

2013

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Recommended Citation

Lafreniere, Kathryn; Menna, Rosanne; and Cramer, Kenneth M.. (2013). Rebelliousness, Effortful Control, and Risky Behavior: Metamotivational and Temperamental Predictors of Risk-Taking in Older Adolescents. *Journal of Motivation, Emotion, and Personality*, 1, 17-26.

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Rebelliousness, Effortful Control, and Risky Behavior: Metamotivational and Temperamental Predictors of Risk-Taking in Older Adolescents

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Adolescence is frequently regarded as a time of increased vulnerability to engaging in risky behaviors such as binge drinking, unsafe sexual activities, and illicit drug use. The present study examined risk perception and risk-taking behavior in older adolescents from two different perspectives, by examining temperamental and metamotivational predictors of likelihood of engaging in risky activities. A sample of 76 undergraduate students aged 17 to 19 years completed a questionnaire package that included the Motivational Style Profile, Rebelliousness Questionnaire, the short form of the Adult Temperament Questionnaire, and the expected risk and expected involvement subscales of the Cognitive Appraisal of Risky Events. Findings indicated that rebelliousness and effortful control (i.e., ability to appropriately regulate attention and behavior) were strong predictors of expected involvement in risky behaviors, and that proactive rebelliousness was a particularly influential predictor of illicit drug use, risky sexual activities, aggressive and illegal behaviors, and risky academic and work behaviors. In addition, a number of significant correlations between temperamental variables and metamotivational dominance were observed, lending empirical support to reversal theory's metamotivational constructs and their measurement.

Keywords: adolescence, rebelliousness, effortful control, temperament, metamotivational dominance

Adolescence is often characterized as a time of increased vulnerability to engaging in risky behaviors such as binge drinking, unsafe sexual activities, and substance abuse. Significant changes in social, emotional, cognitive and physical development, seeking pleasure from high-intensity experiences, and feelings of invulnerability have commonly been identified as hallmarks of the adolescent period (e.g., Ravert et al., 2009). Not all adolescents engage in risky activities to the same degree, however, and a number of different theoretical and methodological approaches have been applied to the study of individual differences in adolescent risk-taking behavior. The present study examined risk-taking behavior in late adolescence from two different perspectives, by examining temperamental and metamotivational predictors of likelihood of engaging in risky activities.

Temperament and Adolescent Problem Behavior

Approaches to personality that are based on temperament focus on constitutional factors that influence developmen-

tal processes, linking individual differences that are seen in early childhood to those that are later expressed in adulthood (Rothbart, Ahadi, & Evans, 2000). Temperamental constructs are seen as biologically based, and include individual differences in emotional reactivity and attentional processes (Evans & Rothbart, 2007). A number of different theoretical approaches have been advanced to describe the basic dimensions of temperament. One of the most influential theories of temperament is Gray's (1987) biopsychological theory. According to Gray, behavior is governed by three biologically-based systems, a behavioral activation system (BAS), a behavioral inhibition system (BIS), and a fight/flight system (FFS) that responds in an unconditioned way to imminent danger or threat. The BAS is influenced by reward, and includes appetitive and aggressive behaviors, whereas the BIS responds to conditioned signals for punishment, and governs the inhibition of behavior (Jorm et al., 1999; Oldehinkel, Hartman, de Winter, Veenstra, & Hormel, 2004). Most research based on Gray's theory has focused on the BIS/BAS distinction, with particular focus on under- and over-activation of these two systems and the implications for personality functioning.

Although the BIS/BAS approach has been useful in encompassing basic dimensions of temperament, Oldehinkel et al. (2004) noted that measures based on BIS and BAS sys-

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tems seem to relate to the probable direction of psychological problems, but are limited in their ability to specify absolute probabilities of the occurrence of psychopathological outcomes. They advocate the use of a more complex multidimensional representation of temperament based on the model of Rothbart and her colleagues (2000). Rothbart's model is based on individual differences in reactivity (i.e., behavioral and physiological responsivity and arousability) and self-regulation (i.e., neural and behavioral processes that act to modulate reactivity). Rothbart and her colleagues have developed instruments to measure temperament across the lifespan, based on four overall temperamental factors: *negative affect*, which includes fear, sadness, discomfort and frustration; *extraversion/surgency*, which is derived from sociability, positive affect, and high intensity pleasure; *orienting sensitivity*, which includes neural and affective perceptual sensitivity; and *effortful control* (Rothbart et al., 2000). Effortful control is comprised of three sub-constructs: *attentional control*, which refers to the capacity to focus and shift attention appropriately; *inhibitory control*, or the ability to suppress inappropriate responses, and *activation control*, or being able to perform an action despite a strong tendency to avoid it. The present investigation employed Rothbart's model of temperament, with a particular focus on effortful control and its sub-constructs.

