Behaviour Research and Therapy 50 (2012) 596–603

Contents lists available at SciVerse ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

Moving beyond the trait conceptualization of self-esteem: The prospective effect of impulsiveness, coping, and risky behavior engagement

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ARTICLE INFO

Article history:
Received 20 December 2011
Received in revised form
22 May 2012
Accepted 12 June 2012

Keywords:
Self-esteem
Risky behavior engagement
Impulsiveness
Maladaptive coping
Adolescence

ABSTRACT

Past research has largely focused on examining self-esteem as an independent as opposed to a dependent variable. At the same time, research suggests that during adolescence, self-esteem is subject to yearly, monthly, as well as daily change, and consequently, it is important to identify underlying vulnerability factors and behaviors, which shape self-esteem lability. In the current multi-wave, longitudinal study, 142 adolescents between the ages of 12–18 completed monthly assessments across 4 months. At the initial assessment, adolescents provided self-report data pertaining to impulsiveness, maladaptive coping, risky behavior engagement, and self-esteem. At each of the follow-up assessments, adolescents provided information about risky behavior engagement and self-esteem. Results of time-lagged, idiographic multilevel mediation analyzes indicated that risky behavior engagement mediated the relationship between impulsiveness/maladaptive coping and subsequent low self-esteem. Critically, when included in the same model, impulsiveness was significant above and beyond maladaptive coping. Additionally, the reverse model with self-esteem as the predictor and risky behavior included as the dependent variable was not significant suggesting that our effect was unidirectional. As a whole, these findings suggest that impulsive youth may engage in behaviors, which ultimately precipitate negative self-evaluations and transient declines in self-esteem.

A growing body of research indicates that self-esteem is not static per se, but rather, varies as a function of time and life events, especially during adolescence. More specifically, Robins, Trzesniewski, Tracy, Gosling, and Potter (2002) examined the trajectory of self-esteem across the lifespan and found that self-esteem was higher in childhood. However, during adolescence, self-esteem precipitously decreased, and then gradually increased across adulthood before declining again in old age. With respect to research examining changes during adolescence in particular, Abernathy, Massad, and Romano-Dwyer (1995) noted that only a small minority of adolescents report stable levels of self-esteem over time. In a sample of 3567 adolescents followed over a period of 4 years from 6th to 10th grade, only 14% of males and 7% of females maintained either high or low self-esteem across the yearly assessments, and the majority of adolescents reported significant fluctuations from year to year. Furthermore, using a clustering data analytic approach in samples of adolescents followed from 6th to 10th grade, researchers identified four distinct trajectories of self-esteem, which seem to arise during middle adolescence: (a) consistently high, (b) consistently low, (c) moderate and rising, and (d) steadily decline (Hirsch & DuBois, 1991; Zimmerman, Copeland, Shope, & Dielman, 1997). Research also suggests that self-esteem in adolescents may fluctuate across measurements taken over several weeks (Tevendale, DuBois, Lopez, & Prindiville, 1997), within a single day (Savin-Williams & Demo, 1983), and in response to particular events (e.g., interpersonal appraisals – Thomaes et al., 2010). As a whole, these findings suggest that adolescent self-esteem is subject to change. At the same time, research is warranted to identify underlying factors or behaviors, which may contribute to such lability during adolescence.

Self-esteem and risky behavior engagement

Despite compelling research examining the instability of self-esteem, the majority of studies have examined level as opposed to lability of self-esteem in relation to risky behavior engagement. In general, examining self-esteem level encompasses a single assessment and implicitly assumes that the construct may not be subject to change over time. By contrast, self-esteem lability is assessed through the use of repeated measurements over a period of time. Such an approach can then delineate patterns of self-

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http://dx.doi.org/10.1016/j.brat.2012.06.002

esteem change as well as factors that potentiate lability (e.g., risky behavior engagement). Importantly, in cross-sectional research, self-esteem has been negatively correlated with externalizing problems (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005) and engagement in antisocial activities (Dumont & Provost, 1999). Similarly, prospective research has also found that lower levels of self-esteem predict cigarette smoking (Abernathy et al., 1995; Carvajal, Wiatrek, Evans, Knee, & Nash, 2000), substance use (Wheeler, 2010), and earlier sexual experiences (Spencer, Zimet, Aalsma, & Orr, 2002). Moreover, in a longitudinal study of self-esteem, Zimmerman et al. (1997) followed 1160 adolescents from 6th to 10th grade, and they reported that steadily decreasing self-esteem across assessments was associated with significant alcohol use and misuse by grade 10. Taken together, these studies delineate the cross-sectional and prospective association between low self-esteem and greater risky behavior engagement across domains.

Conversely, less research has examined whether risky behavior engagement shapes self-esteem. Several cross-sectional studies tentatively suggest that past risky behavior engagement may influence self-esteem. For example, Carvajal et al. (2000) found that adolescents who had previously smoked cigarettes were more likely to report low self-esteem (Carvajal et al., 2000). Similarly, lower self-esteem among 14–19 year old girls is associated with a history of risky sexual partners (Ethier et al., 2006). At the same time, given the cross-sectional nature of these studies, they are ill equipped to disentangle the temporal relationship between behaviors and self-esteem, and thus, cannot definitively determine whether low self-esteem preceded the risky behaviors. Using a prospective study design, Jang and Thornberry (1998) found that self-reported delinquency (i.e., property destruction and/or violent crime) prospectively predicted lower levels of self-esteem at a six-month follow-up. These important findings strongly suggest that adolescents' behaviors do, in fact, have the capacity to prospectively shape self-esteem over a relatively brief period of time. A natural extension of these findings would be to examine whether risky behaviors shape self-esteem lability in adolescence. Specifically, it is plausible that as adolescents engage in behaviors, which are *inconsistent* or *discordant* with their core values, it may trigger more critical or negative self-evaluations (Coyne, McHugh, & Martinez, 2011). Consequently, these negative introspective assessments may then contribute to temporary *decreases* in self-esteem.

