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# Entrepreneurial Social Support, Performance, and Well-being: The Mediating Effects of Metacognition

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# Entrepreneurial Social Support, Performance, and Well-being: The Mediating Effects of Metacognition

by

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# Abstract

Metacognition, or "thinking about thinking," has recently been posited to be an important aspect of the entrepreneurial mindset. Despite this surge of interest on the topic, there is relatively little quantitative evidence examining the effects of metacognition within the entrepreneur psychology literature. This study seeks to understand potential mediation effects of metacognition on the relationship between an entrepreneur's social support and their performance and mental well-being. The study begins with a review of the literature, before describing the motivations and hypotheses for our research. We test our hypotheses on a sample of 238 active North American entrepreneurs using structural equation modeling. We end by discussing our findings, their limitations, as well as their implications for both research and practice.



*Keywords*: entrepreneur, metacognition, performance, well-being, social support

# Preface

This thesis is original, unpublished, independent work by the author, M. Learning under the guidance of Dr. Justin Weinhardt. The empirical research described in this thesis was issued Ethics Approval (file number REB17-1240), issued by the University of Calgary Conjoint Health Ethics Board for the project “Metacognition and Entrepreneurial Performance” on September 25, 2018.

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# Introduction

Elon Musk is a prominent and innovative entrepreneur who after a successful exit from his first company, Paypal, has started some of the most bold and innovative companies around today. He is either founder, CEO, chairman or some combination of the three, for six different companies attempting to disrupt and innovate in six different industries. When asked about his success, Elon credits his ability to - "think back to first principles" (Vance, 2015). In other words, he can examine his own thought process and apply a different framework to the task at hand. This ability to "think about thinking" is a simplified conceptualization of a concept know as metacognition (Flavell, 1987). Recently, the entrepreneurship literature has posited that metacognition is a beneficial ability for entrepreneurs to have, and that it can lead to performing and feeling better in uncertain, novel, and dynamic conditions (Haynie, Shepherd, Mosakowski, & Earley, 2010). Entrepreneurship is an exemplar of these conditions, which necessitates the investigation of how differences in how entrepreneurs think relate to firm performance and other important outcomes.

There has been great interest in understanding entrepreneurial cognition and the "entrepreneurial mindset" over the past several decades (Mitchell et al., 2002). Despite the fascination with entrepreneurial thinking, there has been a relative dearth of quantitative studies looking at the antecedents and outcomes associated with entrepreneurial cognition. There has been a strong theoretical case for metacognition being an important aspect of the entrepreneurial mindset, but very little in terms of quantitatively assessing these theoretical assumptions (Haynie et al., 2010). Metacognition research in other domains suggests that metacognition can fluctuate depending on environmental factors and can be promoted or suppressed in an individual (Gunstone & Northfield, 1994). With this in mind, we also know very little in terms of the

antecedents influencing metacognitive thinking in an entrepreneurial context. Finally, there has been almost no research examining the effects of metacognitive thinking on two prominent dependent variables in entrepreneurship, that of firm performance (see Cho & Jung, 2014 for an exception) and entrepreneur mental well-being. There has been a gradual shift in the entrepreneurship literature towards taking a more holistic approach to evaluating entrepreneurial success, looking beyond just economic gains and instead integrating the health and mental well-being of the entrepreneur (Stephan, 2018; Wach, Stephan, & Gorgievski, 2016). This shift in focus highlights the salience of studying the potential effects of metacognition on the mental well-being of the entrepreneur.

This paper seeks to contribute to the entrepreneurship literature in several ways. One, this paper adds to the small amount of literature using and validating the measure of adaptive cognition scale (MAC; Haynie & Shepherd, 2009). Having a well validated measure for assessing metacognitive awareness in an entrepreneurial context is vital for furthering the research stream and creating cumulative knowledge on the subject. Further, we take a more nuanced look at the relationship between social support and mental well-being and firm performance, by proposing a potential mediation effect. As will be seen in our review of the extant research, it is important to expand the scope of metacognition in entrepreneurship to include broader dependent variables that are prominent in the larger entrepreneurship literature.

To begin, this paper will provide a general overview of the concept of metacognition and metacognitive awareness. We then conduct a brief review of the quantitative metacognition studies in the field of entrepreneurship before identifying some gaps in the literature to help explain the motivation and design of the current study.

## Metacognition and Metacognitive Awareness:

Metacognition as an area of research originated with a seminal paper by Flavell (1979). Metacognition has been described both as a "buzzword" (Livingston, 2003), and one of the "top 100" topics in developmental and cognitive psychology (Nelson, 1992). Although the term is slightly nebulous, metacognition is something that most people, in some form or another, engage in every day. It simply involves taking a higher-order level of thinking that attempts to actively control our engagement in cognitive processes (Flavell, 1987; Livingston, 2003). Metacognition is "cognition about cognitive phenomena" or, more colloquially, "thinking about thinking" (Flavell, 1979). The majority of research on metacognition has been in the realm of educational psychology, which almost ubiquitously recommends that teaching metacognition to learners is an important asset (Lai, 2011). Research on the extent to which metacognition should be promoted within entrepreneurship, or within an organizational context in general, is very limited. The following sections describe the recent attempts to integrate a theory of metacognition into the entrepreneurship literature.

## Measure of Adaptive Cognition

Entrepreneur researchers often take a psychological approach to understanding entrepreneur behavior, decision making, and success (Frese & Gielnik, 2014; Rauch & Frese, 2007; Unger, Rauch, Frese, & Rosenbusch, 2011). Haynie and Shepard (2010) proposed that individuals who are more adaptive in their thinking would have a competitive advantage over other entrepreneurs in dynamic and uncertain environments. To investigate differences in thinking styles, they turned to the metacognitive literature to develop a measure of adaptive cognition. Haynie and Shepherd developed a five factor measure of adaptive cognition (MAC) meant to quantitatively assess the metacognitive awareness in entrepreneurs (2009; Haynie et al.,

2010). The five factors are: goal orientation, metacognitive knowledge, metacognitive experience, metacognitive choice, and monitoring.

*Goal Orientation*: The first factor of metacognition in the entrepreneurial mindset occurs with the interaction between the individual and the environment. This assumes the well-developed theoretical perspective of situated cognition, where both the environment and an individual's motives influence the use of different cognitive strategies (Griffin & Ross, 1991; Haynie et al., 2010). Because the entrepreneurial context is uncertain and dynamic, there will be individual differences in cognition (McMullen & Shepherd, 2006). In practice, the goal orientation factor in the MAC is attempting to capture the interaction between individual motivations and the external environment. There is one major difference between the factor of goal orientation in metacognitive awareness and goal orientation in the broader goal-setting and goal-orientation literature in organizational psychology. The original theoretical underpinnings, and the conceptualizations for capturing goal orientation in the work domain, are concerned with classifying an individual into having either learning or performance orientation (Dweck, 1986; VandeWalle, 1997). The items assessing goal orientation in the MAC are less focused on delineating between the style of goal setting, and more concerned with the individual setting goals in the first place. The goal orientation factor in the MAC is a broader assessment of an individual's attempt at self-regulation (Pintrich, 2000)

Goal orientation is the foundation for developing and employing metacognitive strategies and is defined as: "the extent to which the individual interprets environmental variations in light of a wide variety of personal, social, and organizational goals" (Haynie & Shepherd, 2009, p. 699). Based on this interaction between the individual's motivation and their interpretation of the broader external environment, goal orientation serves the function of focusing the "direction"

and “intensity” of an individual’s cognitions, and engaging the two different types of metacognitive resources: knowledge and experience (Haynie et al., 2010). How an individual engages these resources will influence their choices and ultimately their intended actions and perceptions of the outcomes.

*Metacognitive Knowledge*: The first of the two metacognitive resources is metacognitive knowledge. Metacognitive knowledge encompasses an individual's conscious recognition and employment of their knowledge surrounding people, tasks, and strategy (Flavell, 1987; Von Wright, 1992). One’s knowledge of people can be parsed into intra-individual, inter-individual, and universal beliefs (Haynie et al., 2010). Metacognitive knowledge takes into account an individual’s personal beliefs about themselves, about people they know, and generalizations about all people. An individual’s knowledge about themselves and others is not only helpful in itself but is beneficial in decision making when combined with task knowledge, strategy, and experience.

