PROJECT MANAGER CONFIDENCE AND RISK AWARENESS

by

Carol S. Davis

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Liberty University, School of Business

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Abstract

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The problem addressed was that a project manager's confidence level may lead to insufficient risk awareness and contribute to project failure. The study was conducted among 257 project manager practitioners in the US. The study expanded on the research conducted by Fabricius and Büttgen (2015) which found that project manager overconfidence affects expectations of project success and plays a critical role in the inaccurate assessment of project risk during project planning. A secondary correlation analysis (excluding outliers) found a statistically significant result leading the researcher to reject the null hypothesis, meaning there is evidence to show that overconfident project managers exhibit lower risk awareness. The study has practical implications to project manager practitioners by raising the awareness of understanding how project managers influence risk management in their projects as a prelude to potential project success or failure.

Key words: project manager, confidence, risk awareness, overconfidence, overoptimism

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Dedication

This dissertation is dedicated to Jesus Christ, my Lord and Savior. He is the light of the world who gives eternal life to anyone who believes upon his name. Thank you for your saving grace, love, and mercy and for being with me through this journey and all journeys in my walk with you.

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Section 1: Foundation of the Study

Today's business environments require companies to introduce new and innovative products and services that will meet the growing demand of customer needs. An ever-increasing number of companies have turned to the project management discipline to manage new product development innovations (Nguyen, Marmier, & Gourc, 2013). However, new product development projects are risky propositions, with current literature stating that only 60% of projects succeed in meeting the strategic goals of the project (PMI, 2017a). Recent studies show correct project risk management directly contributes to project success (Teller, Kock, & Gemünden, 2014), identifying and managing threats lead to more efficient project risk management and increased performance (Oehmen, Olechowski, Kenley & Ben-Daya, 2014), and the vital responsibility of project risk management falls to the project manager (Kutsch, Browning, & Hall, 2014; Firmenich, 2017).

Fabricius and Büttgen (2015) found that project manager overconfidence affects expectations of project success and plays a critical role in the inaccurate assessment of project risk during project planning. Overconfidence can blind a person to the size of the threats posed by risk impacts (Van Zant & Moore, 2013). Overconfidence can reduce the ability to recall relevant past risk occurrences and cloud judgments based on emotional responses to risk (Pachur, Hertwig, & Steinmann, 2012). Building on this foundation, the present study seeks to contribute to the general problem of project failures. The study specifically focuses on project manager practitioners in the US by examining the relationship between confidence level and risk awareness during the planning phases of a new project, as a means to explain potential project failure.

Background of the Problem

Project-based work has become so prevalent in contemporary business environments that projects are considered key drivers of both societal and economic activity (Jensen, Thuesen, & Geraldi, 2016). In fact, new market conditions require companies to adapt to project-based organizations for their very survival (Bergman, Gunnarson & Raisanen, 2013). According to the Project Management Institute (PMI), the preeminent professional organization for project managers, one out of four projects fail (PMI, 2017a). The cost of project failures can be staggering – take the case of the 1976 Montreal Olympics project that encountered a 1.25 billion dollar overrun (Patel, Bosela, & Delatte, 2013), or the 63-billion-dollar price tag of the collective cost of failed IT projects in the US (McKay & Ellis, 2015).

Given the large number of project failures, insufficient performance suggests potential deficiencies in current project management practices (Sols, 2015). Further, project success is predicated on the project manager's skill, along with reflective experience and intelligence (managerial, emotional, and technical; Jugdev, Perkins, Fortune, White, & Walker, 2013). Fabricius' and Büttgen's (2015) hypothesis that overconfidence on the part of the project manager reduces the project manager's ability to sufficiently assess risk during the planning phase of a new product development project poses an interesting topic for further study. Since an early and accurate risk assessment may make the difference in not moving forward on a project that should not move forward, bringing attention to the potential bias a project manager's confidence level has on risk management serves as a practical application that could save a company precious resources of time and money.

Problem Statement

The general problem to be addressed is that a project manager's confidence level may lead to insufficient risk awareness during the planning phase of a new project, contributing to project failure (Fabricius & Büttgen, 2015). Conducted among project managers in Germany, the Fabricius and Büttgen study (hereafter referenced as FB2015) measured three risk variables: the project manager's assessment of risk impact, the project manager's assessment of risk occurrence, and the project manager's own risk awareness. In the FB2015 study, the authors found during the planning phase project managers tended to only consider the probability of risks occurring but neglected to factor in the impact of those risks when forming expectations of project success. Further, the authors indicated typical project managers tend to be overly confident in judgments, thus underestimating the occurrence of project deviations from what was planned. Lastly, the authors indicated risk awareness acts as a mediator between overconfidence and risk assessment such that risks seem less threatening, thus sophisticated risk management may seem unnecessary to the overly optimistic project manager, which further contributes to potential project failure.

Long researched in cognitive psychology, the importance of overconfidence and its association with serious judgment errors during decision making has seen growth in business research in recent years, primarily in management and finance (Markovitch, Steckel, Michaut, Philip, & Tracy, 2014). This research expands on the original work published in the FB2015 research. The specific problem was project managers with higher levels of confidence demonstrate lower levels of risk awareness. The focus of the current research was on the relationship of confidence level and risk awareness among project managers.

Purpose Statement

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. This researcher was most intrigued by the finding showing the relationship of overconfidence and risk assessment is mediated through risk awareness (identified in the resulting FB2015 theoretical model). The authors concluded the mediation may be tied to the inability to recall prior risk experiences, leading to the inaccurate assessment of reduced threats and occurrence of risks. This implies projects may be started which later are deemed as unprofitable, indicating the companies should not have proceeded in executing the projects at the beginning.

The conclusion of the original FB2015 research is project managers with higher levels of confidence demonstrate lower levels of risk awareness. The FB2015 research indicated this conclusion leads to project managers who are less likely to conduct proper risk identification, risk management, and contingency planning which increase the threat to project success. Therefore, this study expands upon the FB2015 research study for which it is based by conducting research among a population of project manager practitioners operating in a different country.

Nature of the Study

While Creswell (2014) categorizes primary research into the typical groups of qualitative, quantitative, or mixed methods, he views the three as being not so much discrete but rather on a continuum with qualitative on one end, quantitative on the other, and mixed methods incorporating both approaches. According to Stake (2010), quantitative analysis deals with statistical, numerical, or attributable measurements; whereas, qualitative analysis deals with our

human perceptions and understanding. Creswell (2014) describes the differences simply as quantitative research uses numbers framed in closed-ended questions and hypotheses, while qualitative research uses words framed in open-ended questions. Further, Stake (2010) indicates quantitative leans toward metric, whereas qualitative research is interpretative with researcher-subject interactions and leans toward experiential. Finally, quantitative is focused on generalizing findings to a population versus developing a detailed view for individuals used in qualitative (Creswell, 2014).

Based on this brief review of differences in the types of studies, a quantitative approach was chosen for this research. Firstly, the research examines the relationship between two numerical variables. Secondly, closed-ended questions are used to collect the data regarding these variables. Thirdly, the hypothesis examined in this research calls for statistical analysis in order to examine the relationship under study. A qualitative approach would not have been appropriate because the research was not focused on understanding perceptions that utilized open-ended questions to collect detailed individual findings.

A quantitative methodology is chosen in order to appropriately answer the research question and test the hypothesis. More precisely, the study uses a correlational research design because the study seeks to understand how confidence (the independent variable) relates to risk awareness (the dependent variable) and how the two variables influence each other by applying statistical calculations (Creswell, 2008). The current research is based off of the original FB2015 research. Using the framework outlined by Creswell (2014) a quantitative approach is the proper research method to select for this study based on a postpositivist philosophy, in this case that the effect of the confidence level on the part of the project manager influences risk awareness. The strategy for inquiry uses surveys and experiments. The objective of the study is to test the

underlying inverse relationship between confidence level and risk awareness (i.e., higher levels of confidence are associated with lower levels of risk awareness).

Discussion of method. A quantitative study methodology is chosen to compare any differences between the FB2015 study sample population and the present study sample population. A relational cross-sectional methodology is employed for this study to test the relationship between the proposed variables in the proposed theoretical model. Cross-sectional, or single point in time, data collection is used, being the best known and most frequently used measurement type in quantitative studies (Churchill, 1991). In this case, the research tested how the effect of project manager confidence level influences project manager risk awareness.

Discussion of design. The survey is conducted among a population of project managers actively working in the business environment using an online survey administration. The specific hypothesis is tested using valid and reliable instrument standards and using statistical procedures for analysis. The objective of the study is to test the underlying inverse relationship between project manager confidence level and risk awareness level (i.e., the problem statement) that a project manager's confidence level (independent variable) may lead to insufficient risk awareness (dependent variable) during the planning phase of a new product development project, contributing to project failure.

Summary of the nature of the study. The proper research study methodology used in this research is a quantitative non-experimental correlational design conducted at a single point in time. The study replicated a portion of the original FB2015 research by testing the hypothetical relationship of confidence level to risk awareness among project managers. The study population is US project managers with practical working experience in the project management discipline.

Research Questions

The primary research question addressed was: What is the relationship between a project manager's confidence level and risk awareness level among project manager practitioners? The primary research question forms the hypothetical model to be tested.

Hypothesis

The hypothesis to address the research question was:

Ho1: There is no statistically significant relationship between the confidence level and risk awareness level in project manager practitioners.

Ha1: There is a statistically significant relationship between the confidence level and risk awareness level in project manager practitioners.

Other research questions involved cross-tabulations to examine the relationships between the model variables and the demographic variables of:

- Age
- Gender
- Education level
- Years of project management experience
- Professional certifications
- Functional area currently working in
- Industry currently employed in

Theoretical Framework

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The intention of the study was to offer

possible explanations for project failures in the business context, thus contributing significantly to project management practice. The current study sought to accomplish this purpose by expanding on the FB2015 research which examined "how risk assessment relates to overall anticipated project success and how overconfidence on the part of project managers influences such assessments" (p. 239). The authors hypothesized overconfidence was tied to overly optimistic assessments of the probabilities of risks occurring and their associated impacts in the research model.

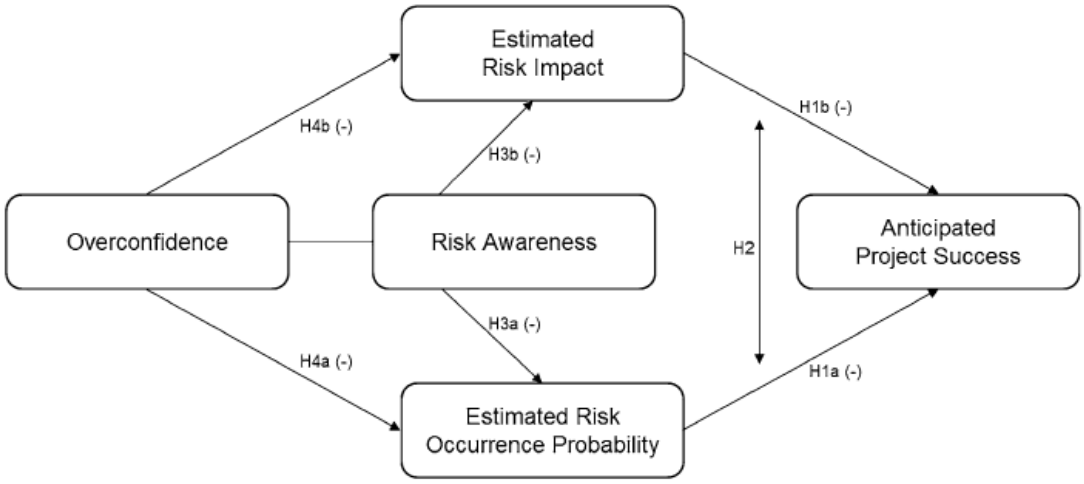

Figure 1. FB2015 Research Model.

Reprinted from " Project Managers' Overconfidence: How is Risk Reflected in Anticipated Project Success?" by G. Fabricius and M. Büttgen, *Business Research, 8*(2), p. 247. Copyright 2015 Springer Science & Business Media. Reprinted with authors' permission.

