Risk-Taking and Goal-Directed Behavior: How risk and decision-making science can inform intentional self-regulation theory

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Abstract

Many consider Intentional Self-Regulation (ISR) or, more broadly, goal-directed behavior, to be an essential skill in promoting positive and adaptive healthy development across the life-span. The Selection-Optimization-Compensation (SOC) model of ISR has described positive development among children, adolescents, and adults among various populations. However, the current SOC does not quantify the lived experiences and interindividual differences resulting from experience, training, and culture. In this paper, I use models from the decision making and risk-taking literature to conceptualize a model that describes interindividual differences in ISR based on lived experiences within the leadership context where risk is a vital decision-making consideration. A conceptual model and important variables to consider to test the model are discussed.

*Keywords:* Selection, Optimization, and Compensation; Intentional Self-Regulation; Risk-Taking; Decision Making; United States Military Academy

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On the darkest of nights, a young military leader was faced with a series of choices that would not only determine if the late-night mission was successful but also whether the Soldiers under his command could potentially live or die. As the ramp of the cargo aircraft opened, the subzero temperatures filled the cargo area. The Soldiers knew they needed oxygen to breathe at this altitude, and the oxygen bottles strapped to their harnesses were running low. The young leader weighed many goals and factors as he decided whether to make the high altitude jump into enemy territory or have the aircraft turn around and safely return to base. The goals of the mission became increasingly conflicting. On the one hand, the immediate safety of those in the aircraft seemed paramount. However, on the other, the safety of those men already rapidly walking toward the enemy-held compound relied on these airborne Soldiers isolating the compound first. Numerous factors weighed on the decision to execute or abort the mission.

An individual’s goal hierarchy informs priorities and provides a framework for these decisions. If the superordinate goal is mission accomplishment, then the leader may choose to execute the mission even if it is inherently risky for his Soldiers. However, if the lives of his Soldiers are the superordinate goal, then the leader will make decisions and align resources to optimize the health of the Soldiers over the execution of the mission. Given perfect information, this decision could be made based solely on the established goal hierarchy. However, no decision is made in isolation, void of all context and biases. Instead, goal-based decisions and goal-directed behavior are deeply embedded in an individual’s context as much as it is in the life-experiences of the individual. Contemporary developmental scientists have sought to describe, explain, and optimize this decision making process and the operationalization of the goal-directed behaviors (termed intentional self-regulation) across the life span. A person’s ability to regulate their relationships with their complex and ever changing context is the fundamental basis for successful development across an individual’s life (Baltes et al., 1999). Unfortunately, goal-based decisions are often difficult due to imperfect information and fuzzy logic[[1]](#footnote-21), summarized well by the military idiom, “mission first, men always.”

In the leadership context, leaders often make goal-based decisions that rely on imperfect and, at times, missing information. Would the oxygen bottles run out before the Soldiers could safely reach the ground? Would the enemy be alerted to the aircraft and train their weapons on the vulnerable Soldiers under parachute? Would the Soldiers be able to land and consolidate on the postage stamp size drop zone in the rugged mountain hills? Did the Soldiers have adequate training to conduct this operation successfully? The outcome of this decision would determine the well-being of the Soldiers this young officer leads and his future professional trajectory. These questions all rely on risk-based probabilities that are informed by prior experience, the culture of the organization, the mentorship of experienced Soldiers, and a little bit of luck[[2]](#footnote-23).

Decision-making researchers describe the process of using experience, mentorship, and culture to make decisions as *naturalistic decision-making*, in an attempt to capture how individuals use their experience to make decisions (Lipshitz et al., 2001). When prior experience does not exist, such as with newly commissioned military officers or newly graduated nurses, naturalistic decision-making can be influenced by more experienced colleagues through mentorship. Even with access to large amounts of information (e.g., books, orders, internet blogs, and historical documents), novice practitioners turn to experienced co-workers to facilitate decision-making (Seright, 2011). In addition to experience and mentorship, a leader’s decision-making and attitudes toward risk-taking can be influenced by the organizational culture (context).