A number of investigators have reported relationships between temperamental constructs and problem behaviors in children and adolescents. For example, Eisenberg et al. (2001) examined relations between the temperamental dimensions of regulation and emotionality and children's internalizing and externalizing behavior, using the Child Behavior Checklist (CBCL; Achenbach, 1991) and the Children's Behavior Questionnaire (Rothbart, Ahadi, Hershey, & Fisher, 2001). Their findings indicated that internalizing and externalizing problems showed distinct patterns of relations with the temperamental variables, with children who were classified as having internalizing problems scoring higher on sadness and lower on attentional regulation and impulsivity, while children with externalizing problems were higher on anger and impulsivity, and low on effortful control regulation. In a sample of 2,230 Dutch preadolescent school children, Oldehinkel et al. (2004) examined relationships between internalizing and externalizing problems, as measured by the CBCL and a measure of early adolescent temperament based on Rothbart's (2000) model. They found that fear tended to be related to internalizing problems, and that low effortful control was related to externalizing problems. Muris (2006) found an interactive effect of neuroticism and effortful control in predicting psychopathology in a non-clinical adolescent sample, in which youth characterized by high neuroticism and low effortful control showed the greatest levels of psychopathological symptoms. Valiente et al. (2003) also found that effortful control was strongly related to ex-

ternalizing problem behaviors in a longitudinal sample of 199 primary school children assessed three times over a 6-year period. They found that effortful control was negatively related to externalizing problem behaviors at all three time periods. In a study that measured both BIS/BAS and attentional control in a non-clinical sample of 1,806 adolescents, Sportel, Nauta, de Hullu, de Jong, and Hartman (2011) found that high levels of behavioral inhibition and low levels of attentional control combined to predict higher levels of internalizing problems, with behavioral inhibition being more strongly associated with anxiety symptoms, while low attentional control was more strongly related to depressive symptoms. Taken together, findings of these studies highlight the importance of effortful control and its sub-constructs as predictors of adolescent psychopathology.

Relations between temperament and adolescent risk-taking have been examined in a number of studies. For example, in a longitudinal study that assessed a sample of aggressive boys at yearly intervals across a 3-year period, Pardini, Lochman, and Wells (2004) found that higher levels of depressed mood and anger, and decreased fearfulness increased the risk of early alcohol initiation, but that good inhibitory control moderated this relationship for the specific emotions of anger and low fearfulness, but not for depressed mood. Willem et al. (2011) examined temperamental differences in a case-control study, using measures of BIS/BAS and Rothbart's (2000) Adult Temperament Questionnaire. They compared a group of adolescents who were clinically referred for substance abuse or dependence with a matched control group of adolescents, and found that the clinical group was characterized by lower levels of effortful control and positive affect, and higher levels of sadness, as compared to the control group.

Reversal Theory and Rebelliousness

Reversal theory is concerned primarily with how we experience motivation and how this influences our behavior and experience (Apter, 1982). The theory suggests that people fluctuate between different motivational states, or "metamotivational modes", that are opposite to each other. Four main pairs of metamotivational modes are posited by reversal theory. The *telic/paratelic* modes involve the relationship between means and ends, wherein the telic state is more goal-directed, and the paratelic state is more oriented towards immediate enjoyment of a present activity. The *negativistic/conformist* modes refer to opposing the rules or tacit requirements of one's present context, or going along with the rules. The *mastery/sympathy* modes concern exerting control over situations, people, or things, versus wanting sympathy, attention, or closeness. Finally, the *autic/alloic* modes refer to directing one's attention and efforts towards oneself (autic) or toward other people (alloic). The autic and alloic modes are frequently considered in relation to other mode pairs, and

in particular to the mastery/sympathy modes. Thus, an individual who is in an autic mastery state will want to feel a personal sense of power and control, while someone in an alloic mastery state will want to experience a collective or vicarious sense of power and control, as in the case of identifying with a winning sports team (Apter, 2007; Apter, Mallows, & Williams, 1998).