Risk assessment heuristics and biases. Three cognitive theories associated with mental errors during decision making that affect project managers are offered by Virine (2014): availability heuristic, anchoring heuristic, and representative heuristic. The availability heuristic involves judgments about probability and frequency of events occurring based on a person's easy recall (Folkes, 1988). In the FB2015 research, the authors indicated overconfidence leads project

managers to underestimate the likelihood of risks occurring and downplay the impact of the risks should they occur. The authors found risk awareness (i.e., the attitude that risks pose threats to project success) to be a mediating variable in risk assessments. Therefore, risk awareness may be a contributing factor in project managers' overconfidence and, thus affect risk assessments and decision-making judgments when anticipating the success of projects.

The anchoring heuristic involves the project manager's tendency to rely on a piece of information and produces the bias of overconfidence in estimating probabilities, which leads to overly optimistic estimates of uncertain events and, eventually, to risk taking (Virine, 2014). When examining effects of task completion time in planning and related cognitive processes, the anchoring effect was proposed as an explanation for optimistic bias in task completion prediction (Weise, Buehler, & Griffen, 2016). Translated to this study and in line with Virine's definition for project managers, participants in the present study may have set ranges of probability of planning phase tasks completion too low and remain overconfident these ranges include true values.

The representative heuristic refers to the estimation of probability of first time events based on similarities with stereotypes developed prior by the person (Abatecola, 2014). Virine (2014) listed optimism as a bias common in the representative heuristic by which project managers overestimate the likelihood of successfully completing a project and underestimating the likelihood of risk. In relation to the present study, project managers may insufficiently assess their own risk awareness level due to their past experience.

Optimism bias. Once the purview of the field of psychology, interest in the optimism bias phenomenon has re-surfaced in recent years by scholars researching decision making in the project management field (Söderlund & Müller, 2014). Optimism bias is linked to unrealistic

project scheduling and project risk (Prater, Kirytopoulous, & Ma, 2016), is found in project planning activities (Tyebjee, 1987), is associated with re-commitment to failing projects (Meyer, 2014), and contributes to underestimating task completion times (Akkermans & van Oorschot, 2016). Optimism bias is closely associated with the overconfidence bias (Tyebjee, 1987). A self-enhancement bias, overconfidence has been identified as one of the most damaging decision-making flaws and is manifested through overoptimism (overestimation of the likelihood of positive outcomes either by magnitude or by frequency) and overprecision (when a person has accurate beliefs on average, but underestimates the risks involved in a decision) (Malmendier & Taylor, 2015).

Discussion of relationships between theories and variables. The theoretical framework of the present study tested the FB2015 research finding that project managers with higher levels of confidence demonstrate lower levels of risk awareness among project manager practitioners. This study was differentiated from the FB2015 research study by conducting research among a different population of project managers – those in the US versus Germany -- across the full spectrum of project manager confidence. The resulting theoretical framework in this study focused on one of the primary FB2015 findings that emerged in the FB2015 study (i.e., the inverse relationship) explaining project managers with higher levels of confidence tend to have lower levels of risk awareness. In this study, the researcher wished to understand whether a project manager's confidence influences his/her ability to recall risks during the planning stage of a new product development project. In order to test whether there was a relationship, the researcher proposed a correlation test among two study variables – the project manager confidence level was the independent variable (IV) and project manager risk awareness level was the dependent variable (DV; Figure 2).

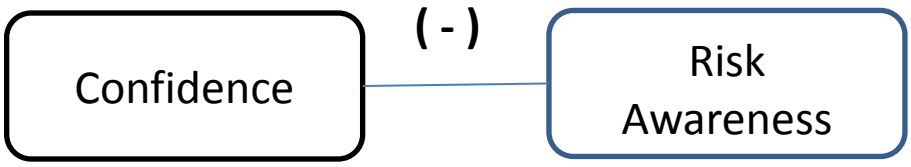

Figure 2. Relationship between Confidence (IV) and Risk Awareness (DV).

Summary of the conceptual framework. Based on the prior FB2015 findings and the body of literature reviewed on heuristics and biases, the relationship between project manager confidence level and project manager risk awareness level was assumed to be inversely related. The literature indicated project managers tended to be overly optimistic in the planning phases of projects. Further, the body of literature indicated project managers tend to have unrealistic project scheduling based on overly optimistic expectations of project success. Finally, the assumption of optimism bias influences higher confidence and resulting lower risk awareness lead this researcher to believe the project manager underestimated the need for risk identification, risk management, and contingency planning as indicated by the body of literature.

Definition of Terms

Confidence Level: A project manager's self-assessment of his or her accuracy in estimations (Fabricius & Büttgen, 2015).

FB2015: An abbreviation used to indicate the original research published in 2015 by Fabricius and Büttgen for which this research study expands upon.

Overconfidence: Excessive certainty regarding the accuracy of one's beliefs (Moore & Healy, 2008; i.e., for this study) an overestimation of one's own ability to make accurate estimates (Fabricius & Büttgen, 2015).

Project: A temporary endeavor undertaken to create a unique product, service, or result (PMBOK® Guide, 2017).

Project Management: The application of knowledge, skills, tools, and techniques of project activities to meet the project requirements (PMBOK® Guide, 2017).

Project Manager (PM): The person assigned by the performing organization to lead the team that is responsible for achieving the project objectives (PMBOK® Guide, 2017).

Project Manager Practitioner: For the purposes of this research, a practitioner is anyone who is currently working as a project manager, has worked as a project manager in the past, or is managing project managers (as qualified for this research study using the screener criteria in the survey instrument).

Project Risk: Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on one or more project objectives such as scope, schedule, cost, and quality (PMBOK® Guide, 2017).

Risk Awareness: A measure of the project manager's generic attitude toward risks and the perceived threat that risks have to project success (Fabricius & Büttgen, 2015).

Assumptions, Limitations, Delimitations

Assumptions of the study included assuming the study was realistic and relevant to project managers, the sample population is generalizable, and that there is a relationship between overconfidence and risk awareness. Limitations of the study included the inability to project findings to other geographic regions and the project duration activity exercise may not simulate real-life project manager activities. Delimitations included participants being chosen from a membership roster, as well as there may be other factors impacting project success than those chosen to be studied in this research.

Assumptions. One assumption of the present study was participants completed the simulated duration estimation activity to the best of their ability under the simulated condition as they would under an actual condition in their working environment. Another assumption was the sample population provided by the local PMI Chapters was generalizable to the population of project managers working in the discipline today. Further, a key assumption was overconfidence had a negative impact on risk awareness (there is no provision to capture a positive or upside impact of project manager's overconfidence on risk awareness).

Limitations. The present study conducted research among project managers in the US, specifically belonging to a local PMI Chapter and did not seek to compare with other geographic regions with the exception of Germany for which the FB2015 research was conducted. The study was limited by the research design in that a simulated duration activity was used rather than a real-life project duration activity. Whether the findings from a real-life project duration activity would show different results or have greater generalizability based on the study instrument is unknown. However, it was highly likely the research design did not capture the complexity of real-life projects (e.g., it lacks the influence of internal or external stakeholders, the effect of organizational role differences, and the difficulties from interactions and communications with other project team members). Finally, while the study attempted to explain the relationship of project manager confidence and risk awareness, the statistical analysis used shows correlation, but did not indicate causation.

Delimitations. The scope of the study was limited to individuals who work on projects within a business environment who belong to a local PMI Chapter or in the researcher's professional network. The convenience sample was chosen to increase the likelihood of finding a reliable and representative sample of project managers with knowledge and experience to

participate in the study. A closed-ended Likert scale questionnaire was administered in order to calculate quantitative precision versus open-ended questions, which may encourage participants to complete the study. A simulated project duration activity was used for ease of survey administration. There may be many other factors affecting anticipated project success, but the research model chosen limited the study variables to two key variables originally tested in the FB2015 study: overconfidence and risk awareness.

Significance of the Study

The research study was chosen to address a significant problem in business today – the high failure rate of projects. The researcher was intrigued by the findings of the original work of Fabricius and Büttgen (2015) that examined the effect overconfidence had on a project manager's risk assessment during the critical stage of project planning, and how insufficiently or incorrectly assessing risk impacted the overall expectation of project success. The study has practical application to project management practitioners by focusing on a potential bias associated with project planning that may ultimately lead to project failure.

Reduction of gaps. While much has been written on the subject of risk in project management decision making, little has been researched on the effect project manager confidence, particularly overconfidence, may play in project manager risk assessments. There appears to be a gap in the scholarly research that examines the effect of project management overconfidence in business projects. A simple electronic search of an exhaustive business database such as ABI/INFORM Global for the subject of overconfidence and project manager in publications in the past five years relating to project management returns primarily the FB2015 research article. Yet, searches of risk assessment and project manager return many articles. The FB2015 article indicated that at the time of their original study, to their knowledge, no

management studies had examined how project managers' inadequate risk assessments influenced expectations of project success.

The authors offered several suggestions for replication of the study. An intriguing replication, not specifically suggested, but is explored in this study is how study findings may differ by geographic location. Since the FB2015 research was original and explored a research gap, any research extending that original research would also serve to reduce research gaps. Since theoretical insights from one research study provide universality to potentially project to another situation (Robson, 2002), conducting research among a different population than originally studied adds to the existing body of knowledge by comparing project managers in one country to another country in this study.

Implications for Biblical integration. Viewing work through the lens of the Gospel gives work greater meaning and purpose (Van Duzer, 2010; Keller, 2012). Integrating a Biblical worldview into the research dissertation enhances its meaning and applicability. Planning and organizing are key foundational concepts in effective project management. Van Duzer, in essence, states the importance of project management in business environments is to conduct planning and organizing activities as an integral part of sustaining any business operation.

During the startup of a new product development project, accurate planning and organizing are critical. The project manager must be cognizant of what is called *planning fallacy* where his or her over-optimistic biases during the planning phase can cloud judgment of the project's likelihood of success (Kutsch, Maylor, & Lupson, 2011). One of the key reasons for planning fallacy is over-optimism on the part of the project manager. Closely associated with optimism bias is overconfidence bias (Tyebjee, 1987).

This study focuses on the influence of confidence, particularly overconfidence, and risk awareness among project managers. Overconfidence is defined as "excessive certainty regarding the accuracy of one's beliefs" (Moore & Healy, 2008, p. 502) and "unwarranted confidence in one's own abilities to make accurate estimates" (Fabricius & Büttgen, 2015, p. 21). There are numerous examples in the Bible concerning overconfidence and the associated risks. God particularly warns against the effects of overconfidence in one's own strength and ability, which typically meets with disastrous consequences. Three well-known warnings describe the dangers of overconfidence as it is defined for this study: "Pride goes before destruction, and a haughty spirit before stumbling" (Proverbs 16:18); Peter's insistence he would never fall away from Jesus, but then denies him three times in one night (Matthew 26); and, the Church in Laodicea whose members rely on their own wealth, but do not realize they are spiritually poor (Revelation 3).

Joshua 7 illustrates an example of pride in one's own confidence going before a fall. When the children of Israel soundly defeated the city of Jericho, their misplaced pride was overflowing in their own strength and ability. Overconfidence caused the Israelites to inadequately assess the risk of engaging in their next battle at Ai. Those who spied out the situation in Ai told Joshua the inhabitants were so few that only a minimum number of warriors would be required for the battle. The Israelite warriors had to retreat and were paralyzed by fear when their courage diminished as a result of being repulsed by the Ai citizens. This story from the Old Testament provides a solid justification for the current study which sought to understand better the relationship between confidence and risk assessment, albeit in a project management context.

The second example of where overconfidence played a role in risk awareness, which is defined broadly as the extent to which attitude plays a role in judgment, is Peter's overconfidence in his own ability to remain faithful to the Lord on the night of Jesus' arrest found in Matthew 26. Although Jesus had told Peter he would deny him three times that night before the rooster crowed, it was only after the rooster crowed that Peter was able to realize he had denied knowing Jesus and to recall the Lord's words of warning. The availability heuristic researched for this current study, which speaks of a person's easy recall of risks based on prior experience, may have been at work in Peter's overconfidence in perceiving the risk of his denial.