An organizational culture is comprised of the underlying assumptions that are developed over time as the group copes with problems of external adaptations and internal integration. These assumptions are then taught to new members as the correct way to think, feel, and act (Schein, 1990). One can imagine that an organization with a risk-averse culture, such as a hospital, may reduce a leader’s propensity to make risky decisions or increase how risky they perceive a decision to be. Instead, a leader would gravitate toward safer decisions. Whereas an organization that celebrates prudent risk-taking, such as the military, may increase a leader’s propensity to make risky decisions or decrease how risky a decision is perceived. Research among fisherman working in high-risk environments concluded that risk perception is learned through social interactions and therefore must be a cultural phenomenon, risk is a relative behavior dependent on the context (culture) (Bye & Lamvik, 2007).

This paper builds upon an existing intentional self-regulation theory to incorporate recent advances in the decision-making and risk-taking literature, specifically, the contribution that uncertainty and risk may have on life-span goal-directed behavior. I will begin the discussion with the developmental theories of intentional self-regulation, briefly describe the current state of decision-making literature and the risk-taking research, and then turn to a proposed integrated developmental model that better captures naturalistic intentional self-regulation in contexts that are seated in risk and uncertainty.

# Intentional Self-Regulation

Intentional self-regulation is considered a fundamental process of human functioning (Bowers et al., 2011) and describes goal directed behavior across the life-span that leads to positive outcomes. Intentional self-regulation can be defined as an “individual’s chosen, organized action-in-context that further self-defined, valued goals or purposes” (Napolitano et al., 2011). The intentional self-regulation process helps an individual navigate successful coactions with their environment to achieve stated goals. The construct of goal-directed behavior is well described in the German action theory literature (Frese & Zapf, 1994). Action theory is situated within the developmental systems metatheory describing goal-directed behavior through the lens of a person context relation (Fischer & Bidell, 2006; Mascolo & Fischer, 2015; Overton, 2015). That is, neither the person nor the context acts independently. Instead, the goal-directed behavior of an individual acts on the context, and the context acts on the individual in a mutually influential manner. Three general models of intentional self-regulation currently exist within the developmental literature (Lerner, 2018; Lerner et al., 2002; see also Gestsdóttir, 2005).

## Motivational theory of life-span development model

The motivational theory of life-span development builds upon the life-span theory of control and the action phase model of developmental regulation to address the control processes involved in goal engagement and goal disengagement (Heckhausen et al., 2010; Heckhausen & Schulz, 1995). The theory posits two forms of control that exist in goal-directed self-regulation. The *primary control* process describes the extent to which the individual realizes control over his or her context (Heckhausen et al., 2010). In other words, primary control is the process wherein individuals change the context to bring the context in line with the individual’s goals (Rothbaum et al., 1982). This process is an assimilation one (Brandtstädter, 1998, 2006; Piaget, 1970). The *Secondary control* process describes the extent to which the individual changes themselves to bring themselves in line with the context. This process reflects accommodation (Brandtstädter, 1998, 2006; Piaget, 1970). Overall, the model describes a system in which an individual is motivated to maximize primary control across life domains and minimize secondary control (Heckhausen et al., 2010) through a sequential process of goal selection, goal engagement, and goal disengagement.

## Tenacious goal pursuit and flexible goal adjustment model

The second theory of intentional self-regulation is commonly referred to as the tenacious goal pursuit and flexible goal adjustment (TENFLEX) model (Brandtstädter, 1998, 2006; Brandtstädter & Renner, 1990). The TENFLEX model describes the *assimilation process* as the individual transforming the circumstances to align with personal preferences and the *accommodation process* as adjusting personal preferences to situational constraints (Brandtstädter & Renner, 1990). According to this model, individuals strive to achieve a subjectively favorable balance of gains and losses across the life span (Brandtstädter, 1989).This balance reflects the equilibration process discussed by Piaget (1970).

