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Improving Adolescent Judgment and Decision Making

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Abstract

Human judgment and decision making (JDM) has substantial room for improvement, especially among adolescents. Increased technological and social complexity “ups the ante” for developing impactful JDM interventions and aids. Current explanatory advances in this field emphasize dual processing models that incorporate both experiential and analytic processing systems. According to these models, judgment and decisions based on the experiential system are rapid and stem from automatic reference to previously stored episodes. Those based on the analytic system are viewed as slower and consciously developed. These models also hypothesize that metacognitive (self-monitoring) activities embedded in the analytic system influence how and when the two systems are used. What is not included in these models is the development of an intersection between the two systems. Because such an intersection is strongly suggested by memory and educational research as the basis of wisdom/expertise, the present paper describes an Integrated Judgment and Decision-Making Model (IJDM) that incorporates this component. Wisdom/expertise is hypothesized to contain a collection of schematic structures that can emerge from the accumulation of similar episodes or repeated analytic practice. As will be argued, in comparisons to dual system models, the addition of this component provides a broader basis for selecting and designing interventions to improve adolescent JDM. Its development also has implications for generally enhancing cognitive interventions by adopting principles from athletic training to create automated, expert behaviors.

Keywords

Judgment and decision making (JDM); Self-regulation; Metacognition; Interventions for JDM; Analytically-created schemas

Poor judgment and decision making (JDM) is at the heart of many problematic behaviors exhibited by adolescents as well as adults. Substance abuse, unprotected sex, reckless driving, criminal activity, and other forms of impulsive and risky behavior that accompany mental health problems and deviancy often involve failures of JDM. Although many cognitive, behavioral, and emotional regulation treatments are focused on improving decision making, recent theoretical developments in this area offer possibilities for improving therapeutic impact. The goal of this paper is to provide a foundation for improving adolescent judgment and decision-making interventions by proposing a modification of current JDM theories and by creating a two-way bridge between theory and practice. Prior literature has been bifurcated: one set has described characteristics and theories of adolescent and adult JDM (Kahneman, 2011; Weber & Johnson, 2009) while the other set has reported on JDM interventions with little discussion of their conceptual underpinnings (Dimeff & Linehan, 2001; Fischhoff, 2008; Mitchell, Bender, Kishna, & Mitchell, 2006). We will attempt to bridge this gap by:

- Discussing recent theoretical advances in adolescent JDM.
- Describing a conceptual framework that merges JDM with principles from memory, educational, and expert processing research.
- Using this framework to identify promising conceptual portals for improving JDM through targeted interventions.
- Presenting examples of these targeted interventions that have been created for adolescents with drug abuse issues. As will be seen, these interventions are designed to facilitate the development of JDM wisdom/expertise by using methods that have been successful in physical training (e.g., sports and dance).

With respect to the first bullet point, Albert and Steinberg (2011) have provided a thorough and well-organized review of the current state of adolescent JDM theories and research. They point to dual process models of development, progress in self-regulation research, and neuroscience discoveries as contributing to new views of adolescent cognition. Naturally, the conceptual landscape has become increasingly complex. Earlier work placed an age-related increase in analytic, abstract thinking capabilities at the heart of improved judgment and decision-making as adolescents matured. More recent work suggests that adolescents can perform as well as adults on analytic reasoning tasks, but frequently rely on rapid, experiential-based thinking in making day-to-day decisions. A key factor in maturation is seen to be the development of metacognitive activities that monitor, influence, and merge analytic and experiential processing. In the first section of this paper we will use Albert and Steinberg's review, Klaczynski's (2005) chapter on a dual process model of adolescent development, and Kahneman's (2011) book on adult JDM as platforms for developing an integrative model that specifies how the analytic, experiential, and metacognitive processing elements work together to influence thinking and general self-regulation.

Dual Process Theories and Self-Regulation

Although we agree with Albert and Steinberg and numerous others who respect the explanatory value of recent neuroscience research, our main goal is to examine theories that directly inform the development of cognitive interventions. Consequently, we will only briefly discuss brain research that relates to developmental changes in JDM. In the present section we focus on dual process theories that posit experiential and analytic processing systems (e.g., Klaczynski, 2005). According to these models, the experiential system provides the human with quick, intuitive, preconscious heuristic processing that relies on automatic pattern recognition while the analytic system is typically conscious, slower, sequential, and systematic.

