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PSYCHOLOGY OF IMPULSIVITY

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Chapter 1

MULTIPLE PERSONALITY DISPOSITIONS TO ENGAGE IN RASH, IMPULSIVE ACTION

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ABSTRACT

Impulsivity has played an important role in efforts to better understand many different forms of psychopathology. Various forms of impulsivity have been linked to numerous DSM-IV (Diagnostic and Statistical Manual for Mental Disorders-Fourth Edition; American Psychiatric Association, 1994) disorders, including borderline personality disorder, mania, attention-deficit hyperactivity disorder (ADHD), binge eating disorder, pathological gambling, and substance use disorders, in addition to the whole section on impulse-control disorders (e.g., intermittent explosive disorder, kleptomania, and pyromania). The DSM-IV describes the essential feature of impulse-control disorders as "the failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others." Thus, it is not surprising that impulsivity has been heavily researched by personality psychologists for many decades and that this research has proven quite successful: Perhaps the most central contributions to the study of impulsivity have been made by personality researchers. In this chapter, we consider some of those contributions. We begin the chapter by reviewing important advances in personality research on impulsivity, including different traits that contribute to impulsive behavior and how these can be measured in children and adolescents. We then describe different models of risk using these impulsivity traits and how these models can help us to better understand the psychological processes at play. Next, we conclude by exploring possible avenues of future research using these impulsivity-related theories.

The Heterogeneity of Personality Contributors to Impulsive Behavior

Over time, it has become increasingly clear to personality researchers that numerous different personality processes have been included under the broad "impulsivity" umbrella. Indeed, Depue and Collins (1999) noted that "impulsivity comprises a heterogeneous cluster of lower-order traits that includes terms such as impulsivity, sensation seeking, risk-taking, novelty seeking, boldness, adventuresomeness, boredom susceptibility, unreliability, and unorderliness" (p. 495). In the past, measures of impulsivity have been used that provide a single "impulsivity" score, despite the diversity of personality constructs included in such measures. It is likely that the use of the same term, impulsivity, to refer to many different trait constructs has slowed advances in understanding the personality underpinnings to impulsive or rash behaviors.

Empirical and Theoretical Advances in Identifying the Personality Dimensions Which Contribute to Impulsive Behavior

Over the past 10 years, several authors have investigated the heterogeneity of the personality underpinnings to impulsive behavior (Evenden, 1999; Eysenck & Eysenck, 1977; Petry, 1991; Whiteside & Lynam, 2001). The approach taken by Whiteside and Lynam (2001) has provided theoretically clear results and has proven generative of considerable new research in this area. They gathered 10 commonly used personality measures involving impulsivity and conducted a factor analysis of the items of those measures, which led to the identification of four dimensions underlying the set of measures: Sensation seeking (the tendency to seek out novel and thrilling experiences), lack of planning (the tendency to act without thinking), lack of perseverance (the inability to remain focused on a task), and urgency (the tendency to act rashly in response to distress, which is now referred to as negative urgency).

These four traits load onto different factors of the Five-Factor Model (FFM) of personality (Costa & McCrae, 1992). Lack of planning reflects low scores on the deliberation facet of conscientiousness, lack of perseverance reflects low scores on the self-discipline facet of conscientiousness (Whiteside & Lynam, 2001), sensation seeking reflects high scores on the excitement-seeking facet of extraversion (Whiteside & Lynam, 2001), and negative urgency reflects high scores on the impulsiveness facet of neuroticism, as well as low conscientiousness and low agreeableness (Cyders & Smith, 2008a; Seibert, Killer, Pryor, Reidy, & Zeichner, 2010). Whiteside and Lynam (2001) found intercorrelations among the four scales ranging from -.14 (between sensation seeking and lack of perseverance), through .00 (between sensation seeking and lack of planning), to a high of .45 (between pack of perseverance and lack of planning). The primary advantages of this work were that it identified a set of separate dimensions underlying the body of existing impulsivity measures and that those dimensions could be readily integrated with an existing, well-supported comprehensive model of personality, the five factor model.

Although these four dimensions summarized the content of existing measures, they did not include impulsive behavior when experiencing intensely positive emotional states.

Although positive affect is of course valuable in many ways (Isen, Niedenthal, & Cantor, 1992; Phillips, MacLean, & Allen, 2002), strong positive affect can also (a) interfere with one's orientation toward the pursuit of one's long-term goals, (b) increase one's distractibility, (c) make one more optimistic about the positive outcomes of a situation (Dreisbach & Goschke, 2004), (d) lead to less discriminative use of information (Forgas, 1992), and (e) lead to poorer decision making (Slovic, Finucane, Peters, & MacGregor, 2004). In short, intense positive affect can lead to behavior that is often described as impulsive. The omission of positive emotion-based impulsivity was addressed by Cyders, Smith, Spillane, Fischer, Annus, and Peterson (2007), who provided evidence for a fifth disposition towards rash action and called it positive urgency, or the tendency to act rashly when experiencing extremely positive emotion. They found that their measure of positive urgency was unidimensional, distinct from other impulsivity-related personality constructs, and explained variance in risky behavior not explained by those other constructs. Additionally, Cyders and Smith (2008a) found that positive urgency, like negative urgency, was associated with high neuroticism, low conscientiousness, and low agreeableness.