In the present study, the construct of negativism dominance or "rebelliousness" is of particular interest, due to its presumed connection with adolescent risk-taking behavior. Rebelliousness in reversal theory has been measured as negativism dominance based on the negativism and conformity subscales of large omnibus measures such as the Motivational Style Profile (Apter et al., 1998), and by a separate Rebelliousness Questionnaire (McDermott, 1988). The Rebelliousness Questionnaire measures two sub-components of rebelliousness: *Proactive rebelliousness* is conceptualized as rebelliousness that is gratuitous and directed toward achieving fun and excitement, while *reactive rebelliousness* is characterized by vindictive responses to provocation, disappointment, or frustration. McDermott's (1988) conceptualization is particularly relevant in the present investigation, in that different temperamental patterns may underlie proactive and reactive rebelliousness.

Reversal Theory and Risk-Taking

Perception of health risks has been investigated in a number of investigations guided by reversal theory. For example, in a study of 113 UK undergraduate psychology students, Boddington & McDermott (2012) found that proactive negativism and low autic mastery significantly predicted resistance to messages about the perceived risks of cannabis use. Lafreniere, Cramer, & Out (2005) examined the relationship between telic dominance and perception of health risks in an experimental study in which student participants were presented with health scenarios that varied in terms of the probability and the latency of particular health risks (e.g., contracting a sexually transmitted infection from unprotected sex, getting Type II diabetes from a sedentary lifestyle and poor diet). Although telic dominance did not interact with the experimental conditions, telic dominant individuals showed greater overall concern about the health risks and greater intention to take actions to avoid them.

Other reversal theory investigations have examined metamotivational states and dominance in relation to risk-taking behavior. For example, in a study of heterosexual risk behavior, Gerkovich (1998) found that paratelic dominant college student participants were more likely than those who were telic dominant to report having had sex with a casual partner, more likely to engage in drinking and illicit drug use, and more likely to report illicit drug use in conjunction with sexual behavior. Telic dominant participants had greater intentions to discuss and use condoms with future sexual partners,

as compared to those who were paratelic dominant. Anderson and Brown (1987) found that regular gamblers tended to be more paratelic than the normative population, and their findings suggested that paratelic dominant people who are in the paratelic state when they gamble are likely to place larger bets in order to increase arousal. A number of studies have shown that athletes who take part in riskier sports tend to be more paratelic dominant than those who choose low-risk sporting activities (Kerr, 2001). In very large samples of Dutch older adults, Klabbbers et al. (2009) found that individuals who were high in rebelliousness were more likely to engage in risky health behaviors, including heavier smoking and alcohol consumption. Across reversal theory studies, paratelic dominance and negativism appear to be predictive of a greater propensity to engage in risky behaviors.

The Present Study

The primary aim of the present investigation was to examine reversal theory's metamotivational dominance constructs (especially telic dominance and negativism dominance) in relation to temperamental constructs (particularly effortful control) in predicting adolescent risk perception and likely involvement in risky behavior. A secondary aim was to examine interrelationships among metamotivational constructs and dimensions of adolescent temperament.

Hypotheses:

1. It was predicted that telic dominance would be positively associated with the perception that illicit drug use, heavy drinking, aggressive behaviors, risky sexual activities, high risk sports, and negative academic and work behaviors are risky behaviors.
2. Negativism dominance was hypothesized to be positively associated with expected involvement in all of the risky behaviors measured (illicit drug use, heavy drinking, aggressive behaviors, risky sexual activities, high risk sports, and negative academic and work behaviors).
3. It was predicted that inhibitory control would be negatively associated with likelihood of involvement with illicit drug use, heavy drinking, aggressive behaviors, and risky sexual activities.
4. All aspects of effortful control (attentional control, inhibitory control, and activation control) were expected to be negatively associated with likely engagement in negative academic and work behaviors.

Method

Participants and Recruitment

The sample consisted of 76 undergraduate students, aged 17 to 19 years old ($M = 18.62$). Nineteen of the participants were male (25%), while the remaining 57 participants (75%) were female. The majority of the sample reported their ethnic

background to be Caucasian/European (63.2%), followed by South Asian (11.8%), Middle Eastern (9.2%), African Canadian/West Indian (9.2%), with 5.3% reporting "other" ethnicities, including biracial and unspecified responses. Students were recruited through the Psychology Department participant pool at the University of Windsor, and represented a variety of academic majors. Participation was in exchange for one experimental bonus point towards a Psychology course of their choice.

Procedure and Measures

Once informed consent was obtained, participants completed the questionnaire in small groups of four to eight students in research rooms in the Psychology Department. The entire session took approximately 35 to 40 minutes, on average.

