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Risk Taking in the Healthy Teen Brain

In our society it is commonly thought that the definitive example of a mature adolescent is one who is well behaved, thoughtful, even subdued. It is seen as a sign of maturation that a teenager would get along better with adults than their own peers. There is typically some shock among parents and teachers if a high school student who is academically motivated and driven participates in risky behavior. It seems that risk taking and socially taboo behavior is not expected from the adolescents who do well in the academic and social aspects of their lives. This paper means to investigate the implications of risk taking and risky behavior in adolescents, questioning whether there is a disparity in behavior of teenagers who are motivated and driven, excelling academically and socially, but also engage in behavior that is seen as risky.

Common risk taking in teenagers includes much experimental behavior. Teenagers are often punished for unsafe driving, crimes such as theft, experimenting with drugs and alcohol, and sexual risk taking. Not all people engage in dangerous behavior for the same reasons and it is quite possible that the motivation for punishable behavior varies greatly from individual to individual. However, common motivation for such behavior is not necessarily at odds with the more positive traits that are present in many high school age students who engage in risk taking. Adolescents who are thriving academically and admired by their peers and superiors are most likely motivated to succeed in other areas of life, and often risky behavior presents an opportunity for large societal gains.

"[...] teens gravitate toward peers for another, more powerful reason: to invest in the future rather than the past. We enter a world made by our parents. But we will live

most of our lives, and prosper (or not) in a world run and remade by our peers. Knowing, understanding, and building relationships with them bears critically on success. Socially savvy rats or monkeys, for instance, generally get the best nesting areas or territories, the most food and water, more allies, and more sex with better and fitter mates. And no species is more intricately and deeply social than humans are." (Dobbs, 2011)

In an fMRI study performed by researchers of Cornell and Stanford University it was found that tendency to engage in risky behavior was correlated with activity of the nucleus accumbens in the brain (Galvan, Hare, Voss, Glover & Casey, 2007). Children, adolescents and adults were studied. All age groups were found to have nucleus accumbens activity that was heightened in situations where they chose to take a risk, and dampened in situations where they chose to avoid risk taking behavior. The key difference between the age groups was in their processing of the situation. Children were hesitant to engage in an activity where they were made aware of detrimental possibilities, and in response their nucleus accumbens activity was dampened. Adults were less affected by the presentation of negative possibilities in the sense that their nucleus accumbens still was heightened in activity by the possibility of a positive outcome, yet they often still chose to avoid the risk taking behavior. The adolescent group was quite different, engaging more vigorously and frequently in the presented risky situation. Adolescents responded strongly to possible positive outcomes and showed a lot of motivation for immediate reward and much less hesitation at the possibility of long term consequence. This finding helps illustrate why high school age students are often more motivated by the possibility of short term social progression than the possibility of long

term negative effects. For example, a student who is considered a responsible individual may choose to drink and smoke to impress peers, with little concern for the long term health effects or the immediate danger of impaired behavior (Steinburg, 2007).

Researchers at NYU found that teenagers who participate in risky behavior are typically overestimating the dangers associated with the behavior. For example, one student estimated that the danger of a sexually active teen contracting HIV/AIDS was 60% (Steinburg, 2007). The real risk of heterosexual vaginal intercourse resulting in HIV/AIDS is less than one percent in the United States. The teenagers inflated perception of the associated risk did not lead to a cemented fear of the risk taking behavior though. This may have something to do with an inability to take the reality of the consequence seriously. If given the odds of a negative consequence a teenager is less likely to attach the emotional stimulus to the thought of the possibility. The sort of cringe effect that some experience when confronted the grim reality of a situation is less present. It is as if the teenage mind is more perfectly logical, more robotic. The numbers are on their side and therefore the behavior is not seen as risky.

The important thing to be taken away from this research is that teenage risk taking is not associated with inferior mental capacity or processing. Behavior that is viewed as negative in society is not excused in the teenage mind by a feeling of invulnerability or by an inability to accurately perceive the possibility of risk. Teenagers and adults have been found to be equally capable of processing the chance of a detrimental consequence associated with a behavior. It is common to accuse adolescents of believing themselves to be invincible or of not thinking things through, but this is not supported by any research

in the area of teenage risk taking.

The reasoning skills of adolescents are actually comparable with the reasoning skills of adults around the age of sixteen. However, the ability for an adolescent to control impulses and resist peer influence are still developing into adulthood. A study by Gardner and Steinberg tested subjects in their behavior during a car racing video game in both solitary and socially influenced situations. The older the subject was the less their behavior was affected by the presence of their peers. Adolescents were highly susceptible to an increase in risk taking when peer pressure was a factor, and the number of crashes that their driving resulted in more than doubled in the social situation. In comparison, adult subjects experienced no increase in the number of crashes during the social portion of the experiment.