The experiential system can be strongly influenced by proximal social, emotional and environmental conditions (hot cognition) while the analytic system is typically not as easily influenced by the immediate context (cold cognition). In experimental situations, adult and adolescent analytic thinking and behavior appear similar and moderately effective. However in real life, both groups tend to rely more on the experiential system. In fact, adults may use this system even more than adolescents (Albert & Steinberg, 2011). Research indicates that adults typically make less risky decisions than adolescents because their experiential processing is less influenced by emotional and social factors and their larger bank of experiences help to calibrate and regulate their processing to more accurately reflect reality (Millstein & Halpern-Felsher, 2002). Furthermore, developmental changes in metacognition (cognitive self-regulation) help adults to better decide when to engage analytic vs. experiential processes and gives them the ability to more easily shift between the systems within the same real-life episode (Klaczynski, 2005; Gardner & Steinberg, 2005; Amsel et al., 2008). Based on these ideas it seems reasonable to provide adolescents with experiences

that will strengthen and integrate the two processing systems as well as improve their ability to regulate their activities. The premise of this paper is that the selection/design of effective interventions to accomplish these tasks can be fruitfully informed by the explication of a framework that identifies specific pathways to improvement.

As a first step in developing a framework to guide JDM interventions, it is important to explicitly tie theories of self-regulation to dual process models. Although dualities such as episodic-semantic (Baddeley, 2002), implicit-explicit, (Roediger, 1990), and approach-avoidance (Elliot & Covington, 2001), have played a major role in psychological frameworks, many theorists have recognized the need for a third homunculus-like component that selects between and integrates the dualities. Freud's notion of ego as a negotiator between the id and superego (Carlson, 2010) is an example of this reasoning, as is Steinberg's (2007) case for three component theories of mind. Although implied, we suggest the dual process theories of development should be explicitly expanded to include two additional components – a self-regulatory system that serves to coordinate the experiential and analytic systems, and a wisdom/expertise system that emerges from the interactions of the experiential and analytic systems (Ardelt, 2004). An explication of the connections among the four components can create predictions about the impact of interventions that strengthen the experiential and analytic systems and their orchestration. As we go forward, we will use the label Integrated Judgment and Decision-making Model (IJDM) to identify the combination of the dual process system with self-regulation and expertise/wisdom (see Figure 1). In this model, the metacognitive element of self-regulation (monitoring and control of cognitive activities) will be emphasized. Although other forms of self-regulation (e.g., emotional regulation) are clearly critical, the focus of the present model is on understanding the cognitive underpinnings of adolescent judgment and decision making. We anticipate that this focus will provide information that will also support objectives that form the basis of such interventions as Dialectical Behavior Therapy (DBT; Dimeff & Linehan, 2001). For instance, a major treatment goal of DBT is to replace a client's desperation with non-traumatic emotions in order to achieve typical states of happiness and unhappiness. An understanding of the multiple JDM processing systems and their interactions is expected to provide additional techniques that will be useful to DBT practitioners, particularly the development of analytically created structures that can be used to reinforce healthy schemas that promote more appropriate and affective behavioral responses. DBT which was developed to treat some of the most challenging disorders (Linehan et al., 1999) aims to "contend with the patient's cognitive schemas (hopes, ambitions, beliefs) and explore healthy psychic reorganization" (Millon & Davis, 1996, p. 687).

Integrated Judgment and Decision-making Model (IJDM)

The proposed model suggests that human behavior is rooted in past experience (the experiential system), analysis of present and future situations (the analytic system), or an integration of the two (expertise/wisdom). Metacognitive processes (an element of self-regulation) are seen to monitor and regulate the use of the three basic systems (see Figure 1). Klaczynski (2005) has described a similar configuration, but maintains the dual process notation by theorizing that metacognition is exclusively a subset of the conscious, analytic system. Furthermore, his conceptualization does not include a separate expertise/wisdom component. It is our position that external awareness control in the form of cues and triggers (i.e., discriminative stimuli) play an important role in metacognition, and that there is evidence for schematic structures that form an intersection between the experiential and analytic systems. For these reasons, and to help with conceptual clarity, we portray metacognition and expertise/wisdom as separable components with characteristics that emerge from both the experiential and analytic systems.