In addition to basic demographic questions, the questionnaire included the following measures:

Motivational Style Profile. The MSP (Apter et al., 1998) consists of 70 items that are measured on a 6-point Likert-type scale with descriptors that range from "never" to "always". This instrument allows for the measurement of all of the metamotivational mode-pairs that are posited by reversal theory (telic/paratelic, negativistic/conformist, autic/alloic, and mastery/sympathy). A dominance score is derived for each of these pairs of modes by subtracting the score for the second mode within a pair from the first (e.g., telic dominance is derived from the telic score minus the paratelic score). In addition, and consistent with previous reversal theory approaches (e.g., Apter & Desselles, 2001, Apter, 2007), the autic/alloic pair was examined in combination with the mastery/sympathy pair, so that scores for autic mastery dominance and alloic mastery dominance were obtained. Autic mastery dominance scores were derived from subtracting scores on autic sympathy from autic mastery, and represented a dominant tendency towards self-oriented mastery. Alloic mastery scores were derived from subtracting scores on alloic sympathy from alloic mastery, and represented a dominant tendency towards other-oriented mastery (i.e., a collective or vicarious sense of power and control). The internal consistency reliability of the subscales of the MSP has been shown to be adequate (i.e., Cronbach's $\alpha > .60$) in many previous investigations, although some previous research has reported lower internal consistency for the conformist subscale (e.g., Lafreniere & Cramer, 2006).

Rebelliousness Questionnaire. Since the concept of rebelliousness was central to the present investigation, the Rebelliousness Questionnaire (RQ, formerly known as the "Negativism Dominance Scale"; McDermott, 1988) was used as an additional measure of negativism dominance. The RQ consists of 18 items with a forced-choice response format, and is administered using the neutral title "Social Reactivity Scale" (Klabbers et al., 2009). This measure is com-

prised of two 7-item subscales and four filler items. *Proactive rebelliousness* measures the tendency to engage in negativistic behaviors for fun and excitement, and *reactive rebelliousness* assesses the tendency to commit unpremeditated acts in response to frustration and perceived affronts. Previous research has provided some evidence of the construct validity of the RQ, and its subscales have shown moderate internal consistency (Klabbers et al., 2009).

Cognitive Appraisal of Risky Events. The Cognitive Appraisal of Risky Events (CARE; Fromme, Katz, & Rivet, 1997) was used to measure risk perception and expected involvement in risky behaviors. The CARE consists of 30 items measured on a 7-point Likert-type scale (from "not at all likely" to "extremely likely") that assess six types of risky behaviors: illicit drug use, aggressive/illegal behavior, risky sexual activities, heavy drinking, high risk sports, and risky academic/work behaviors. The original measure had participants rate their expected risk (i.e., expectation that the activity would lead to negative consequences), expected benefit, and expected involvement in each activity across the next six months. For the present study, participants were only asked to assess expected risk and expected involvement for each activity. Evidence of the strong internal consistency of the measure and its subscales was found in the standardization sample (Fromme et al., 1997) and in subsequent research (e.g., Kelly et al., 2005).

Adult Temperament Questionnaire. The short form of the Adult Temperament Questionnaire (ATQ; Rothbart et al., 2000) was used to measure temperamental dispositions in the present investigation. This instrument consists of 77 items measured on a 7-point Likert-type scale, with response options ranging from "extremely untrue of you" to "extremely true of you". The ATQ is used to assess four general temperamental factors (effortful control, negative affect, extraversion/surgency, and orienting sensitivity). Within each of these four general factors, a number of subscales measure sub-constructs of the general factor. The factor of greatest interest in the present investigation was that of effortful control, and this factor is made up of subscales that measure attentional control (ability to appropriately focus or shift attention), inhibitory control (ability to suppress inappropriate behavior), and activation control (being able to perform an action despite wanting to avoid it). Previous research has shown strong evidence of the internal consistency reliability and convergent validity of ATQ factors and subscales (Evans & Rothbart, 2007), and the measure has been used successfully in previous adolescent samples (e.g., Sportel et al., 2011).

Results

Data Considerations

The data contained few missing values, with less than 4% missing values for any of the items. Missing data were

found to be missing completely at random [Little’s MCAR test $\chi^2(6199) = .000, p = 1.00$], and were handled through imputing the scale mean for the missing items, unless the missing data for a respondent exceeded 20% of the items on a particular scale, in which case, listwise deletion was used. No significant degree of skewness or kurtosis was observed for any of the variables. Most scales and subscales showed adequate internal consistency reliability, with Cronbach’s alpha coefficients ranging from .63 to .94, as shown in Table 1. The only exceptions were the MSP subscales for Conformity and Autic Mastery, but calculation of dominance scores involved combining these subscales with subscales assessing Negativism, and Autic Sympathy, respectively, both of which showed adequate internal consistency. The Reactive Rebelliousness subscale of the Rebelliousness Questionnaire also showed lower internal consistency, but was retained for subsequent analyses.