Pathway to risky behavior engagement

By and large, adolescents use a greater number of risky behaviors as compared to younger and older individuals (Auerbach, Tsai, & Abela, 2010; CDC, 2012). Additionally, adolescents tend to engage in multiple as opposed to singular risky behaviors, and Auerbach, Abela, and Ringo Ho (2007) reported that whereas some youth utilize different non-specific behaviors, other individuals repeatedly utilize a specific cluster of behaviors. These different behavioral patterns may be contingent upon environmental factors such as age, financial means, residential environment, and peer influences, and consequently, research underscores the importance of examining a broad spectrum of behaviors during adolescence. For example, adolescents who had unsafe sexual experiences were more likely to do so under the influence of drugs and alcohol (Borges, Cherpitel, Medina-Mora, & Mondragon, 2004), and similarly, aggression in adolescence is positively associated with illicit substance use (Zhang, Welte, & Wieczorek, 2002). Such findings highlight the co-occurrence of risky behaviors in adolescence; however, they do not address *why* adolescents engage in such behaviors.

While there are many underlying factors that potentiate risky behavior engagement in youth, impulsiveness and maladaptive coping have received significant empirical and theoretical attention. Specifically, adolescents who endorse greater impulsiveness (e.g., Donohew et al., 2000; van Leeuwen, Creemers, Verhulst, Ormel, & Huizink, 2011; Ryb, Dischinger, Kufera, & Read, 2006; Stanford & Jones, 2009) and a tendency to use maladaptive coping strategies (e.g., Flannery, Singer, & Wester, 2003; Galaif, Sussman, Chou, & Wills, 2003; Stanford & Jones, 2009; Willem, Bijttebier, Claes, & Raes, 2011) possess a greater likelihood of using risky behaviors. Both mechanisms are robust and prospective predictors in adolescence, and critically, they are also associated with lower levels of self-esteem (e.g., coping – Mullis & Chapman, 2000; impulsiveness – Watson, Suls, & Haig, 2002).

Goals of the current study

The current study utilized a 4-month, multi-wave longitudinal design with monthly follow-up assessments to examine the prospective relationship between impulsiveness, maladaptive coping, risky behavior engagement, and self-esteem in a sample of adolescents. Additionally, in order to examine the covariation between risky behavior engagement and self-esteem, we utilized a time-lagged, idiographic multilevel model approach, which allows us to examine *within-person* versus *between-person* fluctuations in both risky behaviors and self-esteem over time. Specifically, such an approach examines individuals' self-esteem in relation to their own average self-esteem following increases or decreases in risky behavior engagement relative their own mean engagement (i.e., self-esteem lability). While this sensitivity is critical to determine how one's own behaviors impact self-esteem over time, these findings may be obscured when using a nomothetic as opposed to an idiographic approach. We hypothesized that greater endorsement of impulsiveness and maladaptive coping would contribute to greater risky behavior engagement. Moreover, we believed that greater risky behavior engagement would then mediate the relationship between impulsiveness/maladaptive coping and subsequent lower levels of self-esteem.

Further, in order to provide a more stringent examination of our hypothesis, we also estimated the reverse model with self-esteem as the mediator and risky behavior engagement as the dependent variable. In general, there are mixed findings regarding the self-esteem and risky behavior engagement relationship. By and large, cross-sectional studies have found a robust association (e.g., Ethier et al., 2006); however, prospective research has not supported these findings. Specifically, McGee and Williams (2000) indicated that lower levels of self-esteem did not prospectively predict substance use and sexual activity suggesting that self-esteem may not play an explanatory role in the onset of substance use and sexual behaviors. Consistent with McGee and Williams (2000), we hypothesized model specificity, as the reverse model would not be significant.

Method

Participants

The sample included 142 adolescents (boys = 62 and girls = 80) between the ages of 12–18 ($\bar{x}$ = 15.17 and SD = 1.21) from an urban environment. The ethnic distribution of the sample included 80.1% White, 5.7% Asian, 3.5% East Indian, 2.8% Black, 2.8% Native American, 1.4% Hispanic, and 3.5% endorsed other as their ethnicity.

Procedure

The university Institutional Review Board provided approval for the study, and importantly, the treatment of all participants was in line with the American Psychological Association ethical standards. Before initiating the study, letters of informed consent were provided for parents, and these forms provided an overview of the research objectives and requested consent for their child's participation. Additionally, adolescents also completed assent forms, and participation was permitted only if signed informed assent/consent was received from both the parent or legal guardian and participating adolescent. The initial and subsequent follow-up assessments were completed on school grounds during an adolescent's "free period" as every effort was made to avoid disrupting the normal school day. At the initial assessment, participants completed self-report forms regarding demographics, impulsiveness (Patton, Stanford, & Barratt, 1995), coping (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000), self-esteem (Rosenberg, 1965), and risky behavior engagement (unpublished survey). The study also included 4 follow-up assessments, which occurred every 4 weeks, and participants completed self-report assessments of self-esteem and risky behavior engagement. Participants completed a total of five assessments, and the average participant retention across follow-up assessments was 76%. Prospective data analysis was only conducted for participants completing a minimum of three of five assessments as this allowed for a reliable mean estimate of an individual's self-esteem and risky behavior engagement over time. There were not demographic, self-esteem, or risky behavior engagement differences for individuals completing 3 or more assessments versus those who did not.

Measures

Barratt Impulsiveness Scale-11 (BIS-11) (Patton et al., 1995). The BIS-11 is a self-report measure, which includes 30-items rated on a scale from 1 (rarely/never) to 4 (almost always/always) with scores ranging from 30 to 120. The instrument assesses impulsiveness pertaining to attentional tendencies, motor control, and non-planning, and higher scores reflecting greater impulsiveness. A total score is obtained by summing the items (11-items are reverse scored prior to creating total score). Sample items include, "I say things without thinking," "I don't pay attention," and "I act on impulse." Past research has found that the BIS-11 is both reliable and valid to use with adolescents (Stanford, Greve, Boudreaux, & Mathias, 1996). In the current study, the Cronbach's alpha was 0.68.