Finally, a third example of overconfidence influencing risk awareness is found in the church at Laodicea described in Revelation 3. The church is described as being overconfident in its standing because it was rich, had everything it wanted, and did not think it needed anything. However, God saw the church's actual condition as wretched, miserable, poor, blind, and naked. Business research has shown overconfidence can serve to blind a person to risks in a business setting (Van Zant & Moore, 2013). In the Laodicea example, the attitude of overconfidence (i.e., putting trust in temporal material possessions) results in a low level of risk awareness (i.e., inadequate spiritual maturity and focus on God as the supplier of eternal true wealth).

Relationship to field of study. The study related to the field of project management in a number of key ways. First, the study addressed the potential causes for high project failure rates in businesses – a significant problem in project management today. Failure rates of projects cost billions of dollars every year in the US. Gallup reported IT project failures alone represented 50 billion dollars to 150 billion dollars per year in the US (Hardy-Vallee, 2012). Research designed to explore the reasons for project failure contribute to the body of literature to help the discipline understand why projects fail and how to improve project success.

Second, the study related to the field of project management by examining the important area of risk management. Risk is an inherent reality in projects either from an unplanned event happening or a planned event that does not go as planned (Botezatu, 2016). Recent literature shows an increasing interest in studying project risk and the ways it can be mitigated, whether within the supply chain (Ali & Shukran, 2016), within specific industries such as construction (Firmenich, 2017), or specific roles such as IT (Kutsch et al., 2014). An electronic search of scholarly articles written in the past five years with the combined subjects of risk management in the title and project management within the article returned over four hundred results from the ABI/INFORM Global business electronic database.

Third, the study related to the impact of the project manager. For example, risk management is the primary purview of the project manager (Kutsch et al., 2014; Firmenich, 2017). Further, project success is predicated on the skills of the project manager (Jugdev et al., 2013). While self-efficacy confidence (i.e., how well a person thinks they can perform in a particular task) is typically a positive factor for ultimate success in an activity (Bloomquist, Farashah, & Thomas, 2016), overconfidence is likely the most prevalent and potentially catastrophic error in decision making and judgment (Markovitch et al., 2014).

Summary of the significance of the study. The present study provided practical application to project management practitioners and adds to the body of knowledge in the field of project management. The study helps to fill in the gap found in the literature that ties project failure to inadequate risk assessment influenced by project manager confidence (or overconfidence). The study provides insights into God's warnings of pride written in His word (i.e., an overconfidence in one's own self that blinds a person to the threat of risks).

A Review of the Professional and Academic Literature

The ultimate goal of this research dissertation was to provide potential understanding for project management practitioners to improve project success. The literature review consists of peer-reviewed journals and professional publications primarily focused on the project management discipline as it relates to a business environment. The literature review provides the background knowledge in support of the dissertation study variables which examine the relationship between project manager confidence level (independent variable) and manager risk awareness (dependent variable).

The following literature review is divided into two key sections. First, the paper provides a general discussion of the project management practice and the need for project management research, particularly in new product development for which this researcher is most interested. Within new product development the discussion provides key insights on project planning and project risk management. The research literature contained in this review supports the paradigm shift occurring in project management as the discipline moves from learning based on academic or theoretical discussions to learning based on practitioner experiences. Second, the paper discusses the theoretical concepts and study variables which underpin this research, particularly project manager risk awareness and project manager confidence. A discussion is provided for understanding risk assessment heuristics (availability, affect, anchoring, and representative) and biases (optimism bias and overconfidence bias). These psychological insights provide the theoretical foundation and learning for explaining project manager behavior. A final discussion focuses on project manager characteristics, confidence level, and measures of confidence.

Project management in practice. Contemporary companies have adopted project-based organizational structures to adapt to new market conditions that require delivery of customized

solutions and services (Bergman et al., 2013). This fundamental shift in the way that organizations are structured was first termed *projectification* by Midler (1995). The author noted the evolutionary need to increase competitive advantage by bringing innovative products to market through reformation of new product development processes focused on increasing efficiency and speed. Projectification has allowed for increased flexibility of organizational structures, provided a means for enhanced participation through project teams, and fostered creativity (Lloyd-Walker, French, & Crawford, 2016).

In many ways, the move to projectizing work in organizations has required replacing the outdated hierarchical, functional orientation of traditional project management seen in years past. Standardization of processes is a key component of projectification in an organization to ensure individual working knowledge becomes routine, is available to all, and mandated throughout the organization (Bergman et al., 2013). Standardization is frequently acquired through in-house documentation and from project manager certification programs offered by professional associations, such as the PMI. In comparison, others report projectification limits project effectiveness and leads to an over focus on the iron triangle versus a focus on more updated measures of project benefits realization, such as customer satisfaction (Chih & Zwikael, 2015; Badewi, 2016).

Unlike other long-established disciplines, such as medicine or law, project management is a relatively new discipline which does not have the same foundation of a large body of theory, per se. Project management as the modern discipline we know today began to emerge in the 1990s with the development of standards, such as the PMBOK® *Guide* (Apostolopoulus, Halikias, Maroukian, & Tsaramirsis, 2016). The *Project Management Body of Knowledge (PMBOK®) Guide*, which is a collection of project manager good practices based on practitioners

surveyed, is the generally recognized standard for those involved in the project management profession (Starkweather & Stevenson, 2010). The *PMBOK® Guide* contains generally recognized knowledge and good practice that are applicable most of the time and that enhance the likelihood of success in delivering on expectations. Published every five or so years by the PMI, the *PMBOK® Guide* is continually updated as the profession evolves and is currently in the Sixth Edition 2017 printing (PMI, 2017). The *PMBOK® Guide* stated the use of processes, skills, tools, and techniques found in the book is a testament to the increasing acceptance of project management as a profession (PMI, 2017).

Apostolopoulus et al. (2016) contended that while little has changed within project management theory over the course of the last decade, what has changed in the past few years is how techniques are being used to apply theory to practice. By utilizing standards and methodologies designed to guide practitioners, the authors stated companies can better adapt to change, minimize risk and, thus, ensure project success (Apostolopoulus et al., 2016). The view of project management as a control mechanism for efficient project execution within the strict bounds of time, budget, and specifications, is poorly suited for today's rapidly changing environments that have a high degree of uncertainty and require innovative products for entrance into new markets (Mahmoud-Jouini, Midler, & Silberzahn, 2016).

To address the need for adaptation of project management theory to support the evolving needs of practitioners, the *Rethinking Project Management* research paper published by the Rethinking Project Management Network, recast the project management discipline (Winter, Smith, Morris, & Cicmil, 2006). This research took the discipline beyond its conceptual foundations to inform theory and further develop the practice to support multidisciplinary needs (Winter et al., 2006). The authors noted "the significant growth in project work across different

sectors and industries," contending that project management had become the dominant business model for "strategy implementation, business transformation, continuous improvement, and new product development" (Winter et al., 2006, p. 638).

The Rethinking Project Management Network conducted a series of workshops among leading senior practitioners and researchers and found the project management discipline needed to move from an outdated narrow approach to a broader approach that was more in line with what practitioners were experiencing in their everyday work in the twenty-first century (Dalcher, 2016). Traditionally, project management had focused on the education and training of static methods and tools designed to produce a product or asset. The Network produced a paper that encouraged the project management discipline to revitalize project manager capabilities development through reflection and pragmatism by "borrowing, importing, experimenting, and adapting" (Dalcher, 2016, p. 816) to better address the dynamic, expanding nature of the project management profession.

Despite a profession that uses a feedback loop to generate a body of knowledge and certifications focused on improving the project management practice, projects still fail, indicating a gap in theory and practice. Dalcher (2016) discussed *The Rethinking Project Management* research paper findings in terms of theory about, in, and for practice. The discussion of theory for practice uncovered a "critical need to develop new theories, models, frameworks and approaches to help practitioners deal with the observed complexity in actual projects" (Dalcher, 2016, p. 801). He contended the need to develop more rigor around understanding uncertainty in project work was one key finding from the project conducted by the Rethinking Project Management Network. Finally, Dalcher (2016) concluded the Network findings show "practice needs to challenge research to think and question in new ways…attuned

to the need of the profession…aimed at overcoming the challenges to practice and developing reflective, deliberate, and better-informed practitioners" (pp. 817-818).

A review of the past twenty years of research on the project management practice resulted in two key themes: the ongoing need for explanations of success and failure in project performance and theoretical weakness of research focused on practice (Padalkar & Gopinath, 2016). Among some of the most recent trends focused on project methods appearing in the explanatory research, the authors listed agile methodology, critical chain scheduling, and project management maturity, among others. Once the purview of software development, agile methodology has been applied in recent years to the project management discipline to improve project success over the more traditional waterfall methodology (Serrador & Pinto, 2015). First introduced by Goldratt as a theory of constraints concept, Critical Chain Project Management (CCPM) determines the longest duration of the project based on the co-dependent tasks (Trojanowska & Dostatni, 2017). Project Management Maturity Models (PMMM; i.e., successive maturing of the standardization of project management within the organization) result in the key benefit of higher project success rates (Albrecht & Spang, 2014).

Project management research. Following the publication of the *Rethinking Project Management* research paper findings, a series of books aimed at improving modern project management for practitioners was produced that has influenced the types of project management research conducted and papers published. Walker and Lloyd-Walker (2016) surveyed all papers published in the *International Journal of Managing Project in Business* from its inception in 2008 through 2015, noting project management research has changed radically since the work conducted by the Network. The authors identified 2006 as the tipping point in project management when the discipline experienced a paradigm shift that has resulted in deeper and

richer project management research. One element of the shift noted by Walker and Lloyd-Walker (2016) was the creation of *pracademics* (i.e., the engagement of practitioners as scholars). Pracademics are completing doctoral programs while engaged in full-time demanding project management positions which enable them to draw on their reflections and experience to highly contribute to the project management research (Walker & Lloyd-Walker, 2016).

Through investigating theory-practice relationships within project management, a pragmatic approach has emerged that encourages managers to build projects based on the art of their own experiences in actual project execution and the science of employing empirical research (Lalonde, Buorgault, & Findeli, 2010). When designing theories to test, the authors insist pragmatic project management research should be both scientifically rigorous and relevant. Further, the authors insist research within a business school, unlike other traditional academic departments, must consider the usability of research in the practical application to the project management profession. Thus, research instruments should be based on the practical managerial activities performed by practitioners to form the general theoretical framework tested (Lalonde et al., 2010).

In an effort to contribute to the development of a broad theory of project management, Artto, Gemünden, Walker, and Peippo-Lavikka (2017) conducted a meta-analysis of project management-related literature outside of the pre-eminent mainstream field publications used to inform practitioners, namely *International Journal of Project Management*, *Project Management Journal*, and the *International Journal of Managing Projects in Business*. Building on the work conducted by the *Rethinking Project Management* initiative and challenging the idea that "project management research is published only in PM mainstream journals" (p. 206), the

authors advanced the project management discussion by evaluating project management application and similarities and differences in content across nine technology-focused sectors. By conducting a web search using the key word "project management" across 3,201 journals during the period of 1986-2009, the authors discovered 2,354 project management articles in some 564 journals. Within general project management, new product development research was found extensively in the literature, integrated cross-organizational product development emerged as a significant trend for enabling success in projects, and top key word searches included the words innovation, performance, and new product development (Artto et al., 2017; Padalkar & Gopinanth, 2016).

New product development. Project management is becoming central as the mechanism to deliver products and services in companies, moving from a "specialist subcategory of management" to a "core business activity vital to organizations as a whole" (Flyvbjerg, 2013, p. 760). An ever-increasing number of companies have turned to project management to manage new product innovations that ensure better time, cost, and quality delivery (i.e., the "triple constraint"; Nguyen et al., 2013). More and more companies will need to become proficient in project management by investing in their people and processes to meet the challenge of the need for an ever-increasing stream of new products stimulated by growing consumer demand.