## Selection, Optimization, and Compensation model

The third framework was described by Baltes and Baltes (1990) as a theory of life-span development through the Selection and Optimization with Compensation Model (SOC). The SOC model was initially theorized to describe a universal life management strategy for successful aging and has been adapted to focus on specific contexts, including the workplace (Baltes & Dickson, 2001; Wiese et al., 2000), and child and adolescent development (Gestsdóttir & Lerner, 2007; Lerner et al., 2001). The SOC model is comprised of three processes of developmental regulation. *Selection* refers to setting goals and encompasses the specification of goals, establishing a hierarchy of goals, and a commitment toward goals. A subset of selection is *loss-based selection*, that is, adjusting goals as one ages and resources are no longer available to achieve established goals (such as health) (Freund & Baltes, 2002). *Optimization* refers to the acquisition and investment of goal-related means and encompasses focus, persistence, resource allocation, modeling others, and acquiring new skills, such as executive functioning or strategic thinking (Freund & Baltes, 2002; Lerner, 2018). *Compensation* refers to acquiring alternative means to achieve goals and encompasses substitution of means, enlisting the help of others, activation of unused skills or acquiring new skills, and changes in the allocation of resources (Freund & Baltes, 2002).

These three models have significant overlap theoretically (Haase et al., 2013) and generally describe two similar processes. Each of the three models describes a process wherein an individual exerts control or influence over the context to achieve a goal. Heckhausen (2010) describes this process as primary control, Brandstadter (1990) describes this as assimilation, and Baltes (1990) describes this as Selection, Optimization, and, Compensation. Each of the three models also describes a process wherein an individual must adapt to contextual constraints by adjusting goals. As these are all life-span development theories, initially created to describe positive adaptation as an individual ages, contextual constraints within this literature generally refer to the loss of capabilities later in life. Heckhausen (2010) describes this process as secondary control, Brandstadter (1990) describes this as accommodation, and Baltes (1990) describes this as loss based selection.

All three of the action-theory models have been applied toward adult development contexts. However, only the SOC model (minus loss based selection) has been empirically associated with positive outcomes in child, adolescent, and adult development contexts (Gestsdóttir & Lerner, 2007; Lerner et al., 2001, 2002; Wiese et al., 2000). In the leadership context, the SOC model may be more useful as the assimilation, and secondary control processes emphasized in the other models, fall short of describing the need for leaders to adapt approaches toward accomplishing established goals and instead focus more specifically on loss-based selection processes or mental processes of acceptance when goals are not achieved. In particular, the military leadership context does not support a leader that fails to accomplish a mission and develops an attitude of “it really wasn’t worth it anyway,” which might be a stance taken when using accommodating processes (secondary control or flexible goal adjustment). The SOC model places more nuanced emphasis on the assimilation process by differentiating it into three sub-processes.

## Military decision-making process

The SOC model also mirrors much of the U.S. Army’s military decision-making process (MDMP). Upon receipt of a mission/goal, the MDMP is meant to objectively weigh and assess different courses of action based on mathematically-based decision criteria to optimize available resources in the accomplishment of the stated mission/goal. Once a plan is established, a process of ‘contingency’ planning is conducted to determine alternate approaches toward goal accomplishment if resources become unavailable (CALL, 2015). This process of goal-based planning, the optimization of resources, and compensation of available means follow the SOC framework.

Neither the SOC model nor the MDMP quantify the probabilistic nature of goal-directed decisions in a context where full information is not available. In reality, goal-directed decisions and behaviors are employed in both times of certainty and uncertainty. Uncertainty implies that there is only a probability less than 100% certainty of achieving a goal. The less information available when establishing a goal and plan of action, the less likely it will be guaranteed that the stated outcome will be achieved. A level of uncertainty underlies every decision that is made in naturalistic settings, as a person does not act in a vacuum but instead acts in an everchanging person context relation. To better understand how uncertainty can be quantified, it is useful to discuss the current decision-making literature.

# Decision Making

## Classical decision-making model

Advances in decision-making research may provide insight into uncertainty and intentional self-regulation. The early models of decision-making, referred to as classical decision-making, described a deliberate process that required thorough information to choose the best option between all available alternatives and followed a formal, context-free process (Lipshitz et al., 2001). MDMP is a concrete example of classical decision-making. When synchronizing hundreds of resources on a battlefield, MDMP does provide a formal integration and alignment towards common objectives. By following MDMP, leaders essentially remove their experience-based knowledge from the process to conform to the formal process. Practically, however, aspects of this model are often ignored in favor of the commander’s directed courses of action. The decision-making researchers would refer to this experience-based approach as a naturalistic decision-making process.

