Journal of Applied Developmental Psychology 42 (2016) 8–20

Contents lists available at ScienceDirect

Journal of Applied Developmental Psychology

Do risks matter? Variable and person-centered approaches to adolescents' problem behavior

Kathryn Lynn Modecki

School of Psychology and Exercise Science, Murdoch University, Australia
School of Applied Psychology, Griffith University, Australia

ARTICLE INFO

Article history:
Received 28 November 2014
Received in revised form 17 October 2015
Accepted 6 November 2015
Available online 24 November 2015

Keywords:
Adolescent
Cognitions
Decision making
Latent profile
Risk behavior
Intervention

ABSTRACT

Two limitations in research examining adolescents' risk cognitions have been the absence of developmental age group comparisons on a breadth of cognitions and the need to better characterize how cognitions influence behavior. To address these limitations, this study compared adolescent ($n = 205$; 52% female) and young adult ($n = 274$; 58% female) risk cognitions (risk probability, risk identification, risk tolerance, risk salience, and risk preference) and used variable- and person-centered approaches to explore how cognitions affect problem behavior. Adolescents generally reported lower risk-related cognitions than young adults. Further, risk probability, the cognition typically assessed in research, did not exert an independent effect on behavior. Adolescents and young adults were characterized by two similar cognition profiles, but only adolescents were characterized by a third, maladaptive profile, *Low Identification/High Preference*, reflecting low risk identification and risk salience and high risk preference. Interventions should arguably target these three cognitions within at-risk youth.

Adolescence is widely recognized as a critical period for preventing problem behavior. High school-aged adolescents (grades 9–12) engage in high rates of behaviors that contribute to unintentional injuries, mortality, and social problems such as substance use, aggression, and delinquency (Centers for Disease Control & Prevention [CDCP], 2014). For instance, more than 20% of high school students report binge drinking in the last month and nearly 25% report involvement in a physical fight in the last year (CDCP, 2014). These behaviors, if established during adolescence, often extend into young adulthood, when they can escalate (Neinstein, Lu, Perez, & Tysinger, 2013). In the last 20 years, researchers have made exciting discoveries that can inform interventions by explaining why adolescents choose to engage in activities that threaten their health and long-term interests (e.g. Durston & Casey, 2006; Somerville, 2013; Steinberg, 2008). Much of this research has focused on adolescents' biologically-based reward-system, which impels them to pursue the social and emotional rewards of risky and antisocial choices. However, perceived rewards are only one piece of the decision making puzzle (Ernst et al., 2005; Fischhoff, 2008). Adolescents' cognitive control system, the decelerating-counterpart to their reward-drive, also contributes to their behavioral choices (Van Duijvenvoorde, Jansen, Bredman, & Huizenga, 2012).

In fact, dual system models of decision making point to a critical role for cognitive control in adolescents' problem behavior involvement. For instance, one prominent biological theory contends that adolescents' cognitive control system is underdeveloped relative to their reward-drive (Spear, 2013; Steinberg, 2008). This developmental-lag model implicates a maturation-mismatch between a mature excitatory system and an incipient cognitive system, suggesting that adolescents cannot exert behavioral control in risky and antisocial contexts (Casey, Jones, & Somerville, 2011; Somerville, Jones, & Casey, 2010). Research findings, however, are not unequivocally supportive of "developmental mismatch" theories (e.g. Romer, 2010). As a result, some scholars argue that the control system is no less mature than the affective system. Instead, connections among control systems are simply less networked or fine-tuned, so that this mechanism for regulating dangerous and problematic behavior does not function as rapidly or as regularly as the reward system (Crone & Dahl, 2012; Luciana, 2013). However, both of these viewpoints imply that reduced cognitive control capacities contribute to adolescents' affinity for problem behavior and that determining the effect of control cognitions on behavior requires a nuanced approach.

The current study focuses on risk cognitions as a marker of how the control system curbs adolescents' problematic choices, ranging from shoplifting to violent behavior. More specifically, I address two issues that could better explicate the role of risk cognitions in these types of behaviors. First, many studies have asserted that adolescents and adults are essentially equivalent in judging risks (e.g. Knoll, Magis-Weinberg, Speekenbrink, & Blakemore, 2015, comparing youth ages 12–14 and 15–18, with young adults 19–25 and adults 26–59; Cohn, Macfarlane, Yanez, & Imai, 1995, comparing adolescents ages 13–18 with their parents ages 28–62). However, previous studies have measured risk

E-mail address: k.modecki@Griffith.edu.au.

http://dx.doi.org/10.1016/j.appdev.2015.11.001

cognitions derived from a perspective in which *risk probability*, or adolescents' reported likelihood of possible risk, is fundamental to choice (Slovic, 1998; Slovic, Finucane, Peters, & MacGregor, 2004). Yet a review of cognitive, public health, and criminological literatures identifies several other influential risk cognitions that research has not yet adequately examined. As a result, we do not yet know whether adolescents are less capable than older age groups when anticipating aspects of risk other than risk probability. Second, previous research generally shows only weak linkage between adolescents' risk cognitions and their problematic choices (e.g. Baumgartner, Valkenburg, & Peter, 2010; Ben-Zur & Reshef-Kfir, 2003; Goldberg, Halpern-Felsher, & Millstein, 2002). However, researchers have based these conclusions on variable-centered methods such as regression, which have focused on whether one or two risk cognitions predict problem behavior. Scholars have not yet focused on alternative methodologies to characterize how cognitions might influence decisions. Namely, contemporary decision models suggest that choices to engage in problem behavior may draw on a general, intuitive impression of risk (Quartz, 2009). Methods that treat the adolescent, rather than the variable, as the unit of analysis may best capture these intuitive risk impressions. For instance, person-centered techniques such as latent profile analysis (LPA) can help to assess whether distinct groups of adolescents can be identified through their naturalistic groupings of risk cognitions, and can assess whether these cognition profiles differentiate adolescents who engage in especially high or low levels of problem behavior (Pears, Kim, & Fisher, 2008). As a result, LPA can complement the information regression affords, and together, person- and variable-centered methods can provide more comprehensive understanding of how risk cognitions influence adolescents' choices.