Structural analyses using this five trait model have produced findings of interest to personality and impulsivity researchers. Smith, Fischer, Cyders, Annus, Spillane, and McCarthy (2007) used confirmatory factor analysis to compare several different possible structures of four of the five traits (excluding positive urgency). They found that both a single factor model, reflecting the hypothesis that all the traits are expressions of a single impulsivity dimension, and a hierarchical model, in which impulsivity was represented as a superordinate factor, proved inadequate and fit the data poorly. The best-fitting model represented lack of premeditation and lack of perseverance as two separate facets of an overall low conscientiousness dimension, with both urgency and sensation seeking modeled as separate factors. In addition to these structural analyses, Smith et al. (2007) found good convergent validity in trait assessment across method of assessment and good discriminant validity between traits within method of assessment, using a multitrait, multimethod (MTMM) design.

Cyders and Smith (2007) then added positive urgency and provided evidence for the validity of the resulting five factors by conducting a MTMM study, using interview and questionnaire measures of the five impulsivity-like traits defined by Whiteside and Lynam (2001) and Cyders et al. (2007). They found good evidence for convergent validity for each of the five traits across assessment method, as well as good evidence for discriminant validity between traits within assessment method. Cyders and Smith (2007) also tested several hypotheses regarding the hierarchal structure of the five traits, yielding the following model under which the traits are best organized: (a) both positive and negative urgency as facets of one broad factor, urgency; (b) sensation seeking as its own trait; and, (c) lack of planning and lack of perseverance as facets of low conscientiousness.

This set of findings led Smith et al. (2007) to recommend researchers to refer to the specific personality trait of interest to them (whether lack of planning, sensation seeking, negative urgency, or some other trait) rather than the broad term "impulsivity." Perhaps the term "impulsivity" is instead best used to refer to behavior, rather than personality. In that spirit, in this chapter we do not refer to impulsivity as a personality trait; we refer to personality contributors to impulsive behavior. One measure of this set of five traits is called the UPPS-P (referring to negative urgency, planning, perseverance, sensation seeking, and positive urgency: Lynam, Smith, Cyders, Fischer, & Whiteside, 2007).

The Substantive Meaning of the Five Trait Dimensions

The Urgency Traits

Positive and negative urgency are understood to be emotion-based dispositions to engage in rash or impulsive action. Intense emotions, whether positive or negative, can interfere with rational, advantageous decision-making (Bechara, 2005; Dreisbach, 2006; Shiv, Loewenstein, & Bechara, 2005) and limit one's ability to maintain self-control (Tice & Bratslavsky, 2000; Tice, Bratslavsky, & Baumeister, 2001). Thus, it may not be surprising that when individuals are intensely emotional, they sometimes engage in behaviors that are rash, ill-considered, or maladaptive, in that they work against their long-term interests. Negative emotional states are associated with a greater frequency of many maladaptive, addictive behaviors, including alcohol and drug abuse (Colder & Chassin, 1997; Cooper, 1994; Cooper, Agocha, & Sheldon, 2000). For example, daily diary studies of alcohol use indicate that individuals drink more on days when they experience anxiety and stress (Swendson, Tennen, Carney, Affleck, Williard, & Hromi, 2000). Similarly, negative emotions are understood often to be triggers for binge eating and purging behavior (Haedt-Matt & Keel, 2011; Smyth, Heron, Sliwinski, Wonderlich, Crosby, Mitchell, et al., 2007).

Because decision-making and evaluation of the consequences of actions is impaired under intense emotional states, there is an increased likelihood of high, and hence maladaptive, levels of involvement in rash or ill-considered behaviors. For example, highly emotional individuals, whether unusually distressed or happy, are less likely to modulate their alcohol consumption. For this reason, positive and negative urgency are theorized to relate to problem levels of involvement in a variety of risky behaviors, including drinking, drug use, gambling, risky sexual behavior, and others (Cyders & Smith, 2008b).

Distinction Between the Urgency Traits and other Traits Related to Negative Affect/Affective Lability

Although the urgency traits load on the neuroticism domain of personality (Cyders & Smith, 2008a), it is important to distinguish between them and others of the lower-order traits within the neuroticism domain. Again using the NEO PI-R framework for the five factor model of personality, some neuroticism traits, such as trait anxiety and trait depression, are characterized primarily by negative emotionality and are highly associated with internalizing dysfunction (Costa & McCrae, 1992; Settles, Fischer, Cyders, Combs, Gunn, & Smith, in press). By contrast, high levels of the urgency traits combine high levels of neuroticism with low levels of conscientiousness and agreeableness and are thus thought to involve a personality process by which subjective distress leads to disagreeable rash action, or externalizing behaviors that disrupt the lives of others.