Responses to Stress Questionnaire (RSQ) (Connor-Smith et al., 2000). The RSQ is a 57-item self-report instrument designed to measure both voluntary and involuntary coping strategies among adolescents. Items are rated on a scale from 1 (not at all) to 4 (a lot) with higher scores indicating greater utilization of a given coping strategy. Representative sample items include, "I try to think of different ways to change the problem or fix the situation," "I deal with the problem by wishing it would just go away, that everything would work itself out," and "I tell myself things could be worse." Past research examining the psychometric properties of the RSQ has identified five theoretically distinct subscales: Primary Control Engagement Coping, Secondary Control Engagement Coping, Disengagement, Involuntary Engagement, and Involuntary Disengagement. Moreover, research suggests that whereas primary and secondary control engagement are believed to be adaptive (i.e., RSQ Adaptive), disengagement, involuntary engagement, and involuntary disengagement are viewed as maladaptive approaches (i.e., RSQ Maladaptive) to manage negative life events. In light of the distribution of these subscales, Auerbach and colleagues (Auerbach, Abela, Zhu, & Yao, 2010) have recommended using a *Maladaptive Ratio*. Specifically, such an approach examines the tendency of individuals to use maladaptive as opposed to adaptive coping strategies. To create the maladaptive coping ratio, the sum of the RSQ Maladaptive and RSQ Adaptive subscales were divided by their respective item totals, which accounts for differences in item totals in these subscales. Then, the RSQ Maladaptive score was divided by the sum of the RSQ Adaptive and RSQ Maladaptive subscales. The Cronbach's alpha for the RSQ is 0.91 suggesting strong internal consistency.

Self-Esteem Questionnaire (SEQ) (Rosenberg, 1965). The SEQ is a 10-item self-report measure examining self-esteem. Items range from 1 (strongly agree) to 4 (strongly disagree) with lower scores reflecting low self-esteem (i.e., scores range from 10 to 40). Sample items include, "At times I think I am not good at all," I feel I do not have much to be proud of," and "I wish I could have more respect for myself." In the current study, the SEQ demonstrated excellent internal consistency across assessments (Crobach's alpha = 0.90–0.93).

Risky Behavior Questionnaire for Adolescents (RBQ-A) (unpublished survey). The RBQ-A is a 20-item self-report instrument, which assesses broad-based engagement in risky behaviors in the past month. Specifically, the RBQ-A assesses risky behavior engagement in the following domains: (a) unsafe sexual practices, (b) aggressive and/or violent behaviors, (c) rule breaking, (d) dangerous, destructive, and illegal behaviors, (e) self-injurious behaviors, and (f) substance use (see Appendix 1). Scores range from 0 to 80 with higher scores reflecting a greater engagement in risky behaviors. Past research using the RBQ-A has indicated that it is positively associated with depressive symptoms and negatively correlated with perceived control (Auerbach, Tsai et al., 2010). For the current study, the Cronbach's alpha across assessments was 0.84–0.85, which is indicative of high internal consistency.

Data analytic approach

In the current study, we utilized the multilevel meditational procedure established by Bauer, Preacher, and Gil (Bauer, Preacher, & Gil, 2006). Specifically, the approach was designed to examine mediation in the context of a repeated measures design, and moreover, it allows for the examination of idiographic, time-lagged multilevel models in which time is nested within individuals. A single, simultaneous model accounts for the random effects in different Level I and Level II models, and therefore, possesses key data analytic advantages over the causal steps approach to mediation (Baron & Kenny, 1986). We utilized SAS 9.2 MIXED procedure and maximum likelihood estimation to examine whether risky behavior engagement$_{(\text{Time } T-1)}$ mediates the relationship between impulsiveness or maladaptive coping and self-esteem$_{(\text{Time } T)}$. Importantly, given the non-normal distribution of risky behavior engagement, all analyzes were also examined using a Poisson distribution (i.e., GLIMMIX). Preliminary results indicated that irrespective of using a MIXED or a GLIMMIX (i.e., Poisson) approach, the results remained the same. At the same time, given that impulsiveness, coping, and self-esteem are normally distributed, it was preferable to use a framework accounting for such distribution for all estimated models (i.e., MIXED or Gaussian).

Within the idiographic, time-lagged mediation models, the dependent variable is within-subject level of self-esteem. As self-esteem is a repeated measure, it is considered a Level I variable. The primary between-subject, or Level II, predictors of self-esteem are impulsiveness and maladaptive coping, and the within-subject predictor, a Level I factor, was level of risky behavior engagement. In order to provide a test of the indirect effect, we utilized the macro provided by Bauer et al. (2006) in the supplement section. Use of the macro provides a 95% confidence interval (CI) for the test

of the indirect effect, and critically, the mediation effect is considered statistically significant if the CI does not contain zero. Importantly, to provide a more rigorous examination of our hypotheses, time-lagged reverse models were also estimated in which self-esteem was inserted as the mediator and risky behavior engagement was included as the dependent variable. In order to provide a stringent examination of our proposed hypotheses, the following effects were also included in model estimations. First, when self-esteem was the dependent variable in our analyzes, initial self-esteem was included as a covariate. Similarly, in using risky behavior engagement as the dependent variable, initial risky behavior engagement was inserted as a control in all analyzes. Second, while preliminary analyzes indicated that age and gender did not moderate our findings, we included age and gender as covariates in all estimated models. Last, all models included an autoregressive covariance structure, and additionally, random effects were included for Level I and Level II variables. When interpreting beta coefficients in our models, estimates examining a between-to-within-subject pathway reflect changes in the intercept (e.g., impulsiveness–risky behavior engagement). Conversely, beta coefficients examining the within-to-within-subject pathway (e.g., self-esteem to risky behavior engagement) reflect changes in slope.