## Naturalistic decision-making model

During the 1990s, naturalistic decision-making grew in prominence to capture how contexts influenced decision-making (Orasanu & Connolly, 1993). The naturalistic decision-making model eventually shifted focus from the context in which decisions are made to the way people use their experience to make decisions (Zsambok & Klein, 2014). The shift in focus toward the individual modeled decision-making as matching a decision to the context, and not merely making a context-free choice (Lipshitz et al., 2001).

In naturalistic decision-making research, risk is associated with uncertainty and error. The more uncertainty that exists when making decisions, the higher the probability of making an error, and the higher risk that is involved. Numerous coping strategies exist to reduce uncertainty; however, the more context-specific experience a decision-maker has, the more ability they have to anticipate problems ahead of time and to judge when to continue with a specific plan, or prudently adjust the plan based on their previous experiences (Lipshitz et al., 2001). The naturalistic decision-making research literature suggests that experience plays a crucial role in goal-directed decisions under risky/uncertain contexts, and may inform how individuals decide on long-term goals and resource allocation, which are abundant in uncertainty (Klein, 2008; Zsambok & Klein, 2014).

## Intensional self-regulation and decision-making

As a developmental construct, intentional self-regulation provides a universal process that informs a person’s goal-directed behavior throughout their life span. However, the specificity principle suggests that developmental scientists should consider that specific people make specific decisions about specific goals in specific contexts for specific reasons (Bornstein, 2017, 2019). The current SOC model represents a more *classical* goal-directed behavior model. However, in naturalistic settings, the universality of the SOC process does not explicitly consider how an individual assumes, mitigates, and accounts for the inherent risk of making goal-based decisions when full information is not available.

Consider two individuals, each with identical levels of defined and classically-assessed intentional self-regulation. Both individuals adequately select goals, optimize their resources to achieve those goals, and compensate when goal-based means are no longer available. Even with full information, it would be unlikely that both individuals would choose the same goals and align the same resources toward goal accomplishment even in the same specific context. The specificity principle and the idea of naturalistic intentional self-regulation combine to suggest that interindividual differences will be evident. These interindividual differences would be further highlighted when full information is not available. To account for this variation, developmental scientists must also consider each person’s specific history of experiences within this type of context; willingness to assume risk in goal selection, resource allocation, and compensation; and an individual’s appraisal of the uncertainty and resulting risk level.

An individual’s intuition or “gut feeling” plays a substantial role in decisions (Sadler-Smith & Shefy, 2004). Intuition refers to the assumptions that are formed based on past experiences, successes, failures, and retrospective analysis, or more broadly, the cumulative knowledge that an individual gains as they mature. The fuzzy-trace theory literature posits that as humans develop and gain life-experience, they rely more on intuition to make decisions than on a concrete formal conscious thought process (Brainerd & Reyna, 1990; Reyna & Brainerd, 2011). Intuition may help explain naturalistic decision making and frame why interindividual differences would exist in goal-directed behaviors. Intuition is especially important as developmental scientists conceptually think about ISR across the life-span.

An individual’s intentional self-regulation is critical to navigating successful coactions with their context even during times of certainty, such as conducting daily or weekly chores, and perhaps more importantly, during times of uncertainty, such as changing jobs, moving, economic recessions, and global pandemics. Intuition may help frame how lived experiences contribute to interindividual differences and possibly intraindividual development; however, not all uncertainty is equivalent. Thinking back to the opening of this paper, it is reasonable to consider that qualitatively different processes are employed when decision-makers face the uncertainty that cannot result in personal harm or loss of livelihood and uncertainty where behaviors could lead to harm or a person’s demise. In an *in-extremis* context, that is when lives are on the line, risk-taking research may provide some important additional contributions to intentional self-regulation theory and how intuition may be observed in this context.

