Adolescents

Adolescents' Psychological & Neurobiological Development:

Implications for Digital Marketing

Frances M. Leslie
Linda J. Levine
Sandra E. Loughlin
Cornelia Pechmann

University of California, Irvine

Memo prepared for
The Second NPLAN/BMSG Meeting
on Digital Media and Marketing to Children

for the NPLAN Marketing to Children Learning Community

Berkeley, CA June 29 & 30, 2009
Sponsored by The Robert Wood Johnson Foundation

Adolescents spend substantial time on the internet and they are especially interested in social networking sites and text messaging.[1] According to Pew[2], 95% of 12-17 year olds use the internet, 66% use a mobile phone, and 64% use both. Further, 65% of adolescent internet users visit social networking sites such as MySpace and Facebook, and 57% visit video sharing sites.[1] About 65% of youths aged 18 to 29 send text messages.[3] Therefore, adolescents are extensively exposed to digital marketing, by which we mean advertisements, promotions, placements and research that employ the internet or other digital media.

We will present research evidence that adolescents may require special protection from digital marketing. Research shows that relative to adults and children, adolescents experience heightened emotional arousal and that when they are emotionally aroused they are prone to making poor decisions[4], especially in terms of overweighting benefits versus costs[5], and in terms of consuming risky adult-only products such as cigarettes and alcohol.[6] Digital marketing evokes emotional arousal and encourages adolescents to make important consumption decisions under high arousal, particularly decisions about benefits versus costs and adult-only products. Thus digital marketing exacerbates adolescents' already high risk of making poor consumption decisions.

Digital marketing is predominantly social or peer-to-peer and research shows that these are precisely the types of circumstances that evoke high emotional arousal among adolescents.[5] Digital marketing also transpires through a sequence of real-time and time-sensitive interactions, causing adolescents to evaluate benefits and costs while they are experiencing arousal and are less able to make rational decisions.[7] Yet another problem with digital marketing is that it is more likely than other forms of media to promote adult-only products because of weak standards and oversight.[7] Adolescents are especially prone to consuming unhealthful adult-only products such as cigarettes and alcohol, becoming addicted, and suffering the detrimental effects[8,9] and these risks are heightened by digital marketing.

Adolescent Psychological Development

Adolescents are Prone to Risky Behavior

Adolescence is a unique developmental period that is characterized by novelty-seeking, impulsivity, social adaptation, emotionality and risky behavior.[9] Although social factors predispose adolescents to risky behavior, they are also biologically driven to separate from the family and to explore new territory and potential mates. Such behavior causes increased morbidity, with greater risk of death by suicide, murder and accidental death. Onset of a number of serious psychiatric diseases occurs during adolescence.[10] Impulse control disorders, mood disorders such anxiety, depression, panic attack and schizophrenia generally appear during adolescence, and teens are very vulnerable to post-traumatic stress disorder. Initiation of substance abuse also occurs during adolescence, and early exposure to tobacco and alcohol seems to predispose teens to later substance abuse.[11]

One major cause of adolescents' vulnerability is their propensity to engage in risky behavior. Adolescents are more likely than either children or adults to pursue reckless and risky activities.[9,12-14] In a survey of adolescents between the ages of 11 and 15, 80% reported engaging in one or more problem behaviors during the previous month

such as disobeying parents, school misconduct, substance use, driving while intoxicated, unprotected sex, theft, or fighting.[15] It has been argued that impulsive, reckless behavior is so prevalent during adolescence that it is the norm rather than the exception.[16,17]

Adolescents Understand Risks But ...

This penchant for risk taking has led researchers to ask whether adolescents are less knowledgeable than adults about the potential consequences of risky behavior. Research findings on this issue have been mixed. Some studies show that adolescents tend to minimize the consequences that risky behaviors and situations will have for their own lives.[18-20] In addition, compared with adults, adolescents' risky choices tend to be driven more by perceived rewards and less by potential negative consequences.[21-25] In general, however, studies comparing adolescents' and adults' knowledge about risks reveal more commonalities than differences.[26,27] Indeed, instead of displaying ignorance about risks, adolescents rate the likelihood of some negative outcomes (e.g., an accidental pregnancy or a drunken driving accident) greater than do adults and greater than is indicated by the statistics for their age group.[28-31] Thus it is unlikely that mere ignorance of potential consequences underlies risk taking in adolescence. However, most studies have assessed adolescents' decision-making in low arousal settings, for instance, using questionnaires about hypothetical events.