The experiential system

This system is hypothesized to rely on the matching of a perceived current or expected situation with a similar situation and accompanying behavioral decision stored in episodic memory (Baddeley, 2002). A version of the earlier experiential decision then guides the current behavior. This contextualized heuristic approach (Stanovich, 1999) is typically rapid and cognitively effortless in that it follows a simple “condition-action” (stimulus-response) sequence (Simon, 1992). Others have labeled this system 1 and the analytic component system 2 (Kahneman, 2011).

Piaget and Inhelder (1958) theorized that experiential processing develops prior to logical/mathematical processing (the purview of the analytic system). In contrast, recent theorists (e.g., Klaczynski, 2005) suggest that both experiential and analytic skills develop in parallel with dominance shifting between the systems over time. In fact, there is evidence that experiential-based processing increases in adults, counter to the classic Piagetian notion that the analytic system becomes more dominant as individuals move into and through adulthood (Klaczynski, 2005). There is also evidence that adults’ experiential reactions are generally more conservative (i.e., less risky) than those of adolescents (Rivers, Reyna, & Mills, 2008). We suggest that changes in episodic memory brought about by an ever increasing accumulation of direct and vicarious experiences lead to the formation of schematic structures which in turn contribute to developmental changes in judgment and decision making. As described by schema theorists (e.g., Alexander, 2009; Armbruster, 1996), the common elements of similar episodes (e.g., “going to a fancy restaurant”) are merged into more de-contextualized (abstract) signals and responses (e.g., waiting to be seated, cloth napkins, wine steward, desert tray, etc.) that provide generalizable stored patterns which can be matched to situations that have not been previously experienced. Once a match is made the response components of the schema, rather than a specific episode, guide the individual’s reaction. In essence, the impact of idiosyncratic elements of experiences is reduced in favor of common factors across similar episodes. Consequently, the role of specific people and emotions are likely lessened where decisions emerge from the matching of schematic patterns constructed from multiple, similar episodes (i.e., repeated experiences). This would predict the empirical observation that adults are less influenced by peers and emotions in making decisions. For example, adults and adolescents take similar risks in a driving simulation game when driving by themselves (Gardner & Steinberg, 2005). However, with peer passengers, adolescents elevate their risk-taking while adults maintain the same level of caution.

From our viewpoint, another crucial change in the experiential system over time is the incorporation of analytic thinking activities into episodic memory (e.g., learning and applying the scientific method in school). Using logic, planning, and systematic problem solving to complete a task not only exercises the analytic system, but also provides episodic (experiential) traces that potentially can be used to form schemas that can aid judgment and decision making. We will discuss this possibility in the next sub-sections.

The analytic processing system

This system, which is usually associated with semantic memory as described by Collins and Loftus (1975), operates at a more abstract level, is slower, and requires more cognitive effort. Students receive instruction in using this system in math (e.g., proving theorems), science (e.g., using the scientific method), and most other academic courses. In addition, most professionals use this system to deal with the complexity of their jobs.

The construct of “executive function” (EF) has been used to capture the essence of analytic processing. Anderson (2002) indicates the major functions of EF are anticipation, goal

selection, planning, initiation of activity, self-regulation, and use of feedback. The degree to which EF strategies such as planning and organization are influenced by neurological maturation versus learning has received increased attention in recent years (Meltzer, 2007). Interventions to strengthen EF typically combine activities at the level of the environment, which include structuring situations and assignments and providing props, with training at the level of the person that emphasizes explicit, systematic strategy instructions designed to directly strengthen EF (Dawson & Guare, 2004). Indeed, while in general there is substantial consensus on its critical components and educational applications, the explanatory mechanisms which underlie EF are not well understood.

Piaget and Inhelder (1958) hypothesized that the use of the analytic system (EF) did not mature until the “formal operations” stage, roughly estimated as occurring between 11 and 14 years of age (see Commons and Richards, 2003, for an elaboration). Some researchers assumed that with its emergence, it largely replaced the experiential processing of earlier stages. However, as mentioned previously, recent research suggests that the two systems are available throughout an individual’s lifetime and that the use of the experiential system may actually increase during adulthood especially in making personal life decisions (Klaczynski, 2005).