This hypothesized distinction between neuroticism traits that dispose individuals to internalizing dysfunction and those that dispose individuals to externalizing dysfunction (i.e., the urgency traits), has been validated empirically in adult, alcoholic women; in fifth grade boys and fifth grade girls; and in college students (Settles et al., in press). In the Settles et al. series of studies, negative urgency was associated with early onset of drinking in fifth graders, smoker status in fifth graders; aggression, risky sex, illegal drug use, drinking problems, and conduct disordered behavior in college students; and alcohol dependence diagnosis in adults. In contrast, high levels of other forms of neuroticism consistently predicted internalizing

dysfunction but did not predict any of the externalizing behaviors beyond prediction from negative urgency. Thus, when examining emotionality in relation to externalizing behaviors, or emotion-based dispositions to impulsive action, we recommend that researchers not rely on general measures of negative affectivity, subjective distress, or neuroticism. Instead, they should assess the urgency traits in order to assess that component of neuroticism, which is most relevant to externalizing or impulsive action.

Sensation Seeking

Sensation seeking is not understood to be an affect-based personality trait. Its correlation with overall neuroticism was .04 in the NEO PI-R standardization sample (Costa & McCrae, 1992) and it has low correlations with the urgency traits, typically sharing between 1% and 4% variance with those traits. Individuals high in sensation seeking are more likely to experiment with a variety of new, stimulating behaviors (Zuckerman, 1994). Thus, sensation seeking should be primarily associated with the frequency of thrilling or risky behaviors such as gambling, sexual activity, and drinking. But for high sensation seekers, judgment is more likely to be preserved because these behaviors are not primarily engaged in while experiencing intense affect. As a result, sensation seeking should be less predictive of excessive, and hence problem levels of involvement in risky behaviors.

Lack of Planning and Lack of Perseverance

Lack of planning is understood to refer to the tendency to act without forethought. Of course, limited cognitive mediation before action can lead to maladaptive drug use or other risky behaviors, but this trait does not operate primarily under heavy emotion, and so it tends not to involve disrupted reasoning or decision making to the same degree. As a result, there may be less excessive, problematic engagement in risky behaviors. Lack of perseverance refers to the inability to remain focused on a task; it is thought to be most relevant to impaired school or occupational functioning (Smith et al., 2007). As is true of lack of planning, it is not understood to operate only when one is experiencing intense emotions. The two traits typically share between 9% and 25% of their variance with overall neuroticism (Costa & McCrae, 1992). We next consider the different roles of each of these traits for risky behavior.

Correlates of the Five Impulsivity-Related Traits

Cross-Sectional Research

In cross-sectional studies considering most or all of the traits together, negative urgency has been found to relate to problem drinking and alcohol dependence (Anestis, Selby, & Joiner, 2007a, 2007b; Cyders et al., 2007; Fischer & Smith, 2008; Settles et al., in press; Smith et al., 2007); illegal drug use (Settles et al., in press); problem gambling (Fischer & Smith, 2008; Smith et al., 2007; Whiteside, Lynam, Miller, & Reynolds, 2005); binge eating (Anestis et al., 2007b; Cyders et al., 2007; Fischer, Anderson, & Smith, 2003; Fischer, Smith, Annus, & Hendricks. 2007; Fischer & Smith, 2008; Fischer, Smith, & Cyders, 2008; Smith et al., 2007); risky sex (Settles et al., in press); aggression, including intimate partner violence (Derefinko, DeWall, Metze, Walsh, & Lynam, 2011; Settles et al., in press); mobile phone dependency, such as excessive reliance on talking with friends by phone when distressed

(Billieux, Van der Linden, & Rochat, 2008); compulsive buying behavior (Billieux, Rochat, Rebetz, & Van der Linden, 2008); cigarette craving (Billieux, Van der Linden, & Ceschi, 2007), and excessive reassurance seeking (Anestis et al., 2007b). In addition, negative urgency correlates with a general measure of rash behavior undertaken while in an unusually negative mood (Cyders & Smith, 2010). Because negative urgency is viewed as the tendency to act rashly when distressed, this set of correlates, though referring to diverse behaviors, is consistent with urgency theory (Cyders & Smith, 2008a).

The recognition of the trait of positive urgency is more recent (Cyders et al., 2007), but a number of cross-sectional correlates of this trait have emerged as well. Positive urgency is associated with drinking quantity and problem drinking (Cyders, Flory, Rainer, & Smith, 2009; Settles, Cyders, & Smith, 2010); illegal drug use (Zapolski, Cyders, & Smith, 2009); risky sexual behavior (Zapolski et al., 2009); pathological gambling (Cyders & Smith, 2008b; Cyders et al., 2007); smoking (Spillane, Smith, & Kahler, 2010), and general rash acts undertaken while in a positive mood (Cyders & Smith, 2010). In a laboratory study in which positive mood state was manipulated, positive urgency predicted observed drinking quantity and gambling behavior while in a positive mood (Cyders, Zapolski, Combs, Settles, Fillmore, & Smith, 2010). Unlike negative urgency, positive urgency is unrelated to eating disorder diagnosis (Cyders et al., 2007).

Not surprisingly, positive and negative urgency are substantially correlated, with bivariate correlation estimates ranging from .39 to .71 across studies. There is some evidence that the traits have different correlates: Cyders and Smith (2010) found that negative urgency was uniquely associated with rash acts undertaken while in a negative mood, and positive urgency was uniquely associated with rash acts undertaken while in a positive mood. In addition, and consistent with theory, negative urgency differentiates eating disordered women from others, but positive urgency does not (Cyders et al., 2007). Nonetheless, the frequent occurrence of high correlations between the two traits indicates the need for further research to determine the degree to which they play different roles in the risky process.