Adolescents Make Poor Decisions When Emotionally Aroused

More recent studies have examined adolescents' decision-making in settings that are emotionally arousing and the results tell a different story about adolescent cognition. Figner et al.[32] had adolescents and adults play a gambling game that required them to make increasingly risky decisions. Researchers assessed their level of risk taking and the information they took into account in making decisions. One version of the task allowed for calm deliberation by providing no immediate feedback; the other version was emotionally arousing because participants were given immediate feedback as each win or loss occurred. Under conditions that encouraged calm deliberation, teens and adults did not differ in their risk taking. However, under conditions of heightened emotional arousal, adolescents made riskier decisions than adults, and took into account less information when making their decisions.

One factor that makes situations highly arousing for teens is the presence of peers. Susceptibility to peer influence peaks in early adolescence and then slowly declines during the high school years.[25] Gardner and Steinberg (2005)[5] had younger adolescents (ages 13–16), older adolescents (ages 18– 22), and young adults (ages 24+) complete a questionnaire about risky decision making and then engage in a driving simulation task that assessed actual risk taking behavior. Participants completed the task either alone (low arousal) or in a group with two same-aged peers (high arousal). The results showed that younger and older adolescents were more strongly affected by the presence of peers than young adults. When with peers, younger adolescents and even many older adolescents focused on the benefits of risky activities as opposed to the costs and took more risks. Taken together, these findings suggest that adolescents often know about the risks but are less likely than adults to capitalize on that knowledge in emotionally arousing situations.[33,34]

Adolescents Experience Strong Impulses and Have Weak Impulse Control

Why do emotionally arousing situations have the power to derail adolescent decision making? Adolescents' need to rid themselves of negative emotions may take precedence over impulse control and contribute to their tendency to engage in risky, impulsive acts. Research shows that even relatively mild emotional distress can render people more likely to indulge in short-term pleasures to relieve their distress. Tice et al.[35] found that inducing negative emotion in college students increased their tendency to eat fattening snacks, pursue immediate gratification, and procrastinate. Adolescents frequently experience strong emotions and impulses.[36-39] In fact, adolescents tend to experience more frequent and intense negative emotions, diminished positive emotions, and greater emotional volatility than either younger children or adults.[40,41]

Moreover, while emotionality and sexual impulses reach peak levels in adolescence, the skills needed to control these impulses are in short supply. Such skills do not develop with the onset of puberty but rather improve gradually with age and experience.[12,42] Inhibitory or impulse control—also referred to as the cognitive regulation of emotions, executive control or more colloquially self control—refers to the ability to inhibit, delay, or modify an emotion or impulse or its behavioral expression to avoid negative outcomes and attain long-term goals.[43] The skills that are necessary for self control include planning, monitoring, evaluating, and reflecting. They are evidenced when a person focuses attention on a problem and blocks out irrelevant thoughts or when a person forgoes an immediate reward in favor of a more valuable outcome to be achieved subsequently. Such emerging abilities have been linked to the maturation of the prefrontal cortex, a brain region involved in long-term planning and deliberate decision making that does not fully develop until late adolescence or early adulthood.[9,34] Thus, adolescents often experience strong negative emotions which may overwhelm their already weak inhibitory control, causing them to give in to their immediate impulses without considering the consequences.

Adolescent Neurobiological Development

Adolescent Brains are Immature

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The adolescent behavioral changes discussed above are paralleled by major structural and functional changes in the adolescent brain. In fact, the brain circuitry does not fully mature until the third decade of life. Thus the structure and connectivity of the adolescent brain differs from that of both children and adults particularly in those regions that make executive control decisions and evaluate rewards. Through adolescence, gray matter—or dense cell tissue—is lost[44-46] and white matter—or the insulated fiber bundling that surrounds neuronal tracts—increases, resulting in improved efficiency of nerve impulse transduction.[47] The increases in myelin white matter are believed to underlie young adults' improved accuracy and decreased reaction time on cognitive tasks, as compared to adolescents.[9] Young adults' brain activity is also lower than that of adolescents[48], suggesting greater processing efficiency.