Sicotte, Drouin, and Delerue (2012) asserted competitive advantage in the marketplace is driven by the firm's strategic ability to generate innovations. The authors describe innovative performance in the market as having a technical aspect and a new invention aspect. In their research among 715 firms operating in fast-paced R&D sectors, the authors found project management plays an integral role in new product development and in bringing new products to market. The primary goal of the Sicotte et al. (2012) research was to explain organizational

project management (OPM; i.e., maximizing value) by successful and consistent accomplishment of organizational objectives through projects as a key asset in corporate strategy development. In the final analysis, the authors concluded project management should no longer be viewed as a tool, rather it enables companies to stay competitive in a dynamic environment by aligning corporate strategies to a steady stream of projects supporting innovation (Sicotte et al., 2012).

Project planning. PMI outlines project planning as the second-of-five overall project management process groups, defined as the processes that determine the scope and the action to be taken to achieve the objectives the project aims to achieve (PMI, 2017). Project management research literature disagrees on the importance of project planning, ranging from developing the plan upfront being a critical factor of a successful project to the attitude that plans are meant to be changed over the course of the project (Andersen, 1996, 2016; Dvir & Lechler, 2004; Pinto & Slevin, 1987). In a study of 183 project manager interviews, the impact of project planning on project success was largely determined by the project risk level and the success metrics being targeted (Zwikael, Pathak, Singh, & Ahmed, 2014). The level of risk was found to be the moderating variable between planning and project success, implying that project managers should pay more attention to planning when a high-risk project is being conducted (Zwikael et al., 2014).

New product development projects are risky propositions, with the vital responsibility of risk management falling to the project manager (Kutsch et al., 2014). When turning a failing project around, the project manager must start from the beginning because, in all likelihood, the project failed initially due to inadequate planning (Aziz, 2012). Within project portfolio management that focuses on bringing innovative products to market through a holistic view,

determining the optimal set of projects on the front-end planning stage is at the root for achieving success (Kock, Heising, & Gemünden, 2016).

While the problem with inadequate or incorrect front-end planning is a symptom that plagues all sizes of projects and project portfolios, failure to make correct project estimations in the planning phase can be immensely costly over the life of the project, particularly among what is termed *megaprojects*. Defined as projects which cost $1 billion plus and take years to complete, megaproject spending is estimated to be as much as USD $9 trillion and eight percent of the global gross domestic product (Flyvbjerg, 2014). Much has been written on the over runs of megaprojects (Pitsis, Clegg, Freeder, Sankaran, & Burdon, 2018), particularly in construction of venues designed to support mega-events, such as the Olympic Games and the World Cup (Molloy & Chetty, 2015), within the oil and gas industry (Olaniran, Love, Edwards, Olatunji, & Matthews, 2015), and within public domains, such as mega transport projects (Dimitriou, 2014). However, the number of megaprojects is the highest in history and megaprojects continue to be executed despite often failing the project management triple constraint by being late, over budget, and not up to original requirement standards (Davies, MacAuley, DeBarro, & Thurston, 2014).

Because of the size and scope, as well as the economic, social, and political implications, proper management of the resources associated with megaprojects is more important than ever before for both business and governmental entities (Flyvbjerg, 2014). The author puts forth several explanations, such as optimism bias, for why these megaprojects are seemingly ill-forecasted during the planning phase and mismanaged during the life of the project, despite the ever-increasing use and growth of project management. Flyvbjerg (2014) dispelled former theories provided by various researchers: The Hiding Hand effect (successful problem solving

by beneficially hiding difficulties at the outset, while at the same time underestimating the ability to overcome the obstacle); errors due to creative design desires driving largely architecturally aesthetic projects; and outright deception on the part of the project sponsors. Other researchers have seen value in the Hiding Hand effect, stating the phenomenon that was first researched by Hirschman in 1967 offers project managers a way to understand both uncertainty and complexity in projects (Lavagnon & Söderlund, 2016).

There is evidence among the research that often project managers do not heed the early warning signs that a project is failing. Research indicated the failure to heed these signs has the basis in many explanations, with both psychological and process-related aspects addressed as main barriers to project managers in failing to respond to identified early warning signs (Haji-Kazemi, Anderson, & Klakegg, 2015). The work by Haji-Kazemi et al. revealed a gap in the literature regarding barriers to project managers' responses to early warning signs that subsequently led the researchers to focus their study on explaining why project managers do not respond to signals and suggested actions to improve the situation when signals are heeded. Summary conclusions indicated the main barriers to responding to early warning signs include over-optimism, poor management, and political issues (Haji-Kazemi et al., 2015).

However, another explanation links the lack of attention to these signs to faulty decision making because of overlooking potential problems, overestimating project benefits, and underestimating associated project costs – all symptoms of the psychological theory called planning fallacy (Lovallo & Kahneman, 2003). First coined by the psychologist Daniel Kahneman, winner of the Nobel prize for economics, the planning fallacy is a cognitive bias that leads people to engage in risky projects based on their tendency to overestimate project benefits and underestimate project costs (Flyvbjerg, 2013). When applied to project management, the

impetus of the planning fallacy is the project manager's over-optimistic bias that the project will succeed during the planning phase – a bias that tends to sustain a false optimism into the execution phase of the project (Kutsch et al., 2011). This bias is an unintentional delusion and works to deceive the project manager by continuing to focus on the original project forecast, completion date, or project plan as anchors, despite signs that would lead to a more rational assessment (Sample, 2015).

Project risk management. Project risk is defined simply in terms of an uncertain event or condition (PMI, 2017) with a probability of occurrence and related impact that causes a deviation from the expected plan (Apostolopoulus et al., 2016). Although project risk inherently comprises both threats (negative outcomes) and opportunities (positive outcomes), many project management practices dealing with project risk management are focused primarily on decreasing the potential negative effects (Bryde & Volm, 2009). Further, risk management is exacerbated in complex projects where identification of individual, or separate, risks is of lesser importance than identification of the causal links between combinations of risks that accumulate and compound to bring a project to failure (Williams, 2017). Firmenich (2017) offered a practical and flexible framework for project managers to customize a project risk management process using the following customization options: selection of requisite steps, the people mix for each step, and the methods to be used throughout the process.

Risk management supports the decision-making process (Teller et al., 2014), has a positive effect on project success (de Bakker, Boonstra, & Wortmann, 2011), and is a fundamental process for protecting against vulnerability in projects through the identification, analysis, assessment, and control of risks (Aleksic, Puskaric, Tadic, & Stefanovic, 2017). The authors of these studies indicated all projects involve risk; however, as projects become more

innovative they encounter more uncertainty and increased risk. Further, it is the project manager's responsibility to consider elements of risk and determine the best strategy that will deliver the project on time and on budget, which requires realistic estimates. Nguyen et al. (2013) posited the risk estimation process is often flawed because ease of identification leads most project managers to consider individual risks as independent. In reality, interdependencies exist and can alter the probability of occurrence when risks materialize at the same time, influencing the assessment of the risk impact (Nguyen et al., 2013).

Kutsch et al. (2014) stated while companies realize proper project risk management improves competitive vulnerability, projects fail despite using standard risk management procedures. The authors studied new product development projects that experienced one or more radical deviations from the original project plan. The authors found during the risk assessment stage, project managers dropped risks from the register based on perceived credibility and accuracy of the estimates (i.e., project managers tended to keep risks on the register that were easily assessed and could be defined with confidence). This problem of positivity on the part of the project manager was one key inhibitor to proper risk assessment identified by the authors, noting that risks were minimized for the project manager to appear more confident to deliver to stakeholders versus being perceived as a doomsayer. Kutsch et al. (2014) prescribed project managers must be encouraged to proactively address risk, which is normal and expected in project management, using unconventional tools and methods that reach beyond the familiar and measurable.

In today's business environments, risk management is not just limited to individual projects. Rather, portfolio risk management is becoming increasingly important as companies are managing multiple interdependent projects at any given time. Project portfolio management

seeks to manage all projects at the portfolio level rather than the project level to improve the portfolio as a whole; thus, enhancing decision making from a holistic viewpoint that is predicated on the interrelationships that drive resource allocation, agility, and strategic alignment (Killen, 2013). Connecting information from risks identified and managed in single projects across the entire portfolio of projects allows companies to reduce duplication of work, identify risks simultaneously, and increase project success by avoiding failure (Teller & Kock, 2013). The authors also emphasized a strong risk management culture was important to improved efficacy of the process of managing risk, as well as the need to measure the cost/benefit trade-offs of portfolio risk management activities (Teller & Kock, 2013).

Project success. The *PMBOK® Guide* attributed the use of processes, skills, tools, and techniques as a testament to the increasing acceptance of project management across virtually all types of companies' impact on project success (PMI, 2017). Among the top priorities for project managers, measuring project success has been the subject of study among the project management discipline since the early 1980s and remains so today (Müller & Jugdev, 2012). In a comprehensive review of the subject of project success, the authors provided two key insights from research: there is disagreement on an exact narrow definition of project success, and the components of project success are based on both project success factors (independent variables that increase the likelihood of project success) and project success criteria (dependent variables to judge project success or failure; Müller & Jugdev, 2012). Other research argued project efficiency (on budget and on time), the most widely considered measure of project success, is insignificant compared with measures of customer impact, financial success, project team satisfaction, and achievement of long-term benefits (Mir & Pinnington, 2014).

As an indicator, project success measurement is highly complex, unambiguous, and evades an exact definition in the project management literature, making it hard to monitor and anticipate for project outcomes (Samset & Volden, 2016). Researchers and practitioners have evolved from the simple definition of success as defined by the iron triangle (i.e., cost, schedule, performance) to a multi-faceted definition to find the root causes of project success and to improve performance (Williams, 2015). Researchers have evaluated many elements in the search for factors leading to project success, including the project governance (Joslin & Müller, 2016; Klakegg, Williams, & Shiferaw, 2016), the project decision making process chain (Rolstadas, Pinto, Falster, & Venkataraman, 2015), and the use of project management standards (Doskocil, 2016).

In Doskocil's (2016) examination of standards that impact project success, the author focused on project management methods, techniques, and tools to warn the practitioner that risks related to failure to meet project deliverables can be catastrophic to the organization. Doskocil (2016) stated project success has varied definitions (e.g., the triple constraint: time, cost, and quality), customer satisfaction, and, stakeholders' assessments that the primary output meets the original project purpose. Interestingly, in addition, Doskocil (2016) found the project manager's cognitive and emotional characteristics were thought to have a relationship to project success.

One key contributing factor of project failure is the lack of project teams to learn from prior projects and apply lessons learned to current projects (McKay & Ellis, 2015). Practicing project managers cited poor pre-planning as the main reason for project failure, which led to the recommendation of instituting project learning across all project processes, including risk management processes (McClory, Read, & Labib, 2017). Employing a project learning process during project planning is an important tool for the project manager to capitalize on prior project

managers' experiences in dealing with the range of prior project results from success to failure and all the iterative solutions derived in between.

Finally, there is a vital need within the project management discipline for future practitioner research to test concepts that result in meaningful and measurable constructs for understanding project success (Müller & Jugdev, 2012). The authors recommended more research that will add to the current findings, building incrementally on others' contributions to the project success discussion. Research methods recommended included multivariate approaches, sophisticated measurements, and improved tools, such as web-based surveys, along with perspectives on leadership theories (Müller & Jugdev, 2012).

Theoretical framework. The FB2015 authors found "project managers are less likely to expend effort to identify risks, conduct risk analyses (quantitative or qualitative), and create effective solutions should risks occur when they have higher levels of confidence and demonstrate lower levels of risk awareness" (Fabricius & Büttgen, 2015, p. 256). In a study of 214 project managers using a case study methodology for the planning phase of a new product development project, the researchers evaluated the effect of overconfidence on risk assessments to explain estimations of project success. The theoretical model produced by the research showed the relationships between project manager overconfidence, risk assessment (in terms of estimated impact of various risks, probability of the risks occurring, and the project manager's assessment of their own awareness toward risk), and the estimations by project managers of project success.