Sensation seeking, when evaluating its predictive contribution beyond that of the other four traits, is consistently associated with the frequency of alcohol use, but not with problem drinking (Anestis, et al., 2007a; Cyders et al., 2007; Fischer & Smith, 2008; Miller, Flory, Lynam, & Leukefeld, 2003; Smith et al., 2007); and with the frequency of gambling, but not problem gambling (Cyders & Smith, 2008b; Fischer & Smith, 2008; Smith et al., 2007). The trait is also associated with risky behavior involvement, such as mountain climbing and bungee jumping (Cyders & Smith, 2008b; Fischer & Smith, 2004).

Lack of planning has been associated with school difficulties (Smith et al., 2007), engaging in risky behaviors likely to have a negative outcome (Fischer & Smith, 2004), delinquency (Settles et al., in press), risky sex (Zapolski et al., 2009), and, although less frequently, has sometimes been related to problem drinking and illegal drug use (Settles et al., in press; Zapolski et al., 2009). Lack of perseverance relates to school difficulties (Smith et al., 2007) and sometimes to illegal drug use (Zapolski et al., 2009).

Empirically, prediction from the individual traits is superior to prediction from aggregate traits in this domain. For example, Stice (2002) found that a global measure of "impulsivity" had an effect size of $r = .07$ in predicting eating pathology. Fischer, Smith and Cyders (2008) examined prediction of eating pathology using four of the individual five traits (all but positive urgency) and found a much larger effect size for negative urgency ($r = .38$) than for

any of the other traits (sensation seeking: $r = .16$; lack of planning: $r = .16$; lack of perseverance: $r = .08$). Similar findings have been observed for other addictive behaviors.

Longitudinal Research

We next consider longitudinal designs; in each case, the influence of a trait was evaluated above and beyond the influence of the other traits. In a sample of first-year college students, positive urgency predicted increased gambling behavior from the beginning to the end of the school year, but negative urgency did not (Cyders & Smith, 2008b). Positive urgency also predicted increased drinking problems across the first year of college (Cyders, Flory, Rainer, & Smith, 2009), and both traits predicted increased quantity of alcohol consumed across that period (Cyders et al., 2009; Settles, Cyders, & Smith, 2010); however, the two traits did not predict increased drinking frequency. Positive urgency predicted increased use of illegal drugs and increases in risky sexual behavior and increased positive mood-based risky behavior during the first year of college (Cyders & Smith, 2010; Zapolski et al., 2009). Negative urgency predicted increases in negative-mood based risky behavior across the same longitudinal period (Cyders & Smith, 2010). Negative urgency, in interaction with sexual assault exposure, predicted increases in eating disorder symptoms during college (Fischer, Stojek, & Collins, 2009), and increases in negative urgency across a 3-4 week period were associated with increases in bulimic symptomatology, drinking to cope, and excessive reassurance seeking (Anestis et al., 2007b).

Sensation seeking predicted increased risky behavior involvement (mountain climbing, bungee jumping, skateboarding, scuba diving, parasailing, and parachuting) across the first year of college (Cyders & Smith, 2008b). It also predicted increases in risky sexual behavior and increases in drinking frequency, but not quantity or problems, during college (Cyders et al., 2009; Zapolski et al., 2009). Lack of planning did not predict changes in any drug use or other risky behaviors across the first year of college, again net the influence of the other traits. However, lack of perseverance did predict increases in risky sexual behavior (Zapolski et al., 2009).

It thus appears that the traits predict changes in risky behaviors in ways consistent with theory. However, the research we have reviewed focused largely on college student samples; most often, members of these samples had already engaged in alcohol consumption or other risky behaviors prior to the period of the research. An important question not addressed by this research is the possible roles of these traits for the early onset of risky behaviors. This question is important for two reasons. The first concerns theoretical development of models of etiology: Which, if any, of these five traits contribute to the initial onset of alcohol use, drug use, and other risky behaviors? Or, alternatively, are the traits relevant only for the maintenance of risky behaviors over time? The second concerns application: Early onset of addictive behaviors is predictive of increased risk for the development of substance use problems over time (Anthony & Petronis, 1995; Wills, Sandy, & Yaeger, 2000), longer time periods of exposure to risk (Wills, Sandy, Yaeger, Cleary, & Shinar 2001), increased risk for STD's associated with alcohol use (DiClemente, Hansen, & Ponton, 1996), and reduced physical growth among girls who engage in early smoking behaviors (Stice & Martinez, 2005). We therefore next consider whether individuals differ on these traits in childhood, prior to the onset of risk behavior.

The Five Traits Measured in Childhood Predict the Subsequent Onset of Addictive Behaviors

There is increasing evidence that individual differences in personality, including the five personality domains from the comprehensive five factor model of personality, can be measured in children (Barbaranelli, Caprara, Rabasca, & Pastorelli, 2003; Markey, Markey, & Tinsley, 2004; Measelle, John, Ablow, Cowan, & Cowan 2005). The assessment of personality dispositions to rash action, which involves assessment of more specific, lower order traits rather than broad personality domains, requires an even more precise assessment of personality in children.