Task knowledge refers to specific information as related to a given task. Information about a similar or identical task will be utilized entirely differently depending on the goals of the individual. Task knowledge consists mainly of the plan of action chosen for a given task, but also task specific common knowledge and how past task knowledge performed for a given task (Locke, 2000; Johnson, Johnson, Waddington, & Shouls, 1988)

The last aspect of metacognitive knowledge is that of strategy. An individual uses their knowledge about strategies to make choices about which strategy is most appropriate for achieving a desired outcome. This is important as not everyone has the same desired outcomes, and their knowledge and intuitions about different strategies are going to influence the actions they take to reach a desired outcome.

Therefore, metacognitive knowledge can be formally defined as "the extent to which the individual relies on what is already known about oneself, other people, tasks, and strategy when engaging in the process of generating multiple decision frameworks focused on interpreting, planning, and implementing goals to 'manage' a changing environment" (Haynie & Shepherd, 2009, p. 699).

*Metacognitive Experience*: Alongside metacognitive knowledge, metacognitive experience is the other main factor that individual's high in adaptive cognition use to formulate their metacognitive choice decisions. Metacognitive experience consists of prior memories, intuitions, and emotions that all serve to inform the process of making sense of a given task (Flavell, 1987). Metacognitive experience is described as: "the extent to which the individual relies on idiosyncratic experiences, emotions, and intuitions when engaging in the process of generating multiple decision frameworks focused on interpreting, planning, and implementing goals to 'manage' a changing environment" (Haynie & Shepherd, 2009, p. 699).

*Metacognitive Choice*: Ultimately, an individuals' goal orientation and reliance on metacognitive knowledge and metacognitive experience serves to create a set of varying alternatives for a given decision choice. The individual can then choose the most appropriate decision framework, in the context of the changing environment and motivations, that they believe most appropriate to achieve a desirable outcome. New venture creation can be boiled down to the individual and the choices of action that they take (Shaver & Scott, 1992). Actions are inherently uncertain. In their model of entrepreneurial uncertainty, McMullen and Shepherd identify that an individual must assess their prior knowledge and experience, and their motivations as they relate to the external environment for action to be taken (McMullen & Shepherd, 2006). Metacognitive choice is the part of the metacognitive process where all the

factors culminate into an action decision and is critical for dealing with uncertain outcomes inherent to the entrepreneurial process. Metacognitive choice can be described as the "extent to which the individual engages in the active process of selecting from multiple decision frameworks the one that best interprets, plans, and implements a response for the purpose of 'managing' a changing environment" (Haynie & Shepherd, 2009, p. 700).

*Monitoring*: The last stage of cognitive adaptability in the metacognitive entrepreneurial mindset is monitoring. Monitoring is the act of receiving and implementing feedback from the actions arising from the selected decision framework (Flavell, 1979, 1987). Using this feedback, an individual re-assesses and adapts their own motives and goal orientation. Further, the individual may take this feedback and adjust which types of metacognitive knowledge and experience they use to inform their metacognitive choice (Haynie et al., 2010). A formal definition for monitoring is: "seeking and using feedback to reevaluate goal orientation, metacognitive knowledge, metacognitive experience, and metacognitive choice for the purposes of 'managing' a changing environment (Haynie & Shepherd, 2009, p. 700)." Monitoring specifically, is the one attribute of metacognition that makes it beneficial in dynamic and uncertain environments, because monitoring allows the individual to continually adapt their decision framework to suit changes in the environment.

The circular nature of this process can be seen in Figure 1, with monitoring influencing both goal orientation and the two metacognitive resources, which ultimately adjusts the metacognitive choice accordingly. The model of cognitive adaptability is operationalized through the MAC by asking questions that load onto individual factors, which in turn load onto the second order latent construct of cognitive adaptability (Haynie & Shepherd, 2009).

Throughout this study, we treat the term "metacognitive awareness" as synonymous to an individuals' level of adaptive cognition.

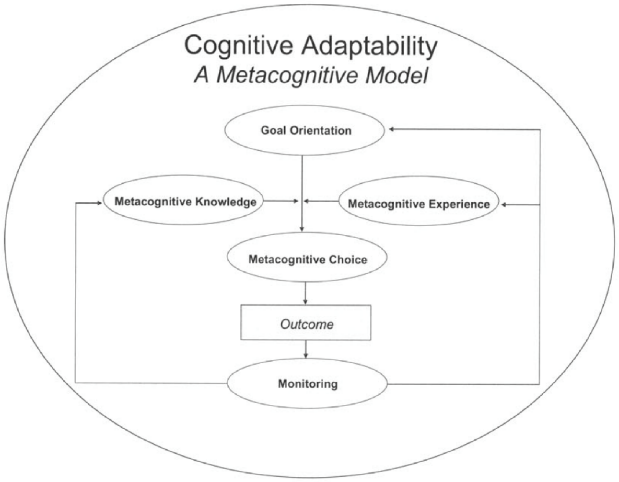


*Figure 1: A Model of Cognitive Adaptability Source: (Haynie & Shepherd, 2009)*

## Metacognition in Entrepreneurship Literature Review

Despite the inception of both a conceptual model and a quantitative scale for measuring metacognitive awareness in the entrepreneurial context, there is a relative dearth of quantitative entrepreneurial metacognition research. The following section is devoted to reviewing the sparse and scattered quantitative studies utilizing some or all of the metacognitive awareness scale. Of the 187 citations[1] for Haynie & Shepherd's MAC (2009), only nine studies are published in reputable journals[2] that take a quantitative approach to measuring factors of metacognition in an entrepreneurial context. We briefly describe the purpose of each study in the next section. Information about all the studies are summarized in Table 1.

In a study examining the decision making of technology company CEO's, Mitchell, Shepherd, and Sharfman (2011) used conjoint analysis to assess the effects that metacognitive experience has on erratic decision making, or the inconsistent judgements made by managers that

[1] As of January 2019

[2] We used the existence of SCOPUS journal metrics to identify which journals were "*reputable*."

may influence the strategic direction of the firm. The study concluded that the CEOs who were higher in metacognitive experience were less erratic in their decision making (Mitchell et al., 2011).

In another study, Haynie, Shepherd, and Patzelt (2012) ran a conjoint analysis on business undergraduate students without prior entrepreneurial experience. They hypothesized that those with higher metacognitive resources (knowledge and experience) would be more effective at adapting decision policies based on feedback. Further, the authors tested for moderation effects where the two metacognitive resources positively moderate the relationship between cognitive feedback (as opposed to outcome feedback) and adapting decision policies. The authors found support for only the main and moderation effects of metacognitive knowledge (Haynie et al., 2012).

In a test of mediation, Cho and Jung (2014) tested the relationship of metacognition on firm performance through entrepreneurial orientation. The authors found support for full mediation, with two factors of metacognition having a strong positive relationship with entrepreneurial orientation, which in turn had a strong positive relationship on firm performance. The study makes no justification as to why only two of the five factors were chosen (Cho & Jung, 2014).

Mattingly, Kushev, Ahuja & Ma (2016) hypothesized that the two metacognitive resources (experience and knowledge) would moderate the relationship between the probability of expected outcome and the entrepreneurs' decision to persist. In other words, the more one utilizes metacognitive resources, the higher the impact that a given probability of success has on persistence decisions (Mattingly et al., 2016).

In the only study of our review to examine potential predictors of metacognition, Bajwa, Shahzad, and Aslam (2017) tested the relationship between the big-five personality traits and adaptive cognition. The authors predicted that all of the big-five traits would have a significant impact on cognitive adaptability, and that there would be significant gender differences among the impacts of personality on cognitive adaptability. The authors found that only extraversion and neuroticism were significantly related to cognitive adaptability, and only in men. Extraversion was found to be negatively related to cognitive adaptability in men, with neuroticism being positively related. Both these results were contrary to the proposed direction of effect (Bajwa et al., 2017).

Botha and Bignotti (2017) examined the relationship between adaptive cognition and entrepreneurial intent. The authors hypothesized that all five dimensions would have a positive relationship with intentions, but only found support for goal orientation, metacognitive experience, and metacognitive choice. Monitoring was found to have a significant negative relationship to entrepreneurial intention, contrary to prediction. The authors found mixed moderating effects for level of education, and entrepreneurial type (Botha & Bignotti, 2017).

Urban and Wood (2017) examined metacognition in the context of corporate entrepreneurship. Corporate entrepreneurship was conceptualized as the frequency of opportunities identified by an employee, as well as the innovativeness, profitability, and feasibility of the opportunities. The authors hypothesized that employee metacognition would have a positive relationship with corporate entrepreneurship. The authors found support for their hypothesis, with the inclusion of metacognition greatly increasing model fit (Urban & Wood, 2017).

