. 215).

Approach #3: Expertise Development in Understanding Cognition

A different approach for understanding adolescents’ cognitive development is to view it as the development of expertise. Expertise development focuses on the attainment of both knowledge and skills for functioning as an expert within a particular domain or setting, such as expertise in a particular occupational field (Keating, 2004). Rather than viewing information processing changes or changes in reasoning capacities as the driving force of expertise development, this approach considers the acquisition of specific knowledge and skills fundamental for increases in processing speed and advanced reasoning (Ericsson & Charness, 1994, 1997). Expertise development has primarily been studied among adults, especially among high performing experts, such as elite artists, athletes, and business executives. Despite its heavy emphasis on adult populations and high performing experts, this approach is increasingly being applied to expertise development among adolescents and as a general model of cognitive development. Given the limited research with adolescent populations, we will next briefly highlight the dimensions of emerging theory on expertise development that are relevant to adolescent cognitive development.

Based on the theoretical and empirical work of Ericsson and colleagues (2006; 1994, 1997), developing expertise appears to involve the following factors. First, experts are able to build a complex and ‘deep’ conceptual understanding (e.g., Case, 1999) of skills, content, and behaviors needed to accomplish their work. These deep conceptual understandings represent high-order interconnected knowledge and skills that emerge over time, routinely engage in reflection, and generate self-explanations about their performance. Note that a deep conceptual (metacognitive) understanding presumes a degree of skill automaticity (e.g. overlearned or routinized skills/behaviors that can be performed with little conscious effort). These conceptual understandings, become an integral mechanism for performance and skill improvement. Implicit in the development of expertise is the large amount of time needed to become an expert, at least ten years of deliberate practice (intentional, narrowly focused practice) and often longer (Ericsson, 2006; Ericsson & Charness, 1997).

Although an expertise model of cognitive development has not been applied to adolescence, its key features align well with research on adolescent brain and cognitive development (Keating, 2004). As noted in Chapter 3 and in prior sections of this chapter, adolescence is a time of rapid development of many cognitive capacities including, increased metacognitive control and awareness, enhanced self-regulation, and coordination of behavior, affect, and thinking. Indeed, adolescence may be an optimal time (from the perspective of brain development) to develop expertise in an area (David M Hansen & Jessop, 2017). As research on expertise development among adolescents emerges, there may be intriguing implications for education.

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12

Identity, Meaning, & Purpose

Objectives

- Explain what identity development is and why it is so important for humans
- Describe several biological, neurological, and contextual factors that contribute to identity formation in adolescence
- Identify various social and cultural contexts and how they impact an individual's sense of identity, meaning, and purpose
- Provide examples for how a well formed sense of identity, meaning, and purpose contribute to a person's life satisfaction and happiness while aberrant experience in this formative domain can lead to negative outcomes

Overview

Identity development is arguably the single most important psychosocial task of adolescence. A well-formed sense of identity consistently correlates with positive outcomes in all areas of life from career satisfaction to health; and identity confusion consistently correlates with internalizing pathologies such as depression and anxiety. However, identity construction is a difficult process, more so for some than others, and, as most psychological constructs, identity is an iterative, complex interaction between physiology, experience, beliefs, and social and cultural contexts. It is in this section that we will look at some theory concerning identity development, how various identity formation typologies correlate with personality traits, and the typical stages of the identity construction process. Taken all together, these perspectives can offer a lot of insight into the adolescent experience and the types of circumstances that foster optimal developmental outcomes.

What is identity development?

Identity development is the constructive process of synthesizing various cognitive, personal, and social experiences into a coherent framework or narrative that an individual considers central to his or her being. The notion of one's understanding of "selfhood" as being central to being human has roots in the earliest philosophical and religious traditions, and the modification of a person's relationship with this self-concept is the central focus of many traditional religious practices and psychotherapy regimens.

While identity formation is a personal endeavor, it is inextricable from social experience and is a social process guided by personal feelings of belonging (as opposed to feelings of isolation), acceptance (as opposed to rejection), and purpose (as opposed to meaninglessness)—all socially referenced feelings. Identity development in adolescence is often characterized by experimenting with various identities modeled through imitation and the subsequent responses received from various social groups including family, community, and peers—with peers often taking on the role of the most significant influencer.

Popular Theories of Identity Development

Erikson

Erik Erikson pioneered a stage-wise theory for identity development in the 1950s. Erikson posited two primary modes of identity processing: identity synthesis and identity confusion. *Identity synthesis* represents a coherent and internally consistent sense of self over time and across situations. *Identity confusion* represents a fragmented or partial sense of self that is incapable of supporting consistent, self-directed decision-making.

Marcia

In the 1960s James Marcia expanded on Erikson's work with his identity status model. Marcia delineated the primary dimensions of identity development as *exploration* and *commitment*. Exploration refers to sorting through and testing various potential identity alternatives while commitment refers to selecting one or more of these alternatives in which to adhere. Marcia further divided the primary dimensions into "present" and "absent" dimensions for a total of four possible identity development states (Table 12.1) (Schwartz, Zamboanga, Luyckx, Meca, & Ritchie, 2016):

Table 12.1. Marcia’s four possible identity development states.

Stage	Description	Personality Correlates
Achievement	Set of commitments enacted after a period of exploration	Balanced thinking and mature interpersonal relationships
Moratorium	State of active exploration with few commitments	Openness to new experience, curiosity, anxiety, depression, and generally poor well-being (e.g., higher incidences of depression, risk taking, etc.)
Foreclosure	Set of commitments enacted without prior exploration	High sense of self-satisfaction and lower incidences of internalizing symptoms (i.e., less likely to be depressed)
Diffusion	An absence of commitments and a lack of interest in exploration	Low self-esteem, lack of self-direction, and lack of agency

Dimensional Approaches

More recently researchers investigating identity development have preferred to explore the dimensions that influence the identity formation process. Below is a five-dimensional model of identity formation posited by Luyckx et al. (2008) (Table 2). The examples in the table relate to typical career related identity formation, but these dimensions can apply to a wide variety of domains including religious, racial, sexual, and others:

Identity Domains

It is well understood that identity is a multi-faceted construct and individuals have different identity commitments in various domains. Some of the most common domains of identity commitments include political preference, religion, gender, sexuality, familial relationships, and ethnicity. The degree to which a person relies on one or more of these domains in forming their identity is dependent on many factors including the social and cultural context in which they are developing.