Results

Descriptive data

Pearsons bivariate correlations are included in Table 1. Notably, age was positively correlated with risky behavior engagement suggesting that older youth reported a greater number of risky behaviors. Not surprisingly, lower self-esteem and greater risky behavior engagement were associated with higher scores on impulsiveness and the maladaptive coping ratio. Importantly, risky behavior engagement was negatively correlated with self-esteem indicating that adolescents who report lower levels of self-esteem may utilize a greater number of risky behaviors. Additionally, Table 2 provides descriptive statistics for risky behavior engagement and self-esteem over time.

Main effect models: predicting risky behavior engagement and self-esteem

Prior to estimating mediation models in which self-esteem and risky behavior engagement were the dependent variables, preliminary main effect models were estimated. All main effect models included age and gender as covariates as well as a random effect for intercept. Results indicated that higher levels of impulsiveness predicted lower self-esteem ($b = -1.52$, SE $= 0.44$, $t(139) = 3.44$, $p = 0.0008$) and greater risky behavior engagement ($b = 2.62$, SE $= 0.56$, $t(139) = 4.69$, $p < 0.0001$) over time. Similarly, a higher score on the maladaptive coping ratio was associated with lower self-esteem ($b = -3.47$, SE $= 0.34$, $t(139) = 10.19$, $p < 0.0001$) and greater risky behavior engagement ($b = 1.59$, SE $= 0.55$, $t(139) = 2.87$, $p = 0.0047$). Taken together, these findings suggest that it is appropriate to explore the proposed mediation models.

Table 1
Pearson bivariate correlations, means, standard deviation for age, impulsiveness, maladaptive coping ratio, risky behavior engagement, and self-esteem at the initial assessment.

Variables	1.	2.	3.	4.	5.
1. Age	–				
2. Impulsiveness	0.12	–			
3. Maladaptive coping ratio	−0.02	0.33***	–		
4. Risky behavior engagement	0.20*	0.39***	0.25**	–	
5. Self-esteem	0.03	−0.32***	−0.64***	−0.24**	–
Mean	15.17	68.46	0.84	8.65	19.99
Standard deviation	1.21	9.44	0.26	8.64	5.83

Note. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Table 2
Mean and standard deviation for risky behavior engagement and self-esteem during the follow-up period.

	Risky behavior engagement		Self-esteem	
	Mean	Standard deviation	Mean	Standard deviation
Follow-up 1	7.35	8.36	18.99	5.68
Follow-up 2	6.27	7.39	18.93	6.24
Follow-up 3	5.70	7.21	18.30	5.76
Follow-up 4	6.40	6.38	19.52	5.84

Note. Follow-up assessments occurred every 4 weeks.

Mediation models: impulsiveness and maladaptive coping as predictors of risky behavior engagement and self-esteem over time

Initially, we examined a mediation model which included impulsiveness, risky behavior engagement$_{(\text{Time } T-1)}$ and self-esteem$_{(\text{Time } T)}$. Results indicated that higher impulsiveness predicted greater risky behavior engagement over time (**path a**: $b = 2.79$, SE $= 0.58$, $t(659) = 4.81$, $p < 0.0001$). Additionally, greater risky behavior engagement predicted lower levels of self-esteem over time (**path b**: $b = -0.17$, SE $= 0.04$, $t(659) = 4.68$, $p < 0.0001$), and after controlling for the proportion for the risky behavior$_{(\text{Time } T-1)}$ and self-esteem$_{(\text{Time } T)}$ relationship, impulsiveness continued to predict lower levels of self-esteem (**path c′**: $b = -0.58$, SE $= 0.24$, $t(659) = 2.41$, $p = 0.016$). Using the SAS macro provided by Bauer et al. (2006) for the test of the indirect effect, the 95% CI indicated that the partial mediation effect is significant (**path a*b$_j$**: $b = 0.47$, SE $= 0.14$; 0.19, 0.75).

In our next set of analyzes, the mediation model included the maladaptive coping ratio, risky behavior engagement$_{(\text{Time } T-1)}$, and self-esteem$_{(\text{Time } T)}$. A maladaptive coping ratio predicted greater risky behavior engagement over the course of the study (**path a**: $b = 1.69$, SE $= 0.73$, $t(659) = 4.81$, $p = 0.02$), and similar to the model above, greater risky behavior engagement predicted lower self-esteem (**path b**: $b = -0.16$, SE $= 0.03$, $t(659) = 4.81$, $p < 0.0001$). Importantly, after controlling for the proportion of variance accounted for by the relationship between risky behavior engagement and stress, a maladaptive coping ratio was not a significant predictor of lower levels of self-esteem (**path c′**: $b = 0.26$, SE $= 0.27$, $t(659) = 0.95$, $p = 0.34$). The 95% CI yielded from the test of the indirect effect indicated that the full mediation model is significant (**path a*b$_j$**: $b = 0.28$, SE $= 0.13$; 0.01, 0.54).

Given the correlation between impulsiveness and maladaptive coping ($r = 0.33$, $p < 0.001$), we also estimated a model which included impulsiveness, maladaptive coping ratio, risky behavior engagement, and self-esteem. In doing so, we determined whether our predictor variables contributed unique effects to changes in risky behavior engagement and self-esteem over time. The fixed effects included in Table 3 indicate that when including impulsiveness and maladaptive coping ratio in the same model, impulsiveness predicts above and beyond, and the mediation model containing maladaptive coping ratio is no longer significant. Moreover, when examining a test of the indirect effect for the mediation model containing impulsiveness, risky behavior engagement, and self-esteem (see Fig. 1), the 95% CI suggested that the partial mediation model is significant (**path a*b$_j$**: $b = 0.44$, SE $= 0.14$; 0.17, 0.70).

Table 3
Time-lagged, idiographic mediation model including impulsiveness, maladaptive coping ratio, risky behavior engagement, and self-esteem.