Moore and Wang (2017) tested cognitive adaptability as a negative moderator between an entrepreneur's quality of mentoring and perceived organizational innovativeness. The authors found support for their hypothesis, suggesting that when cognitive adaptability is low, quality mentorship has a larger effect on perceptions of organizational innovativeness than when cognitive adaptability is high (Moore & Wang, 2017).

Moore and Wang (2018) also tested cognitive adaptability as a mediator between executives perception of their mentors' passion and the executives perception of organizational innovativeness. The authors found support for their hypothesis, indicating that cognitive adaptability plays a role in perceptions of organizational innovativeness (Moore & Wang, 2018).

*Table 1*
*Summary of studies using the MAC scale in entrepreneurship literature*

| Analysis | Scale used | Independent Variable | Dependant Variable | Effect Size | Hypothesis Supported |
|---|---|---|---|---|---|
| Conjoint Analysis | Partial MAC | ME | Erratic Strategic Decision | -0.25 | Yes |
| Conjoint Analysis | Partial MAC | MK | Effective Decision Policy Change | 0.14 | Yes |
| | | ME | Effective Decision Policy Change | 0.09 | No |
| SEM | Partial MAC | MK & ME | Firm Performance | 0.212 | Yes |
| Conjoint Analysis | Partial MAC | ME (as moderator) | Persistance Decision | -0.178 | No |
| | | MK (as moderator) | Persistance Decision | 0.31 | Yes |
| SEM | Full MAC | Extraversion | Cognitive Adaptability | -0.17 | Yes |
| | | Openness | Cognitive Adaptability | 0.04 | No |
| | | Agreeableness | Cognitive Adaptability | 0.08 | No |
| | | Neuroticism | Cognitive Adaptability | 0.11 | Yes |
| | | Conscientiousness | Cognitive Adaptability | -0.10 | No |
| SEM | Full MAC | GO | Intentions | 0.288 | Yes |
| | | MK | Intentions | 0.043 | No |
| | | ME | Intentions | 0.085 | Yes |
| | | MC | Intentions | 0.105 | Yes |
| | | MON | Intentions | -0.205 | No |
| Regression | Full MAC | Metacognitions | Corporate Entrepreneurial Activities | 0.26 | Yes |
| Regression | Shortened MAC (two items each factor) | Metacognition (as moderator) | Innovativeness | -0.13 | Yes |
| Regression | Shortened MAC (two items each factor) | Metacognition (as mediator) | Innovativeness | 0.16 | Yes |

| Authors | Sample size | Sample Details |
|---|---|---|
| Mitchel et al (2011) | 64 (2,048 decisions) | Technology company CEOs |
| Haynie et al (2012) | 217 (10,000 decisions) | Business undergraduates |
| Cho & Jung (2015) | 190 | Active U.S. entrepreneurs |
| Mattingly et al (2016) | 124 | Active U.S. entrepreneurs |
| Bajwa et al (2017) | 443 | Active Pakistani entrepreneurs |
| Botha & Bignotti (2017) | 602 | Potential entrepreneurs |
| Urban & Wood (2017) | 784 | South African financial sector employees |
| Moore & Wang (2017) | 200 | Multinational multi-industry organization leaders |
| Moore & Wang (2018) | 215 | Multinational multi-industry organization leaders |

## Gaps in the Literature

It is clear from the prior literature review that research on metacognition in entrepreneurship is still in its infancy. There have been important first steps in examining how adaptive cognition might affect some common entrepreneurial outcomes such as performance, intentions, corporate entrepreneurship, and perceptions of innovativeness. Further, studies have begun to show how specific aspects of metacognition influences decision-making consistency and decision outcomes. Although the metacognition literature is still young, there is room for major improvement and some obvious gaps in the literature.

Mainly, this paper seeks to examine if adaptive cognition is a possible mechanism in explaining entrepreneur firm performance and mental well-being. This is essential as the current state of the literature shows very little on metacognition as a mechanism influencing the relationship of antecedents on important entrepreneurial outcomes. While research in students receiving interventions to improve metacognitive awareness suggests that metacognition can be trained (Bangert-Drowns et al., 2004; Mitchell et al., 2005; Schmidt & Ford, 2003), we hope to

examine an important antecedent of metacognitive awareness beyond those of academic interventions. For this, we delve into the research on social support as a potential contextual factor influencing adaptive cognition and firm performance/entrepreneur well-being. As well, we hope to begin integrating adaptive cognition into existing models in the entrepreneurship literature and examine its relationship to common variables of interest.

Entrepreneurship does not happen in a vacuum. Success or failure is contingent on a wide variety of personal and environmental factors. One such factor that can have an impact is social support. Social support can be defined as "*the social resources that persons perceive to be available or that are actually provided to them by nonprofessionals in the context of both formal support groups and informal helping relationships*"(Cohen, Gottlieb, & Underwood, 2001, p. 129). We use this study to examine adaptive cognition as a possible pathway in which social support influences well-being and performance in entrepreneurship.

# Hypotheses

## Hypothesis 1 – Social Support and Metacognitive Awareness

To help understand the effects of social support on metacognitive thinking, we draw upon a socio-cognitive perspective that suggests social support may directly change the way we think about a new venture and how we appraise and make sense of situations. In a qualitative analysis of successful serial entrepreneurs, De Koning and Muzyka (1999) proposes that successful entrepreneurs maintain a strong and stable network of close "inner circle" connections that are used as close and trusted confidants when exploring and exploiting new opportunities. Gemmell, Boland, and Kolb (2012) echo this idea that strong inner circle social ties play a vital role in the new venture idea refinement process, noting that diversity in an entrepreneurs inner circle helps to provide essential alternative perspectives to ideas. This suggests that an entrepreneur's inner

circle may actually change the ways in which the entrepreneur thinks about their new ventures. An early review of social support also discusses how social support affects interpretations of stressful events (in our case, managing a new venture) and how "support exchanges can broaden the individual's interpretation of the event and promote its clearer understanding" (Shumaker & Brownell, 1984, p. 24). It is clear that having an inner circle of close social ties plays an important role in the new ventures.

Cornelissen and Clarke (2010) suggest that entrepreneurs use language as way to clarify and refine their businesses, and through this linguistic interaction with the broader social context they are able to make sense of their new ventures. This "sensemaking" allows entrepreneurs to overcome doubt and uncertainty in the new venture process (Cornelissen & Clarke, 2010; McMullen & Shepherd, 2006). The simple act of talking about, and more specifically discussing with inner circle close ties, has major implications on how entrepreneurs think, conceptualize, and as a result, act in the new venture process. Thus, entrepreneurs with higher levels of social support are more likely to have these close ties, are more likely to discuss their new ventures with these close social ties, and are as a result going to be able to cognitively appraise and make sense of their business differently than those lacking in social support. This continuous process of monitoring and adapting cognitive frameworks and integrating diverse perspectives regarding one's business is inherent in the metacognitive process. Taking an expansionist view of the subject, Jost, Kruglanski, and Nelson (1998) come to the same conclusion surrounding the concept of social metacognition. The authors conclude that metacognition "has much to do with our own personal and family experience, the social groups to which we belong, [and] ongoing social situations" and that metacognition is "part and parcel of the social world" (Jost et al.,

1998, p. 151). We share this view and expect to see that entrepreneurs with higher levels of social support are more metacognitively aware.

*Hypothesis 1: Entrepreneurs' level of social support will be positively associated with metacognitive awareness.*

## Hypothesis 2 – Metacognitive Awareness on Performance and Well-being

The most well-researched link between metacognition and performance is that of metacognition on academic performance. In a meta-analysis on learning interventions, Hattie, Biggs, and Purdie (1996) found metacognitive awareness to be an essential factor for any effective K-12 learning intervention. A study on university science students used journaling to promote more metacognitive awareness by having them focus on describing the processes they used for learning. The students that completed these learning self-reflections performed better in the course than the control group that completed a scientific journal report (McCrindle & Christensen, 1995). In a broader meta-analysis of writing interventions and academic performance, Bangert-Drowns and colleagues (2004) found that metacognitive prompts in writing interventions had the largest effect size in predicting academic performance.

In one of the only metacognitive intervention studies directly involving entrepreneurship, Mitchell and co-authors (2005) investigated how metacognition influences students acquisition of entrepreneurial expertise. The authors found support for their hypotheses that students who participated in a metacognition improvement curriculum were more likely to gain entrepreneurial expertise than those students who were not exposed to the curriculum.