Table 12.2. Luyckx et al. dimensions of identity formation, descriptions, and examples from career choices.

Dimension	Description	Example
Commitment Making	The degree of commitment to a specific direction and goals in life	Taking AP bio and chem courses in high school and applying to colleges based on the reputation of their pre-med program
Identification with Commitment	The degree to which these commitments contribute to a sense of self	Telling everyone you plan on becoming a doctor; in making decisions, you consider if it is something consistent with what a doctor would do
Exploration in-depth	The degree to which one is reflecting on commitments that have already been made without necessarily exploring other options	Struggling with AP chem and wondering if you have what it takes to make it to medical school
Exploration in-breadth	The degree to which one is considering new possible commitments	Shadowing a nurse at a local hospital; attending a summer program for another applied science field
Ruminative Exploration	Repeatedly worrying about alternative directions without ever being able to close down the exploration process.	Not choosing a college and taking a year off after high school; never cultivating a skill set to mastery levels

Genes, Neurons, and Environment

Identity has been explored in ways that inherently consider and express the interactions of genes, the brain, and the environment. Researchers are increasingly able to quantify the impact of genes on identity formation outcomes, and identity research theories are consistently finding support for culturally derived differences in neurological functioning amongst groups.

Identity in the Brain

From the perspective of neuroscience, identity research is often conducted under the paradigm of “self-referential processing.” Self-referential processing is exactly what it sounds like: cognitive processing that references the mental systems and constructs involved in creating a sense of “self.” Several key brain regions are consistently activated during these self-referential processing paradigms.

The ventromedial prefrontal cortex (VMPFC) is the most commonly activated region associated with self-referential processing, and the degree of activation of the VMPFC often correlates with the degree of “self-referentiality” of thoughts (D'Argembeau et al., 2005). The

dorsomedial prefrontal cortex (DMPFC) is also commonly activated, but often in different ways, depending on cultural context, as will be discussed later.

Self-referential processing is often conducted congruently with emotional processing. Emotionally charged self-referential processing has been shown to activate the anterior cingulate cortex (ACC) as well as the VMPFC and DMPFC. Studies designed to differentiate degrees of emotionality from degrees of “self-referentiality” have shown that emotional processing is predominantly executed by subcortical regions including the amygdala, nucleus accumbens, and the insula while self-referential processing is consistently relegated to cortical midline structures (CMS) (VMPFC, DMPFC, ACC, etc.). However, there is evidence to suggest that initial judgments of self-reference can modulate the processing of emotional stimuli. In other words, the brain can monitor emotional stimuli for degree of relevance to identity constructs and in turn modulate emotional processing in sub-cortical regions. For example, an emotionally charged stimulus will be more emotionally salient if it is subsequently judged to directly relate to some aspect of personal identity or self-referential processing (Herbert, Pauli, & Herbert, 2011), e.g., someone who identifies strongly with their Russian heritage will find political comments about Russia more emotionally salient and stimulating. The brain structures that are involved in these processes are rapidly developed during the adolescent years and help highlight the role of normative social, emotional, and identity formation processes during this sensitive period.

Genes and Identity

Research in the differences between monozygotic and dizygotic twins has shown a genetic influence on identity formation. On a wide range of identity dimensions, genes were shown to explain about 18-45% of the variance, with environmental factors accounting for about 55-82% of the variance (Markovitch, Klimstra, Luyckx, Abramson, & Knafo-Noam, 2017).

Identity and Culture

The burgeoning science of cultural neuroscience has been instrumental in elucidating how self-referential processes in the brain are carried out. No serious consideration of identity formation and the resultant outcomes can take place without recognition of the cultural context in which the development takes place. For example, cultures that place high value on independence and individualism will tend to encourage individuals to identify with these traits. On the other hand, cultures that place high value on relationships and interpersonal identity constructs will tend to encourage identity formation conducive to such values. Thus, it is certain that the beneficial effects of a certain type of identity formation are not necessarily universal.

East—West Comparisons

A general compare and contrast of western and eastern philosophical traditions shows that western philosophers have tended to focus on personal self-identity whereas eastern philosophers have emphasized the relation between self and others (Ching, 1984). These ways of thinking manifest in fundamentally different cognitive styles for self-representation, i.e., the independent self in western thinking and the interdependent self in eastern thinking. Neuroimaging studies have shown that Westerners employ the medial prefrontal cortex (MPFC) to represent only the self, whereas Chinese utilize the MPFC to represent both the self and close others, e.g., mom, brother, best friend.

Religion and Identity

Religion can direct identity development in many obvious ways, but it can also have some less obvious consequences on neurological functioning. While religions vary widely in beliefs and practices, many share in the philosophical tradition of altering one's sense of self. For example, Christianity often uses the sacrifice of Jesus as a model for the personal relinquishing of one's self to God, God's judgments, and God's will. This self-sacrificial process is theorized to have direct influence on neurological functioning in the brain. Recent studies have compared Chinese Christians and Chinese non-Christians during their processing of self-judgments. For non-religious participants, self-judgments induced increased activity in the ventral medial prefrontal cortex (VMPFC). However, for Christian participants, self-judgments induced increased activity in the dorsal medial prefrontal cortex (DMPFC). Also, DMPFC activation was positively correlated with the ratings of the importance of Jesus's judgment in subjective evaluation of a person's personality (Han et al., 2008). This is consistent with the theorized role of the VMPFC in processing information as self-referential and the role of the DMPFC in evaluations of self via metalizing another's perspective, e.g., a friend's or Jesus's perspective. Interestingly, similar results were found when comparing non-religious with Buddhist participants (Han et al., 2010), with the Buddhist participants showing similar activation to the Christian participants.