Expertise/wisdom

One of the major distinctions made between the experiential and analytic systems involves the degree to which they operate in a specific, concrete context. The experiential system is seen as highly influenced by the immediate situation, while the analytic system is hypothesized to operate largely context free with its focus on abstract processes (Albert & Steinberg, 2011). From our point of view, this creates a false dichotomy that can lead to the assumption that the operation of the two systems is mutually exclusive: when one is operating the other is not. This exclusivity appears incompatible with research that suggests there is an area of overlap created by schema formation in the experiential system and concretization using mental simulation (imagery) to contextualize abstract plans in the analytic system. The result is a set of lightly contextualized schemas that have the potential of being informed by both of the basic systems. In fact, this intersection falls in line with many of the definitions of “wisdom and expertise,” where knowledge is informed by both logic and concrete experience. In particular, this idea is in concert with fuzzy-trace theory (Rivers, Reyna, & Mills, 2008) that suggests that as individuals develop greater expertise in a domain, their decisions tend to be based on the meaning of the information (fuzzy memory traces) rather than verbatim details. Furthermore, Klein’s (1999) recognition-primed decision model (RPD) of expert processing, which posits that a tentative plan is triggered and then mentally simulated, makes use of this intersection rather than purely experiential or analytic functioning. While schema theorists have demonstrated the abstraction of repeated experiences, researchers and practitioners focusing on training cognitive skills (e.g., executive functioning, problem solving, planning, and decision making) have shown that procedures can be concretized sufficiently to transfer to new situations (Evans, 2006; Gaskins & Pressley, 2007). We contend that this two-way growth of the “wisdom/expertise” area is what accounts for differences between adults and adolescents, as well as individual differences within both groups. It is proposed that those with opportunities for more high-fidelity growth of this overlap area will be more effective in making sound behavioral decisions. Of course, the expectation is that such predictions would hold only for specific content areas for an individual. In essence, one can have a lot of “sports” wisdom (i.e., automated behavioral responses) and very little “relationship” wisdom depending on interest and opportunity.

Cognitive regulation

Metacognition is typically hypothesized to include the monitoring of one's own thought process (Klaczynski, 2005). It is considered to be a key component of executive functioning and self-regulation, but it also has a general role in monitoring information produced by both the experiential and analytic systems. Educational research has provided evidence that metacognitive skill increases with age (at least until adulthood; Amsel et al., 2008) and training (Gaskins & Pressley, 2007). Presumably, external and internal cues can signal this system whether a particular line of thinking and reacting should be initiated, continued, changed, or discontinued. Although most theorists (e.g., Klaczynski, 2005) view metacognition as exclusively a part of the analytic processing system, our view is that metacognitive cues can also arise out of the experiential system. The activation of two similar experiences which lead to conflicting responses or consequences in the past (e.g., having said yes to drugs in one case and no in another) is likely to trigger metacognitive activity in order to respond to the present episode. Further, we suggest that metacognitive involvement of this sort may in fact become less necessary as the formation and use of the intersection between the experiential and analytic systems (wisdom/expertise) increases. Natural formation of schemas with less emotional and social content along with more "over time" exposure to analytical processing of personal issues will reduce internal conflicts between and within the two systems by providing an area of integration. One of the consequences of this integration is the use of elements of stored schemas as a basis for developing proactive "nudges" (i.e. signals and reminders; Thaler & Sunstein, 2008) to direct behavioral reactions and enhance self-regulation. Figure 1 shows the potential linkage between metacognition and the other components of the model.

Targeting Interventions to Improve Adolescent Judgment and Decision-Making

The need for enhanced JDM interventions

In their extensive review of psychological processes that impact judgment and decision making, Weber and Johnson (2009) state that recent discoveries in JDM phenomena "provide prescriptions for how to improve decision quality" (p. 78). They point to the influence of affective processes (e.g., attention, emotional states) and perceived risk on decision-making as potential entry points for interventions. Much of the recent work with adolescents describes characteristics of youth in comparison to adults, focusing primarily on strengths (Gladwell, 2005) and weaknesses (Kahneman, 2011) associated with the experiential system. The underlying assumptions are that such studies can inform intervention efforts by raising awareness of weaknesses or problem areas that will inevitably prompt individuals to improve their decision and judgment skills. However, even the authors of this descriptive information are pessimistic about its use or impact (Kahneman, 2011). Consequently, deliberate and targeted efforts aimed at designing interventions that map directly onto JDM and more general self-regulation models are needed.