Predictor	Parameter estimate (b)	Standard error	t-value	Degrees of freedom (df)
Risky behavior engagement model:				
Age	1.37	0.47	2.93**	649
Gender	−3.01	1.14	−2.63**	649
Initial self-esteem	−0.14	0.73	0.19	649
Impulsiveness	2.61	0.59	1.43***	649
Maladaptive coping ratio	1.03	0.72	−0.76	649
Self-esteem model:				
Age	0.14	0.18	1.89	649
Gender	−0.85	0.45	15.76	649
Initial self-esteem	4.55	0.29	7.34*	649
Impulsiveness	−0.66	0.24	2.74**	649
Maladaptive coping ratio	−0.41	0.27	1.51	649
Risky behavior engagement	−0.17	0.03	4.82***	649

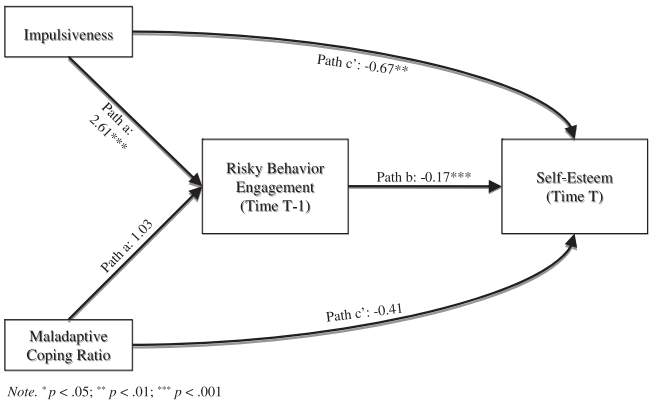
Note. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Reverse mediation models

In order to provide a stringent examination of our hypothesis, we also examined a reverse model in which (a) self-esteem was the mediator and (b) risky behavior engagement was included as the dependent variable. Initially, we estimated separate models for impulsiveness and maladaptive coping ratio. In these models, both impulsiveness (**path a**: $b = -1.25$, SE $= 0.51$, $t(621) = 2.48$, $p = 0.01$) and maladaptive coping ratio (**path a**: $b = -3.44$, SE $= 0.37$, $t(621) = 9.33$, $p < 0.0001$) predicted lower levels of self-esteem over time. However, within these respective models, self-esteem$_{(\text{Time } T-1)}$ was not predictive of subsequent risky behavior engagement$_{(\text{Time } T)}$ (impulsiveness model − **path b**: $b = 0.02$, SE $= 0.05$, $t(621) = -0.46$, $p = 0.65$; maladaptive coping ratio model − **path b**: $b = -0.01$, SE $= 0.06$, $t(621) = -0.21$, $p = 0.83$). Given these results, the reverse mediation models are not significant suggesting that our effect may be unidirectional.

Discussion

Historically, self-esteem has been viewed as a moderator and mediator of psychological dysfunction (Orth, Robins, & Meier, 2009). At the same time, adolescence is a key developmental period in which individuals have not established a clear and permanent identity (for review see Meeus, 2011). This "identity gap" may increase susceptibility to self-esteem lability in response to life events (e.g., academic success versus failures), and importantly, an adolescent's behaviors may also precipitate similar fluctuations. In particular, adolescence is a period characterized by increased frequency for broad-based engagement of risky behaviors (for overview see CDC, 2012). The impetus for such engagement is multifold including, but not limited to, experimentation (Engels & ter Bogt, 2001), peer influences (Prinstein & Dodge, 2008) and symptom management (Comasco, Berglund, Oreland, & Nilsson, 2010). As differential patterns of risky behavior engagement may be discordant with an adolescent's core values (Coyne et al., 2011), such engagement may, ultimately, shape how individuals feel about themselves. In these circumstances, adolescents may regret their behaviors, which has a direct impact on introspective evaluation, and during these moments, adolescents may experience a transient decline in their self-esteem. This perspective is consistent with third-wave approaches to treatment such as acceptance and commitment therapy (ACT) as the treatment focuses on the functions of behaviors (e.g., Hayes & Pierson, 2005). Specifically, ACT assesses the discordance of one's behaviors and core values as it relates to the topography of psychopathology. Consequently, targeting symptom reduction is not typically the primary objective; however, symptom attenuation is usually a direct result when individuals resume engaging in behaviors that are more consistent with their own values (Greco & Hayes, 2008).



Note. $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$

Fig. 1. Mediation model: An examination of the pathway mediating self-esteem lability.

Consistent with our hypothesis, the results indicated that both impulsiveness and maladaptive coping contributed to greater risky behavior engagement, and moreover, risky behavior engagement mediated the relationship between these underlying vulnerability factors and subsequent self-esteem lability. However, when including both impulsiveness and maladaptive coping in the same model, impulsiveness predicted above and beyond maladaptive coping. An examination of the reverse models found that self-esteem did not mediate the relationship between impulsiveness or maladaptive coping and risky behavior engagement. Taken together, these findings suggest that the hypothesized model is unidirectional, and critically, adolescents' patterns of risky behaviors have a significant impact on the stability of self-esteem in adolescence.

The pathway leading to self-esteem lability

Past research examining the relationship between risky behavior engagement and self-esteem has primarily focused on examining whether low self-esteem is predictive of different patterns of substance use (e.g., Carvajal et al., 2000; Zamboanga, Schwartz, Jarvis, & Van Tyne, 2009), sexual behaviors (Spencer et al., 2002), and externalizing behaviors (Donnellan et al., 2005). A majority of such research has been cross-sectional; however, more recent research has examined the prospective association between self-esteem and risky behavior engagement. At the same time, scant research has examined whether risky behavior engagement predicts level or lability of self-esteem. Importantly, research that has examined this direction of effect has been cross-sectional (e.g., Ethier et al., 2006), which does not allow researchers to accurately determine if low self-esteem is an antecedent of risky behavior engagement or, conversely, a response to these behaviors.