The Adolescent Identity Crisis

There is an entire genre of contemporary and classical literature that centers around the teen identity crisis, e.g., *The Fault in our Stars*, *The Catcher in the Rye*, *Jane Eyre*. Highlighted by these examples from literature and empirical research on the subject, the core components of the identity construction process during this time are mediated by interactions with other people. When teens begin utilizing the newly acquired mental capacities that allow them to consider higher-level identity constructs, they do so in the context of multiple outside influencers including parents, teachers, and peers.

The Psychosocial Moratorium

In contemporary American culture, the complexity of identity formation has created the need for the psychosocial moratorium—a sort of “time out” from excessive responsibilities and obligations that might hinder exploration and self-discovery. Encouraging teens and young adults to stay in school for an extended period of time often supports this explorative stage. This allows them to think seriously about their plans for the future without making any permanent decisions. For those who can tolerate the uncertainty of this stage and use it to gather information, it can be an exciting and rewarding period. For others, it can be an uncomfortable and anxiety inducing time.

Resolving the Identity Crisis

For most, identity formation is not a single identity crisis, but a series of minor identity crises over a long period of time (often extending into young adulthood and even resurfacing later in life, e.g., the midlife crisis). In the end, identity formation results in feelings of general well being and belonging—a sense of knowing who one is and where one is going coupled with positive reinforcement from others who matter. Identity formation results in a continuity between

the past and future. It produces a coherent narrative of the individual and allows them to function completely in their interior as well as their social lives.

In American culture, a defining characteristic of coherent identity achievement is a strong sense of [agency](#). People who achieve a strong sense of identity tend to take responsibility for themselves, have control of their decision making processes, and feel confident they will be able to make the right decisions and overcome obstacles along the way.

A coherent sense of identity does not usually form before the age of 18. It seems that it is the late teens and early twenties that are critical periods for identity *crystallization*. It has also been shown that attempts to speed up this processes, e.g., by coaching individuals to think more about how specific life events play a role in their development, are not effective (Habermas & de Silveira, 2008).

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13

Moral Development

Objectives

- Differentiate between normative and descriptive theories of morality
- Briefly explain the history of moral psychology
- Compare and contrast prominent theories in moral development
- Identify unique neurological aspects of adolescent development that help explain moral development during the teenage years
- Propose several higher level, abstract mental processes that help explain moral development during the teenage years

Overview

As the primary focus of ancient philosophy, the study of morality and ethics precedes psychology by thousands of years. However, while ancient and philosophical treatments of the subject tend to be [normative](#), i.e., focus on the way things *ought* to be, modern psychological treatments tend to be [descriptive](#), i.e., describe what people believe to be right and wrong, how they arrive at those beliefs, and how those beliefs impact behavioral outcomes. In contemporary moral psychology, moral development is seen as a necessary component of well-functioning groups (e.g., families, communities, schools, nations, etc.), as proper group function often requires norms of conduct and behaviors that are best for the group but might not be best for the individual (i.e., altruistic behaviors). Evolutionary psychology posits that moral biases are an evolved consequence of these group level benefits derived through the process of [group selection](#). These biases help explain a wide range of phenomena including care for strangers, pleasure in seeing moral offenders punished, religious ideals of purity, political party affiliation, brand loyalty, sports team fandom, and others.

A Brief History of Moral Psychology (Giammarco, 2016)

Dilemma-based Morality Scales. The earliest attempts at studying the psychology of morality tended to focus on moral reasoning and used stage-wise descriptions of moral development. These stages usually implied a normative stance, as higher stages were seen as better or ideal. They were also highly subjective and limited to narrow cultural contexts.

Piaget

In the 1930s, Piaget proposed a cognitive-developmental perspective of moral development (Piaget & Inhelder, 2013). In Piaget's theory, the first stage of moral development consisted of children obtaining a sense of moral identity from their parents. Typically, a parent's relationship with his or her child is authoritative, i.e., based on a real power imbalance and authoritative control over the child; thus, in Piaget's theory, children's sense of morality is purely a response to the constraints put in place by parents, e.g., rewards and punishments (...or the lack of constraints). In the second stage, children interact more extensively with peer groups, and moral development enters the "autonomous" stage. In this stage, children develop a sense of morality through peer engagement where they have to negotiate and resolve conflicts; thus, morality is seen as tool for fostering positive relationships, and moral development becomes centered on honing this tool through cooperation and reciprocity.

Kohlberg

In the late 1950s, the study of moral judgments found renewed interest through the research of Lawrence Kohlberg. Kohlberg created a model of moral development that attempted to explain in more detail the stages that all individuals go through as they develop their moral reasoning abilities (Kohlberg, 1978; Kohlberg & Hersh, 1977). Kohlberg's model consisted of six stages: (1) obedience and punishment, (2) individualism and exchange, (3) interpersonal relationships, (4) authority and social order, (5) social contract, and (6) universal principles. According to Kohlberg, no stages could be skipped, and once a stage was reached, it was retained for life. However, the methods Kohlberg used to support this model were criticized as being too subjective and never stood up to statistical or psychometric rigor.

Rest

In response to the subjective and unstandardized methods used by Kohlberg, a new self-report instrument designed to assess moral development was created by James Rest in 1974 (J. Rest, 1974). The Defining Issues Test (DIT) is a self-report measure of moral development that presents participants with a series of hypothetical moral dilemmas. After each dilemma, the participant is given three choices for how the protagonist should act, and the participant must choose one. Next, participants rate the degree to which certain issues related to the dilemma influenced their decision, and finally rank four items in terms of which one best reflects their thought process while arriving at their decisions. The degree to which they rate the issues as being important and the rank of each step in their thought process are used to assign a developmental stage. The instrument has found widespread use; and consistent correlations with higher degrees of moral development are still found in likely places, e.g., philosophy graduate students score higher than students in other disciplines. Also, results were found to positively correlate with moral comprehension, pro-social behaviors, and professional decision-making.