While a plethora of cognitive interventions exist, few (if any) have been designed specifically to fit within JDM models. The most commonly used cognitive intervention approaches can be found in educational and counseling settings. Interventions developed for education focus primarily on improving critical thinking (CT) and/or executive functioning (EF) processes, and are grounded in educational theory (see Abrami et al., 2008); those developed for counseling focus on the link between thought and behavior and are typically grounded in Cognitive Behavior Therapy (CBT; e.g., Butler, Chapman, Forman, & Beck, 2006). CBT emphasizes that changing one's thought patterns (e.g., cognitive restructuring) can change one's self-regulation and behavioral responses, whereas CT/EF training emphasizes that learning to apply specific techniques improves educational and problem-

solving success (Meltzer, 2007). While both have spawned effective intervention strategies, they are based on theories that are primarily derived from the observation of client (student) deficiencies and are typically tailored to specific individual and situational attributes. We believe these interventions can be strengthened by incorporating aspects of normative cognitive function represented by the IJDM (Figure 1).

Intervention portals suggested by IJDM

Our integrated model of JDM suggests portals through which specially-designed interventions can impact thinking. We believe that to develop replicable and transferable interventions, it is crucial to focus on critical and manipulable components, with particular emphasis on the pre-conscious and conscious factors that limit their efficacy and efficiency. Two interlocked components or “portals” that meet these criteria and that provide opportunities for growth are the *wisdom/expertise* intersection between the experiential and analytic systems and the *cognitive regulation (metacognitive) processes* that control the development and use of this intersection.

The wisdom/expertise intersection contains schemas for: (a) understanding/responding to a wide variety of experiences, and (b) navigating through unknown territory when experiencing something new or when actively revising/reconstructing existing memories. This component contains information that results from the merging of similar episodes (experiences) into schemas (e.g., the general process of going to a drive thru restaurant or the general structure of a suburban house) as well as information that results from the application of analytically created structures to specific episodes (e.g., using the typical journal article structure to navigate through or develop a new paper). Direct and vicarious experiences appear to create schemas without the need for conscious attention. Presumably, as similar experiences accumulate, a schema becomes more well-developed, accessible, and more resistant to change. Consequently, behavior is hypothesized to emerge more frequently from matching a new situation to a schema than a specific episode. As suggested earlier, this may explain why adults with more thoroughly developed schemas, especially those that incorporate self-regulatory components, are less influenced by emotions and specific people than are adolescents. It could also explain why individuals with long and more intense exposure to adverse events may be more resistant to change – their schemas may be more fully (albeit negatively) developed.

From this analysis it is our contention that helping individuals form more robust and effective schemas can serve to enhance judgment, decision-making, and self-regulation. One approach is to intervene through the experiential system and provide high fidelity episodes that offer dynamic, real-life decision-making opportunities through broad-based interventions such as therapeutic communities and other structured treatments (e.g., De Leon, 2000). Another complimentary approach is through the analytical system by training individuals in the development and repeated use of analytically created structures (decision-making guides such as worksheets and checklists) that aid in processing past and future life episodes. This approach can serve to help identify, build, strengthen, and personalize effective schemas that will facilitate pattern matching during subsequent situations, thus facilitating judgments and decisions that have more positive consequences for the individual. Cognitive tools can be developed to train individuals, particularly adolescents, to improve their judgment, decision-making, and self-regulation by increasing their wisdom/expertise intersection and developing metacognitive nudges to initiate and sustain its use.

As described earlier, metacognition is traditionally referred to as the monitoring and management of thinking. It is seen as critical for altering ineffective behaviors and maintaining positive behaviors. The rapid and pre-conscious responding of the experiential system’s pattern matching processes generally precludes concurrent metacognition but may

be receptive to both pro- and retroactive monitoring and control. Analytic activities appear more amenable to concurrent metacognition, and indeed, cognitive regulation studies typically focus on this type of processing. Activities in the wisdom/expertise intersection may fall between the other two components in terms of metacognitive receptivity. Schema activation (e.g., going to a party) provides cues for subsequent behavioral steps beyond those available in the immediate context and thereby facilitates metacognitive involvement. Importantly, the specific elements of schemas provide a basis for identifying and developing signals (i.e., nudges) that will trigger self-regulation activities in making judgments and decisions. These metacognitive nudges can be internal in the form of self-talk and external in the form of concrete reminders and manipulations of the physical environment. Training adolescents to develop and use positive “nudges” in conjunction with schema development is the basis of an intervention targeted toward the key portals identified within IJDM.