Though metacognition has rarely been studied directly in the context of entrepreneurial performance, the well-researched theory of strategic entrepreneurship is an area that can shed some light on why metacognition may be beneficial to firm performance (Hitt, Ireland, Camp, &

Sexton, 2001). Uncertainty is an inherent and unavoidable aspect of entrepreneurship; but within uncertainty lies the potential for an entrepreneur to exploit opportunity and create value and wealth (Ireland, Hitt, Michael, & Sirmon, 2003; Shane & Venkataraman, 2000). In the words of top entrepreneurship scholars, "the successful future strategists will exploit an entrepreneurial mindset, melding the best of what older models have to tell us with the ability to rapidly sense, act, and mobilize, even under highly uncertain conditions (McGrath & MacMillan, 2000, p. xv)." This description of the entrepreneurial mindset is very metacognitive in nature. It highlights the fact that an individual that is more metacognitively aware is more adept at considering alternative courses of action, and selecting the most appropriate one in light of the external environment and knowledge about themselves, others, tasks, strategies, and prior experience (Haynie et al., 2010). Theoretically, an individual that is more metacognitively aware will be better at identifying and exploiting opportunities, which will in turn have positive effects on firm performance. Thus, our second hypothesis is as follows.

*Hypothesis 2a: Entrepreneurs' level of metacognitive awareness will be positively associated with firm performance.*

Many effective clinical psychology treatments have a solid grounding in cognitive strategies for adjusting ways of thinking, the most widely used "gold standard" being cognitive behavioral therapy (CBT; Beck & Carlson, 2006). However, recently new research has aimed at taking a more metacognitive approach to therapy. A treatment known as metacognitive therapy (MT) has risen in popularity for treating a wide variety of mood, anxiety, mental, and behavioral disorders (Wells, 2008, 2011, 2013). Where CBT is concerned with the content of our negative thoughts, MT is focused instead on changing process of arriving at negative thoughts and controlling our style of thinking (Wells, 2008). In some very recent research, MT has been

shown to be a more effective treatment CBT in the treatment of social anxiety (Nordahl & Wells, 2017), obsessive compulsive disorder (Papageorgiou et al., 2018), and generalized anxiety disorder (Nordahl et al., 2018). MT has also shown efficacy in improving treatment-resistant depression after only eight sessions (Wells et al., 2012). This new and promising area of clinical research suggests that metacognitive interventions can have profound effects on many negative aspects of our psychology. It is likely that in our sample of entrepreneurs, more metacognitive awareness as measured by the MAC will be positively related to lower levels of mental illness symptoms. According to Keyes (2007, 2002), mental illness, or "languishing" and well-being, or "flourishing" fall on two separate continuums, where the absence of mental illness symptoms does not necessarily indicate higher levels of psychological well-being. The two separate constructs have a correlation of -.53, so there is a moderate relationship between the two continuums. However, metacognitive based approaches to therapy only help explain the reduction of mental illness, which is only one part of the two conceptual components of mental well-being.

Research on coping is another area that can help us understand the potential positive effects of metacognitive awareness on mental well-being. Coping is defined as the "process of managing taxing circumstances, expending efforts to solve personal and interpersonal problems, seeking to master, minimize, reduce or tolerate stress induced by unpleasant and stressful situations" (Drnovsek, Örtqvist, & Wincent, 2010, p. 194). Coping is generally considered to come in two separate categories: problem-based coping and emotion-based coping (Lazarus & Folkman, 1984). Problem-based coping consists of defining a problem, thinking of different solutions, comparing the alternatives, choosing, and acting (Lazarus & Folkman, 1984). Problem-based coping has many parallels to metacognitive awareness, especially in generating

alternatives, comparing, and choosing the most appropriate strategy based on the wider context. On the other hand, emotion-based coping is more concerned with changing the affective response to stressful situations such as avoidance or minimization of consequences (Lazarus & Folkman, 1984).

A meta-analysis comparing different scales found that in general, scales measuring problem-based coping strategies were more positively related to positive psychological well-being than those scales measuring emotion-based coping techniques (Kato, 2015). Further, a problem-based coping style is positively related to levels of positive affect and negatively related to levels of negative affect. These effects are significantly stronger than with emotion-based coping (Ben-Zur, 2009). In a study looking specifically at entrepreneurs, problem-based coping was found to be positively related to personal well-being, and significantly more related to positive psychological well-being than an emotion-based coping approach (Drnovsek et al., 2010). Problem-based coping is conceptually similar to metacognitive awareness. We can draw parallels between the stages of problem-based coping with the factors of metacognitive awareness: defining the problem (goal orientation), generating different solutions (evaluating metacognitive knowledge and experience), assessing benefits and costs of each solution and choosing (metacognitive choice), and taking action and evaluating (monitoring) (Lazarus & Folkman, 1984; Drnovsek et al., 2010). We can expect that entrepreneurs measuring higher in metacognitive awareness are more likely to engage in problem-based coping over emotion-based coping, as well as engaging in more effective problem-based coping. Thus, the beneficial effects of problem-based coping are likely to be mirrored in entrepreneurs with higher metacognitive awareness. This brings us to our next hypothesis.

*Hypothesis 2b: Entrepreneurs' level of metacognitive awareness will be positively associated with mental well-being.*

## Hypothesis 3 - Social Support on Performance and Well-being – Mediated by Metacognitive Awareness

Occupational health psychology is rooted in trying to understand how to improve worker performance and well-being. It is a mostly ubiquitous finding that social support has a beneficial effect on an individual's health and well-being (See Taylor, 2011 for a thorough review on the subject). One of the most researched and well-supported theories in occupational health psychology is the job demands resources model (JDR; Demerouti et al., 2001). The theory originated to help explain the occurrence of burnout in workers, but has since been extended to explain many types of stress-strain relationships (Bakker & Demerouti, 2007; Demerouti et al., 2001). Broadly speaking, the JD-R model describes the work environment as consisting of both demands and resources. Demands are aspects of a job that require physical or psychological efforts, sustained over a period of time. Resources are described as aspects of the job that help achieve work goals, stimulate growth, or reduce demands (Bakker & Demerouti, 2007).

Our variable of interest, social support, is a common and well-researched resource within the JDR model, and is "probably the most well-known situational variable that has been proposed as a potential buffer against job stress" (Bakker, Demerouti, & Verbeke, 2004, p. 89). The research on social support within JDR theory is slightly complex in that it interchanges examining moderating effects, mediation effects, direct effects, and suppressor effects all under the term "buffering effect" (Viswesvaran, Sanchez, & Fisher, 1999). This paper is less concerned with the exact mechanisms in which social support influences outcomes, only that there is strong quantitative evidence supporting the idea that social support is related to higher well-being and improved performance in workers. Meta-analytic evidence has shown social support to be

strongly related to performance and well-being enhancing variables like job satisfaction ($r$ = .68, $k$ = 4, $N$ = 13,367) and work engagement ($r$ = .51, $k$ = 17, $N$ = 43,935) while being negatively related to burnout ($r$ = -.22, $k$ = 6, $N$ = 2,168) which significantly reduces performance and well-being in workers (Halbesleben, 2006). Recently, a meta-analysis and systematic review on the subject found that job resources have a consistently strong positive effect on both performance and well-being (mean $r$ of .21 and .29 respectively). In the study, social support was one of the most frequently studied job resources (Nielsen et al., 2017). We can expect entrepreneurs to receive similar benefits from social support as their worker counterparts. Thus, our third hypothesis is as follows:

*Hypothesis 3a: Entrepreneurs' level of social support will be positively associated with firm performance*

*Hypothesis 3b: Entrepreneurs' level of social support will be positively associated with well-being*

One of the less-understood aspects and a yet "unresolved issue" of the JDR model is exactly what "explanatory underlying mechanisms" explain outcomes (Bakker & Demerouti, 2017). We posit that metacognitive awareness may play a partial mediating role in the relationship between social support and corresponding outcomes.