Zapolski, Stairs, Settles, Combs, and Smith (2008, 2010) found that measures of each trait were internally consistent, there was good convergent validity of assessment across measurement method, as well as good discriminant validity between traits within method. In addition, the traits concurrently predicted different behaviors in ways consistent with theory. For example, both positive and negative urgency predicted aggressive behavior; lack of perseverance predicted attentional problems; sensation seeking predicted risky behavior involvement; negative urgency predicted risky behavior involvement while in a negative mood; and positive urgency predicted risky behavior involvement while in a positive mood. Gunn and Smith (2010) confirmed the five trait structure in a sample of 1,843 5th grade children (ages 10 and 11). Consistent with college populations, positive urgency, negative urgency, and sensation seeking related to 5th grade drinker status, and negative urgency related to 5th grade binge eater and purger status (Combs, Pearson, & Smith, 2011; Gunn & Smith, 2010; Pearson, Combs, & Smith, 2010). A combination of positive and negative urgency related to 5th grade smoker status as well (Combs, Spillane, Caudill, Stark, & Smith, in press). Thus, the five trait structure appears to exist in pre-adolescent children, the traits can be measured reliably and using multiple methods, and they play concurrent predictive roles consistent with what has been observed in adults.

Longitudinal research has recently shown that positive urgency measured in 5th grade prospectively predicts the onset of, and increases in, drinking behavior across the transition into middle school (Settles & Smith, 2011). Negative urgency, again measured in elementary school, predicts the subsequent onset of and increases in binge eating behavior during the same transition (Pearson, Combs, Zapolski, & Smith, 2011). Smith and Zapolski (2011) found that a combination of lack of planning and lack of perseverance predicted smoking onset in boys across the middle school transition, and that those traits together with positive and negative urgency predicted smoking onset in girls across the same transition. Thus, it appears to be the case that most or all of the five traits predict the onset of different forms of risky behavior; this set of findings is consistent with the possibility that variation on these traits influences the likelihood of the early onset of addictive behaviors. We next turn to consideration of how this effect operates; that is, the mechanism by which a personality trait can increase the likelihood of drug use or other risky behavior involvement.

Acquired Preparedness: A Mechanism by which Personality Leads to Addictive Behavior

It is clear that particular personality traits may increase the likelihood of engagement in risky behaviors; thus, it is essential to identify possible mechanisms by which traits such as positive and negative urgency, lack of premeditation, lack of perseverance and sensation seeking influence the early onset of addictive behaviors. One possible mechanism is described by the Acquired Preparedness (AP) model. This theory is an extension of person-environment transaction theory (Caspi, 1993; Caspi & Roberts, 2001). Among the contribution of person-environment transaction theory is the recognition that individuals with different personality traits will respond differently to the same environmental event. The AP model extends that concept to hypothesize that, because individuals can respond differently to the same event, they can learn different things from the same event. Thus, psychosocial learning is not just a function of experience; rather, one's dispositional characteristics help shape one's learning experiences. One's learning, in turn, influences one's behavior. As a result, the influence of personality disposition on behavior is mediated by psychosocial learning.

The label "acquired preparedness" refers to the idea that individuals are differentially prepared to acquire certain learning experiences as a function of their personalities (Smith & Anderson, 2001). In a longitudinal, laboratory study, Smith, Williams, Cyders, and Kelley (2006) demonstrated this process. Individuals exposed to precisely the same learning, who experienced precisely the same outcomes from a common behavioral trial, nevertheless formed different expectancies from the experience; their different expectancies could be predicted by prior differences in their personalities (Smith et al., 2006).

There have now been a number of longitudinal studies testing the AP model. Among college students, Settles and colleagues (2010) found that positive urgency at the start of college predicted increased endorsement of expectancies for reinforcement from drinking, measured partway through the first year of college, which in turn predicted increases in the quantity of alcohol typically consumed by the end of that year. The relationship between initial positive urgency and quantity consumed at the end of year appears to have been mediated by positive alcohol expectancies. In the same study, the apparent influence of negative urgency at the start of college on typical drinking quantity at the end of the first year was mediated by the motive to drink to cope with distress. These findings are consistent with the AP model: Traits predicted changes in learning, which in turn predicted increases in addictive behavior.

Using a different personality representation of disinhibition and testing the AP process over a much longer time interval, Corbin, Iwamoto, and Fromme (2001) found that positive, but not negative, expectancies about alcohol partially mediated the influence of sensation seeking and lack of premeditation (measured during the summer before college entry) on alcohol use and related problems four years later (i.e., during the fourth year of college).