Creating and Delivering Targeted Interventions to Improve Adolescent Judgment and Decision-Making

The focus of this section is on *analytically created schemas* for developing and empowering the wisdom/expertise component of the integrated model and the use of *metacognitive nudges* for monitoring and controlling this component as well as the experiential and analytical components. Of course these interventions require supporting materials and activities that engage and empower adolescents in order to be successful. In our recent work we have created intervention components that use examples, collaborations, demonstrations, and language that speak to and motivate adolescents in residential treatment. The resulting manual-based intervention is the Treatment Readiness and Induction Program (TRIP; Bartholomew, Dansereau, Knight, Becan, & Flynn, 2011), which focuses on increasing participation in substance abuse treatment by helping youth think more clearly and systematically about their drug use and personal problems. Participants are provided with opportunities to practice and internalize problem-solving, decision-making, and self-control strategies during eight interactive group sessions. In the remainder of the paper we will limit our discussion to two core strategies. It is expected that these specific components can be easily modified to enhance other therapies and manualized interventions.

Improving wisdom/expertise through analytically created schemas

Analytically created schemas (ACSs) also called derived structural schemas (Dansereau, 1995) are “fill-in-the-blank” guides or checklists that incorporate general characteristics and steps that underlie a collection of activities or instances. These structures differ from “naturally” acquired schemas in that they are consciously created by individuals to help understand and respond to objects and procedures that are either infrequently experienced or are ones whose common elements are not obvious. In either case, unconscious statistical averaging via the experiential systems will not be effective; conscious derivation of schema categories is necessary. In most cases, ACSs are developed and used by professionals. A few examples are worksheets used by teachers, procedure checklists used by engineers, planning guides used by travel and event planners, and orders of operations used by mathematicians. Although prevalent in professional and educational arenas, ACSs are much less frequently developed and used by individuals in dealing with personal problem solving, decision-making, and planning (Dansereau, 2005). An exception is the use of worksheets as a part of cognitive behavior therapy (CBT) homework assignments. These between-therapeutic session activities are considered critical to the success of CBT (Beutler et al., 2004). Although CBT worksheets have characteristics of ACSs, they are typically tailored to the client’s specific issues and circumstances via collaborative development (Kazantzis et al., 2004). In addition, these tools are usually designed to re-structure specific non-productive emotional responses (e.g., anxiety). Our model (IJDM) suggests that this targeted CBT

approach can be expanded to enhance basic wisdom/expertise schemas that can generalize across individuals and situations.

As stated earlier, the use of the analytic system is effortful and is often avoided by both adults and adolescents. However, it is clear that repeated explicit application of an ACS leads to the formation of an implicit schematic structure that represents internalized expertise. One of the salient characteristics of domain experts is that they are often unable to explicitly describe how they do what they do. This “expert paradox” (good at performing not at explaining) results from explicit processing being internalized over time and practice. Once this process is complete, the expert’s processing is fast, pre-conscious, and effective. In terms of our model, as the wisdom/expertise intersection is further developed it serves to guide future activities through matching and mental simulation (Klein, 1999). In this way the study of expert development in professional realms can direct the development of interventions to enhance adolescent JDM.

Graphic approaches to aid decision analysis have been recommended and extensively used as scaffolds (Larkin & Simon, 1987; Dansereau & Simpson, 2009). In particular, node-link displays called “guide maps” have been shown to assist counselors, clients, and students in reaching more effective and satisfying decisions (Dansereau, 2005). For example, versions of these maps have been used by CBT therapists as worksheets to assist in skill acquisition. A relevant example of the map approach derived from the IJDM to promote the development of new ACSs is labeled WORK IT (see Figure 2). This ACS was designed to integrate components that have been individually promoted in the decision making literature (e.g., goal setting and implementation intentions) into a structure that can be used to train adolescents on becoming more expert in coping with personal dilemmas. Certainly other ACSs can be developed and used to accomplish related objectives.