Metacognitive awareness, and specifically metacognitive knowledge, has a major component of understanding yourself, others, and your relationship with others. Those higher in metacognitive awareness are much more likely to be aware of the social support available to them, and to be more in tune with maintaining social support. Somewhat counterintuitively, the level of actual received support is secondary to the perceptions of support being available (Gottlieb & Bergen, 2010). Therefore, simply being more aware of the support around you, as

metacognitive aware people are, is one cognitive mechanism in which entrepreneurs can realize the beneficial effects of social support (Gottlieb & Bergen, 2010; Taylor, 2011). Further, many forms of social support are bi-directional and require at least a certain amount of reciprocity at some point, or uninitiated support to others in order to elicit reciprocity at a later date (Taylor, 2011). Metacognitively aware entrepreneurs are more likely to attend to and maintain their network effectively due to their increased reliance on thinking about their knowledge of others, people in general, and past relationship experiences (Haynie et al., 2010). Lastly, metacognitively aware entrepreneurs are more effective at learning and gaining entrepreneurial expertise from mentors (Mitchell et al., 2005). Metacognitive awareness appears to be a mechanism in which entrepreneurs can "extract" expertise from their social support network, as well as just maintaining and being aware of the social support around them. This gives us the final components of hypothesis 3:

*Hypothesis 3c: Entrepreneurs' level of metacognitive awareness will partially mediate the relationship between social support and well-being.*

*Hypothesis 3d: Entrepreneurs' level metacognitive awareness will partially mediate the relationship between social support and firm performance.*

## Hypothesis 4 - Well-being on Performance

There has been a long tradition in occupational health psychology of examining the effects of well-being in the workplace. The happy-productive worker hypothesis posits that "happy" workers perform better at many different tasks related to job performance (Brief, Burke, George, Robinson, & Webster, 1988; Spector, 1997). In a review on the subject, Cotton & Hart (2003) discuss that although the literature uses mixed methods, there is a general consensus that high stress and low well-being have detrimental effects on many aspects of performance. Other

reviews on the topic have examined "a body of longitudinal evidence, and some studies have found that well-being predicts future performance" with "more enduring aspects of well-being that are associated with subsequent work performance" (Daniels & Harris, 2000, p. 306). Multiple field studies have confirmed the happy-productive worker hypothesis and suggest that psychological well-being is one of the most appropriate measure of "happiness" to use (Wright & Cropanzano, 2000).

While this relationship between well-being and performance has not explicitly been transferred to and tested in the entrepreneurship literature, it is quite likely that the results will be remarkably similar. An entrepreneurial firm's performance relies heavily on the actions of the entrepreneur and management team (Jin et al., 2017). Therefore, an entrepreneur with low well-being is going to perform worse at specific job tasks, like their employee counterpart, but in the case of the entrepreneur this poor job performance will directly lead to poor firm performance. This leads us to our fourth hypothesis:

*Hypothesis 4: Entrepreneurs' level of well-being will be positively associated with firm performance.*

The full hypothesized model is show below:

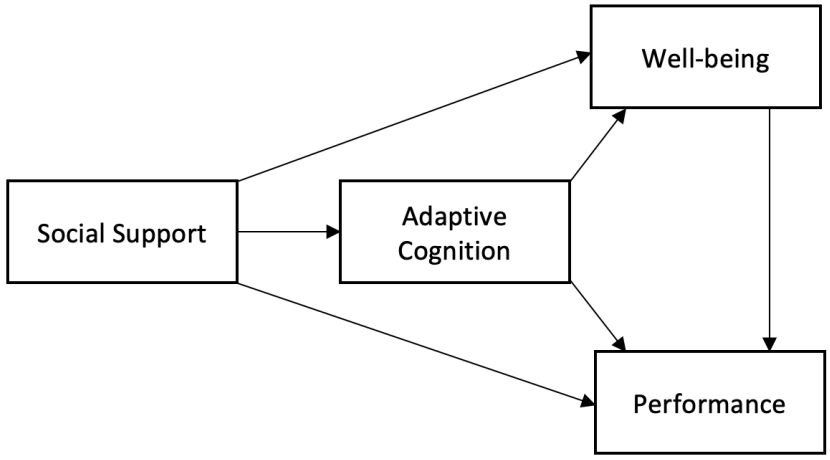


*Figure 2: Theoretical Model*

# Research Methods:

## Measures:

*Psychological Well-being.* We used two separate measures of mental well-being. First, we utilized the psychological well-being scale (PWB) which has slowly grown to become a gold-standard in measuring general mental well-being (Diener et al., 2009). This measure captures a variety of aspects of well-being that were absent in prior scales. These include: Csikszentmihalyi's (1990) concept of flow and optimal engagement, Peterson and Seligman's (2004) optimism construct, and Maslow's (1943) idea of feeling respected by others as a human need. In addition, the PWB scale measures "meaning, positive social relationships (including helping others and one's community), self-esteem, and competence and mastery (Diener et al., 2009, p. 252)" which existed in previous scales prior to the creation of the PWB scale (Ryan & Deci, 2001; Ryff, 1989). The PWB measure is a seven-point scale ranging from "Strongly disagree" to "Strongly agree." Sample items include "I lead a purposeful and meaningful life" and "I am engaged and interested in my daily activities" (Diener et al., 2009). Reliabilities and correlations for all measures can be found in table 1 and the full scales used can be found in the appendix.

*General Health Questionnaire.* Second, we chose the general health questionnaire 12 (GHQ-12; Goldberg et al., 1997). The GHQ-12 is a very well validated, concise scale that is used as a non-clinical psychiatric assessment (Mari & Williams, 1985; McCabe, Thomas, Brazier, & Coleman, 1996). More recently, the GHQ-12 has been shown to have a dichotomous aspect to it, and therefore able to represent psychological well-being in absence of the psychiatric conditions it diagnoses (Hu, Stewart-Brown, Twigg, & Weich, 2007). We chose to include the GHQ because we wanted to assess entrepreneurial well-being as not only the existence of positive

traits (from the PWB scale), but also the absence of negative well-being traits. The GHQ-12 asks "how often in the last two weeks have you experienced…" on a four-point scale ranging from "less than usual," to "much more than usual." Some sample items include "lost much sleep over worry" and "been able to face up to your problems (reverse scored)"(Goldberg et al., 1997).

As mentioned previously, we are ascribing to Keyes' (2002) continuum that conceptualizes psychological well-being as being a separate yet related construct alongside the absence of mental illness symptoms. This is echoed by the World Health Organization (WHO), which defines mental health as not only the absence of mental health problems but also a "state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community (WHO, 2014)." This was our motivation for including both the GHQ as a measure for assessing the absence of clinical symptoms of decreased well-being, as well as the PWB to measure the "flourishing" aspects of well-being.

*Performance*. Our second dependent variable is firm performance. The biggest issue with measuring firm performance in new ventures is the difficulty involved in getting any objective measures of performance. As such, measures of subjective perceived performance are often utilized and deemed as appropriate in entrepreneurship research (Chandler & Lyon, 2001; Murphy, Trailer, & Hill, 1996). Due to the presumed heterogeneity of businesses in our sample, we chose to assess both the weight of importance as well as the entrepreneurs satisfaction of performance in several areas (as per Chandler & Hanks, 1993). These areas included: sales/revenue, sales/revenue growth, employee growth, market share, profitability, innovativeness, and overall performance. This gives us a multiplied score of the two questions "How important is each of the following areas to the success of your business" (rated from 1 =

“Not important at all” to 5 = “Extremely important”) and “How satisfied are you with your firm's performance in the following areas” (rated from 1 = “Very dissatisfied” to 5 = “Very satisfied”). The resulting score is a summed measure of weighted satisfaction of performance intended to adequately asses performance in absence of difficult to acquire objective measurements of performance.

*Metacognitive Awareness*. To measure metacognitive awareness we use Haynie and Shepherd’s full MAC scale (Haynie & Shepherd, 2009). As per the source, the scale was an 11-point semantic differential measure ranging from “not very much like me” to “very much like me.” The scale contained 36 items. Sample items included: “I am aware of what strategies I use while engaged in a given task (monitoring)” and “I think of several ways to solve a problem and choose the best one (knowledge).”

*Social Support*. We chose a measure of social support used in Tetrick and colleague’s paper on the stress-strain process difference between business owners and non-owners (Tetrick, Slack, Da Silva, & Sinclair, 2000). The measure was changed slightly to match a purely entrepreneurial context. This measure captures several important characteristics of a good social support measure. One, it is only concerned with perceived social support and not objective measures of support. Although perceived and actual support can vary, for the beneficial effects many studies indicate that perception of support is more important than actual support received (Gottlieb & Bergen, 2010). Second, the measure does not assess the number of supporters (i.e. one friend versus twelve), as having many supporters is no more beneficial than having a few or even one close relationships (Taylor, 2011). The scale asks, "How easy is it to talk with the following," "How much can these people be relied on for support when things get tough at work," "How much are the following people willing to listen to your problems," and “How much

do these people provide you with assistance or information to make your work life easier for you" about the following five people: significant other/spouse, peers, subordinates, a mentor, friends outside of work. The scale goes from 0 = "Do not have any such person" to 4 = "Very much."