# Risk-Taking

Risk-taking is abundantly mentioned in the neuroscience, decision making science, and risk research fields (e.g., Peterman & Anderson, 1999; Renn, 1998; Steinberg, 2010; Taylor-Gooby & Zinn, 2006). A recent meta-analysis in the *Journal of Risk Research* provides a useful description and definition for the four core concepts that exist in the current risk literature (Bran & Vaidis, 2019). The first is risk-taking propensity, which refers to the consistent tendency of a person to engage in risk-taking behaviors. The second is risk appraisal, which is the subjective assessment of riskiness. The third is risk-taking behavior, which is the behavioral actions a person takes involving risk. The final concept is risk-taking attitude, which refers to the risk preference or the extent to which a person favors risky choices (Bran & Vaidis, 2019). Research on risk-taking attitude suggests that the appeal of risky situations may relate to the management and minimization of the risk involved (Paquette et al., 2009) and not to the riskiness of the situation itself, as a result, this paper will focus on the first three concepts.

## Risk-taking propensity

Empirical studies suggest both a global risk-taking propensity (Duell & Steinberg, 2019; Veliz et al., 2015) and a more context-specific risk-taking propensity (Horvath & Zuckerman, 1993) among individuals; this contextual specificity suggests that a person may show higher risk-taking propensity in some contexts compared to others. These findings also suggest that risk-taking may be both global (some individuals are more likely to make riskier decisions overall) and context-specific (some individuals are only more likely to make riskier decisions in specific contexts). Research also suggests that individuals have higher risk-taking propensity in high-stress environments (Sicard et al., 2001), following violent combat experiences (Killgore et al., 2008), and with higher levels of perceived self-efficacy (Krueger & Dickson, 1994).

## Risk appraisal

Risk by its nature is subjective. The same action can be considered risky for one person but safe for another depending on experience, training, personal situations, and organizational culture (Bran & Vaidis, 2019; Bye & Lamvik, 2007). Skydiving is an excellent example of this subjectivity. If experienced skydivers perceived the same level of risk in this hobby as someone that has never stepped out of an aircraft while it was in flight, skydivers would be less likely (maybe unwilling) to conduct this activity (Bran & Vaidis, 2019). However, the years of training and experience may influence the risk appraisal of the skydivers. Risk appraisal may be an important aspect to consider when thinking about how previous experiences influence an individual’s intentional self-regulation.

## Risk-taking behavior

Risk-taking behaviors are most certainly grounded in culture and can be influenced by the context (Crenshaw & Yoder-Wise, 2013). For example, in organizations that reward bravery and risk-taking, such as the military and fire fighters, leaders who are willing to expose themselves to potentially life-threatening situations are seen as more effective (Frost et al., 1983) and thus would have more favorable attitudes toward taking risks or making risky decisions. Evidence suggests that risk-taking behavior is a global construct. That is, increased positive or socially acceptable risk-taking behaviors are associated with increased negative or socially unacceptable risk-taking behaviors (Duell & Steinberg, 2019; Veliz et al., 2015).

Risk-taking is a complex construct that is best described through the dynamics of individual context relations (e.g., Mascolo & Fischer, 2015), such as models from relational developmental systems metatheory (Overton, 2015). How an individual assesses risk and makes risky decisions cannot be reduced to any one of these core concepts without considering how these concepts coact with the context and more importantly, the person. An individual’s life experience plays an essential role in intentional self-regulation, especially in contexts where risk-taking is a professional necessity. In order to understand the potentially idiographic character of a specific person’s intentional self-regulation in a leadership context, an individual’s lived experience, mentorship, culture, and risk-taking (propensity, appraisal, and behaviors) must be included. The resulting model, termed naturalistic intentional self-regulation will now be explored.

# Naturalistic Intentional Self-Regulation

Conceptually, the proposed model, which is presented in Figure 1, begins with a specific person in a specific context. Lived experiences, mentorship, and culture influence an individual’s risk-taking (propensity, appraisal, and behaviors). Risk-taking in turn would influence the loftiness of the goals selected, the accumulation of available resources, the persistence of behaviors toward the stated goals, and determine when compensation processes should be enacted. The success or failure of the goal-directed behavior would then act in a circular nature to inform future risk-taking and goal-directed behavior. The model depicts the person context relation.