The current study sought to examine different pathways, which may contribute to self-esteem lability. Expanding on the robust relationship among impulsiveness, maladaptive coping, and risky behavior engagement (e.g., Stanford & Jones, 2009; Willem et al., 2011), the model indicated that risky behavior engagement mediated the relationship between impulsiveness/coping and subsequent self-esteem (see Fig. 1). When including both impulsiveness and coping in the same model, however, only impulsiveness remained a significant predictor of risky behavior engagement and subsequent self-esteem lability. Unexpectedly, these findings did

not vary as a function of age or gender. These results suggest that impulsive adolescents may be more susceptible to engage in broad-based risky behaviors, and moreover, such youth are also inclined to exhibit lower self-esteem over short periods of time (i.e., 4-months). Again, these findings are interesting to frame in the context of ACT as greater impulsive tendencies may predispose youth to *act without thinking*. Specifically, adolescents may engage in behaviors, which they later regret, and importantly, these behaviors may not judiciously reflect their stated values. In such instances, these youth may be susceptible to self-esteem lability as shame, regret, and guilt may surface. Nevertheless, when youth learn to control impulsive tendencies, it may allow them to make better informed decisions about their actions, which ultimately, can contribute to more stable and/or higher levels of self-esteem (Wilson & Murrell, 2004).

A test of model specificity

In contrast to past research, self-esteem was not predictive of subsequent risky behavior engagement. Importantly, the study focused on self-esteem *lability* as opposed to *level*, and the unidirectional effect of the findings suggests that risky behavior engagement may be contributing to lability. These findings underscore the importance of re-evaluating self-esteem as an outcome as opposed to a predictor; especially when examining the prospective influence of self-esteem in adolescence (see Abernathy et al., 1995; Zimmerman et al., 1997). While the majority of past research has analyzed self-esteem as a predictor of deviant behaviors (e.g., Jang & Thornberry, 1998) and symptoms (e.g., Kernis, 2005), the current results underscore the importance of expanding our conceptualization of self-esteem as a state as opposed to a trait factor. The current methodological approach appears to be developmentally applicable, and importantly, highlights important differences from past research.

Limitations

Despite several important strengths of the project including use of a multi-wave longitudinal study design, high sample retention, and ambitious data analytic approach, there are several limitations. First, the study utilized self-report instruments to assess underlying vulnerability factors and risky behavior engagement. Self-report instruments are susceptible to response biases, and unfortunately, may be limited by the relative insight a given adolescent possesses about complex psychological processes. Further, in reporting risky behavior engagement (see Appendix 1), it requires participants to recall behaviors over the course of the past month. However, adolescents may feel compelled to underreport risky behavior engagement as this is more socially desirable, and additionally, it is conceivable that some adolescents may not recall all behaviors over the course of the preceding month. Consequently, future research would benefit from utilizing more sophisticated approaches including: (a) behavioral tasks assessing implicit functioning, which may more accurately assess underlying vulnerability factors and (b) ecological momentary assessments, which probe for intermittent assessment of behavioral functioning (i.e., risky behavior engagement over the past week). Second, the current study followed adolescents over the course of four months, which unfortunately, is only a "snapshot" of their rapidly evolving lives. While the data sheds important light onto the complex relationship between risky behaviors and self-esteem, the scope of the research is limited by the breadth of time assessed. Future research would benefit from prospective designs that follow youth over longer periods (e.g., years) in order to determine if risky behavior engagement continues to contribute to self-esteem lability or whether it ultimately shapes more chronic low levels of self-esteem. Third, the current study maintained moderately strong retention during the follow-up assessments. Additionally, while every effort was made to include all adolescents in the high school, only adolescents who provided both parent and personal consents were included. Reasons for non-participation were not assessed, and unfortunately, we cannot ascertain how this may have impacted our findings. Fourth, while the RBQ-A has been used in adolescent samples (e.g., Auerbach, Tsai et al., 2010), reliability and validity have not been examined. Therefore, future research should examine the psychometric properties of the instrument. Fifth, given the relatively brief duration of the study, both coping and impulsiveness were only assessed at baseline as significant variability was not anticipated. At the same time, these variables may also be subject to change, especially during adolescence, and thus, future research would benefit from examining impulsiveness and coping as within-subject factors in the context of the mediation model. Last, the current National Institute of Mental Health (NIMH) Research Domain Criteria places an emphasis on assessing dimensions of observable behaviors across different units of analysis. In doing so, there is a desire to understand how behavior and/or neurobiological functioning underpins psychopathology in general as opposed to a specific disorder. The findings from the study are in line with the NIMH stated mission in examining the integration of behavior and vulnerability. At the same time, future research may benefit from also connecting such research to the onset and maintenance of different psychopathologies.

Clinical implications

In sum, there is a wide array of reasons *why* adolescents engage in risky behaviors. Importantly, impulsiveness and maladaptive coping are both strongly associated with risky behaviors including precious sexual activity, substance use, self-harm, and rule-breaking. However, impulsiveness, which includes motor, attentional, and non-planning processes, is a stronger prospective predictor of these behaviors. While impulsive youth may not consider or immediately understand the consequences of their behaviors, over time these actions may negatively shape or skew their self-perception. Using interventions such as ACT may help impulsive youth curb risky behaviors, which contribute to feelings of worthlessness, and may ultimately help these individuals engage in behaviors that are more aligned with their core values.

Acknowledgments

The research in this article was supported by a McGill Social Sciences and Humanities Student Research Grant and a McLean Hospital – Harvard Medical School Institutional Grant awarded to Randy P. Auerbach.

Appendix 1

Risky Behavior Questionnaire for Adolescents (RBQ-A)

In this questionnaire we are interested in whether certain events have happened to you in the **past month**. Please indicate how often the following events have happened to you in the **past month**. Please use the following scale: 0 = Never; 1 = Almost never (1 time per month); 2 = Sometimes (2–4 times per month); 3 = Almost always (2–3 times per week); 4 = Always (4 or more times per week).