## Sample

The final sample for this study consisted of 238 self-identified entrepreneurs. The potential participants were contacted by a third-party data collection company. Potential participants were asked an initial qualifying question of "Are you an entrepreneur or business owner? For the purpose of this study, we define an entrepreneur as anyone who is currently starting, or owns/manages, a business that employs less than 25 employees, earns less than $5 million in revenue, and has been in existence for less than 5 years." 2,213 people were drawn randomly from a larger panel representative of the broader United States population. Of those, 354 answered "yes" to the qualifier question, filled out the Time 1 survey completely, and were invited back to answer the time 2 survey a month later. 238 of those that were invited back filled-out the time 2 survey in its entirety[3]. Metacognitive awareness and social support were assessed at time 1, while PWB, GHQ, and performance were assessed at time 2.

The average age of our entrepreneur sample was 47 years old. Our sample was quite diverse in terms of revenue, number of employees, and days/hours they work per week on their business. 62% of our sample was female. 79% reported being the sole owners of their business, with the remainder having partners (16%), non-partner major shareholders (2.5%) or some other ownership arrangement (2.5%). On average, the entrepreneurs in the sample worked 41 hours a week, with a standard deviation of 17 hours. The average revenue was just shy of $700,000, with

[3] Roughly 20 participants' answers were left out of the analysis due to a variety of exclusion criteria (i.e. failing attention checks, contradicting their qualifying question answer with open ended responses).

an average number of employees of just about 7. However, many businesses were much smaller with the median revenue being $75,000 and median number employees being 2. The average number of days worked per week was just below 6 days, and only 11% of entrepreneurs in the sample worked 4 days or less per week on their business. 37.3% of the sample had a university undergraduate degree, and 17.8% had finished either a Masters or Doctoral level degree. The remainder had either only finished high school or had completed some or all of a college/trade school/diploma program.

## Analysis

To test our hypotheses, we applied structural equation modeling (SEM) using the AMOS program and maximum likelihood estimation (Arbuckle, 2009). SEM is a robust multivariate statistical technique that is particularly useful when examining relationships between latent constructs (Hair, Black, Babin, Anderson, & Tatham, 2006) and when testing mediating relationships (Malhotra et al., 2014; Baron & Kenny, 1986), as is the case with our theoretical model. Our analysis took place in two stages; first, we used confirmatory factor analysis (CFA) to test our measurement model and ensure the latent constructs showed adequate validity. Second, we used a nested model approach to test overall model fit and a bootstrapping approach to further test individual hypotheses.

Before running the analysis, we decided to create composite measure with parceling, a common practice when performing structural equation modeling (Landis, Beal, & Tesluk, 2000). Creating item parcels is meant to cut down on the number of individual items loading onto a construct, which significantly reduces the ratio of parameters to sample size (Landis et al., 2000). There are many implications to factor in when considering a parceled model, but in the case of a relatively small sample and hypotheses concerned with the relationship between latent

constructs, composite measures are an entirely justifiable statistical decision (for a thorough look at pros and cons of parceling, see Little, Cunningham, Shahar, & Widaman, 2002). In general, item parcels tend to have higher reliability, higher communality, higher ratio of common-to-unique factor variance, and lower chance of distributional violations when compared with individual items (Little et al., 2002). Items were evenly split amongst parcels in an alternating assignment (ex. For a 9 item factor: parcel one = items 1,3,5,9 and parcel two = items 2,4,6,8) which is just as effective yet much simpler compared to other methods for creating composites (Landis et al., 2000).

None of the constructs had correlations above the critical level of 0.7 and variance inflation factor values were all well below the cut-off of 10 indicating that multicollinearity was not an issue (Hair et al., 2006). None of the variables showed any major skewness or kurtosis. Common method variance (CMV) can potentially be an issue when surveys are self-reported and from the same source (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). As suggested by Podsakoff and colleagues (2003), we controlled for CMV by designing the study to collect items measuring dependent and independent variables with a significant time gap in between (one month) as well as assuring the anonymity of responses to reduce social desirability bias.

# Results

*Table 2:*
*Means, Standard deviations, Internal Consistency Reliabilities, and Correlations among the Study Variables*

| | | *M* | *SD* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|
| 1 | Social Support | 2.16 | .88 | (.92) | | | | |
| 2 | Adaptive Cognition | 8.71 | 1.37 | .27** | (.96) | | | |
| 3 | Performance | 83.34 | 31.81 | .46** | .34** | (.85) | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | PWB | 5.67 | .89 | .40** | .41** | .54** | (.88) | |
| 5 | GHQ | 2.76 | .48 | .28** | .22** | .39** | .53** | (.86) |

* p < .05, ** p < .01; Reliability estimates (α) are reported on the diagonal.

## Measurement Model

We first conducted a CFA of the only second order factor we used, metacognitive awareness ($\chi^2$ = 148.1, $p$ <.001, df = 30, CFI = .095, RMSEA = .129). We compared the metacognitive awareness construct against an alternative one factor model. The one factor metacognitive awareness model showed significantly worse fit ($\Delta\chi^2$ = 248.2, df = 35, $p$ <.001, CFI = .083, RMSEA = .209), which supports the original conceptualization of the scale.

We then proceeded to conduct a CFA on our entire measurement model containing all of the latent constructs (social support, psychological well-being, and adaptive cognition), excluding the GHQ and performance scores as they were observed variables in our model. Several of the measures have not been widely used in the entrepreneurship literature; therefore, we wanted to validate the factor structure before moving to our analyses. Our CFA results showed good fit of the measurement model ($\chi^2$ = 254.7, $p$<.001, df =111, CFI = 0.95, RMSEA = 0.074). The model fit indices are within the benchmarks for adequate fit laid out by Hair and colleagues (2006). We compared our entire measurement model against a model that had all items loading on to one factor, which had significantly worse fit. Further, factor loadings of items onto their theoretically defined latent construct were all above a commonly suggested benchmark level of 0.5 (Hair et al., 2006). In addition, the total variance extracted are all well above the recommended minimum of 50% (Fornell & Larcker, 1981). Lastly, the average variance extracted was at least 0.5 as well.

Nested Model and Bootstrapping:

After validating the measurement model, with all constructs having high reliability, we proceeded to test our hypotheses and theoretical model. The full hypothesized model can be seen in Figure 3. We first contrasted a series of nested structural models in AMOS following the Anderson and Gerbing (1988) approach. We first tested our full theoretical model as a benchmark for comparison against alternative models. Fit for our theoretical model was adequate ($\chi^2 = 326.4$, df = 140, $p < .001$, CFI = 0.938, RMSEA = .075).

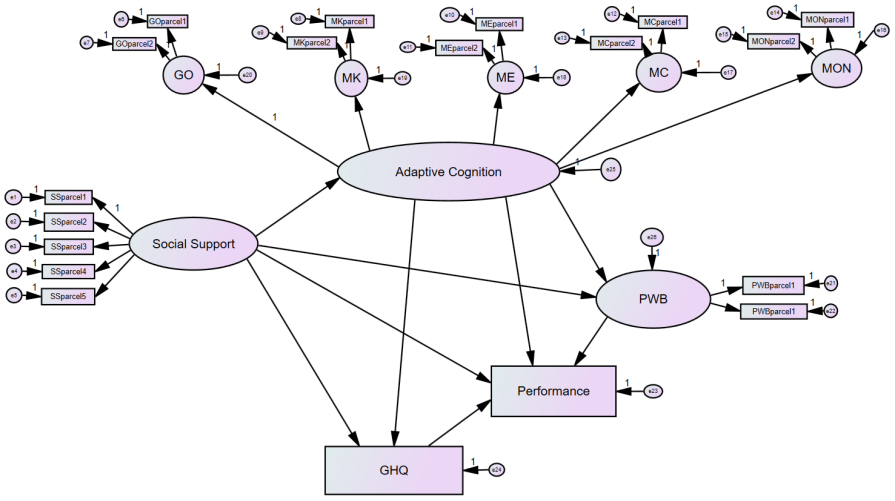


*Figure 3: Full hypothesized model*

We then tested two nested models, one omitting the metacognitive awareness mediation pathways ($\Delta\chi 2 = 65.99$, df = 144, p<.001, CFI = .092, RMSEA = .085), and one omitting the direct effects of social support ($\Delta\chi 2 = 81.60$, df = 144, p<.001, CFI = .091, RMSEA = .088). The full hypothesized model shows much better fit than the two alternative models, which provides some initial support for our partial mediation hypothesis (see table 4, models 1-3). To examine all our hypotheses of direct effects, we checked for significant standardized regression weights in our theoretical model. See table 3 for summary of regression weight results. Overall, we found support for hypotheses H1, H2b, H3a, H3b. We found partial support for H4, with PWB to

performance being significant, but GHQ to performance not being significant. We did not find support for H2a.