Bivariate correlations among all scale measures were examined. Of particular interest were the correlations between CARE risk perception and expected involvement subscales and the measures of metatmotivational dominance and temperament. Based on the correlational analyses, predictors of expected involvement in risky behaviors were identified and entered into multiple regression analyses with CARE subscales as the outcome variables.

Perception of Risks

Bivariate correlations were examined to identify correlates of the perception that each particular risky behavior would be likely to result in a negative consequence, and relatively few of the temperamental or metamotivational constructs were found to significantly relate to risk perception. Attentional control, or the ability to appropriately focus or shift attention, was positively related to perceiving negative consequences for aggressive and illegal behaviors, $r(73) = .27, p = .021$, risky sexual activities, $r(74) = .30, p = .008$, risky academic and work behaviors, $r(74) = .27, p = .020$, and illicit drug use, $r(74) = .36, p = .001$. Perception of illicit drug use as risky was also positively associated with effortful control, $r(74) = .26, p = .024$, and autic mastery dominance, $r(74) = .24, p = .033$. Perception of heavy drinking as risky was positively correlated with both MSP negativism dominance, $r(74) = .27, p = .017$, and proactive rebelliousness, $r(74) = .28, p = .015$. None of the temperamental or metamotivational variables was significantly associated with the "high risk sports" subscale of the CARE.

Expected Involvement in Risky Behaviors

Correlations between risk perception for each specific CARE subscale and expected involvement on the same subscale were examined. Risk perception was unrelated to expected involvement in aggressive and illegal behaviors, risky

Table 1
Cronbach’s Alpha Reliability Coefficients for All Measures (N = 76)

Measure	Alpha
Motivational Style Profile	
Telic	.76
Paratelic	.65
Negativism	.81
Conformity	.39
Autic Mastery	.59
Autic Sympathy	.73
Alloic Mastery	.86
Alloic Sympathy	.73
Rebelliousness Questionnaire	
Proactive Rebelliousness	.63
Reactive Rebelliousness	.52
CARE: Risk Perception	
Illicit Drug Use	.90
Aggressive/Illegal Behavior	.93
Risky Sexual Activities	.93
Heavy Drinking	.80
High Risk Sports	.80
Academic/Work Behaviors	.83
CARE: Expected Involvement	
Illicit Drug Use	.82
Aggressive/Illegal Behavior	.82
Risky Sexual Activities	.65
Heavy Drinking	.94
High Risk Sports	.76
Academic/Work Behaviors	.76
Adult Temperament Questionnaire	
Effortful Control	.77
Negative Affect	.77
Extraversion/Surgency	.72
Orienting Sensitivity	.72

Note. CARE = Cognitive Appraisal of Risky Events

sexual activities, high risk sports, and risky academic behaviors. Risk perception was negatively correlated with expected involvement in illicit drug use, $r(74) = -.38, p = .001$, indicating that participants who perceived illicit drug use to be associated with negative consequences reported a lower likelihood of using illicit drugs. Surprisingly, risk perception was positively associated with expected involvement in heavy drinking, $r(74) = .51, p < .001$. That is, adolescents who believed that heavy drinking leads to negative consequences reported a greater likelihood of engaging in heavy drinking in the next few months.

Correlations between metamotivational and temperamental constructs and CARE subscales were examined to identify significant predictors to enter into multiple regression analyses predicting each of the risky behavior subscales. Because of the conceptual overlap between MSP negativism dominance and proactive rebelliousness, and the high correlation between these two variables, $r(74) = .71, p < .001$, only proactive and reactive rebelliousness scores were entered into regression analyses as indicators of negativism dominance, to allow for more sensitive measurement of negativism dominance and to prevent multicollinearity. MSP negativism dominance was significantly and positively related to the CARE subscales for illicit drug use, $r(74) = .30, p = .009$, aggressive and illegal behaviors, $r(74) = .51, p < .01$, risky sexual activities, $r(74) = .40, p < .01$, heavy drinking, $r(74) = .34, p = .002$, and risky academic and work behaviors, $r(74) = .27, p = .019$. Proactive rebelliousness showed similar significant positive correlations with each of these subscales. In cases where both effortful control and one or more of its sub-constructs were significantly correlated with a particular outcome measure, only the sub-construct was entered into the regression model because of its non-independence from effortful control. Effortful control was significantly and negatively related to the CARE subscales for illicit drug use, $r(74) = -.25, p = .028$, risky sexual activities, $r(74) = -.26, p = .021$, and risky academic and work behaviors, $r(74) = -.28, p = .016$.