	Questions	Never	Almost never	Sometimes	Almost always	Always
1.	Have you destroyed property (other than your own)?	⓪	①	②	③	④
2.	Have you been unfaithful to your boyfriend or girlfriend?	⓪	①	②	③	④
3.	Have you been in a physical fight?	⓪	①	②	③	④
4.	Have you bullied, threatened, or intimidated a peer(s)?	⓪	①	②	③	④
5.	Have you been binge drinking and/or drinking to get drunk?	⓪	①	②	③	④
6.	Have you used illegal drugs?	⓪	①	②	③	④
7.	Have you sold illegal drugs?	⓪	①	②	③	④
8.	Have you skipped class (or entire days of school)?	⓪	①	②	③	④
9.	Have you cheated or plagiarized?	⓪	①	②	③	④
10.	Have you shoplifted?	⓪	①	②	③	④
11.	Have you stolen money?	⓪	①	②	③	④
12.	Have you had unsafe sex?	⓪	①	②	③	④
13.	Have you verbally harassed someone?	⓪	①	②	③	④
14.	Have you made attempts to cut or burn yourself?	⓪	①	②	③	④
15.	Have you purged or binged?	⓪	①	②	③	④
16.	Have you gambled?	⓪	①	②	③	④
17.	Have you lied to your family members (e.g., grandparents, parents, siblings)?	⓪	①	②	③	④
18.	Have you driven (a bicycle, a moped, and/or a car) recklessly (e.g., at fast speeds, under the influence of a substance)?	⓪	①	②	③	④
19.	Have you used cigarettes?	⓪	①	②	③	④
20.	Have you engaged in acts of revenge?	⓪	①	②	③	④

References

Abernathy, T. J., Massad, L., & Romano-Dwyer, L. (1995). The relationship between smoking and self-esteem. *Adolescence, 30*(120), 899–907.

Auerbach, R. P., Abela, J. R., & Ringo Ho, M. H. (2007). Responding to symptoms of depression and anxiety: emotion regulation, neuroticism, and engagement in risky behaviors. *Behaviour Research and Therapy, 45*(9), 2182–2191.

Auerbach, R. P., Abela, J. R., Zhu, X., & Yao, S. (2010). Understanding the role of coping in the development of depressive symptoms: symptom specificity, gender differences, and cross-cultural applicability. *The British Journal of Clinical Psychology, 49*(4), 547–561.

Auerbach, R. P., Tsai, B., & Abela, J. R. Z. (2010). Temporal relationships among depressive symptoms, risky behavior engagement, perceived control, and gender in a sample of adolescents. *Journal of Research on Adolescence, 20*(3), 726–747.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: new procedures and recommendations. *Psychological Methods, 11*(2), 142–163.

Borges, G., Cherpitel, C. J., Medina-Mora, M. E., & Mondragon, L. (2004). Violence related injuries in the emergency room: alcohol, depression, and conduct problems. *Substance Use & Misuse, 39*(6), 911–930.

Carvajal, S. C., Wiatrek, D. E., Evans, R. I., Knee, C. R., & Nash, S. G. (2000). Psychosocial determinants of the onset and escalation of smoking: cross-sectional and prospective findings in multiethnic middle school samples. *Journal of Adolescent Health, 27*(4), 255–265.

Centers for Disease Control and Prevention. (2012). Youth risk behavior surveillance – United States, 2011. *Surveillance Summaries, 61*(4), 1–168.

Comasco, E., Berglund, K., Oreland, L., & Nilsson, K. W. (2010). Why do adolescents drink? Motivational patterns related to alcohol consumption and alcohol-related problems. *Substance Use & Misuse, 45*(10), 1589–1604.

Connor-Smith, J. K., Compas, B. E., Wadsworth, M. E., Thomsen, A. H., & Saltzman, H. (2000). Responses to stress in adolescence: measurement of coping and involuntary stress responses. *Journal of Consulting and Clinical Psychology, 68*(6), 976–992.

Coyne, L. W., McHugh, L., & Martinez, E. R. (2011). Acceptance and commitment therapy (ACT): advances and applications with children, adolescents, and families. *Child and Adolescent Psychiatric Clinics of North America, 20*(2), 379–399.

Donnellan, M. B., Trzesniewski, K. H., Robins, R. W., Moffitt, T. E., & Caspi, A. (2005). Low self-esteem is related to aggression, antisocial behavior, and delinquency. *Psychological Science, 16*(4), 328–335.

Donohew, L., Zimmerman, R., Cupp, P. S., Novak, S., Colon, S., & Abell, R. (2000). Sensation seeking, impulsive decision-making, and risky sex: implications for risk-taking and design of interventions. *Personality and Individual Differences, 28*(6), 1079–1091.

Dumont, M., & Provost, M. A. (1999). Resilience in adolescents: protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. *Journal of Youth and Adolescence, 28*(3), 343–363.

Engels, R. C. M. E., & ter Bogt, T. (2001). Influences of risk behaviors on the quality of peer relations in adolescence. *Journal of Youth and Adolescence, 30*(6), 675–695.

Ethier, K. A., Kershaw, T. S., Lewis, J. B., Milan, S., Niccolai, L. M., & Ickovics, J. R. (2006). Self-esteem, emotional distress and sexual behavior among adolescent females: inter-relationships and temporal effects. *Journal of Adolescent Health, 38*(3), 268–274.

Flannery, D. J., Singer, M. I., & Wester, K. L. (2003). Violence, coping, and mental health in a community sample of adolescents. *Violence and Victims, 18*(4), 403–418.

Galaif, E. R., Sussman, S., Chou, C.-P., & Wills, T. A. (2003). Longitudinal relations among depression, stress, and coping in high risk youth. *Journal of Youth and Adolescence, 32*(4), 243–258.