This model proposes that in contexts where there are higher levels of uncertainty, an individual’s risk-taking (propensity, appraisal, and behaviors) may have more influence each of the SOC processes. Higher levels of risk-taking may produce loftier goals, encourage more acceptance of risk in planning for those goals, and more optimistic framing of resource availability. Finally, higher levels of risk-taking may delay the activation of compensation processes. If goals are reached, the model proposes a higher level of risk-taking in subsequent goal-directed behavior.

To test this model, researchers should start within a higher-risk context. Measures of intentional self-regulation, self-reported risk-taking appraisal and propensity, behavioral indicators of risk-taking, and organizationally important outcomes would need to be collected to determine if and how risk-taking moderates the association of ISR with institutionally important outcomes. Additional contextual variables (lived experiences, mentorship, and culture) could help explain differences in an individual’s risk-taking.

The United States Military Academy (USMA) provides a unique higher-risk context to test naturalistic intentional self-regulation. Young leaders are groomed and tested throughout the 47-month curriculum to assess and mitigate risk while making decisions when information is often incomplete. Project Ar^ete, a joint longitudinal character development study between USMA and Tufts University has produced a rich dataset that contains self-reported intentional self-regulation (SOC measure), a self-reported risk-taking subscale (Masculinity measure), a self-reported domain specific risk-taking propensity and appraisal measure (bespoke DOSPERT measure), behavioral indicators of risk-taking (such as Airborne School, Air Assault School, and Combat Diver Qualification Course attendance), and important organizational performance measures. If risk-taking does moderate the association of ISR with institutionally important outcomes, a qualitative analysis would need to be considered to understand the association between risk-taking and experience, mentorship, and culture.