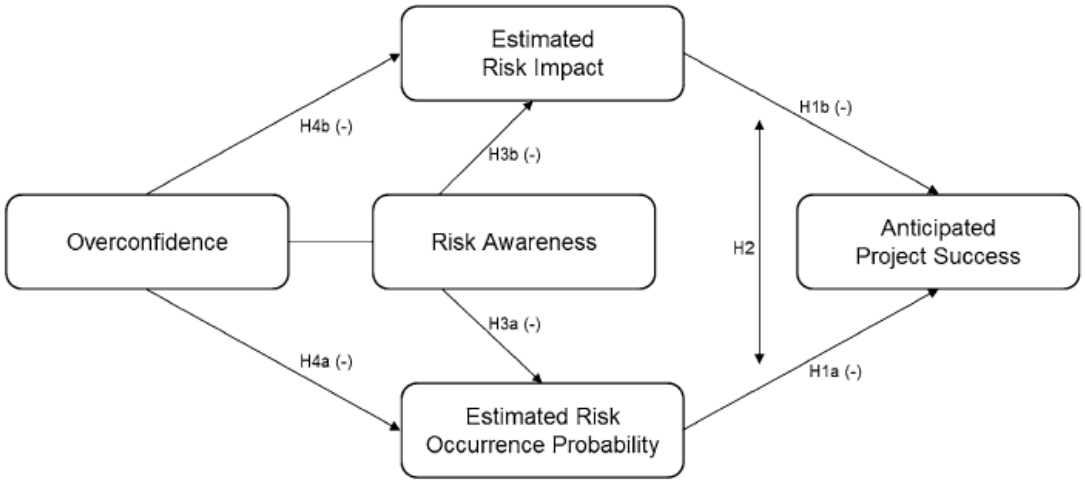

Figure 3. FB2015 Research Model.

Research model findings showing the relationship between overconfidence on risk impact and risk occurrence through the mediating variable of risk awareness in explaining anticipated project success. Reprinted from "Project Managers' Overconfidence: How is Risk Reflected in Anticipated Project Success?" by G. Fabricius and M. Büttgen, Business Research, 8(2), p. 247. Copyright 2015 Springer Science & Business Media. Reprinted with authors' permission.

The results of the FB2015 study indicated risk assessment is influenced by project managers' overconfidence through the mediator of risk awareness. The authors found the following:

> The mediation through risk awareness indicates that overconfidence may be linked to the reduced availability of risks, which leads to risks being perceived as non-threatening and unlikely to occur….and encourage companies to start seemingly beneficial projects which later show an unfavorable benefit-cost ratio, indicating they should have never been undertaken in the first place. (p. 258)

The authors concluded such bias in the risk assessment may lead project managers to bypass the need for project risk management. This research utilized the FB2015 theoretical framework and expanded on the research by focusing on the relationship between project manager confidence level and the mediation variable of risk awareness.

Risk assessment heuristics and biases. In the review of global theoretical models, one of the prevalent probabilistic theories of decision making is the heuristics and biases approach (Pallieral, 2002). This approach explains that judgment errors occur based on the common use of heuristics (rules of thumb) or cognitive biases in problem solving. Among the psychological underpinnings of human risk perception two key heuristics are used for judging risk: availability heuristic and affect heuristic (Pachur et al., 2012). Availability heuristic is defined as the bias that is created when a person determines the frequency of an event based on the ability to recall relevant instances (either direct or indirect experience); whereas, affect heuristic is defined as the bias that is created when a person's emotional (or affective) response determines the perception of how impactful the risk will be (Pachur et al., 2012). The availability heuristic (primarily through a person's direct experience) played a somewhat stronger role than the affective heuristic in risk judgments (Pachur et al., 2012).

Availability heuristic. First introduced to the literature by Tversky and Kahneman, the availability heuristic refers to how easy or difficult it is to recall information used in making probability judgments (Wänke, Schwarz, & Bless, 1995). Tversky and Kahneman (1973) focused their seminal research on the availability heuristic to analyze accuracy in judging probabilities of events in hopes of reducing the incidence of human judgment errors under uncertain situations. The availability heuristic specifically refers to a decision maker's preference, selection, and assignment of importance to alternatives that give weight to own prior experiences and/or industry standards rather than evaluating other sources of input when aiming to reduce decision uncertainty (Eriksson & Kadefors, 2017).

The availability heuristic is at play when the person making the decision assesses the probability of a current event based on memories of that event occurring in recent happenings

(Abatecola, 2014). Not only do decision makers consider the content of the recall, but ease or difficulty in the ability to recall information plays an important role in judging future events in terms of frequency, probability, and typicality (Schwarz et al., 1991; Folkes, 1988). Specifically, within the project management field, the availability heuristic is a bias researched in the literature for examining the problem of overoptimistic forecasts (Stingl & Geraldi, 2017).

Affect heuristic. The affect heuristic draws on a person's emotional or affective state to make decisions and react to situations involving perceived risk (Pachur et al., 2012). People come to rely on emotion and affect to navigate uncertainty in decision making. The power of positive affect has been demonstrated by experiments in which repeated exposure to a stimulus resulted in a positive preference or attitude (Slovic, Finucane, Peters, & MacGregor, 2007). Research in positive psychology is a relatively new concept tracing back to the late 1990s and focuses on factors that build positive qualities rather than only focusing on repairing things that need to be fixed, thus making it possible for individuals and communities to thrive and flourish through positive emotions (Seligman & Csikszentmihalyi, 2000). Understanding positive psychology in a project management environment provides practitioners with a means to achieve overall project success by drawing on the leadership tools of positive meaning, positive emotions, and positive relations (Berg & Karlsen, 2014).

Anchor and Representative Heuristics. Virine (2014) studied heuristics specifically in relation to project managers and found that overconfident project managers insufficiently assess risk in anticipation of project success. Along with the availability heuristic, the author identified two other heuristics of interest at play in assessing risk under decision making situations – anchoring heuristic and representative heuristic. The anchoring heuristic involves the project manager's tendency to rely on a piece of information and produces the bias of overconfidence in

estimating probabilities, which leads to overly optimistic estimates of uncertain events and, eventually, to risk taking (Virine, 2014). An example of the anchoring effect might occur when the project manager sets a starting point value for some event during the planning phase that becomes an anchor to adjust from as the project progresses. The representative heuristic refers to the estimation of probability of first time events based on similarities with stereotypes developed prior (Abatecola, 2014). An example of the representative heuristic might occur when a project manager creates a project schedule for a particular type of new product development project based on the schedule for a prior similar project.

Optimism bias. Lund (1925) was an early researcher to show the correlation of belief and desire. Optimism bias occurs when a person believes that they are more likely to have positive events happen than negative events. This illusionary state hinges on the perception of control (i.e., self-confidence) leads to an exaggerated optimism bias where attribution for positive outcomes are determined to be under the manager's control while attribution to negative outcomes are explained as uncontrollable external events (Lovallo & Kahneman, 2003). This "delusional optimism" can have extreme impacts when determining project estimations, particularly baseline project measures that appear to disregard reason and logic (Prater et al., 2016). Other studies have shown that even when a person is aware of optimism bias they are unlikely to change their behavior to control for the bias (Sharot, 2011). In fact, unrealistic optimism will tend to persist even when provided with information that challenges a person's beliefs because the decision maker will tend to selectively update future expectations when the challenging information is positive, however fail to update when the challenging information is negative – a phenomenon called *optimistic asymmetry* (Sharot, Korn, & Dolan, 2011).

Other researchers challenged the idea selective updating occurs because of optimism bias (Shah, Harris, Bird, Catmur, & Hahn, 2016). Using their own methodology, the researchers tested the assertions of Sharot et al. (2011) regarding positive and negative events and found no evidence of optimistic belief updating, concluding that people are not fundamentally biased toward optimism about future life events (Shah et al., 2016). A rebuttal research by Garrett and Sharot (2017) examined the methodology of the Shah et al. (2016) original research on optimistic asymmetry in belief updating and found support for the pervasive phenomenon across numerous studies in several disciplines, including behavioral economics, psychology, and neuroscience. Further, the latter research found the asymmetry leads to other positive biases of superiority illusion (beliefs about the person) and unrealistic optimism (beliefs about the person's future; Garrett & Sharot, 2017).

Optimism applied to project management. Optimism bias has been researched long within the project management discipline, however renewed interest has surfaced in recent years in relation to decision making in the project management field by notable scholars such as Söderlund, Flyvbjerg, and Kahneman (Söderlund & Müller, 2014). Prater, Kirytopoulos, and Ma (2016) conducted a comprehensive literature review about optimism bias in the project management discipline using a quantitative key word literature search of electronic databases, as well as a specific search of preeminent project management journals. The authors found 312 papers of which 33 papers were deemed most pertinent. Optimism bias was first mentioned in the professional literature in 2004, with steady growth beginning in 2008 to the present. The 33 papers referenced 1,948 papers of which Flyvbjerg, Williams, Morris, Kahneman, and Samset were the chief authors on the subject. Optimism bias has been widely accepted as "one of the major causes of unrealistic scheduling of projects," discussed most frequently in relationship to

project risk, heavily researched currently, and mitigated most often by quantifying the impacts of optimism bias by applying a multiplier to future projects (i.e., a reference class approach; Prater et al., 2016, p. 382).

Due to human beings' innate survival instincts, optimism plays a positive role in predictions of future events. However, optimism bias can prove to be detrimental in the early planning stages of projects, in continuing to pursue failing projects that should be terminated, and in inaccurately estimating project duration. Project management researchers found optimism bias surfaces during the planning phase of new product development projects because of engaging in planning activities (Tyebjee, 1987), when projects are failing as a means to recover and re-commit to project delivery rather than termination (Meyer, 2014), and in underestimating task completion times despite knowing longer completion times on past projects (Akkermans & van Oorschot, 2016).

Optimism bias during the project planning phase. Tyebjee (1987) examined the planning phase of a project, particularly during the forecasting process, and found many biases associated with optimism bias. Some of the more notable biases mentioned were availability (publicizing product success stories leads to overestimation of success frequency), overconfidence (uncertainty of predictions is under estimated based on available facts) and success/failure attributions (success is attributed to skill, whereas failure is attributed to chance, leading to discounting past failures). The very act of planning was found to induce optimism in the person conducting the planning activity about the plan's potential achievement (Tyebjee, 1987).

Optimism bias in failing projects. Using an experimental design among more than 300 decision makers responsible for selecting projects from a wide range of countries and in a

multitude of industries, Meyer (2014) tested the impact of optimism bias on in-project and post-project decisions concerning failing projects. The study results found optimism bias encouraged decision makers to increase their commitment due to a perceived benefit-cost ratio that exceeded the original business case. The warning to management decision makers is to beware of the likelihood of significant unrealistic optimistic tendencies of project managers to save failing projects thinking that the benefits will outweigh the costs (Meyer, 2014).

Optimism bias in estimating task completion times. When examining effects of task completion time in planning and related cognitive processes, the anchoring effect was proposed as an explanation for optimistic bias in task completion prediction (Weise et al., 2016). The authors stated people tend to underestimate completion times by basing estimations on carrying out individual tasks within the sequence of total tasks that will lead to successful completion. Since people do not plan for failure, rather plan for success, people tend to be more optimistic in their projections of how long it will take to complete the tasks in the plan. Weise et al. (2016) recommended backward planning as remediation for optimism bias in calculation of completion times where the project manager starts at the end target completion date and then works backward in reverse-chronological order of sequencing the steps and associated time completion estimates.

Overconfidence bias. Optimism bias is associated to the overconfidence bias (Tyebjee, 1987). Having been studied by psychologists and organizational behaviorists since the early 1970s, overconfidence, a self-enhancement bias, was noted nearly 300 years ago by the famed economist Adam Smith as one of the most damaging decision-making flaws (Malmendier & Taylor, 2015). When understanding the effects of overconfidence in economic terms, it is important to explain why a person holds on to a view when rationality would say otherwise

(Malmendier & Taylor, 2015). The authors examined overconfidence from the different manifestations of overoptimism (overestimation of the likelihood of positive outcomes either by magnitude or by frequency) and overprecision (when a person has accurate beliefs on average, but underestimates the risks involved in a decision). The authors put forth three possible explanations of how overconfidence can persist over time rather than being learned away: (a) avoidance of learning about one variable by substituting learning for another variable; (b) reinforced by other behavioral biases; and (c) useful heuristics and biases in one context used in another where they are of little use (Malmendier & Taylor, 2015).