Greco, L. A., & Hayes, S. C. (2008). *Acceptance and mindfulness treatments for children and adolescents: A practitioner's guide*. Oakland, CA US: New Harbinger Publications.

Hayes, S., & Pierson, H. (2005). Acceptance and commitment therapy. In A. Freeman, S. H. Felgoise, C. M. Nezu, A. M. Nezu, & M. A. Reinecke (Eds.), *Encyclopedia of cognitive behavior therapy* (pp. 1–4). New York, NY: Springer.

Hirsch, B. J., & DuBois, D. L. (1991). Self-esteem in early adolescence: the identification and prediction of contrasting longitudinal trajectories. *Journal of Youth and Adolescence, 20*(1), 53–72.

Jang, S. J., & Thornberry, T. P. (1998). Self-esteem, delinquent peers, and delinquency: a test of the self-enhancement thesis. *American Sociological Review, 63*(4), 586–598.

Kernis, M. H. (2005). Measuring self-esteem in context: the importance of stability of self-esteem in psychological functioning. *Journal of Personality, 73*, 1569–1606.

van Leeuwen, A. P., Creemers, H. E., Verhulst, F. C., Ormel, J., & Huizink, A. C. (2011). Are adolescents gambling with cannabis use? A longitudinal study of impulsivity measures and adolescent substance use: the TRAILS study. *Journal of Studies on Alcohol and Drugs, 72*(1), 70–78.

McGee, R., & Williams, S. (2000). Does low self-esteem predict health compromising behaviours among adolescents. *Journal of Adolescence, 23*, 569–582.

Meeus, W. (2011). The study of adolescent identity formation 2000: a review of longitudinal research. *Journal of Research on Adolescence, 21*(1), 75–94.

Mullis, R. L., & Chapman, P. (2000). Age, gender, and self-esteem differences in adolescent coping styles. *Journal of Social Psychology, 140*(4), 539–541.

Orth, U., Robins, R. W., & Meier, L. L. (2009). Disentangling the effects of low self-esteem and stressful events on depression: findings from three longitudinal studies. *Journal of Personality and Social Psychology, 97*(2), 307–321.

Patton, J. H., Stanford, M. S., & Barratt, E. S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical psychology, 51*(6), 768–774.

Prinstein, M. J., & Dodge, K. A. (2008). *Understanding peer influence in children and adolescents*. New York, NY: Guilford Press.

Robins, R. W., Trzesniewski, K. H., Tracy, J. L., Gosling, S. D., & Potter, J. (2002). Global self-esteem across the life span. *Psychology and Aging, 17*(3), 423–434.

Rosenberg, M. (1965). *Society and adolescent self-image*. Princeton, NJ: Princeton University Press.

Ryb, G. E., Dischinger, P. C., Kufera, J. A., & Read, K. M. (2006). Risk perception and impulsivity: association with risky behaviors and substance abuse disorders. *Accident Analysis and Prevention, 38*(3), 567–573.

Savin-Williams, R. C., & Demo, D. H. (1983). Situational and transituational determinants of adolescent self-feelings. *Journal of Personality and Social Psychology, 44*(4), 824–833.

Spencer, J. M., Zimet, G. D., Aalsma, M. C., & Orr, D. P. (2002). Self-esteem as a predictor of initiation of coitus in early adolescents. *Pediatrics, 109*(4), 581–584.

Stanford, M. S., Greve, K. W., Boudreaux, J. K., & Mathias, C. W. (1996). Impulsiveness and risk-taking behavior: comparison of high-school and college students using the Barratt Impulsiveness Scale. *Personality and Individual Differences, 21*(6), 1073–1075.

Stanford, S., & Jones, M. P. (2009). Psychological subtyping finds pathological, impulsive, and 'normal' groups among adolescents who self-harm. *Journal of Child Psychology and Psychiatry, 50*(7), 807–815.

Tevendale, H. D., DuBois, D. L., Lopez, C., & Prindiville, S. L. (1997). Self-esteem stability and early adolescent adjustment: an exploratory study. *The Journal of Early Adolescence, 17*(2), 216–237.

Thomaes, S., Reijntjes, A., Orobio de Castro, B., Bushman, B. J., Poorthuis, A., & Telch, M. J. (2010). I like me if you like me: on the interpersonal modulation and regulation of preadolescents' state self-esteem. *Child Development, 81*(3), 811–825.

Watson, D., Suls, J., & Haig, J. (2002). Global self-esteem in relation to structural models of personality and affectivity. *Journal of Personality and Social Psychology, 83*(1), 185–197.

Wheeler, S. B. (2010). Effects of self-esteem and academic performance on adolescent decision-making: an examination of early sexual intercourse and illegal substance use. *Journal of Adolescent Health, 47*(6), 582–590.

Willem, L., Bijttebier, P., Claes, L., & Raes, F. (2011). Rumination subtypes in relation to problematic substance use in adolescence. *Personality and Individual Differences, 50*(5), 695–699.

Wilson, K. G., & Murrell, A. R. (2004). Values work in acceptance and commitment therapy: setting a course for behavioral treatment. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 120–151). New York, NY: Guilford Press.

Zamboanga, B. L., Schwartz, S. J., Jarvis, L. H., & Van Tyne, K. (2009). Acculturation and substance use among Hispanic early adolescents: investigating the mediating roles of acculturative stress and self-esteem. *Journal of Primary Prevention, 30*(3–4), 315–333.

Zhang, L., Welte, J. W., & Wieczorek, W. W. (2002). The role of aggression-related alcohol expectancies in explaining the link between alcohol and violent behavior. *Substance Use & Misuse, 37*(4), 457–471.

Zimmerman, M. A., Copeland, L. A., Shope, J. T., & Dielman, T. E. (1997). A longitudinal study of self-esteem: implications for adolescent development. *Journal of Youth and Adolescence, 26*(2), 117–141.