*Table 3:*
*Standardized Regression Weights of Hypothesized Model*

| Path | | | $\beta$ | $p$-value |
|---|---|---|---|---|
| SS | ---> | AC | 0.307 | *** |
| SS | ---> | Performance | 0.308 | ** |
| SS | ---> | PWB | 0.392 | *** |
| SS | ---> | GHQ | 0.301 | ** |
| AC | ---> | Performance | 0.060 | 0.34 |
| AC | ---> | PWB | 0.372 | ** |
| AC | ---> | GHQ | 0.18 | * |
| PWB | ---> | Performance | 0.326 | *** |
| GHQ | ---> | Performance | 0.111 | 0.117 |

*** p<.001, ** p<.01, *p<.05; SS, Social Support; AC, Adaptive Cognition; PWB, Psychological Well-being; GHQ, General Health Questionnaire

For an additional test of mediation, we conducted bootstrapping via the Preacher and Hayes method (2008). Bootstrapping has been shown to be an effective and robust test of mediation (Hayes, 2009). We bootstrapped 5000 resamples with a bias-corrected confidence interval of 95%. Hypothesis 5a and 5b predicted that metacognitive awareness would partially mediate the relationship between social support and entrepreneur performance and well-being. The 95% confidence interval for the indirect effects on both measures of well-being did not contain zero, indicating a significant partial mediation effect of metacognitive awareness (Preacher & Hayes, 2008). The confidence intervals of the total indirect effects on performance also does not contain zero. However, due to the structure of our hypothesized model, we had indirect effect pathways on performance going through metacognitive awareness and both the well-being measures (Hypothesis 4). AMOS is limited in its functionality to isolate specific indirect effects, so we tested and bootstrapped one model with the paths of well-being on

performance removed. This isolated the mediation effects of metacognitive awareness on performance. Though much smaller than the total effects on performance in our hypothesized model, the indirect effect in this isolation model is still significant (confidence interval does not contain zero). See table 5 for bootstrapping effects and confidence intervals.

*Table 4:*
*Model Comparison Using Structural Equation Modeling*

| Model | $\chi^2$ | df | $\chi^2$/df | $\Delta\chi^2$ | CFI | RMSEA |
|---|---|---|---|---|---|---|
| Model 1 – Full hypothesized model | 326.410 | 140 | 2.33 | | .938 | .075 |
| Model 2 – No AC pathways (no mediation) | 392.398 | 144 | 2.72 | 65.988*** | .917 | .085 |
| Model 3 – No SS pathways (only direct effects from AC) | 408.030 | 144 | 2.83 | 81.60*** | .912 | .088 |
| Model 4 – Model 1 with performance loading on well-being measures instead of the other way around | 316.047 | 140 | 2.26 | 10.363*** | .941 | .073 |
| Model 5 – Model 4 with PWB loading on GHQ | 284.752 | 139 | 2.04 | 41.658*** | .952 | .067 |
| Recommended Value (Hair et al., 2006) | | | 1.0 - 2.0 | | >.95 | <.08 |

*** p<.001, ** p<.01, *p<.05; all changes in chi-square compared to model 1; SS, Social Support; AC, Adaptive Cognition; PWB, Psychological Well-being; GHQ, General Health Questionnaire

Finally, as per Hair et al (2006), a model in isolation has little value and best practice is to compare it to the closest theoretically plausible alternative models. For other plausible models, we chose to reverse the relationship between well-being and performance to have performance load onto our well-being measures instead ($\Delta\chi2 = 10.363$, df = 140, $p < .001$, CFI = .0941, RMSEA = .073). This model showed marginally better, yet statistically significant, model fit than our hypothesized model. We then tested another alternative model, that added a path from PWB to the GHQ ($\Delta\chi^2 = 41.658$, df = 139, p<.001, CFI = .0952, RMSEA = .067). This alternative model had much better and statistically significant fit to our data. To see a summary

of model fit comparisons, see table 4. In the following discussion section, we will dissect the better fitting models in more detail.

*Table 5:*
*Total Standardized Indirect Effects Bootstrapping Results*

| Path | Indirect Effect | LLCI | ULCI |
|---|---|---|---|
| SS – AC – PWB | 0.114 | 0.053 | 0.194 |
| SS – AC – GHQ | 0.055 | 0.016 | 0.117 |
| SS – Performance | 0.233 | 0.144 | 0.337 |
| SS – AC – Performance* | 0.057 | 0.023 | 0.107 |

* Isolated direct effect (removed PWB-Performance and GHQ to performance path); SS, Social Support; AC, Adaptive Cognition; PWB, Psychological Well-being; GHQ, General Health Questionnaire

# Discussion:

## Discussion of Results and Implications for Research:

This study integrates research in management, entrepreneurship, psychology, and organizational behavior. The entrepreneurship literature has shown a great interest in how entrepreneurs think, and the underlying cognitions that affect behavior, intentions, and outcomes (Baron, 1998; Mitchell et al., 2002). More recently, the literature has posited the role of metacognition in entrepreneurial success; but this area of research remains largely underdeveloped in terms of both theoretical contributions and quantitative evidence (Haynie et al., 2010). This study focuses on the role metacognitive awareness plays in mediating social support and important outcomes of entrepreneurial success: a new venture's performance and its founder's mental well-being.

We developed and tested a structural equation model that links metacognition to the role social support plays on entrepreneur success outcomes. Our hypothesized model showed very good fit for the data and most of our hypotheses regarding direct and indirect effects were supported. Overall, it is clear that metacognitive awareness plays a significant role in mediating the relationship between social support and both performance and well-being. Social support has

strong direct effects on these outcomes, but it appears being more metacognitively aware serves as a mechanism to also influence both outcomes. The recent shift towards a metacognitive perspective of entrepreneurial success has a lot of merit and should be a continued focus for future researchers.

Our theoretical model may have provided good fit for the data, but when compared against slightly tweaked, but theoretically plausible models, it becomes apparent that there are better models to fit our data. SEM is a process that is best used for comparing models against each other. The first alternative model was reversing the proposed direction of pathways from well-being to performance. There has been a long debate in the occupational health literature discussing the origins of job performance and job engagement/job satisfaction (Judge, Thoresen, Bono, & Patton, 2001; Judge, Weiss, Kammeyer-Mueller, & Hulin, 2017). Does higher job performance lead to higher job engagement? Or is it vice-versa? Our analyses showed parallels to this debate. We hypothesized that well-being would influence performance, but the alternative model of performance loading onto well-being fit the data better. Our results seem to add to the recent evidence of "bi-directionality" relationship of performance and well-being in entrepreneurship research (Dijkhuizen, Gorgievski, van Veldhoven, & Schalk, 2018). Future research should make attempts to better parse out the interrelationships of performance and well-being.

Our last, and best fitting hypothesized model contained an additional path of PWB linked to GHQ. In hindsight, this is an unsurprising result. Any of the "diagnoses" of the GHQ are likely to be manifestations of symptoms of low levels of psychological well-being. This model changes very little in terms of our hypotheses, but just better accounts for the correlation of our two well-being measures. This is likely capturing some of relatedness reported in Keyes (2002)

two continuums of mental well-being. Future research looking at well-being as an outcome should expect and hypothesize a relationship between such highly correlated and theoretically related measures.

As well, based on our results we found limited support for our claims that metacognitive awareness has a strong direct effect above and beyond other predictors on an entrepreneur's firm performance. This result is intriguing, as metacognitive awareness showed significant evidence of being a partial mediator of performance. It is clear that new venture success is a hard thing to boil down to individual factors and direct relationships. Future research should examine the exact mechanisms in which metacognitive awareness, and other aspects of entrepreneurial cognition, affect performance. This research should attempt to isolate the phenomenon and determine specific contexts where the effects of more metacognitive awareness may be beneficial.

## Implications for Practice:

This study has provided some quantitative support for the previously untested assumption that metacognitive awareness is beneficial for entrepreneur well-being and performance. Metacognitive awareness can be "taught" as seen in the many intervention studies (Hattie et al., 1996; Dignath, Buettner, & Langfeldt, 2008). Entrepreneurial education should be placing an emphasis on teaching, or at least making students aware of, different metacognitive approaches to entrepreneurial thinking. Further, metacognitive awareness is something that can be assessed when determining student suitability for pursuing entrepreneurship.