WORK IT uses four core processes described by Byrnes (1998) and considered components of executive functioning (Anderson, 2002): (1) set goals, (2) consider one or more ways of accomplishing goals, (3) evaluate options, and (4) implement the option that seems like the best way to proceed. WORK IT also contains additional activities recommended to enhance decision-making such as multiple perspective-taking (Epley, Morewedge, & Keysar, 2004), rating each option along several dimensions (Kahneman, 2011), and implementation intentions (Gollwitzer & Sheeran, 2006). Individuals use WORK IT to analyze decisions and plans by completing the graphic structure. They are guided through this process a number of times using both personal and hypothetical problem examples. The structured prompts embedded within WORK IT serve to guide thinking and help participants internalize the key elements of systematic decision-making. For example, in one training application adolescents work through a hypothetical scenario where they are allowed to leave residential substance abuse treatment on a 4-hour pass home. Their parents have invited family members over, including two cousins with whom the client used to use drugs. It’s expected that they will have illicit substances with them which may be tempting to the client. As adolescents work through the scenario, they identify the problem, explore potential options for dealing with social pressure, consider various perspectives (e.g., mother’s views if they choose not to come home or if she is told of the cousins’ use), and potential outcomes of the decision (e.g., rejection by cousins if refuse, self-efficacy for withstanding peer pressure). Through exposure to various training scenarios in different formats (e.g., individually, in teams) participants engage in solution-focused activities that promote the internalization of schemas for how to solve complex social problems.

Research on an earlier version of this ACS, as well as numerous others in the form of guide maps, indicates that multiple experiences with such structures positively alter self-reported judgments and decisions even when the schema is not explicitly used (Kreitler, Dansereau,

Barth, Repasky, & Miller, 2012). Our interpretation, based on literature describing the development of expertise (e.g., Ericsson, Charness, Feltovich, & Hoffman, 2006), is that experiences with ACSs like WORK IT train individuals to monitor and control their decision making, improve their judgment, and contribute to the development of wisdom/expertise structures that are automatically activated by matching new situations that call for similar processing. In essence, analytic repetition (analogous to practice in the athletic training approach to developing expertise) is proposed to create schema components that can be accessed rapidly by pattern matching processes similar to those used by the experiential system. This less effortful processing is more likely to be used by adolescents than analytic processing in real-life context.

The key to achieving an efficient level of wisdom/expertise is the use of meaningful repetition similar to that used in sports and other physically-based activities such as dancing and singing. In this regard, recent work drawing parallels between cognitive concepts like willpower and muscle development (Baumeister, Vohs, & Tice, 2007) suggests that willpower can be strengthened with practice and fatigued with excessive use. This “physical” view of cognition proposes that training methods used in sports and similar activities are likely to have direct applicability in enhancing JDM, problem solving, and execution of plans. The problem is that like some forms of physical training, analytic use or practice is typically effortful and boring until it becomes internalized and automatic. Consequently most people, and especially adolescents, tend to not put into practice what they learn through limited exposure. In the physical realm, personal trainers and coaches have recognized that guided and supported practice (particularly involving the use of peer collaboration) is necessary to insure sufficient skill development to move from initial exposure to continued use. Given the recent research findings reported by Baumeister and others (Baumeister, Gailliot, & Tice, 2009), it appears that cognitive skill training could benefit from following the same trajectory as physical training. Consequently, ACS interventions like WORK IT and other cognitive tools should include extensive practice that uses guided decision analyses, spaced repetitions, and peer involvement to increase trainee engagement and persistence.

Metacognitive nudges

Self-talk, supportive people (e.g., teachers, coaches), and environmental reminders have been shown to serve as nudges that can initiate, modify, or terminate cognition, emotion, and behavior (Thaler and Sunstein, 2008). In the experiential system, nudges are typically integrated with stored episodes and are consequently automatically created and activated. For example, the companionship of a particular peer might serve as a cue to drive more recklessly based on prior experiences with that peer. On the other hand, the analytic and wisdom/expertise components are likely more receptive to consciously developed nudges (such as reminder notes), and are consequently more open to intervention efforts. We believe training adolescents to identify and create positive nudges can be done most effectively in conjunction with the development of ACSs for enhancement of the wisdom/expertise component. For example, the “rating” portion of WORK IT is designed to promote the development of nudges in the form of self-talk and images (e.g., “How would my mom rate this option?”). Thaler and Sunstein (2008) have discussed the importance of nudges in JDM. Their suggestions for nudge creation, especially environmental nudges (like product placement) can be used to expand the metacognitive consequences of the use of structures like WORK IT, especially during the Imagine (planning) stage (see Figure 2). In conjunction with developing positive nudges, it is equally critical for individuals to identify internal and external triggers that lead to poor judgments and decisions so they can be modified or avoided. Using guide maps and cooperative processing to analyze past decisions and to promote the identification of positive and negative nudges can facilitate this process. As

with ACS usage, extensive guided practice similar to that used in athletic training is essential for developing internalized and automatic nudges.