However, the changes that occur in gray and white matter are not homogeneous throughout the brain; the sensory processing regions mature earlier than the higher-order regions that serve to integrate them.[44,49] Decreases in gray matter volume and density occur during adolescence in frontal regions, particularly in the prefrontal cortex which is the executive control center. Myelination of frontal pathways progresses throughout adolescence, providing important connections between higher-level processing regions.[50,51] The myelination of the pathway that connects language processing areas also increases dramatically during adolescence, suggesting that language processing is immature.[50] In a brain pathway that connects a cortical region that is important in emotional responding with the subcortical hippocampus that is important in memory formation, myelination increases 100% during adolescence.[52]

Major structural changes also occur in the amygdala during adolescence. The amygdala provides information on drives, emotional memories and stimulus salience, and it is especially sensitive to negative experiences. The basolateral amygdala in particular provides a critical input to the functioning of the prefrontal cortex. Growth and maturation of fibers from the basolateral amygdala to the prefrontal cortex occurs throughout adolescence and into adulthood.[53] During this period there is also significant loss of both neurons and glia in these areas.[54] Since interactions between the amygdala and the prefrontal cortex underlie the processing of emotional information[55], the immaturity of this pathway may contribute to the emotional instability of adolescents and make delayed gratification more challenging. In contrast to the basolateral amygdala, the amygdala grows overall during adolescence.[56,57]

Whereas adults rely on a sophisticated interplay between multiple brain structures to make risk/return tradeoffs, this is simply unavailable to adolescents.

Adolescents Overvalue Rewards Versus Risks

Among adolescents, the ventral striatum which is the action center for motivated behavior exhibits an exaggerated response to rewards; in contrast, prefrontal cortex executive control activity remains at low childhood levels. In effect, striatal action regions are more active relative to prefrontal cortex regions during adolescence, which may underlie the increased "approach" behavior that is a hallmark of adolescence.[58] Also, the prefrontal cortex/amygdala/ventral striatum triad which comprises the "shopping center" of the brain is immature among adolescents and causes them to overvalue rewards and benefits and to underestimate risks and costs.[59] In other words, the shopping center of the brain should be used to make rational tradeoffs between benefits and costs, and both the ventral striatum and the prefrontal cortex should be involved in tradeoff analysis.[59] However, these areas and particularly the balance between prefrontal cortex and striatal regions are immature in adolescence. Whereas adults rely on a sophisticated interplay between multiple brain structures to make risk/return tradeoffs, this is simply unavailable to adolescents.

In addition, control over impulses, urges and reflexes are immature in adolescence. This may help to explain adolescents' high level of risk taking relative to both children and adults.[48] For instance, the ability to inhibit reflexive eye movements, which depends on executive control, is not mature until after adolescence.[60-62] Brain areas that are

important to behavioral inhibition, including frontal-parietal regions, are likewise immature.[63] Whereas adolescents use more generalized circuits to improve performance on inhibitory tasks, adults recruit more sophisticated task-specific systems.

Research also shows that the "social brain" regions are more active among adolescents as compared to adults. Along with the prefrontal cortex, a specific region of the parietal lobe is critical in attributing emotion to facial expressions.[64] Activation of these regions during face processing tasks peaks in adolescence and then decreases in adulthood. Moreover, adult brain activity is largely sensitive to a stimulus' attentional demands, but adolescent brain activity is more sensitive to the stimulus' emotional characteristics.[65] Also, the social brain regions are more strongly activated during self-reflection among adolescents as compared to adults.[66]