This study continues the long tradition of examining the benefits of social support, specifically identifying if the often-researched benefits hold true in an entrepreneurial context. The findings confirm that social support is a very positive resource for entrepreneurs to draw upon. Entrepreneurship policy should be encouraging, and should provide programs to, current

and potential entrepreneurs to educate and assist them in increasing both perceptions and actual access to social support. Future research should parse out the strength of relationships of each individual type and source of social support on dependent variables of interest (i.e. difference between having a mentor vs. friend vs. significant other that listen to your problems vs. provide assistance).

## Limitations:

As with any study, our research comes with several potential limitations. First, the MAC scale used in relatively new, and has never been compared to alternative and pre-existing measures used for capturing metacognitive awareness in different contexts. It has been suggested that the complexity of metacognition makes it a hard construct to measure, and as a result may have some reliability issues (Schraw & Moshman, 1995; Lai, 2011). Future research should compare the MAC with other measures for metacognition used in other literatures to ensure that we are actually measuring what we hope to be measuring. As well, the MAC is quite a time-consuming scale as it measures 36 items. Development of a shorter MAC scale that has similar psychometric property may be warranted to help cut down on potential survey fatigue when the MAC is measured with other constructs (Porter, Whitcomb, & Weitzer, 2004).

Our next limitation is that we only have subjective measurements of firm performance. Objective performance measures are very difficult to procure when the sample consists entirely of newer businesses. The ideal performance measurement would measure capture both objective and subjective measures, but practical reasons such as time and cost limited us to purely subjective measures. However, prior research has shown objective and subjective measures to be highly correlated, limiting any major consequences of our lack of objective measures (Dess & Robinson Jr, 1984).

This study used a cross-sectional design, so any assumptions about causality are limited. We did minimize our chance of common method variance issues by separating the survey into two time-points one month apart, but the surveys assessed different measures at each time point which limits our understanding of how our variables react within-person over time. Due to many practical limitations such as the difficulty and cost associated with identifying entrepreneurs, the low survival rate of new ventures, and the high attrition rate common in longitudinal designs, the entrepreneurship literature has been slow to adopt longitudinal research designs (Galloway, Kapasi, & Whittam, 2015). Future research should examine metacognitive awareness and entrepreneurial outcomes using within-person over-time designs.

Though education research has rich history of using metacognitive interventions, this research only assessed the level of metacognitive awareness rather than experimentally manipulating it (Hattie et al., 1996; Dignath et al., 2008). It is important to not just understand the potential benefits of metacognitive awareness, but to see how it can be fostered and improved in current and nascent entrepreneurs. Future research should look at how entrepreneurship education and policy can "teach" current and future entrepreneurs to be more metacognitively aware.

Our last limitation is the generalizability of this study. The effects of social support, perceptions of support, and how support is received can vary significantly across cultures (Taylor, 2011). Our sample was entirely North American, so our findings may not hold true in significantly different cultures. Further, this study did not collect any information regarding specific industries that the entrepreneurs were engaged in. Though unlikely, some industries may be majorly over-represented in our sample making it tough to generalize to entrepreneurs engaged in other industries.

# Conclusion:

General consensus seems to be that entrepreneurs stand to benefit from having more metacognitive awareness, especially when acting in the conditions of uncertainty so inherent in pursuing the entrepreneurial path (Little, Cunningham, Shahar, & Widaman, 2002). However, empirical research on the subject still has a long way to go before we can truly understand how metacognition affects the "how" of entrepreneurship (Austin, Stevenson, & Wei-Skillern, 2012). This paper gave an overview of the existing quantitative literature on the topic of metacognition in entrepreneurship. We then proceeded to identify several gaps in the literature that motivated this study. First, we looked at how a salient resource of social support may influence metacognition and entrepreneurial outcomes and how metacognition directly effects outcomes. We also tested mediating effects of metacognitive awareness on entrepreneurial outcomes. We used SEM to test our hypotheses with a sample of 238 North American entrepreneurs. Overall, we found support that social support is related to higher levels of metacognitive awareness, better performance, and better well-being. We also found support for the mediating effects of metacognitive awareness on performance and well-being. We did not find support for our hypothesis that metacognitive awareness is directly related to performance but did find that it is directly related well-being. We tested our model against several alternative models and discussed the results of those comparisons. Last, we discussed several important implications for both research and practice while identifying potential limitations to our study. Our results show that metacognition remains a promising area for future research within the entrepreneurship literature. To summarize our views on the topic, we think that "thinking about thinking" is worth thinking about.

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# Appendix - List of Measurement Scales

**Adaptive Cognition**

Five factors – measured on a 11 - point. Semantic differential measure, anchored on the left with the statement “not very much like me” and on the right with the statement “very much like me.”

**Goal Orientation**

I often define goals for myself.
I understand how accomplishment of a task relates to my goals.
I set specific goals before I begin a task.
I ask myself how well I've accomplished my goals once I've finished.
When performing a task, I frequently assess my progress against my objectives.

**Metacognitive Knowledge**

I think of several ways to solve a problem and choose the best one.
I challenge my own assumptions about a task before I begin.
I think about how others may react to my actions.
I find myself automatically employing strategies that have worked in the past.
I perform best when I already have knowledge of the task.
I create my own examples to make information more meaningful.

I try to use strategies that have worked in the past.
I ask myself questions about the task before I begin.
I try to translate new information into my own words.
I try to break problems down into smaller components.
I focus on the meaning and significance of new information.

**Metacognitive Experience**

I think about what I really need to accomplish before I begin a task.
I use different strategies depending on the situation.
I organize my time to best accomplish my goals.
I am good at organizing information.
I know what kind of information is most important to consider when faced with a problem.
I consciously focus my attention on important information.
My "gut" tells me when a given strategy I use will be most effective.
I depend on my intuition to help me formulate strategies.

**Metacognitive Choice**

I ask myself if I have considered all the options when solving a problem.
I ask myself if there was ah easier way to do things after I finish a task.
I ask myself if I have considered all the options after I solve a problem.
I re-evaluate my assumptions when I get confused.
I ask myself if I have learned as much as I could have when I finished the task.

**Monitoring**

I periodically review to help me understand important relationships.
I stop and go back over information that is not clear.
I am aware of what strategies I use when engaged in a given task.
I find myself analyzing the usefulness of a given strategy while engaged in a given task.
I find myself pausing regularly to check my comprehension of the problem or situation at hand. I ask myself questions about how well I am doing while I am performing a novel task.
I stop and reread when I get confused.

**GHQ-12**

In the last two weeks have you…
[Prompts: Less than usual, No more than usual, Rather more than usual, Much more than usual]
1. been able to concentrate on what you're doing?
2. lost much sleep over worry? (R)
3. felt that you are playing a useful part in things?
4. felt capable of making decisions about things?
5. felt constantly under strain? (R)
6. felt you couldn't overcome your difficulties? (R)
7. been able to enjoy your normal day to day activities?
8. been able to face up to your problems?
9. been feeling unhappy or depressed? (R)
10. been losing confidence in yourself? (R)
11. been thinking of yourself as a worthless person? (R)
12. been feeling reasonably happy, all things considered?

**PWB**

7 – point scale ranging from “Strongly Agree” to “Strongly Disagree”
I lead a purposeful and meaningful life.
My social relationships are supportive and rewarding.
I am engaged and interested in my daily activities.
I actively contribute to the happiness and well-being of others.
I am competent and capable in the activities that are important to me.
I am a good person and live a good life.
I am optimistic about my future.
People respect me.

**Social Support**

Four questions:

1.) How much do these people provide you with assistance or information to make your work life easier for you?
2.) How easy is it to talk with the following?
3.) How much can these people be relied on for support when things get tough at work?
4.) How much are the following people willing to listen to your problems?

Asked about the following people:

- Significant other/Spouse
- Peers
- Subordinates
- A mentor
- Friends outside of work

On a five point scale:
0 - Do not have any such person
1 - Not at all
2 - A little bit
3 - A fair amount
4 - Very much

**Perceived Performance**

A performance area is the sum of a multiplied score between each of the following two questions:
1.) How important is each of the following areas to the success of your business?
1 – Not important at all
2 – Slightly important
3 – Important
4 – Very important
5 – Extremely important

2.) How satisfied are you with your firm's performance in the following areas?
1 - Very dissatisfied
2 - Dissatisfied
3 - Neither satisfied nor dissatisfied

4 - Satisfied
5 - Very Satisfied

Each asked about the following areas:

- Sales/revenue
- Sales/revenue growth
- Employee growth
- Market share
- Profitability
- Innovativeness
- Overall performance