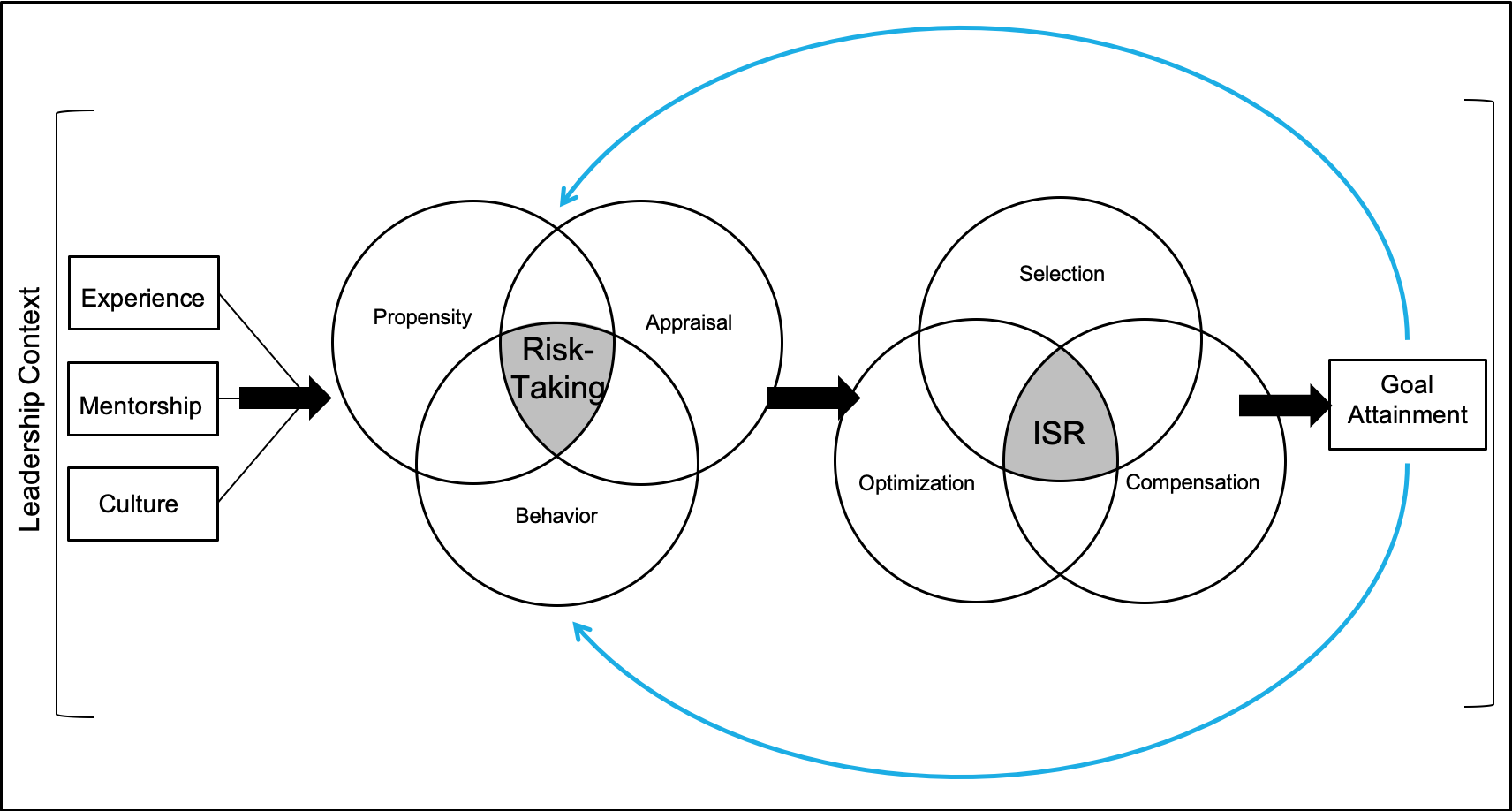
If the model is supported, the model would then need to be tested across similar contexts (perhaps the Air Force Academy or the Naval Academy) before it can be tested across broader contexts (e.g., first responders, health care workers). Subsequent research should also focus on low-risk contexts to determine if levels of uncertainty and contextual risk attenuate the relationship between ISR and risk-taking.

# Conclusions

Several years ago, high above the mountainous landscape, it was the training, experience, council, and culture that informed my goal-directed behavior and decision-making process. After issuing the execution order and watching my well-trained Soldiers disappear into the midnight abyss, I confidently stepped out of the aircraft, one step closer to accomplishing our mission. Now, as a developmental scientist, I am grappling to understand the processes that make some individuals more positively adaptive than others in leadership contexts. I want to understand why I made life-altering decisions throughout my military career so that I can better prepare future leaders to be optimally equipped to make appropriate decisions.

The integration of research by developmental scientists, risk-taking scientists, and decision-making scientists provides a lens to understand these processes better. Future research is needed to determine if and how lived experience influences risk-taking propensity, risk appraisal, and risk-taking behavior; whether risk-taking influences the positive contributions that intentional self-regulation has on successful adaptation throughout the life-course; and if risk-taking does influence intentional self-regulation, how can this influence be optimized throughout life span development.

**Figure 1**

*The Naturalistic Model of Selection Optimization Compensation in a Leadership Context.*  *Note.* While simplistic, this model displays how a specific context (previous experiences, guidance/mentorship, and culture) influences a specific individual’s risk-taking and goal-directed behavior, which in turn influences future risk-taking in a reciprocal manner.

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In partial fulfillment of the requirements for the degree of Doctor of Philosophy Child Study and Human Development

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I would like to thank my advisers, Dr. Richard M. Lerner and Dr. Sara K. Johnson for their guidance, help, and direction in the process of crafting this paper.

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1. This term is popularized in modern computing applications which is based on “degrees of truth” rather than “right/wrong” or “true/false” (<https://searchenterpriseai.techtarget.com/definition/fuzzy-logic>). Fuzzy logic more closely mirrors how human’s make decisions compared to boolean logic. [↑](#footnote-ref-21)
2. The moment preparation meets opportunity. [↑](#footnote-ref-23)