The current study addresses these two issues, which research has under-explored to date. First I compare mean-level differences between adolescents and young adults on five theoretically relevant risk cognitions (risk probability, risk identification, risk tolerance, risk salience, and risk preference). Importantly, use of a young adult sample as a comparison represents a conservative test of adolescents' developmental deficits in perceiving risk, because the pre-frontal system, which is responsible for cognitive control, continues to fine-tune throughout young adulthood (Luciana, 2013). Thus, although young adults are should be less risk-averse than adults (Modecki, 2009). Second, I explore the influence of risk cognitions on behavior using two complementary approaches, variable-centered (regression) and person-centered (LPA) methods (Bates, 2000). A traditional variable-centered approach assesses direct relations between risk cognitions and problem behavior and whether the magnitude of these relations differs for adolescents versus young adults. In corresponding analyses, I take a person-centered approach to identify meaningful cognition patterns among these different age groups and test whether individuals with certain cognition patterns are more or less problem behavior involved. As a result, this study informs understanding of developmental age-group differences in risk cognitions and also how these cognitions impact youthful choices.

Which risk cognitions matter?

Faced with antisocial opportunities in the real world, adolescents estimate the probability or likelihood of possible risks (*risk probability*). Before gauging probability, however, they must also identify possible risks (*risk identification*). Further, young people likely also draw on information about their own tolerance for negative consequences (*risk tolerance*) and intuitively assess how much they care about negative outcomes should they occur (*risk salience*). Finally, adolescents arguably gauge the relative importance of possible risks in relation to possible benefits of problem behavior (*risk preference*). As a result, all of these cognitions likely inform adolescent impressions of risk. However, questions as to whether cognitions, outside of risk probability, reflect adolescents' under-estimation of risk relative to young adults remain underexplored. Further, additional research is needed to determine the degree to which risk cognitions play a role in adolescents' problem behavior, especially once other relevant factors such as perceived benefits and decision experience are taken into account (Goldberg et al., 2002; Halpern-Felsher et al., 2001). Of these five risk cognitions, the most studied involves risk probability.

First, studies that compare adolescents' *risk probability* or *likelihood* with older age groups provide mixed evidence of developmental differences. Some studies have found that adolescents (13–18) underestimate the potential risk associated with occasional involvement in problem behaviors relative to their parents (Cohn et al., 1995); whereas others studies have found no evidence that adolescents underestimate risk likelihood relative to parents (Quadrel, Fischhoff, & Davis, 1993) or relative to young adults (20–30 year olds) (Millstein & Halpern-Felsher, 2002). One potential explanation for these inconsistencies is that developmental age group differences in decision making may be less attributable to adolescents' capacity to agree with already identified risks, and more attributable to adolescents' diminished capacity to generate potential risks on their own accord (Beyth-Marom, Austin, Fischhoff, Palmgren, & Jacobs-Quadrel, 1993; Millstein & Halpern-Felsher, 2002). Thus, age group differences may not exist for risk probability, but they may exist for risk identification, as described below. Evidence also suggests that the effect of adolescents' probability judgments on behavior may be neither independent nor linear. Although research often associates probability judgments with problem behaviors, the strength of this association is typically only weak to moderate, especially when the model includes perceived benefits (Maslowsky, Buvinger, Keating, Steinberg, & Cauffman, 2011). In light of recent characterizations of decision making as a dynamic process drawing on many cognitions simultaneously (Quartz, 2009), these modest effects suggest that risk probability judgments may influence behavior mainly through joint inter-dependencies with other cognitions. That is, risk probability may pattern together in specific ways with cognitions such as risk identification, risk tolerance, risk salience, and risk preference to drive adolescent choices.

The second cognition involves risk identification. Tasks in which adolescents spontaneously identify risks (*risk identification*) may capture developmental age group differences in risk cognitions not identifiable though probability judgments (Beyth-Marom et al., 1993; Millstein & Halpern-Felsher, 2002). For example, participants have generated their own lists of potential decision-risks in a small number of developmental studies (Widdice, Cornell, Liang, & Halpern-Felsher, 2006). These studies indicate that adolescents could spontaneously identify some risks, but developmental differences did emerge. For instance, adolescents (12–18) spontaneously reported fewer negative consequences of risky decisions (e. g. attending a beer party) than their parents on roughly half of all behaviors that they have engaged in only one-time (Beyth-Marom et al., 1993). Further, in a comprehensive exploration of developmental decision competencies, young adults (college students) considered more risks and long-term consequences associated with their hypothetical decisions than adolescents (grades 6–12) (Halpern-Felsher & Cauffman, 2001). Together these findings suggest that adolescents have a diminished capacity for identifying risks relative to young adults. However, rather than directly influencing adolescents' problem behavior involvement, diminished risk identification may contribute to specific patterns of cognitions, and these distinct patterns may convey either high or low risks to adolescents. As a result, it is not only important to examine age group differences, but also to assess how risk identification patterns together with other cognitions to shape adolescents' behavioral choices. For instance, adolescents who identify few risks may also report especially high risk preference. Together, problematic cognition constellations may characterize those adolescents who are most heavily disposed toward risky and antisocial choices.

Third, possible adverse outcomes deter adolescents less than young adults (i.e., they have greater *risk tolerance*), especially when pursuing