There are three major aspects that come into play when discussing the reasons for teenage risk taking. First and foremost, there is a biological benefit to risk taking. Teenagers are at the point in their development where humans would have been motivated in the past to secure their social footing. This would include pack dominance, security with land and food, and even a mate. It is beneficial as children to be hesitant to engage in risk because we can ride on the social success of our parents. As children the main biological concern is avoiding an early demise. However, once humans are motivated to leave their parents it becomes extremely important that they secure a place for themselves in the social hierarchy. The more risks they take during this time the higher possible payout, and the rewards are very significant. Securing a good mate can lead to a strong continuation of the lineage, securing social dominance can lead to better

protection and provisions for the individual and eventual family. Although these issues may seem much less relevant in modern day society, they are still very much a part of our past and are engrained into our biology as a result.

The second and third aspects of this behavior are very much connected. During adolescence humans are learning the intricacies of the social world more significantly and more quickly than they ever will again. One of the most basic methods of learning is trial and error. Because of this the teenage mind is inclined to delve into the unknown, for in the unknown there is the most to be learned. There is a lot of appeal within an inquisitive mind for an opportunity with unknown consequences. The adolescent brain looks at the mystery as containing a lot of potential benefit and compared with the mature adult brain, the adolescent brain is more highly motivated by potential benefit. Not only is this the cognitive perception of risk taking, but the physiological state of the brain reflects this view. As children grow into adults the grey matter of the brain increases significantly. It is not until adulthood that this huge bulk of grey matter acquired throughout adolescence begins to be chipped away. The seeking behavior that is so strongly influential during the teenage years is key in the shaping of this grey matter later in life. Adolescents have not yet developed the default mental pathways that adults use in day-to-day behavioral processing. Their reactions to events and outside stimuli are completely novel, and must be processed individually and creatively before the adult brain can carve away at the grey matter, creating patterns and habits that are used to respond to stimuli more efficiently.

“The brain doesn't actually grow very much during this period. It has already reached 90 percent of its full size by the time a person is six, and a thickening skull

accounts for most head growth afterward. But as we move through adolescence, the brain undergoes extensive remodeling, resembling a network and wiring upgrade." (Dobbs, 2011)

The most significant physical change in the brain is not an increase in capability from adolescence to adulthood, but rather a refining of pathway taken by neurotransmitters in response to a stimulus. In an experiment conducted by B. Luna of the University of Pittsburgh, subjects of various ages were given a test that required them to direct their attention away from a randomly appearing flashing light on a screen (Dobbs, 2011). The test takes a lot of self control because the natural tendency is to direct attention towards such a stimulus. Children who were given the test performed very poorly, showing very little ability to control their natural impulse. However, adolescents as young as fifteen were able to perform the test with equal success to the adult subjects. Although teenagers are still much more susceptible to impulsive behavior than adults, it is not because they are incapable of self control but rather that they have not cemented the behavior that allows them to control impulses with less effort. Without any motivation the adolescent subjects performed the test more poorly than the adult subjects, but when a reward was offered they were able to focus on the impulse and dampen it, successfully directing their attention away from the stimulus. This shows that the adolescent mind is capable of more mature processing if it is focused and intent, but that there is still a fairly strong impulsive force at play.

The conclusion that has the potential to bring about the most growth in the

societal view of risky behavior is that it is not at odds with good academic habits or success in other aspects of life (Giedd, 2009). Students who excel in sports or academics are actually showing a continuation of their highly motivated seeking behavior when they engage is risk taking with peers. This new understanding of the development of the teenage brain and the stages necessary to reach adult maturity explain why the star athlete, the 4.0 student and the teenager with the bad driving record can often be the same person. The benefit in understanding these connections and similarities can aid parents and teachers greatly in spotting and diagnosing true psychological issues such as depression. A red flag is often raised by behavior that seems erratic, but it is important to be aware that erratic and risky are not always synonymous. Although the behavior can be quite scary and detrimental, a teenager who takes risks is most likely developing normally and healthily.

Another benefit of this understanding of the development of the teenage brain is in assessing which youth are most likely to be engaging in harmful behavior. A lot of focus and mistrust can be put on the students who seem to stick out as a danger not because they do well, but because they are reserved. This focus has the potential to be misdirected and misleading. Drug use and bad drinking habits are not necessarily characteristic of the students who do not fit in as well. Much of drug experimentation takes place in highly socially successful circles as a result of peer encouragement and pressure.

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