Adolescent Neurotransmitter Systems Undergo Reorganization

Neurotransmitter systems are immature in adolescence as well; they are undergoing reorganization. The dopamine system, which is critically involved in predicting reward and reinforcement learning[67], undergoes substantial reorganization.[68] Dopamine stimulation of the prefrontal cortex continues throughout adolescence with either a monotonic increase until adulthood[69], or possibly an 'overshoot' at puberty and subsequent pruning.[70] In any event, dopamine receptor levels in the prefrontal cortex and ventral striatum reach peak levels during adolescence, and then decline to substantially lower levels.[71] Overall, the distribution and functional roles of dopamine receptors within the prefrontal cortex and striatal regions are different in adolescents, suggesting age-related differences in the processing of rewards.[72-74]

All of these findings indicate that adolescence is a crucial and sensitive period for brain development, particularly for the maturation of circuits and systems that are involved in evaluating rewards, risks and social consequences.[48,75] As a result, negative environmental inputs such as drugs and other toxins pose a greater risk in adolescence relative to adulthood.[76]

Adolescent Marketing Susceptibility

Adolescents Rely on Ads and Products to Bolster Self Esteem

Research has also been conducted on adolescents' marketing susceptibility. It suggests that adolescents are generally knowledgeable about marketers' persuasive motives and tactics and can be taught to protect themselves and resist marketing tactics.[77] Nonetheless, adolescents seem to be more vulnerable to at least some forms of marketing than either adults or children. Many adolescents are uncertain about their ability to transition to adult status and have considerable self-doubt; as a result, they look to advertising models to identify adult-only products and activities that will help them to project a more mature and positive self image and to boost their self esteem.[78] For instance, Martin and Kennedy[79] found that 8th and 12th graders were more likely than 4th graders to compare themselves to advertising models, and this was particularly true of youths with low self esteem.

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Adolescents seem to be particularly interested in buying heavily advertised young adult products.[80,81] Adolescents seek to buy young adult products to signal to others and themselves that they are mature and should be free to engage in pleasurable young adult activities such as drinking, smoking and dating.[82] In effect, adolescents take up risky consumption behaviors such as smoking to look older and the extensive advertising for adult-only products encourages them to do so. Pollay et al.[6] found that cigarette advertising had three times more influence on brand shares among adolescents than adults. Other studies have found that adolescents are more likely than adults to smoke the most heavily advertised cigarette brands.[83] Since adolescents are especially receptive to advertising for young adult brands and may establish lifetime brand loyalties, many marketers of young adult brands differentially target adolescents.[84]

Adolescents are also especially receptive to social messages about products being popular or cool, as compared to health messages about risk, which means that adolescents may not be deterred by health risk information.[82,85] In fact, emphasizing that a product poses a severe health risk sometimes even boomerangs and increases product use because adolescents feel invulnerable and are allured by the perception of risk.[82] Overall, adolescents seem prone to boomerang or reactance effects, meaning doing the opposite of what they are told to do. For instance, Pechmann and Wang[86] found that if an entertainment-oriented television program for adolescents intentionally includes a social marketing message about quitting smoking, disclosing that intent is counterproductive and actually lowers the intent to quit.

Implications for Digital Marketing

What does the research on adolescent psychological and neurobiological development suggest about adolescents' response to digital marketing? It indicates that adolescents are more prone to making poor decisions when emotionally aroused. Since digital marketing purposefully evokes high emotional arousal and urges adolescents to make consumption decisions under high arousal, it exacerbates this problem. In this state, adolescents are likely to overvalue benefits relative to costs. In addition, the research on adolescents' marketing susceptibility indicates that adolescents are especially vulnerable to making poor decisions about risky young adult products, and it is precisely these products that are often promoted via digital marketing. For example, Chester and Montgomery (2007)[7] report that McDonalds encouraged young cell phone users to text a special phone number and receive an instant electronic coupon for a free McFlurry dessert. This type of digital marketing is intended to elicit both emotional arousal and an immediate response. It is precisely in these situations that adolescents are vulnerable to making poor decisions such as binging on junk food. The digital marketing tactic of text messaging was emotional and time-pressured which likely exacerbated adolescents' difficulties in making rational cost-benefit tradeoffs. Overall, the research as a whole suggests that adolescents may require special protection from digital marketing.

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