Overconfidence in business projects. Long researched in cognitive psychology, the importance of overconfidence and its association with serious judgment errors during decision making has seen explosive growth in business research in recent years, primarily in management and finance (Markovitch et al., 2014). Managerial overconfidence is prevalent in business today, and while personal judgments are at play in individuals making choices, an alternative explanation is there are times in which managers make a strategic decision to show overconfidence by choosing risky projects based on environmental pressures (economic or institutional) on their careers (Citci & Inci, 2016).

Overconfidence tends to blind a person to the size of the threats posed by risk impacts, especially when entering markets; however, being underconfident can also pose a risk by preventing entering markets that are lucrative and under penetrated (Van Zant & Moore, 2013). In research on CEOs, the managerial personal trait of overconfidence was found to be a contributing risk factor in future stock price crashes because of allowing failing projects to continue (Kim, Wang, & Zhang, 2016). Research by Van Zant and Moore (2013) suggested

calibrating beliefs is a way managers can leverage the beneficial effects of confidence to improve decision making without falling prey to the negative effects of overconfidence.

A study among finance professionals in the banking industry found overconfidence can lead to many problems that have dangerous effects to their own firms and to their clients' firms (Kaustia & Perttula, 2012). The authors studied different types of overconfidence and the effect of debiasing treatments in probability assessments in the financial industry. Three areas were studied that examined overconfidence in probability assessment: calibration overconfidence, better-than-average overconfidence, and unfounded overconfidence. Each of the experiments had a debiasing treatment (i.e., some form of warning) regarding the tendency to be overly optimistic in the professionals' responses. The authors found overconfidence in probability assessment was innate and difficult to reduce among the subjects measured in the study of the financial industry, even when provided warnings (Kaustia & Perttula, 2012).

When considering the effects of overconfidence in the realm of entrepreneurship, the results can be both a blessing and a curse. Simon and Shrader (2012) found having optimistic overconfidence (i.e., the overestimation of a favored outcome occurring which fails to occur) is potentially the most catastrophic judgment error leading to entrepreneurial failures. The authors cited numerous studies in the discussion of the obvious positive effects of overconfidence among entrepreneurs: they are more likely to initiate new business ventures; they expect their actions to succeed; they have greater certainty of success than mainstream business managers; and they do not expect their ventures to fail. However, based on the findings from the study among entrepreneurs in the computer and software industry, the authors concluded disadvantages of optimistic overconfidence outweigh advantages, particularly when the entrepreneur fails to

recognize the desire to reach the intended outcome unintentionally influences decision making (Simon & Shrader, 2012).

Project manager characteristics. The necessity for corporations to constantly provide innovations in dynamic 21st century environments has led to projectification and poses new leadership challenges for project managers (Tyssen, Wald, & Spieth, 2013). Based on projections by PMI, 15.7 million new roles will be created in the project management field between 2010 and 2020, requiring education to evolve from technique-oriented learning common in the past to nontraditional learning that focus on reflection and creativity for future practitioners (Ramazani & Jergeas, 2015). Project success is predicated on the project manager's skill, along with reflective experience and intelligence (managerial, emotional and technical) (Jugdev et al., 2013). Drawing on trait theory, several attributes important to leaders, such as assertiveness, decisiveness, persistence, and self-confidence (Tyssen et al., 2013) will also be important for facing leadership challenges in project management.

Project Manager Risk Awareness. The very nature of project execution involves uncertainty (Lloyd-Walker et al., 2016). It is a challenge that falls to the project manager to identify, monitor, and mitigate project risk. For the project manager to be able to successfully handle project risk, the project manager must be aware of own attitudes toward risk and the ability to objectively identify risk. Project manager risk awareness is a measure of the generic attitude toward risks and the perceived threat risks have to project success (Fabricius & Büttgen, 2015). When encountering risk, the way in which the project manager will react to risk is determined by risk perception and risk propensity (Huff & Prybutok, 2008). The authors define risk perception as the estimated likelihood level and the controllability of the perceived risk

based on the situation; whereas risk propensity is defined as the tendency of the person for either risk acceptance or risk avoidance based on the person's characteristics (Huff & Prybutok, 2008).

It is the project manager's responsibility to be aware of the potential risks in a project and take actions that will reduce risk, namely using conventional methods of risk management in the form of planning, identification, analysis, and response (Kutsch & Hall, 2010). It should be noted the project manager may perceive project risk as either positive (i.e., opportunities) or negative (i.e., threats), therefore project managers can react to risk in the following ways: avoidance, reduction of the negative effects, or acceptance (Botezatu, 2016). Among the negative effects of project risk, Botezatu (2016) identified the following potential risks for project managers to be aware: long implementation period, planned acquisitions at the end of the project, team members inexperienced in project management, simultaneous parallel activities, and lacking progress reports during execution. Following the work conducted by the *Rethinking Project Management Network* findings, discussions began to reflect on the conventional methods of operational planning and control as potential reasons why uncertainty still plays a strong role in project management and advocated new, more flexible ways of dealing with the intangibles of project risk (Atkinson, Crawford, & Ward, 2006).

Project Manager Confidence. Self-confidence is among the most important personal characteristics of a project manager that demonstrates competence (Dillon & Taylor, 2015). Competence is also demonstrated by positive psychological capital -- defined as the project manager's confidence, optimism, hope, and resiliency to succeed (Gallagher, Mazur, & Ashkanasy, 2015). Behaving in a confident way in his/her role gains the project manager the respect of the project team and the organization and increases the perception of competence,

separating a good project manager from a bad project manager who behaves in an inexperienced way (Medina & Francis, 2015).

A project manager's self-confidence plays a role in the successful delivery of projects (Geoghegan & Dulewicz, 2008). Using the leadership dimensions questionnaire (LDQ; Dulewicz & Higgs, 2005) and project success questionnaire (PSQ; Pinto & Slevin, 1986, 1988a, 1988b), Geoghegan and Dulewicz (2008) conducted a study among project managers and found quantitative support for the hypothesis there is a statistically significant relationship between a project manager's leadership competencies and project success. The findings contribute value to project management practitioners for guidance in selecting project managers with capabilities that lead to increased project success.

Lessons learned conversations expand the availability of project management wisdom and ultimately aid in the development of the project manager's self-confidence (Jugdev & Wishart, 2014). In studying critical success factors (those elements most important for achieving a goal), the project manager is seen as an important factor in identifying lessons learned throughout the life of the project versus at the end of the project since it is difficult to remember happenings at the end of a multi-year project (Allen, Alleyne, Farmer, McRae, & Turner, 2014). Informal on the job lessons learned often describes the typical project manager's experience primarily because of three key factors: they have other job responsibilities than just project management; they lack or have limited formal training; and they use their own personal lessons learned as standards in the absence of industry standardization (Savelsbergh, Havermans, & Storm, 2016). Lessons learned can be beneficial by documenting the collection of unbiased data through statistical analyses of actual outcomes, compared with predicted outcomes, to help the

project manager in making more precise judgments and improve future decision making (Van Zant & Moore, 2013).

In a survey among IT professionals measuring the impact of lessons learned sessions, 67% of the causes of IT project failures were attributed to ineffective project plan estimation (Jorgensen & Gruschke, 2009). The authors found overconfidence in the accuracy of the estimates indicated the project planning did not reflect the uncertainties around the amount of effort to achieve the plan, indicating that projects would benefit from documenting lessons learned from project managers' own experiences in past estimations. The authors concluded the typical post-mortem and project review lessons learned sessions may be inadequate in improving individual project manager's estimates without also having the project manager understand one's own learning biases and that of others (i.e., focusing on the psychological biases) as much as the actual documented probabilities around the estimations. The authors suggested incorporating feedback from other project managers' estimations rather than only reviewing feedback on one's own estimations to improve realistic estimations (Jorgensen & Gruschke, 2009).

Measures of confidence. When making decisions, people tend to overestimate skill when the decision task at hand is relatively easy to do but underestimate their skill when the task at hand is difficult (Benoit & Dubra, 2011). The authors stated during the 1990s there was much written in the literature espousing evidence overconfidence was pervasive, but later research exposed misleading conclusions that led to misconfidence – the assumed, but not true, over or under confidence of the participant. While over and under confidence have been studied, it is typically overconfidence that is researched and discussed significantly more in the literature due to the biases and potential negative effects of overconfidence. A simple search of scholarly and peer-reviewed articles using online databases produced 13,491 results with overconfidence in the

title, while only 835 contained under confidence in the title, regardless of whether both topics may have been discussed in the articles. The overconfidence effect is present when a person's predictions exceed accuracy of actual occurrence, and a person's confidence estimates are more prone to error when the person is highly confident (Pulford & Colman, 1996). Among the three types of overconfidence in the literature – overestimation, overplacement, and overprecision – measurements of overprecision were of primary interest for this dissertation study.

Overprecision is the "excessive certainty regarding the accuracy of one's beliefs" and is typically measured by asking participants to estimate within a certain confidence level (e.g., 90%) the accuracy of their answers to general knowledge questions with numerical answers (e.g., "How long is the Nile River?"; Moore & Healy, 2008). Glaser, Langer, and Weber (2013) argued while using interval level estimates can be stable and well-calibrated to show true measures of overconfidence, using general knowledge (superior information) questions proves to be inaccurate from an average overconfidence perspective of the participant's level of superior information. The authors proposed specific knowledge questions using an artificial task pertinent to the discipline being studied for determining the interval estimates to eliminate the influence of superior information inaccuracies and using upper and lower bound endpoints for the intervals to minimize miscalibration (Glaser et al., 2013). To mitigate for general knowledge miscalibration, Fabricius and Büttgen (2015) chose a task-based exercise relevant to project managers who commonly estimate activity durations of various functional team members working on project teams.

Closely associated with the topic of self-confidence is self-efficacy and is defined as how well an individual believes he/she can perform a particular task or perform in a particular situation (Blomquist, Farashah, & Thomas, 2016). The authors researched the use of a self-

efficacy measure and found it to be simpler and more cost effective in understanding project manager behavior. The findings from the Blomquist et al. (2016) study should improve role definition, hiring, training, and performance predictors of project managers and, thus, project success.

Summary of the literature review. The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The intent of the literature review was to examine the extant literature in order to establish the case for the research approach investigated in the study. Since the project manager is ultimately responsible for successful project completion, importance was placed on project manager confidence. The ability to assess risk during the critical planning stages of a new product development project was researched in the literature review to provide understanding for guidance of the study development.

Within the project management discipline, the discussion focuses on new product development methodology, project planning, project risk assessment, and project manager confidence. Since the purpose of this dissertation is to provide applied learning for practicing project managers in the field, rather than solely an academic or theoretical exercise, the literature review predominantly focused on sources that discuss the proposed theoretical framework and the hypothesis tested in this dissertation. The intent of the review was to delve further into the available literature to address the relationships of the dissertation study variables of interest: project manager level of confidence (the independent variable) and risk awareness (the dependent variable).

Transition and Summary of Section 1

The overall research question to be addressed is: What is the relationship between a project manager's confidence level and risk awareness level among project manager practitioners in the US? To address this question, the study utilized a quantitative correlational analysis. The research method and study design are presented in the following section. Within the following study design section, methodology, population and sampling, data collection, data analysis, and reliability and validity are all discussed.

Section 2: The Project

The study examines the relationship between project manager confidence and risk awareness during the planning phase of a new product development project. It is hypothesized there is an inverse relationship between project manager confidence and risk awareness (i.e., project managers with higher levels of confidence have lower levels of risk awareness). This hypothesis infers confidence level may have an impact on the project manager's perceived reduced need to identify and manage risks. Because project managers may not perceive risks as threatening, this biased risk assessment may lead to project failure. In addition, the study collects demographic information on respondents to determine the extent to which these factors have any relationship to the study model variables. This chapter explains how the research was conducted using the following in-depth discussions: purpose statement, role of the researcher, participants, research method and design, population and sampling, data collection, data analysis, and reliability and validity.