Support for the AP model has also been found from studies of early adolescence. Combs, Smith, Flory, Simmons, and Hill (2010) found that the apparent influence of the trait of ineffectiveness, measured during the first year of middle school, on eating disordered behavior two years later appears to have been mediated by learned expectancies that thinness leads to overgeneralized life improvement. Pearson et al. (2011) found that the predictive relationship between negative urgency, measured in 5th grade, and binge eating behavior one

year later appears to have been mediated by learned expectancies that eating helps alleviate negative affect. With respect to drinking behavior, Settles and Smith (2011) showed that the relationship between 5th grade positive urgency and 6th grade drinker status appears to have been mediated by expectancies that alcohol facilitates positive social experiences. The latter two studies may prove informative for efforts to understand the developmental processes underlying addictive behavior involvement. It may be that high-risk personality traits present before adolescence shape the psychosocial learning process in a way that heightens risk for early involvement in addictive behaviors. As is well known, early involvement in these risky behaviors is associated with ongoing difficulties and subsequent dysfunction. We next consider other models of impulsive personality and risk from the perspective of this research.

Relationships between the Five Trait Structure of the UPPS-P and other Models of Impulsive Personality

Gray: Reward Sensitivity Theory

Another prominent model of impulsive behavior that has developed from comprehensive models of personality is Gray's (1970) reward sensitivity theory, which was later updated by Gray and McNaughton (2000). This model describes three overall systems that drive motivated behavior: The Behavioral Approach System (BAS), the Behavioral Inhibition System (BIS), and the Flight-Fight-Freeze System (FFFS). The BAS is thought to be activated by signals of reward and non-punishment; its activation primarily results in approach or reward-seeking behavior. The FFFS system is thought to be responsive to all aversive stimuli, and its activation results in fear or panic. The BIS is understood to be responsible for the resolution of competing goals inspired by BAS and FFFS activation. In mixed incentive conditions, both reward and threat exist; thus, to evaluate such situations, the BIS involves increased arousal, risk assessment, and consideration of threat avoidance versus threat approach.

Individual differences in the strength of these systems seem to be present. High-BAS individuals tend to be sensitive to reward and tend to act to pursue reward; individuals with very high BAS activity appear to be so biased toward the pursuit of reward that they follow punishment with increased activity, as though they are pursuing reward even more aggressively (Avila, 2001; Patterson & Newman, 1993). Indeed, there is evidence that BAS activity inhibits reactivity to punishment (Avila & Parcet, 2002; Corr, 2002). When BAS activity is high and both BIS and FFFS activity are low, individuals are focused on the pursuit of reward and fail to consider possible punishments; this results in rash or impulsive behavior (McNaughton & Corr, 2004).

BIS, BAS, and FFFS can be understood as broad motivational systems that underlie individual differences in personality (Corr, 2001). A handful of studies have investigated how BIS and BAS relate to comprehensive models of personality and to traits identified as particularly relevant to rash or impulsive action (FFFS has taken on more prominence in the Gray & McNaughton, 2000, revision of the theory and individual differences in FFFS have, so far, been studied less extensively, but see Keiser & Ross, 2011). In studies relating these constructs to the five factor model of personality as measured by the NEO PI-R, BAS correlates with impulsiveness/negative urgency from the neuroticism domain, excitement

seeking/sensation seeking from the extraversion domain, and negatively with deliberation (analogous to positively with lack of planning) from the conscientiousness domain (Keiser & Ross, 2011; Mitchell, Kimbrel, Hundt, Cobb, Nelson-Gray, & Lootens, 2007). This finding is consistent with the view that BAS reflects a broad motivational dimension involving several different personality traits shown to relate to rash action.

Some measures of individual differences in BAS identify specific subscales. Carver and White (1994) developed a measure that includes the three subscales of reward responsiveness, drive for reward, and fun seeking. They felt that the particular dimension of reward sensitivity that would prove most central was not yet clear in the literature, so they represented each of these three dimensions in their measure. We found no studies that factor analyzed the three Carver and White (1994) scales with the 30 facets of the NEO PI-R; to the degree that overall BAS scores reflect combinations of different traits, results with overall BAS scores may not apply to the lower order dimensions measured by Carver and White.

BIS appears to be similarly broad: It relates highly to anxiety, depression, self-consciousness, and vulnerability from neuroticism, negatively to assertiveness from extraversion, negatively to openness to actions from the openness domain, positively to trust from agreeableness, and positively to deliberation from conscientiousness (Keiser & Ross, 2011: these correlations are similar, but not in full agreement, with those reported by Mitchell et al., 2007). Thus, measures of individual differences in BIS appear to reflect variation along several different traits related to internalizing dysfunction (Settles et al., in press).

Wills: Behavioral and Emotional Regulation

Wills and his colleagues (e.g., Wills, Pokhrel, Morehouse, & Fenster, 2011; Wills, Walker, Mendoza, & Ainette, 2006) have provided extensive validation of a risk model that includes impulsivity as one component. In the most recent version of their model (Wills et al., 2011), they understand risk to be a function of good behavioral self-control, poor behavioral regulation, good emotional self-control, and poor emotional regulation. We understand the constructs they use to measure poor behavioral regulation and poor emotional regulation to relate closely to the existing literature on personality contributors to impulsive action, and we next explain the links between the Wills model and personality impulsivity research. Following that, we return to their focus on good emotional and behavioral self-control and the theory underlying the inclusion of these positive processes with the negative processes.