The only metamotivational or temperamental variable that was found to correlate with the CARE high risk sports subscale was extraversion/surgency, $r(73) = .27, p = .021$, so no regression analysis was run on this subscale. The heavy drinking subscale was found to be negatively correlated with telic dominance, $r(74) = -.30, p = .01$, and inhibitory control, $r(74) = -.23, p = .048$, and positively associated with proactive rebelliousness, $r(74) = .32, p = .005$. When these variables were entered into a standard regression analysis, the overall regression model was significant, $r^2 = .15, F(3, 72) = 4.10, p = .01$, but none of the individual predictors was statistically significant.

Final regression models for the remaining CARE subscales are shown in Table 2, and illustrate predictors that were entered into each standard regression based on their significant correlation with the outcome variable. The overall regression model for illicit drug use was significant, $r^2 = .20, F(3, 71) = 6.00, p = .001$. The only significant predictor was proactive rebelliousness (squared semi-partial correlation coefficient [sr^2] = .09), accounting for 9% of the unique variance in expected involvement in illicit drug use. The regression model for aggressive and illegal behaviors was also significant, $r^2 = .34, F(2, 72) = 18.48, p < .001$. Here, proactive rebelliousness emerged as the strongest predictor ($sr^2 = .17$), followed by reactive rebelliousness ($sr^2 = .10$), with each of these predictors accounting for a substantial

amount of the variance in expected involvement in aggressive and illegal behaviors. For the risky sexual activities subscale, the final regression model was significant, $r^2 = .32, F(2, 73) = 17.29, p < .001$, with proactive rebelliousness emerging as the only significant predictor, accounting for 26% of the unique variance in this variable. The final regression model for risky academic and work behaviors was also significant, $r^2 = .18, F(3, 72) = 5.25, p = .002$. Proactive rebelliousness was a positive predictor of this variable ($sr^2 = .07$), while activation control ($sr^2 = .05$), was a significant negative predictor of risky academic and work behaviors.

Relationships among Metamotivational and Temperamental Constructs

Pearson bivariate correlations between reversal theory's metamotivational constructs and the temperament dimensions from the ATQ are shown in Table 3. Telic dominance, autic mastery, and alloic mastery were all significantly and positively related to effortful control and a number of its subscales, indicating that individuals who were telic dominant and those high in mastery dominance tended to be able to focus attention when needed and make themselves perform actions, rather than engaging in avoidance. Telic dominant individuals were also greater in their ability to suppress inappropriate behavior, as compared to those who were paratelic dominant. Telic dominance was negatively related to extraversion/surgency and high intensity pleasure, indicating that paratelic dominant individuals were more likely to derive pleasure from social situations and those involving high stimulus intensity. Autic mastery dominance was positively related to positive affect, and negatively associated with negative affect, fear, and sadness, while alloic mastery dominance was negatively associated with frustration. Negativism dominance, as assessed by the MSP, was negatively associated with effortful control, activation control, and inhibitory control, and positively related to high intensity pleasure. Proactive rebelliousness showed a similar pattern, in that it was negatively associated with effortful control and inhibitory control, and positively associated with high intensity pleasure and frustration. Reactive rebelliousness was only associated with negative affect, and in particular, with frustration.

Discussion

Taken together, the results of the present investigation supported the strong role of rebelliousness and effortful control as influential predictors of risk-taking in older adolescents. Although proactive rebelliousness tended to overshadow the temperamental variables in the final regression models, effortful control and its subscales were found to be associated consistently with lower risk-taking across the risky behaviors, with the exception of participation in risky sports. In

Table 2
Final Regression Models for Expected Involvement in Risky Behaviors (N = 76)

Outcome Variable	Predictor Variables	β	t	sr^2	R^2
Illicit Drug Use	Proactive Rebelliousness	.35	2.84**	.09	.20***
	Reactive Rebelliousness	.12	1.12		
	Inhibitory Control	-.09	-0.75		
Aggressive & Illegal Behaviors	Proactive Rebelliousness	.43	4.35***	.17	.34***
	Reactive Rebelliousness	.29	2.89**	.10	
Risky Sexual Activities	Proactive Rebelliousness	.58	5.33***	.26	.32***
	Inhibitory Control	.03	0.28		
Academic & Work Behaviors	Proactive Rebelliousness	.31	2.54*	.07	.18**
	Activation Control	-.24	-2.10*	.05	
	Inhibitory Control	.02	0.14		