Purpose Statement

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The study was an extension of the FB2015 research conducted among project managers in Germany. In the FB2015 study, the authors found risk assessment is influenced by project managers' overconfidence through the mediator of risk awareness. The authors stated the following:

> The mediation through risk awareness indicates that overconfidence may be linked to the reduced availability of risks, which leads to risks being perceived as non-threatening and unlikely to occur….and encourage companies to start seemingly beneficial projects which later show an unfavorable benefit-cost ratio, indicating they should have never been undertaken in the first place. (p. 258)

The authors concluded a biased risk assessment may lead project managers to underestimate the need for project risk management, which further increases the threat of risks to project success. This research utilized the original FB2015 research theoretical framework and built on the original research by focusing on the relationship between project manager confidence level and project manager risk awareness. This research further extends the FB2015 study by conducting the research among a different regional population (i.e., among project managers in the US). Studying the potential for project manager confidence level to affect project manager risk awareness, particularly in the critical phase of project planning, provides significant learning as a possible reason contributing to high project failure rates.

Role of the Researcher

The researcher has spent much of the past 10 years as a PMP certified practicing project manager in a Fortune 100 company and much of the past 25-year career working in some function where project management principles are employed. Over those many years, the experiences the researcher encountered with project success or failure are predicated largely on the assumptions laid out during the planning phase of the project. An accurate risk assessment during the planning phase is a key determinate used to manage the uncertainty that naturally occurs within any project. Therefore, the idea that project manager confidence may potentially play a major role in the success or failure of a project intrigues this researcher.

The researcher's role was to review periodicals and articles that contained research with immediate and practical application to the project management discipline for which an expansion of the research would provide additional learning. The researcher evaluated the FB2015 research design and methodology and wondered whether similar findings would emerge in another population sample. Further, the researcher wondered whether other levels of confidence, rather

than just overconfidence, would have similar effects on project managers' risk awareness. These two curiosities set this researcher's quantitative investigation apart from the FB2015 study.

The researcher was responsible for obtaining permission from the original study authors for use of their questionnaire in the current research. Further, the researcher was responsible for obtaining permission to conduct the study among a different population, primarily members of local PMI Chapters, by contacting the Chapter president or contact listed on the Chapter website. Lastly, the researcher was responsible for executing the study, gathering the data, analyzing the data, and reporting the findings in this doctoral dissertation. The online questionnaire was administered to respondents using SurveyMonkey.com. As part of the pre-study review process, the researcher was responsible for completing the IRB checklist, providing all materials to be used during study execution, and obtaining approval by the IRB to continue into study execution and data collection. Materials provided to the IRB included the invitation to participants in the PMI Chapter monthly e-newsletter or direct email invitation with a link to the survey, the survey instrument, and the email to the Chapter contacts requesting distribution of the survey to membership email addresses.

An online survey was administered due to the ease of execution and immediate access to the sample population. There are many benefits of an online survey for data collection. For example, the online survey provides the flexibility of design of the duration estimates used to test project manager confidence; there are minimal costs for executing the online survey; the data are automatically inputted as a result of participants answering the questions; the data are stored in a convenient manner for analysis; and, the inclusion of the survey link in the invitation from the Chapter increases the likelihood of participation rates.

Participants

The research was conducted among members of local PMI Chapters and the researcher's professional network who are currently working as a project manager or have worked in the past as a project manager. Permission to conduct the research among the membership was obtained from the Chapter contacts on the local PMI Chapter websites. An invitation email with the survey link was distributed to Chapter memberships directly, through websites, and through the Chapter newsletters as well as distributed via email directly to the researcher's professional network. All participants voluntarily opted into the study, and no participants participated other than on a volunteer basis.

An invitation to the study was distributed by the Chapters or in direct email by the researcher. The members were sent a link to the survey. Once the participant clicked on the link, they were taken to the SurveyMonkey questionnaire where the first page contained a description of the study and a screening question. Only participants who were currently working in a project management role or had worked in a project management role were included in the study (i.e., those under the age of 18, students, academicians, and non-specified participants were excluded from participation during the screening process; see Appendix E). Once participants were qualified for the study based on the screening questions, they began the study questionnaire.

Participants were told the purpose of the research was for the researcher's doctoral dissertation which examined project manager confidence and risk assessment. The participants were told the data would be collected using the online survey, analyzed for practical findings, and the findings would be published as part of the fulfillment of this student's dissertation requirements. Participants were further assured of confidentiality of the collected data and

anonymity of the responses. The research data did not retain the participant's email address therefore no identifiers were collected in order to maintain the anonymity of the participant. The participants provided informed consent to be included in the study by clicking on the "take the survey" button.

Research Method and Design

The study of how things work in the world is typically defined as science. Scientific research focuses on the desire to gain better knowledge or find a solution to an identified problem or opportunity that has meaning to the researcher. Topics for scientific research can come from many sources – workplace issues, the researcher's own experiences, field of study literature, and replication of other researchers' work to offer additional learning or explanation of a phenomenon (Terrell, 2016). One of the essential elements of any dissertation is finding a topic intriguing enough to the doctoral student to conduct the dissertation research project.

Because one out of four projects fail (PMI, 2017a), important issues a project manager faces in the workplace are why projects fail and, conversely, what is the valuable learning from failures that will increase the likelihood of future project success (McClory et al, 2017; Duffield & Whitty, 2016). To learn about the topic of project failure, this doctoral researcher reviewed the literature and found thought-provoking published research that explored the topic of project manager confidence as a contributing factor in project failure. Finding a promising study to replicate was a secondary goal of the literature review. Replication is underutilized in social sciences, yet replication is critically important to progressing a promising line of research by developing and refining theories and producing convergent thinking for stronger evidence than singular studies alone would do (Murphy, Barlow, & von Hippel, 2017; Robson, 2002; Vogt, Gardner, & Haeffele, 2012). This applied dissertation research project sought to replicate a

portion of the work performed by the FB2015 research by expanding on the authors' findings in two key ways: by conducting research among a different population and by analyzing the natural distribution of project manager level of confidence in contrast to only the overconfidence phenomenon studied in the original research.

The FB2015 study found overconfidence on the part of the project manager negatively affected the project manager's risk assessments which led to overly optimistic estimations of project success. The authors found overly optimistic estimations of project success could be a contributing factor to project failure, especially during the critical project planning phase. Therefore, this applied dissertation research project focuses on better understanding the level of a project manager's confidence during the planning phase of a new product development project and his or her risk awareness, which ultimately may contribute to project failure during project execution.

Discussion of method. Scientific research is categorized into three broad categories: quantitative, qualitative, and mixed methods (Creswell, 2014; Stake, 2010; Terrell, 2016). Scientific thinking is comprised of both quantitative and qualitative thinking in the pursuit of research understanding (Stake, 2010) and is not completely discrete, but rather viewed on a continuum (Creswell, 2014) with any given project being predominately quantitative, qualitative, or mixed. For this research, a quantitative non-experimental approach is used. Following is a brief discussion of each method and the rationale for using a quantitative non-experimental approach.

Quantitative research methodology. Terrell (2016) describes quantitative research as deductive testing of a priori hypotheses by way of "if" or "did" research (i.e., "if something happened" or "did something happen" and "to what degree") through the collection and analysis

of numeric data (p. 26). Quantitative research involves two types of research design: non-experimental design and experimental design. Non-experimental design involves survey research (i.e., questionnaires or structured interviews) to collect numeric data regarding trends, attitudes or opinions from a sample of the population under study to generalize findings to the population as a whole; whereas, experimental design involves exposing one group in the population to a specific treatment while withholding the treatment from another group with the aim of determining the effect of the treatment (Creswell, 2014).

Quantitative research focuses on exactness in terms of "linear attributes, measurements, and statistical analysis" (Stake, 2010, p. 11). Data collection can be either cross-sectional where information about the variables is collected at a single point in time or longitudinal where data are collected over a period of time providing a holistic picture of changes in the variables over time (Churchill, 1991). Among quantitative research methodology, Trochim and Donnelly (2016) discuss three primary types in the following section: descriptive studies, relational studies, and causal studies.

Descriptive studies. As the name indicates, quantitative descriptive studies are primarily focused on describing something that is going on or exists. Public opinion polls are an example of descriptive studies in which data are reported based on the proportion (or percentage) of people holding a view. Quantitative descriptive studies usually involve surveys to collect the data (Trochim & Donnelly, 2016).

Relational studies. In quantitative relational studies, the researcher is interested in studying the relationships, or correlations, between two or more variables (Trochim & Donnelly, 2016). There are two types of variables: independent variables, in which the variables are being manipulated in the study, and the dependent variable which is affected by, or is the outcome of,

the independent variables. In addition, the study can be longitudinal in which data are collected over time or cross-sectional in which data are collected as a snapshot in time. A relational cross-sectional methodology was employed for this study because the researcher wished to test the relationship between the proposed variables in a hypothetical model. Cross-sectional data collection is used, being the best known and most frequently used measurement type in quantitative studies (Churchill, 1991).

Causal studies. As the name indicates, quantitative causal studies investigate the cause and effect relationship of variables (Trochim & Donnelly, 2016). Unlike correlation, in which simply the researcher is studying whether a relationship exists, causal relationships indicate that a variable is causing the outcome of another variable. Typically, these types of studies test hypotheses about proposed relationships between the variables of interest to the researcher.

Qualitative research methodology. Qualitative research uses qualitative data gathered from open-ended questions, emerging approaches, and text or image data employing the following primary research strategies: phenomenological, grounded theory, ethnographic, case study, and narrative (Creswell, 2014). The author states phenomenological research involves conducting interviews among individuals who have lived an experiential phenomenon; grounded theory involves multiple stages of data collection and refinement grounded in participants' views from which a theory emerges; ethnographical research involves observing participants in a natural setting to understand shared behavior, language and actions; case studies involve in-depth analyses of data collected over a sustained period of time; and, narrative studies involve a collaborative approach in which the researcher's views are combined with the participant's in the study of their lives.

For each of these qualitative research designs, Stake (2010) indicated the focus is largely on perceptions and understanding of the researcher in terms of feelings, awareness, and observation to offer explanations about the subject under study. Due to the nature of management which employs structure and procedures, quantitative study is often preferred for its replication ability and clearly-defined outcomes, yet qualitative study offers more flexibility and richness in developing emerging theory (Van den Berg & Struwig, 2017). Qualitative research uses inductive reasoning through employing interrogative pronouns (who, what, when, where, why, and how) in gathering data to understand specific events or situations (Terrell, 2016). Qualitative research is not necessary and not employed in this dissertation project. The aim of this research was to test a theory already published using deductive reasoning and testing proposed hypotheses using quantitative data collection.

Mixed methods research methodology. Mixed methods research is defined simply as a combination of both qualitative and quantitative research methodology in the research design (Stake, 2010). Mixed methods research is gaining in popularity both regionally and across disciplines, yet researcher skill and proficiency is lagging (Gutterman, 2017) due to the relatively new shift from mono-methodology of using either qualitative or quantitative research design. Mixed methods use remains underutilized in management sciences, including project management, due largely to the need for greater time, money, and capacity resources and the tendency to prefer quantitative over qualitative research (Bentahar & Cameron, 2015).

In recent literature, there is much written on the use of mixed methods as the blurring of the line between the use of quantitative and qualitative methods and the collaborative use of both in a given research project (Azorin & Cameron, 2010; Fisher & Stenner, 2011; Onwegbuzie, 2012). This doctoral researcher's aim is to test the hypothesis and model drawn from the

FB2015 work among a different population than the original research. Due to the fact the researcher was replicating a portion of the previously published quantitative research study, a mixed method approach is not necessary and was not employed.

Discussion of design. The research employed a quantitative non-experimental correlational study design using a standardized case-based study approach. The research expands on a study that examined the role of overconfidence in estimation of risk assessments (FB2015). The current study used a portion of the original survey instrument where project duration estimation activities typically conducted by project managers are simulated using the new product development planning process in which currently practicing project managers were given a set of furniture products to estimate completion times. The research also used the question determining risk awareness from the FB2015 research. Data were gathered on survey participants' confidence level, risk awareness, and demographics to explain the relationships revealed in the research.