Although Wills and colleagues have measured their constructs a bit differently in various studies, their most recent assessment of poor behavioral regulation includes three constructs: Distractibility ("I am easily distracted from my school work"), what they call impulsiveness ("I often do things without stopping to think"), and immediate gratification ("I tend to spend my money as soon as I get it"). The first of these constructs appears analogous to lack of perseverance and the second to lack of planning: Two constructs identified in personality-impulsivity research as representing facets of low conscientiousness. The third, preference for immediate gratification, has been hypothesized to relate to lack of perseverance (Dick, Smith, Olausson, Mitchell, Leeman, O'Malley, & Sher, 2010). This hypothesis was supported by a recent meta-analysis, which found that it did relate to lack of perseverance (there was also a relationship to sensation seeking), but did not relate to others of the five traits (Cyders & Coskunpinar, in press). Thus, it appears that Wills' poor behavioral regulation consists primarily of traits related to two of the five traits, those related to low conscientiousness.

Wills et al.'s (2011) measurement of poor emotional regulation included these constructs: Affective lability ("One minute I can be OK and the next minute I can be tense and nervous"), angerability ("When I have a problem I blame and criticize other people"), anger rumination ("I often find myself thinking about things that have made me angry"), and sadness rumination ("I often find myself thinking about things that have made me sad"). These constructs appear to reflect components of neuroticism/emotional lability, but do not appear to include content referencing a tendency to act when distressed, as is represented in negative urgency. Accordingly, the constructs in this domain may not fully represent an emotion-based disposition toward rash behavior; the urgency traits do not appear to be represented in the Wills model. As is typically true of studies using measures of negative affectivity, poor emotional regulation does correlate with substance use (Wills et al., 2011). However, given the Settles et al. (in press) finding that such measures tend not to correlate with substance use when the urgency traits are included, this component of the Wills model might benefit from the inclusion of negative and positive urgency.

In examining how these personality traits relate to adaptive or maladaptive functioning, Wills et al. (2011) measured good emotional self-control and good behavioral regulation separately from their measures of poor emotional self-control and poor behavioral regulation. Good emotional control in Wills et al. (2011) included soothability ("I can easily calm down when I am excited or wound up"), sadness management ("When I am feeling sad or down, I can control my sadness and carry on with things"), and anger management ("When I am angry or upset I stay calm and keep my cool"); good behavioral self-control included planfulness ("I like to plan things ahead of time"), future time perspective ("Thinking about the future is pleasant for me"), problem solving ("When I have a problem I think about the choices before I do anything"), and delay of gratification ("I can do boring work if I think it will pay off later on").

In support of the value of measuring good and poor self-control separately, Wills et al. (2011) found that good and poor emotional self-control interacted: Poor emotional control was associated with impaired control problems more strongly for those low on good emotional self-control. Similarly, poor behavioral regulation predicted impaired control problems more strongly for those low on good behavioral regulation skills. Though this study was cross-sectional, Wills, Ainette, Stoolmiller, Gibbsons, and Shiner (2008) did find that good self-control (in this study, a combination of the emotional and behavioral) reduced the effect of negative life events on subsequent substance use. These findings are consistent with research on adaptive and maladaptive coping styles: Adaptive coping appears to be inversely related to substance use, and maladaptive coping positively related to substance use over time (Wills et al., 2001). To the degree there is overlap between coping styles and emotional and behavioral self-control, this finding may provide further support for the Wills et al. (2011) perspective.

It may well be that good emotional and behavioral self-control are not the same thing as low levels of poor emotional and behavioral self-control. One of the most effective treatments for disorders characterized by emotion driven rash action, such as borderline personality disorder, is dialectical behavior therapy (Linehan, 1993). A characteristic of that and similar treatments is to teach individuals how to manage their intense affective states without engaging in immediately gratifying, but harmful, actions. Individuals are taught to adjust their emotional reactions by considering the context, learning to experience emotions without acting, and learning to adjust reactions through relaxation, prayer, and other soothing

activities. Other relevant skills include learning adaptive alternative behaviors in response to events that trigger strong emotions, and learning to evaluate behavioral choices in terms of one's long-term goals. These types of interventions have proven effective for drug abuse, alcohol abuse, and eating disorders (Clyne & Blampied, 2004; Linehan, Dimeff, & Koerner, 2007; Robins & Chapman, 2004).

Possibly, this form of treatment does not necessarily change clients' characteristic, intense affective response style; rather it provides behavioral skills to clients, so that through reflection and effort, they can employ those skills to manage their intense affective reactivity. If so, then many individuals who have undergone such treatment might still describe themselves as high on a trait like negative urgency, but they may also describe themselves as having behavioral skills to manage that aspect of their personality. Perhaps an accurate description of such individuals would be that they have propensities for both poor and good emotional self-control. Whether this is the case, or it is instead true that this type of treatment does reduce urgency levels and so alter personality, is not yet clear.

We consider the value of separate measurements of good and poor self-control to be intriguing, yet also unresolved. The Wills et al. work is quite promising, but in their measurement of impulsivity-related traits, they did not include negative urgency, positive urgency, or sensation seeking; those are the three traits shown to be most predictive of risky behavior longitudinally, even while controlling for those traits that were included in the Wills et al. research (lack of perseverance and lack of planning). It is possible that low levels of the urgency traits, which would denote little tendency to act in ill-advised ways when emotional, reflect the same psychological process as that indexed by measures of good self-control. There is a need for further research to address these competing possibilities.