Note. sr^2 = squared semi-partial correlation coefficient

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 3
Correlations of Temperament Scales and Subscales with Metamotivational Constructs (N = 76)

ATQ Scale/ Subscale	Metamotivational Construct					
	Telic Dominance	Negativism Dominance	Autic Mastery	Alloic Mastery	RQ Proactive	RQ Reactive
Effortful Control	.30**	-.29*	.34**	.28*	-.34**	-.16
Activation Control	.30**	-.25*	.28*	.32**	-.22	-.20
Attentional Control	.02	-.03	.41**	.33**	-.10	-.02
Inhibitory Control	.35**	-.37**	.14	-.01	-.47**	-.13
Negative Affect	.17	.01	-.32**	-.21	.07	.31**
Fear	.17	-.07	-.41**	-.11	-.02	.10
Sadness	.19	-.13	-.25*	-.18	-.12	.17
Discomfort	.18	.01	.02	-.01	.06	.10
Frustration	-.09	.20	-.14	-.26*	.26*	.47**
Extraversion/ Surgency	-.23*	.16	.08	-.11	.09	-.04
Sociability	-.03	.04	-.01	-.20	.01	-.02
High Intensity Pleasure	-.30*	.25*	-.02	-.03	.23*	.01
Positive Affect	-.18	.05	.26*	-.02	-.10	-.09

Note. ATQ = Adult Temperament Questionnaire, RQ = Rebelliousness Questionnaire.

* $p < .05$ ** $p < .01$

general, attentional control was more strongly related to perceiving behaviors as having negative consequences (i.e., risk perception), while inhibitory control was more strongly associated with expected involvement in the risky behaviors. That is, adolescents who were able to focus attention appropriately were more likely to perceive negative consequences of risky behaviors, while those who had difficulty inhibiting inappropriate approach behavior reported higher likelihood of engaging in risky activities.

Contrary to our first hypothesis, telic dominance was not significantly associated with higher risk perception for any of the risky behaviors. Telic/paratelic dominance was also unrelated to expected involvement in most of the risky activities, with the exception of heavy drinking, in which paratelic

dominant individuals reported greater expected involvement in this behavior. Findings from this study provided strong support for our second hypothesis. Proactive rebelliousness was an important predictor of likely involvement in illicit drug use, aggressive and illegal behaviors, risky sexual activities, and risky academic behaviours, and was also correlated with both risk perception and expected involvement in heavy drinking. MSP negativism dominance showed the same pattern of correlations with these risky activities. Reactive rebelliousness was found to correlate with expected involvement in illicit drug use and aggressive and illegal behaviors. Negativism dominance and proactive rebelliousness were both negatively associated with inhibitory control, suggesting that

negativism might have a temperamental basis that leads to difficulty in suppressing inappropriate behavior.

In support of our third hypothesis, inhibitory control was found to be negatively correlated with expected involvement in illicit drug use, heavy drinking, risky sexual activities, and risky academic and work behaviors. This variable was overshadowed by proactive rebelliousness in the final regression models, but nonetheless, our findings provide strong evidence that reduced inhibitory control is associated with increased propensity to engage in a number of risky behaviors. Our fourth hypothesis, that all aspects of effortful control would be negatively correlated with risky academic and work behaviors, was partially supported. Activation control, or the capacity to perform an action when there is a strong pull to avoid it, emerged as a significant negative predictor of risky academic and work behaviors in the regression model, accounting for slightly less variance than proactive rebelliousness. Since a number of the items on the risky academic and work behaviors subscale pertain to failing to study hard enough, procrastinating on tasks or assignments, and missing school or work, it is clear that youth who are able to push themselves to persist in their tasks and efforts will engage in less academically risky behavior. Inhibitory control was also negatively correlated with risky academic and work behaviors, but attentional control was not significantly related to this outcome variable.

The results of the present study are consistent with previous research in finding that effortful control and its sub-constructs tend to be negatively related to engagement in risky behaviors. In contrast to previous research (e.g., Pardini et al., 2004; Willem et al., 2011), however, we did not find relationships between either positive or negative affect and expected involvement in risky behaviors. The significant temperamental correlates in the present study were effortful control or its sub-constructs, and inhibitory control, in particular. In the case of expected involvement in risky sports, the only significant finding was a positive relation with extraversion/surgency. It is arguable that involvement in risky sports involves a different kind of risk-taking that is much less likely to lead to problematic outcomes as is true for the other risky behaviors, and this line of reasoning is supported by the fact that the risky sports subscale was the only one that was unrelated to rebelliousness in the present study.