By the end of the 1990s, the scenarios of the DIT were deemed to be outdated and a new instrument, the DIT-2 was created (J. R. Rest & Narvaez, 1999). The DIT-2 not only revised the scenarios, but also used more sophisticated statistical analysis methods, and it was found that, psychometrically, there was little difference between stages 2 and 3 and stages 5 and 6. This led the creators of the DIT-2 to propose an updated model that consisted of three levels instead of six. This departure from the six-stage model became known as the Neo-Kohlbergian model, which placed more emphasis on an automatic process of “[schemas](#).” It also said that individuals retained their abilities for reasoning at lower levels, and that the stage-wise progression was more gradual than discrete (i.e., on a continuum).

However, despite decades of improvements, studies using the DIT and DIT-2 remain highly criticized for their lack of reliability (especially with younger children), the failure to control for other variables (e.g., age, education, SES), and the highly subjective and normative nature of the stages themselves. Nonetheless, the DIT and DIT-2 continue to find widespread use in moral development research.

Gilligan

In the 1980s and 1990s, one of Kohlberg’s students, Carol Gilligan, began looking more closely at the differences between the ways boys and girls approach moral dilemmas rather than the decision-based outcomes themselves (Gilligan & Attanucci, 1988; Murphy & Gilligan, 1980). She originally posited that girls approach morality from an orientation of concern for care and harm whereas boys approached morality from the orientation of concern for justice. While these sex differences in moral orientation remain inconclusive, it led researchers to start looking more closely at the possibility of different types of moral orientation and ways of approaching moral dilemmas. Some contexts that proved to show an influence on moral orientation during assessment were the use of real-life versus hypothetical dilemmas and considerations of social consequences (e.g., social stigma of giving an unconventional response). For example, researchers assessing children’s likelihood of cheating found that cheating behavior was a function of how likely a child perceived his or her chances of getting caught—not an inborn tendency for cheating or a lack of knowledge that cheating is wrong. So in other words, everyone cheats; some people are just more risk averse than others.

Non-dilemma Based Moral Theories-Moral Foundations Theory

Since Kohlberg there have been various attempts to create non-dilemma based models of moral development. One that has gained a lot of traction in the past decade is Jonathan Haidt's moral foundations theory (MFT). MFT highlights the primacy of moral intuitions, stating that our feelings and intuitions are the primary source of our moral judgments—and moral reasoning is an afterthought with the purpose of justifying our position and actions to others (Haidt, 2001, 2012).

MFT is based on a systematic review of evolutionary psychology and anthropology literature. Through this review, Haidt identified five areas of moral regulation that persist across cultures: (1) care/harm, (2) fairness/reciprocity, (3) in-group/loyalty, (4) authority/respect, and (5) purity/sanctity. Recently, a sixth foundation, liberty, has found empirical support and offers many promising avenues for research in adolescent development. See Table 14.1

MFT is assessed via the Moral Foundations Questionnaire (MFQ). In the MFQ, participants rate the degree to which an item is relevant in making a moral decision (any moral decision). An example of an item designed to assess for the care/harm foundation asks the participant to rate the importance of the degree to which “someone suffers emotionally” influences their moral decision making. Based on the relative degree to which participants are influenced by items from each foundation, a moral foundations profile for that individual or group can be created. Interesting correlations have been found with these profiles. For example, political liberals rate the care/harm and fairness/reciprocity foundations as highly relevant to their moral decision-making while ranking the in-group/loyalty, authority/respect, and sanctity/loyalty foundations relatively low. On the other hand, political conservatives give equal weight to all five foundations when making moral judgments.

What really makes MFT interesting is that it provides an explanation for moral development that is highly integrated with evolutionary theory and biology. One of the criteria for each foundation is that it plausibly could have provided an adaptive advantage to our ancestors and their ability to function in large, coordinated groups. However, the theory is relatively new, and there remains a lot of work to be done in building empirical evidence in support of these claims of adaptive mechanisms. Below is a rough outline of each foundation, the adaptive challenge it possibly arose from, original triggers, current triggers, characteristic emotions, and relevant virtues.

Morality Binds and Blinds

In the light of moral foundations theory, moral phenomena are seen as cognitive biases that “bind and blind,” i.e., they help in binding people together in groups, but they also can blind people from information or thought processes. Take for example sports team fandom. A fan who believes his or her team to be the best and find identity with other fans who also hold this belief will readily accept evidence in support of the belief that their team is the best but will have a hard time accepting, even to the point of becoming delusional, any evidence to the contrary. This phenomenon is at the heart of social, political, religious, scientific, and ideological divides and the inherent difficulty that arises when trying to foster dialogue across such divides.

In helping to explain this, it is important to remember here that the human brain didn't necessarily evolve to find the truth. The human brain evolved to survive, and there are strong arguments for how cognitive biases and blind spots that help us remain an accepted member of a group could increase our chances of survival.

Adolescent Moral Development in the Brain

Given that morality is a highly complex function of human behavior, it is obvious that there is not one particular brain region or network that is responsible for moral processing. Rather, morality is the result of complex interactions of various regions and networks dependent on context—both the personal, mental contexts of the individual (e.g., beliefs, identity, IQ) and the external contexts of the environment including audience or even the smell of the room. For example, studies have found that people will align themselves more closely with a conservative political viewpoint if they are in a room that has been doused with a foul smelling spray or in a location next to hand sanitizer—the theory being that it [primes](#) them to be more sensitive to threats of pathogens or outsiders and thus biases them toward more conservative values (Schnall, Haidt, Clore, & Jordan, 2008).

Key Brain Regions Implicated in Adolescent Moral Development

Frontal Lobe

One of the most consistently reported findings associated with adolescent development is the decrease in grey matter and increase in white matter throughout the cortex, especially the frontal cortex. This increase in white matter and concurrent decrease in grey matter is a result of synaptic pruning and increased myelination (see chapter 3). Thus, the number of connections during adolescence decreases (sometimes at a rate of about 30,000 per second), and useful connections are strengthened. The frontal cortex is often implicated in executive control and reasoning tasks.

Parietal Lobe

Research suggests that the parietal lobe is mainly associated with working memory and cognitive control. A key function of several distinct areas in the parietal lobes seems to be the perception and representation of social information that may be relevant for making inferences about others' beliefs and intentions and general representations of personhood.