We have considered evidence for a model that includes five traits related to rash action or impulsive behavior and reviewed the relationships between other impulsivity models and those five traits. Most current models do not include all five traits; typically, they represent some, but not all, of the personality contributors to rash action.

Summary and Conclusion

There have been recent important advances in understanding the personality contributions to impulsive or rash behavior. Following the recognition that there is no single personality trait of impulsivity, numerous investigators have explored the ways in which these personality traits play a role in impulsive behavior. One of the most promising efforts was that by Whiteside and Lynam (2001), who identified four traits that summarized the many dimensions represented in existing measures of impulsivity. Cyders et al. (2007) identified a fifth trait, and the five traits are positive and negative urgency, sensation seeking, lack of planning, and lack of perseverance. We view this five trait model as important because (a) impulsivity personality work can be integrated with the basic science field of personality as each of the five traits can be understood within the framework of comprehensive models of personality; (b) each of the five traits predicts different involvement in risky behaviors; and (c) existing measures of impulsivity-related traits can be understood within the five trait framework: Most measures represent one or two of the five traits.

In both children and adults, measures of the five traits converge across assessment method and there is good discriminant validity between the traits within assessment method. The five traits are not facets of an overall impulsivity dimension; rather, they are only modestly related to each other. The traits account for different aspects of rash, risky behavior both cross-sectionally and longitudinally. The urgency traits predict problem levels of involvement in risky behaviors and sensation seeking predicts the frequency of engagement in such behaviors. Individual differences in the traits when measured in childhood predict the onset of a number of risky or impulsive behaviors across transition into adolescence.

Two of the traits, positive and negative urgency, reflect emotion-based dispositions to rash action. These two emotion-based traits have proven useful for understanding dispositions toward impulsive behavior through the AP model. In particular, these traits may operate by biasing the learning process, such that the high-risk traits make high-risk learning more likely, thus leading to maladaptive behavior. It also seems that inclusion of these emotion-based traits in other risk models would strengthen and perhaps better capture the psychological processes at play that put individuals at risk for engaging in risky behaviors.

The research we have reviewed here suggests several future research directions. First, what additional personality traits are relevant to rash, impulsive behavior? Second, there is a need for further developed theory concerning how personality measures relate to laboratory tasks thought to assess impulsive behavior. According to a qualitative review (Dick et al., 2010) and a meta-analysis (Cyders & Coskunpinar, in press), different personality traits appears to relate to different laboratory tasks; for example, negative urgency, lack of planning, and lack of perseverance correlated with tasks thought to reflect prepotent response inhibition, whereas sensation seeking related to tasks thought to reflect delayed response. However, in each case, the effect sizes were small. Validation research, considering issues such as construct representation (the degree to which variation on a task reflects variation on the underlying construct) (Embretson, 1998; Strauss & Smith, 2009) and construct validity of self-report measures (Cronbach & Meehl, 1955; Smith, 2005; Strauss & Smith, 2009), can play a useful role in this line of investigation. There is also a need for systematic investigation of the possible differential effectiveness of different treatments for addictive behaviors as a function of variation in personality: Do particular interventions function in meaningfully, reliably different ways for different clients? Additionally, research is needed to test the process by which traits may facilitate the development of diagnosable disorders (i.e., bulimia nervosa) from initial engagement in risky behaviors (i.e., binge eating and purging).

This is an exciting time to study how personality contributes to rash, impulsive action. The numerous advances in recent years have shed new light on this topic; at the same time, they have raised as many new research questions as they have provided answers.

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Chapter 2

BRAIN WAVES IN IMPULSIVITY SPECTRUM DISORDERS

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ABSTRACT

Impulsivity has proven to be an important psychological construct reflected in both normal and pathological human behaviors and traits. However, the definition, measurement, and manifestations of the construct are varied and multifarious. Impulsive behaviors are observed in a wide range of psychiatric/behavioral disorders, including alcohol/substance use and abuse disorders (AUDs/SUDs), conduct disorder (CD), attention-deficit hyperactivity disorder (ADHD), antisocial (ASPD), narcissistic and borderline personality (BPD) disorders, pathological gambling, and eating disorders, and are variously termed as 'impulsive' or 'impulse-control', 'externalizing', or 'disinhibitory' disorders. Studies utilizing sensitive and non-invasive electrophysiological techniques to analyze brain waves in impulsive conditions and disorders have elucidated brain functioning associated with these conditions. These electrophysiological procedures primarily include electroencephalogram (EEG), event-related potentials (ERPs), and event-related oscillations (EROs). Major electrophysiological findings across the majority of the 'impulsivity spectrum disorders' include excessive beta power in the resting EEG, decreased P3 amplitude of the ERP, and decreased ERO delta and theta power. This chapter attempts to summarize, explain and synthesize key findings of studies that have used electrophysiological methods to elucidate and understand impulsivity in its normal and pathological manifestations.

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