We examined the relationship between risk perception (i.e., the likelihood that engaging in a particular activity would lead to negative consequences) and expected involvement in the same activities. One might expect that adolescents who perceive negative consequences resulting from certain activities would be less likely to expect to engage in those activities. The only risky behavior that followed this pattern was illicit drug use, where perception of negative consequences was negatively related to expected involvement in illicit drug use. An unexpected finding was

that of a positive association between risk perception and expected involvement in heavy drinking. Adolescent participants who perceived heavy drinking to be likely to lead to negative consequences were actually more likely to report that they expected to engage in this behavior. There are a number of plausible explanations for this finding. Adolescents are able to drink legally at age 19 in Ontario, and since student binge-drinking is fairly typical in a university population, participants might have realistically appraised the likelihood of their involvement in this activity, despite their foreknowledge of the possible negative consequences. In addition, we did not measure expected benefits of risky behaviors in the present study, and it is conceivable that the students perceived the benefits of heavy drinking (e.g., as facilitating their social life) to outweigh the risks. The finding that proactive rebelliousness was positively associated with both perception of heavy drinking as risky and expected involvement in heavy drinking might also partially account for this seemingly anomalous finding. Proactive rebelliousness was not significantly related to risk perception for any of the other risky behaviors, and it is possible that more highly rebellious youth wanted to engage in heavy drinking precisely because they perceived it to be risky.

Results of the present study provide support for conceptualizing negativism dominance as two separate components, as well as supporting the construct validity of the RQ as a measure of proactive and reactive rebelliousness. Not only did these two constructs differ in their ability to predict specific risky behaviors, but they were also associated with different temperamental variables. In our study, adolescents who were characterized by proactive rebelliousness were more likely to report expected involvement in a broad range of risky behaviors, including illicit drug use, aggressive and illegal behaviors, risky sexual activities, heavy drinking, and risky academic and work behaviors. Individuals high in proactive rebelliousness showed lower inhibitory control and effortful control, greater frustration, and greater high intensity pleasure, supporting McDermott's (1988) characterization of proactive rebelliousness as being oriented towards pursuing fun and excitement. Reactive rebelliousness was associated with expected involvement in illicit drug use, and aggressive and illegal behaviors (e.g., fighting and confrontations with others). There was no significant relationship between reactive rebelliousness and effortful control or any of its sub-constructs, and the only temperamental variables found to be associated with reactive rebelliousness were negative affect, and in particular, frustration. This pattern of findings is consistent with McDermott's (1988) conceptualization of reactive rebelliousness as a way of reacting to interpersonal disappointment or perceived affronts.

The construct validity of the MSP measure of telic/paratelic dominance also received some support in the present investigation. The only risky behavior that

significantly related to telic dominance was heavy drinking, with paratelic dominant individuals reporting a greater likelihood of engaging in this behavior. This finding is consistent with results reported by Gerkovich (1998). Telic dominant individuals in the present study were characterized by higher levels of activation control (i.e., being able to force themselves to perform an undesired activity) and inhibitory control, as well as greater overall effortful control. Paratelic dominant individuals were higher in extraversion/surgency, and particularly in high intensity pleasure, supporting reversal theory's depiction of paratelic dominance as being oriented toward seeking excitement and adventure.

Although it was unrelated to expected involvement in any of the risky behaviors, the metamotivational construct autic mastery dominance showed an interesting pattern of correlations with temperamental constructs in the present study. Specifically, autic mastery dominance (conceptualized in reversal theory as personal power and control) was significantly and positively related to effortful control, activation control, attentional control, and positive affect, and was negatively associated with fear, sadness, and overall negative affect. The overall picture that emerges is one of an individual who is positive, in control, and capable of appropriately focusing attention and effort on necessary tasks. It would be interesting to examine autic mastery dominance within the context of other related constructs from positive psychology, such as hardiness and resilience, to further investigate the construct validity of this concept.

While the present study yielded a number of interesting findings that have relevance for adolescent risk-taking from both a reversal theory and a temperamental perspective, this investigation was limited by its relatively small sample size, and the fact that university students are unlikely to display as much variability in their risk-taking activities as might be seen in a community sample. Future research should investigate the relations between temperamental and metamotivational predictors of adolescent risk-taking in large community samples that also include younger adolescents, in which interactive effects of temperamental and metamotivational predictors could be investigated. In addition, research that examines the specific pattern of metamotivational states that characterize adolescents at the time that they engage in risk-taking behavior would be particularly informative. On the whole, the results of the present study support the consideration of metamotivational constructs as predictors of adolescent risk-taking, and provide additional support for the construct validity of reversal theory's metamotivational dominance measures.

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