Temporal Lobe

The temporal lobe is a region highly active in theory of mind (ToM) tasks. Structural abnormalities within the temporal lobe have been associated with psychopathy. The temporal lobe houses substructures implicated as the initial sites of social perception. These regions are also heavily involved in emotional processing, and are an indispensable region for making inferences about other peoples beliefs and intentions (Allison, Puce, & McCarthy, 2000). Areas of the temporal lobe are activated when research participants apply punishment to “excluders” in the dictator game (a research game where an individual can choose how to split a sum of money between him or herself and a second, anonymous player). These regions show greater activation in justice-based moral dilemmas compared to care-based moral dilemmas.

Temporo-parietal Junction

The temporo-parietal junction (TPJ) is an area of the brain where the temporal and parietal lobes meet. The TPJ seems to play a key role in moral intuitions and in belief attribution during moral processing in others. The TPJ is involved in encoding beliefs and integrating them

Table 14.1. Description of Domains of Moral Regulations

	Care/ harm	Fairness/ reciprocity	In-group loyalty/ betrayal	Authority/ respect	Sanctity/ degradation	Liberty/ oppression
Adaptive challenge	Protect and care for others, especially offspring	Benefit from two-way relationships without being taken advantage of	Form cohesive groups able to accomplish more than the sum of the individuals	Cultivate beneficial relationships within hierarchal social structures	Avoid pathogens	Autonomy of individuals within a social context
Original triggers	Suffering or distress of one's child	Cheating, cooperation, freeloading	Threat or challenge to group	Signs of dominance and submission	Human waste, diseased people	Submission, subjugation
Current triggers	Baby seals, cute cartoons	Wall Street Protests	Sports fandom, nationalism	Bosses, respected professionals	Taboo ideas, sexual impurity	Forced marriage
Characteristic emotions	Compassion	Anger, gratitude, guilt	Group pride, anger against traitors	Fear	Disgust	Anger
Relevant virtues	Caring, kindness	Fairness, justice, trustworthiness	Loyalty, patriotism, self-sacrifice	Obedience, deference	Temperance, chastity, piety, cleanliness	Independence, personal responsibility

Based on a table from Jonathan Haidt's book, "The Righteous Mind: Why Good People are Divided by Politics and Religion" (Haidt, 2012)

with relevant features of actions and outcomes. The right TPJ is active when subjects process prior intentions. The left TPJ is activated when a subset of social intentions or lying is involved.

Anterior Cingulate Cortex

A more specific area of the frontal cortex that shows pronounced volume increase during adolescence as a result of white matter increase is the anterior cingulate cortex (ACC) (Casey et al., 1997). It is thought that the ACC plays a crucial role in several areas relevant to moral development including self-control, behavioral inhibition, and the integration of various mental representations of the body state—all key aspects of moral reasoning and behavior. Second-order representations of body state are the product of integrating cognitive and contextual information with the first-order sensory information derived from insular and somatosensory cortices. Research tends to suggest that the ACC is responsible for this integrative process and that the right-ACC is responsible for the integration of autonomic responses with behavioral effort. Interestingly, the ACC is implicated as a key node of the salience network (see chapter 3).

Anterior Insula Changes

The ACC is highly connected with the anterior insula (AI). The AI is responsible for conveying homeostatic information to consciousness, i.e., making us aware of subconscious, somatosensory responses and body states. Thus it is involved in detecting things like our own heartbeat and plays a primary role in our ability to empathize with others. The most common activation site of the AI in children is on the left side, which is preferentially involved in parasympathetic activity commonly associated with positive feedback, such as reduced tension. The most common activation site of the AI in adolescents is the right side, which is preferentially involved in sympathetic activation commonly associated with negative feedback, such as elevated heart rate or stress responses (Allman et al., 2010). Also, disproportionately concentrated in the right AI, as well in other SN regions, is a unique type of neuron (spindle neuron) that facilitates rapid communication between brain regions. Practically, this shift reflects a key transition during adolescence characterized by the increased influence of ‘negative’ feedback on cognitive control, including the detection and anticipation of behavioral, emotional, and social errors, such as personal embarrassment or empathy (e.g., prosocial error detection).

Combining Neurological and Social Influences Into Higher Level Mental Processes

The above neurological changes support the idea of adolescence as an important time for moral development and shed some light on possible neurological causes of behaviors often exhibited by teens. Based on the regions of the brain and the types of networks that show pronounced development during adolescence, we would expect to see teens as being much more sensitive to social cues as salient stimulation and much more averse to negative emotional stimulation. However, several additional mental abilities must be present for these neurological changes to result in a fully formed moral sense as we know it.

Self-Conscious Emotions

Empathy is a vicarious emotional response to another’s emotional state. For example, the fear felt while seeing the facial expression of a good actor as he’s being chased by dinosaurs or the pain and reflexive sheltering of one’s foot upon seeing someone stub his or her toe are both empathic responses to another’s negative emotional state. On the other hand, sympathy is

defined as feelings of concern, compassion, or sorrow for another individual. To better highlight this distinction, consider that you could see a villain stub his toe and vicariously have an empathic response and feel that pain while at the same time have no sympathy for the individual due to your prior judgment of him as villainous and thus deserving of any ill that befalls him. At the same time, having never been on the verge of starving to death, you might find it impossible to empathize with orphans in such a dire state, yet you can readily sympathize and feel concern for them.

Adolescence is a time to become more aware of emotions and their meanings on a cognitive level. This awareness is then directed through experience and social and cultural contexts to arrive at conceptual understandings of the self and one's relationship with the rest of the world. It is this process of identity formation and self-awareness that gives rise to many morally relevant emotional responses such as pride, shame, guilt, or embarrassment—all highly salient motivators for teens. These self-conscious emotions (pride, guilt, etc.) have a strong social component and require higher-level abilities of abstract thought such as perspective taking. These higher level abilities allow us to imagine how we are perceived by others and are precisely what we'd expect as developing during adolescence based on neurological evidence. In many ways, moral development can be seen as a result of these empathic responses, newfound abilities of higher-level cognitive abstraction and an individual's desire to avoid negative feelings that result from the integration of these.