Concluding Comments

This paper expands models of judgment and decision-making by integrating ideas from research in education and the development of expertise into the dual-processing system that forms the core of recent JDM theories. The goal is not only to develop a more complete framework, but also to identify portals (access points) in the system that can be used to guide the development of interventions for enhancing JDM, especially for adolescents. Our proposed IJDM recognizes the importance of the intersection between the experiential and analytic systems. This intersection, expertise/wisdom, can be targeted for enhancement by training and coaching on analytically created schemas (ACS), such as WORK IT to develop schemas and nudges that can be activated automatically.

Given that poor judgment and decision making is at the heart of many problematic behaviors exhibited by adolescents and adults, designing and implementing interventions aimed at improving judgment is imperative. The internalized schemas of youth engaging in deviant behavior (e.g., substance use, criminal activity), for example, may be distorted and inhibited by environmental factors (e.g., negative peer groups) and low frequency episodes (e.g., successful negotiation with an adversary). Even when individuals “know what is right,” they may choose other options if conflicts arise between their values and social cues, particularly if existing schemas for how to respond are negative and ingrained. For instance, because adolescents are often motivated by social rewards, the temptation to use is strong when offered illegal substance in the presence of valued peers, even when motivation to stay clean is high.

Interventions aimed at improving JDM under real life circumstance must focus on the development and internalization of schemas (process oriented) rather than solely developing a verbatim set of responses for use in certain situations (solution-oriented). The IJDM model described herein suggests that through practice applying ACSs to engaging and relevant topics and scenarios, participants gain both types of experiences. They explore options and “bank” potential behavioral responses (solutions) that they can use in future life encounters (e.g., what to say when offered an illegal substance). But most importantly, they develop an internal schema that they can apply to real-time decision making (in full or in part). Through repetition and practice applying general ACSs to a wide variety of situations (some realistic, some fantasy examples) they internalize the process of how to approach a complex decision. This generic process is then easily accessible and can be applied in a wide variety of contexts. When social cues or events deviate from what is “practiced” in counseling or educational settings, the schema is still available to assist the individual in decision making. This flexibility aids in situations where JDM can be sabotaged (e.g., social situations where motivation to fit in or please others can conflict with and override personal values and intentions).

The JDM challenge for all individuals, and especially adolescents, calls for enhancements to typical experience – based means of gaining wisdom. Consequently, the authors would suggest that training that improves personal JDM wisdom/expertise would be valuable as a standard part of educational and job training curricula in addition to its use in remediation and treatment.

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Figure 1.
An Integrated Judgment and Decision-Making Model (IJDM).

work it

W WHAT's the problem or issue?

Who will be affected by what you decide?

Who can help you with this decision? (Helpful People)

(1)

(2)

(3)

Think about your Options and Choices
What would your "Helpful People" suggest?

Options	CHOICE A	CHOICE B	CHOICE C
Describe each Option or Choice			
For each choice, what <u>good</u> things might happen?			
For each choice what <u>not so good</u> things might happen?			

work it

R Rate It

Enter your Options or Choices from Previous Page

Options	CHOICE A	CHOICE B	CHOICE C
How will you feel 10 minutes after you make this choice?	Very Bad 0 1 2 3 4	OK 0 1 2 3 4	Very Good 0 1 2 3 4
How will you feel 2 weeks after you make this choice?	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
How will you feel 1 year after you make this choice?	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
How would the #1 person most affected rate this choice?	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
How would your #1 "helpful person" rate this choice?	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
TOTALS			
Add up your ratings for each choice			

k Know more about what to do:
Look over your choices and your ratings.
Think about how other people will be affected and what your "helpful people" would say.
Describe your best choice here:

work it

i Imagine how you will turn your choice into action

What specific steps are needed? List them in order.	When will you do this step?	Who can help with this step?	What "roadblocks" might get in your way? How will you get around them?

Give yourself time to carry out your plan
Use this worksheet as a reminder
Then see what else needs to be done

t TEST the Results!

How I made progress resolving my problem?
What needs to happen next?

Figure 2.
WORK IT: An analytically created schema.