However, for a teen, such abilities are new, and it takes time to be able to rein them in and apply them appropriately. The coordinating of these newfound cognitive abilities with external realities and the calibrating of these cognitive-emotional systems is an extended process, and much of the behavior observed in adolescence is indicative of this process. Thus, in the same way that a child makes errors when trying to apply rules of language (cows, ducks, *sheeps*), adolescents make errors in applying their new social-emotional cognitive abilities in socially and culturally appropriate ways.

Imaginary Audience and Personal Fable

Researcher Abigail Baird (Baird, 2008) proposes that this moral-developmental process gives rise to two common patterns of thought in teens: the imaginary audience and the personal fable. The imaginary audience refers to teens' tendency to believe that others are always watching and evaluating them. The personal fable refers to the common adolescent belief that the self is unique, invulnerable, and omnipotent. In one extreme, the adolescent errs in his or her attempt to differentiate his or her thoughts and feelings from the thoughts and feelings of others (their imaginary audience), thus concluding that his or her thoughts and others' thoughts are one and the same. On the other extreme, the adolescent fails to recognize the commonality of his or her thoughts with the thoughts and experiences of others, thus arriving at a sense of being overly unique (personal fable). Characteristic expressions of the personal fable include sayings such as "No one can understand what I'm going through," "that won't happen to me," and "I can do anything."

The balancing and calibrating of these abilities is highly dependent on social contexts and experiences. Thus, peers take on a highly significant role in developing these abilities in teens as peers constitute the primary social context in which they develop. From this perspective, moral development is seen as a complex process of adapting neurological changes in the brain with appropriate behaviors for a particular social and cultural context. Adapting here means avoiding negative feelings, whether physical or emotional (either direct or empathic). Thus moral

development is highly dependent on these peer social contexts and can explain much of the stereotypical behavior exhibited by teens.

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14

Sexuality

Objectives

- Recognize the biological development associated with sexual maturity
- Consider the complexity of social and cultural influences on adolescent sexuality
- Explain sex differences between boys and girls in a the contexts of past and current research findings
- Explain effective school based supports for LGBTQ youth

Overview

American culture has an interesting relationship with adolescent sexuality. On the one hand, it is everywhere—explicitly in media, schools, and the public sphere in general. On the other hand, American adults abhor the idea of teens being sexually active and prefer to either pretend it doesn't exist or actively campaign against it. For example, 80% of American adults agree with the statement that “teenage sex is always or almost always wrong (Diamond & Savin-Williams, 2009). As psychologists, our job would be much easier if we could look at human sexuality in purely biological terms. However, like so many other things, human sexuality is a complex interaction of biological, social, cultural, and psychological factors. The strong moral biases stimulated when the topics of sexuality arise can have major implications for human sexual development—how sex is framed, viewed, and engaged in (and how research is conducted). These biases can influence public policy and social contexts in negative ways, and policy initiatives and efforts to change sexual behavior of adolescents often have counterintuitive outcomes. In this chapter we'll look at some of the research that is used to help describe adolescent sexual development and some of the research that correlates social and personal factors with sex related outcomes, e.g., religion, risky sexual behaviors, relationships, contraceptive use, STDs, teen pregnancy, and sexual orientation. From here a picture of the requirements for healthier approaches to sexuality in personal and social contexts should become clearer.

Sexual Development

Adolescence is not the first time that feelings and behaviors that are sexual in nature arise. Children often experience sexual feelings and engage in pleasure inducing activities involving the erogenous zones. However, it is during adolescence that hormonally induced changes create explicit sexual drives and deliberate, sexually motivated behaviors.

With puberty come the obvious differences between boys and girls in the development of secondary sex characteristics. However, there are also less obvious (and often stereotypical) psychological differences between boys and girls and their developing approach to sex. Some of these psychological differences are biological and some are socially induced, but, in general, girls view sex as motivated by a desire for more serious emotional relationships and boys view sex as means of enhancing social status (Diamond & Savin-Williams, 2009).

Sexual activity usually progresses via stages, so it is important to not view sexual intercourse as an isolated behavior but rather as one activity in a long progression of behaviors. Most adolescents' first experience with sex falls under the category of autoerotic behavior, i.e., sexual behavior experienced alone. The most common forms of autoerotic behavior include fantasizing about sex and masturbating. Different studies report different results, but about half of all adolescent boys and a quarter of all adolescent girls report having masturbated before the age of 18. By 16 years old, about 80% of boys and girls have engaged in some form of non-coital sexual behavior, e.g., oral sex. Getting an accurate measure of sexual intercourse among adolescents is challenging, as boys tend to overstate their level of activity and girls tend to understate it (Kaestle, Halpern, Miller, & Ford, 2005).

Sex in Context

The probability that a teen will turn newfound sexual desires into sexual activity is highly dependent on social context, and girls are more influenced by social factors than boys in this

regard. In boys, hormone levels (e.g., testosterone) are directly related to likelihood of engaging in sexual activities (Skoog, Stattin, & Kerr, 2009). In girls, an increase in androgens increases their interest in sex, and an increase in estrogens increases their secondary sex characteristics and thus, often, their physical attractiveness to boys, but whether or not that increased interest and attractiveness is translated into sexual behavior is highly dependent on social context. Most social contexts are more uniformly tolerant and encouraging of sexual behavior for boys. However, for girls, the social environments and attitudes towards sex are more varied, thus, for girls, sexual expression is often restricted by social influences.

Parents

Adolescents from homes with parents who have warm personalities, are involved in their children's lives, and monitor their children's behaviors are less likely to become sexually active at a young age or engage in risky sexual behaviors (Ellis, Schlomer, Tilley, & Butler, 2012). Generally, teens are more likely to talk about sex with mothers than fathers, and teens are more receptive to having multiple conversations over a period of time than to having one big "sex talk" (Martino, Elliott, Corona, Kanouse, & Schuster, 2008). In the end, parent-adolescent communication regarding sex is more effective at deterring risky sexual behaviors than it is at promoting abstinence, but even that effect is small. More important factors include adolescents' opportunities to have sex, their having sexually active friends, and their use of alcohol or drugs (Whitbeck, Yoder, Hoyt, & Conger, 1999).

When parents talk to their teens about sex, the values and attitudes expressed by the parent and the subsequent interpretation of those values and attitudes by the teen tend to be most important in determining outcomes (Khurana & Cooksey, 2012). For liberal parents, talking about sex is correlated with an increase in sexual activity for girls, but that is not true if the parents explicitly disapprove of premarital sex (Usher-Seriki, Bynum, & Callands, 2008). In Hispanic families, communication with adolescents about values and beliefs about sex is correlated with decreased sexual activity amongst teens; however, the degree to which they directly caution against sex seems to have no effect (Lefkowitz, Romo, Corona, Au, & Sigman, 2000). Also, parents and adolescents who speak regularly about sex are more likely to turn down unwanted sex when they are pressured by others (Ream & Savin-Williams, 2005). Thus, parent-adolescent communication seems to be more effective at deterring risky sexual behavior than promoting abstinence.

Virginity Pledges

A relatively recent phenomenon common in schools is the use of "virginity pledges" in an attempt to decrease unwanted teen pregnancy and prevent the spread of STDs. Over the past 30 years, millions of American youth have made virginity pledges promising to abstain from sex until marriage. The research suggests that virginity pledges work only for younger adolescents, but high school pledgers are just as likely to have sex as non-pledgers. Longitudinal studies have shown that students who pledge and then engage in sex often deny having ever made the pledge at all (Hollander, 2006). In fact, one study found that 82% of adolescents who had taken a virginity pledge denied having done so 5 years later (Rosenbaum, 2006).

The Meaning of Sex for Boys and Girls

The typical boy's first sexual experience is masturbation; thus, for boys, from the beginning, sex gets placed outside the realm of interpersonal experience. Many boys have had an orgasm prior to starting dating, and the relationship building aspects of dating have to be integrated into an already existing sense of sexuality and sexual capabilities. This helps explain why boys are more likely to keep matters of sex and intimacy separate, experience sex first with someone they just met or a casual date, and generally initiate sex (Diamond & Savin-Williams, 2009). Boys tend to contextualize early sexual experience more as a matter of recreation than a matter of intimacy and emotional relationship building. For girls, sex is often part of a narrative that includes elements of romance, love, friendship, and intimacy. Girls are more likely than boys to use sex to enhance an emotional connection.

The social contexts for boys and girls also differ. Sex is typically more socially acceptable for boys than it is for girls, and, because of the possibility of pregnancy, the actual risk of consequence is greater for girls. Societies tends to monitor the sexual activity of girls more closely; and girls are more likely to be encouraged to approach sex cautiously and perceive having greater abilities to say no to unwanted sex (Zimmerman, Holloway, Langer, & Sprecher, 1995).

It is important to note that these differences between males and females are not inevitable nor are they consistent across cultures. And, certainly, not all adolescent boys have the typical male experience nor do all adolescent females have the typical female experience. Also, as research methods are improving and researchers are learning to overcome certain cultural biases respondents might have, boys are beginning to appear much more romantically motivated and girls much more sexually motivated than previously thought (Diamond & Savin-Williams, 2009). Finally, as each sex matures, they become more similar, i.e., males increasingly emphasize the role of sex in forming and maintaining emotional relationships and place less emphasis on sex as a means to elevating their social status.

Sexual Orientation

It is common for young adolescents to engage in sexual behaviors with same sex peers, have fantasies about people of the same sex, and question the nature of their sexual identity (Diamond & Savin-Williams, 2009). It is more common for males to have had same-sex relations prior to identifying as gay or bisexual, whereas it is more common for women to first identify themselves as gay or bisexual prior to engaging in same-sex relations (Saewyc, 2011).

There is ever increasing evidence that adolescents' sexual orientations are the result of complex interactions of social, environmental, and biological factors (Saewyc, 2011). There is evidence for a genetic component to sexuality, as sexual orientation is more likely to be similar among close relatives than distant relatives. Of course, it is likely environment plays a large role in these contexts too, but it does suggest that some aspects of sexual orientation are inherited.

School Supports for LGBTQ Youth

This section contributed by Linda Flores

Teens who identify as LGBTQ, or are questioning, face added difficulty in forming their identities because of the stigmatization of their sexual orientation. Contemporary research has emphasized the importance of support for LGTBQ students learning to cope with stress related to their sexuality. Aside from the stress that all adolescents face, LGBTQ youth must cope with stressors "ranging from overt rejection or victimization to internalized shame or vigilance

regarding a hidden sexual identity” (Doty et al, 2010, p. 1135). As a result, students who identify as LGBTQ simply have added pressures to worry about because of how LGBTQ persons have been historically victimized, humiliated and shunned by society. It is being posited in this research that, despite the need for added supports for LGBTQ students, schools across the board are not adequately supporting LGBTQ students. A vast majority of schools would better meet these needs by incorporating supports earlier at the middle school level, by utilizing LGBTQ inclusive sexuality education materials and by supporting the operation of a Gay-Straight Alliance (GSA) organization in their school.

Essential Need for Support

In research performed by Doty et al (2010), LGBTQ youth’s own perceptions of the support they receive for coping with sexuality related stress was examined compared to other areas of adolescent stress. This research draws heavily on the matching theory which describes that support from social structures is most effective when it explicitly addresses the stressors being focused on. The study completed by Doty et al (2010) included one-hundred LBG persons between age 14-21 and gathered data regarding coming out experiences and levels of perceived support for sexuality stressors versus non-sexuality stressors (p. 1137). This study found that “support for sexuality related stressors differed from support for other types of problems” in that they felt less supported on issues relating to their sexuality (Doty et al, 2010, p. 1142). The data collected also reaffirmed the existence of greater feelings of sexuality related stress due to a lack of support, and the need for sexuality specific support as the matching theory of social support suggests. This research sets the clear foundation for moving forward under the understanding that support for LGBTQ persons is essential to their development but greatly lacking from their experiences in social support systems.

Supports at the Middle School Level

Other studies expand on these premises as they take into account the increase in LGBTQ youth who are coming out at younger ages in middle school. These investigations support the claim that supports are more valuable when presented in the beginning stages of sexual discovery as all students, and especially LGBTQ students, are developing in middle school. In the research by Horowitz et al (2011), three middle schools were examined over three years as they participated in a program designed by Out for Equality, a “school-based program designed to help LGBTQ students, families, and staff overcome the well-documented social, emotional, and academic challenges they face in American schools” (p. 32). The goals of the program were to “decrease homophobia and improve the learning environment for LGBTQ students in middle school” (Horowitz et al, 2011, p. 33). In the program, opportunities to collaborate with school social workers were provided, LGBTQ support specific staff training sessions were conducted, and students were guided through activities and awareness raising events that sought to expand their understanding of sexuality as a spectrum, increase their levels of tolerance and instill appreciation of diversity.

In the evaluation of these efforts, researchers found that students in all three schools, but notably in School B & C, reported on post-assessments that they “could find answers to LGBTQ questions ‘sometimes’ or ‘a lot of the time’” after participating in these programs (Horowitz et al, 2011, p. 36). This demonstrates significant growth when compared to reporting on pre-assessments that they could ‘almost never’ find these answers. Overall, the schools that participated in this program reported greater “student understanding of or sensitivity to LGBTQ

issues, and [decreased] challenge in discussing sexuality in a middle school setting” for students (Horowitz et al, 2011, p. 37). Besides these improvements to understanding and comfortability for students, staff also reported feeling more informed and capable of addressing sexuality related harassment and bullying. These efforts to combat teacher non-responsiveness, through dispelling misinformation and providing tools to teachers for addressing this kind of harassment, is yet another essential benefit of increasing school support for LGBTQ youth. This study concludes by supporting the notion that “it is clear that programming targeted to middle grades LGBTQ youth is both essential and widely lacking” (Horowitz et al, 2011, p. 38). Therefore, these researchers support the argument being made in this study that further efforts need to be made on the part of schools to support LGBTQ youth through informative and explorative programs.

Inclusion in Sexual Education

An additional way in which schools should be better supporting LGBTQ students is through the addition of more inclusive, non-heterocentric sexual education curriculum. Current sexual education curriculum in schools is not being designed to meet the needs of LGBTQ students. For instance, programs built on foundations of abstinence until marriage effectively ostracize LGBTQ youth into believing that healthy sexuality is only on the other side of heterosexual marriage (Gowen et al, 2014, p.789). Research has proposed the need to include sexuality education geared towards the needs of LGBTQ youths in order to ensure their positive health outcomes as equally as schools are supporting their heteronormative students. As the study performed by Gowen et al concluded, LGBTQ youths also perceive their schools’ sexuality education programs as being exclusionary of LGBTQ-sensitive curriculum materials and resources.

Five focus groups of 30 LGBTQ youth each participated in answering questions designed to draw upon their experiences in sexuality education courses in Oregon schools—one of only nine states in the U.S. that “requires LGBT-inclusive discussion of sexual orientation” (Gowen et al, 2014, p. 791). Yet, despite being educated in a state requiring schools to include LGBTQ materials, only 15% of youth “reported their school having any LGBTQ-inclusive curricula—below the national average” of 17.9% of schools (Gowen et al, 2014, p. 792). With such a small percentage of American schools supporting LGBTQ sexuality education in their curriculum, it is clear that schools have much progress to make towards supporting these youths’ sexual health. It is suggested that schools begin by incorporating curriculum that directly addresses LGBTQ issues and by providing access to LGBTQ specific resources, as well as “emphasizing sexually transmitted infection prevention over pregnancy prevention” (Gowen et al, 2014, p. 794). Incorporating these suggestions into sexuality education curriculum is believed to not only raise LGBTQ youth health outcomes, but also their perceptions of their own inclusion in the school climate.

Impact of GSAs

The final type of support suggested for schools to better protect and include LGBTQ youth is the formation and operation of a school sponsored Gay-Straight Alliance, or GSA, organization. GSAs started out as community program which moved into schools in the 1990’s as staff or educator sponsored advocacy and support organizations. Over time, they became more and more student driven organizations used for homosexual and heterosexual students to engage in discussion of gay issues, peer support, and hosting events that raise awareness and encourage

support of LGBTQ persons. Research performed by Poteat et al in 2013 studied the effects of having GSAs in schools on victimization of LGBTQ students. Researchers collected data from over 17,000 students ages 10-18, narrowed to LGBTQ students, and compared reported levels of victimization and suicidality in schools with and without GSAs. (Poteat et al, 2013, p. 324). The study found that all “youth in schools with GSAs were less likely to report suicide attempts than those in schools without GSAs” (Poteat et al, 2013, p. 327). That is, both LGTBQ and heterosexual youth benefitted from the support GSAs provide. While the study found only a subtle decline in the levels of victimization in schools with GSAs versus schools without, the school climates in those with GSAs was reported as “foster[ing] safer school climates in general and benefit[ing] all students, not only those who are GSA members” (Poteat et al, 2014, p. 328). The effects of this change in climate includes decreases in substance use, truancy and other risk behaviors. These positive effects on school climate and levels of suicidality for all students, as well as the subtle effects on incidents of victimization of LGBTQ youth, demonstrate the value of incorporating GSAs as a support system and resource for all students in American schools.

Conclusion

Issues adolescent LGBTQ students face in their sexuality are showing up earlier and earlier as middle school age is slowly becoming the average age of coming out. These students are faced with the tasks of coping with a highly stigmatized and victimized sexuality, all while navigating other aspects of adolescence. It is clear based on this research that schools are not meeting LGBTQ students’ needs across the board. Many schools nationally, for example, completely neglect any sexuality education relating to their LGBTQ students. Inclusionary sexual education materials and supporting the operation of GSAs as a valuable support and advocacy system for students need to be mainstays in American education. In order to comprehensively meet the needs of LGBTQ students and ensure their positive health outcomes, as well as overall feelings of safety in their own school, schools need to make a greater effort to reach these students and support them in these ways.

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