The study addressed the problem statement that a project manager's confidence level may lead to insufficient risk awareness during the planning phase of a new product development project, contributing to project failure. The researcher wished to test the hypothesis to determine correlation between the variables of interest. The hypothesis was linked to the overarching research question: What is the relationship between a project manager's confidence level and risk awareness among project manager practitioners? The hypothesis is:

- Ho1: There is no statistically significant relationship between the confidence level and risk awareness in project manager practitioners.
- Ha1: There is a statistically significant relationship between the confidence level and risk awareness in project manager practitioners.

Risk awareness variable. Project risk management seeks to minimize the negative impacts of uncertainty and the probability of an event even occurring (Teller et al., 2014). The dependent variable (DV) is project manager's risk awareness. In this study, risk awareness is defined as a measure of the respondent's generic attitude toward the extent to which risks pose a threat to project success in project management practice (defined by the FB2015 study).

Confidence level variable. The overconfidence effect is present when a person's predictions exceed accuracy of actual occurrence, and a person's confidence estimates are more prone to error when the person is highly confident (Pulford & Colman, 1996). One typical way to measure overconfidence is through interval estimates in which the survey participant is asked a stated question and asked to provide not only the answer to the question, but also a numerical estimate (i.e., best and worst-case estimates) for how confident they believe the answer they provided is the correct answer (FB2015). The FB2015 researchers chose a task-based exercise that is relevant to project managers since project managers typically estimate activity durations of various functional team members working on their projects.

Summary of research method and design. Among the various research methodologies reviewed, a quantitative non-experimental correlational study design is the most appropriate for this research dissertation because the researcher wishes to replicate a portion of the FB2015 original research, for which a similar study design was employed. Further, the current research collects data at a point in time, further defining this research study as cross-sectional. Finally, the current research uses terminology, task-based activities, and questions relevant to project managers practicing in the field, increasing the likelihood of accuracy in respondents' answers.

Population and Sampling

The population is the entire class under study for which a sample will be drawn to make inferences and generalized conclusions that represent the population (Crow, Davis, & Maxwell, 1960). The sampling frame is made up of the target population membership that is used to draw the sample and can include several sources (e.g., a membership roster; Stevens, Wrenn, Ruddick, & Sherwood, 1997). The sampling methodology is either nonprobability sampling (i.e., convenience samples, judgement or purposive samples, or quota samples) or probability sampling (i.e., simple random samples, systematic samples, stratified samples, cluster samples, or multistage samples; Guy, Edgley, Arafat, & Allen, 1987). The current study used a convenient sample of practicing project managers drawn from local PMI Chapter membership rosters in the US and the researcher's professional network.

Discussion of population. The desired population for this research study included individuals with project management experience. For this population, the sampling frame chosen was the contact rosters of local PMI Chapters from the Chapter's email distribution lists. The Chapters chose to distribute the invitation with the survey link via direct distribution to members, monthly Chapter newsletters, or postings on Chapter websites. In addition, the invitation and survey link were emailed directly to the researcher's professional network. Permission was obtained from the contact listed on the local PMI Chapter website and in most cases the contact was the Chapter president. The invitation indicated a link would direct the participant to the online survey for their voluntary participation.

Discussion of sampling. Since participation was voluntary and individuals opted in to the survey from either the Chapter distribution method or the researcher's direct email which were easily available to the researcher, the sampling method is a nonprobability convenience

sample. The method was chosen in this case because the probability of selection is unknown and could not be determined beforehand, and web surveys in which respondents self-select by clicking on the survey link is a primary example of a convenience sample (Clow & James, 2014). No attempt to randomize, stratify, or cluster the sample by creating mutually exclusive groups a priori was conducted. However, the final sample was a mutually exclusive grouping of individuals with project management experience with the participants themselves self-determining their inclusion into the grouping.

Eligibility and characteristics of the sample. Although nonprobability studies do not have an associated margin of error and, thus, cannot be used for generalizations to the population, inferences can be drawn from the data with high generalizability applied when the researcher has striven to obtain a sample that accurately reflects the target population (Clow & James, 2014). In this case, the sample was furthered refined from the entire roster of voluntary opt-in survey participants to include only individuals that were currently working as project managers or had worked as a project manager in the past – representing the relevant target population of project manager practitioners. Anyone under the age of 18, students, members of academia, and those not specified to have hands-on experience as a project manager were excluded from the sample (Appendix E, Questions 2A and 2B).

Sample size. A typical response for an external survey is 10-15% and 30%-40% for an internal survey (Fryrear, 2015). The expected sample size for this study was estimated between 200-300 responses. Determining sufficient sample size is difficult even for practicing statisticians. However, based on a G* power calculation for a priori sample size, 322 should be a sufficient sample size given one independent variable and one dependent variable using a bi-variate correlation analysis. Historical evidence is an alternative method for determining sample

size (i.e., using what other researchers have used) for similar study situations in past research (Churchill, 1991). In this case, the FB2015 original study included 204 project managers from which the authors were able to satisfactorily analyze the data collected. The current study of qualified participants was 257 which yielded a 6% +/- confidence interval (margin of error) at the 95% confidence level, which is considered standard. Therefore, the researcher continued with the analysis of the sample.

Summary of population and sampling. Because the desired research sample population is practicing project managers, the researcher chose to sample from local PMI Chapters' member rosters to increase the likelihood of obtaining qualified respondents. The Chapter members and project managers from the researcher's professional network who opted into the study were further qualified using a screening question in the online questionnaire to ensure either current or past project management experience. A study sample of 200-300 responses was reasonable to expect, with the resulting 257 sample sufficient to conduct the analysis outlined in the research method and design.

Data Collection

The following section describes the data collection methods used in this study: instruments, data collection techniques, and data organization techniques. The instrument used portions of the FB2015 original survey instrument (Appendix E; questions 3, 4, and 5). An online survey was chosen due to the ease of administration and immediate data gathering capabilities. The study used a methodology for the variables of interest that were relevant to project managers and was conducted among practicing project managers. The data were collected anonymously, stored on the researcher's PC, and will be securely maintained for three years post data collection.

Instruments. The FB2015 research survey instrument was used because the researcher desired to replicate a portion of the study by expanding on the original research to conduct the study among a different regional population. The questionnaire contained questions designed to assess each of the variables identified in the proposed model tested. In addition, the questionnaire contained demographic questions to obtain data on participants along with questions to determine the level of experience of the project managers participating in the study (Appendix E).

The FB2015 original research was conducted among German project managers and the questionnaire was administered in the German language. The questionnaire used in this study was translated into English. The English version of the questionnaire was pre-tested for readability and understandability among a select number of US project managers who were current practitioners. All seven of the testers were PMI Project Management Professionals (PMPs) and worked in the company where the researcher currently works. A PMP is a person who has proven they have at least 3,500 hours of project management work experience and have passed the PMP certification test. In addition, the online version was also pre-tested among ten PMPs to ensure the online questionnaire functionality was working as intended. The pre-test data were not used a part of the final dataset.

The English version did not require modification regarding the variables tested in the original German questionnaire. However, this research focused only on two primary variables of most interest to the current research. The German version of the demographic question assessing educational background was modified by replacing the answer choices with those relevant to the educational maturation system within the United States. Other additions to the original study questionnaire included adding the consent form required by the Liberty University Institutional

Review Board (IRB) and the following additional demographic questions: years of professional project management experience, project management certifications held, whether the project manager planned to obtain a project management certification, the functional area in the company in which the project manager worked, and the industry the project manager currently worked.

Within the questionnaire, the survey respondents were asked a question with six elements designed to measure risk awareness. The question measured the project managers' risk awareness in terms of their own attitude toward project risk. The six elements used a 7-point ordinal Likert scale for measurement. A mean score was calculated for the risk awareness variable across the six elements. This line of questioning provided the inputs for the dependent variable of risk awareness.

Within the questionnaire, the survey respondents were tasked with building five pieces of furniture by reviewing the schematics of assembly instructions associated with each piece and then estimating the time to assemble each piece. The respondents were asked to provide duration ranges for assembling the furniture such that they were 80% sure the actual value was within the estimated duration range. Interval estimates for the duration range were collected in terms of least amount (in minutes) and in terms of the most amount (in minutes) of time. This series of questions provided the inputs for the independent variable of confidence (or, overconfidence).

The furniture activity duration time exercise measured overconfidence in the FB2015 study and was used in the current study. The original authors chose the furniture exercise because of simplicity. Further, the general thought was project managers would find the exercise familiar and relevant because project managers are frequently asked to produce project activity duration estimates during project planning. The original FB2015 authors provided the actual

times that they created using test subjects to build the actual five pieces of furniture. These actual times are used in the calculation of the interval scores. For example, if a respondent's estimation of duration for assembling furniture piece #1 is 15 minutes (least amount of time estimated) and 20 minutes (most amount of time estimated) and the actual time was 18 minutes by the test subjects, then, the respondent's estimation is within the level of confidence. The given confidence level is 80%, and for each participant if three out of five (60%) furniture interval duration time estimates included the actual furniture assembly time, the participant's overconfidence (OC) score is OC = .80 - .60 =.20. A distribution of all the participants' OC scores was produced to determine the distribution level of confidence.

The remaining questions within the questionnaire gathered demographic data on the survey respondents. Specifically, the following statistics, with the associated measurement type in parentheses, were gathered about the respondents: age (ordinal), gender (nominal), level of education (ordinal), years working as a project manager (ordinal), project management certifications held (nominal), intentions to obtain certifications (nominal), functional area of the company in which they worked (nominal), and company industry (nominal). The demographic questions used closed-ended answer choices. A final open-ended question gave the respondents an opportunity to provide any feedback desired. The final open-ended question gathered qualitative data to provide insight into any positive or negative comments about the research survey or methodology.

Closed-response type questions were used for the confidence (IV) and risk awareness (DV) variables measured. The advantage of a closed-response question is consistency where statistical analysis can be used for comparisons to increase reliability (i.e., the consistency of responses) should a survey be repeated, and for validity (i.e., the ability to make accurate

inferences) from the data (Johnson & Morgan, 2016). When using Likert scales, the researcher calculates the Cronbach's alpha score for internal reliability (i.e., the extent to which the items within themselves and with the overall instrument exhibit consistency; Croasmun & Ostrom, 2011). In the FB2015 original research the reported Cronbach's alpha for the variables tested was 0.75, indicating an acceptable to good indication of reliability based on a score of "65" as unacceptable and "85" excellent (Bonnett & Wright, 2014). In the current study, the Cronbach's alpha was .795.

Data collection techniques. Prior to data collection, a full review of all documents and methodology to be used in the survey execution was approved by the Liberty University IRB. The submittal of documents for review included the following: IRB application explaining the full details of the proposed study, the participant consent form and survey questionnaire used, the investigator agreement and signature page, the permission letter from Dr. Golo Fabricius providing permission to use the study methodology and survey instrument, a blurb announcing the survey invitation in the PMI Chapter newsletter, and a letter from SurveyMonkey Inc. granting permission to use the program for survey execution. The submittal package was reviewed and submitted to the IRB by the researcher's Chair. Upon approval by the Liberty University IRB, the research survey was executed.

The link to participate in the survey was distributed via email using the local PMI Chapter databases of member contacts. An invitation to participate in the survey was provided following the consent form. As explained in the consent form, by clicking on the "take the survey" button, participants were agreeing to have their survey responses anonymously included in the study. The online survey was self-administered by the project managers who voluntarily participated in the study. Within the consent form, the project managers participating in the

study were explained the questionnaire contents, the estimated completion time of no more than 10 minutes, and assured of their anonymity, ability to withdraw from the study at any time, and security of their responses. The participants were also told the study was for educational purposes conducted by the doctoral candidate and that no personal identifiable data would be published.

The survey was sent to participants via an email with the embedded link directly from the local PMI Chapter distribution lists, the local Chapter newsletters, or posted to the Chapter websites. Additionally, the researcher emailed the survey invitation and link to the researcher's professional network. The survey was hosted by SurveyMonkey.com. The program also allows for a manual cutoff date, which the researcher chose once a sufficient sample was obtained. The invitation asked respondents to complete the questionnaire within the next couple of days. Toward the end field date, an exact date was provided in any reminder emails.

Data organization techniques. The original data were collected using a SurveyMonkey.com web link and housed on the site. Tables of simple descriptive statistics and visual graphics (e.g., histograms, bar charts, and pie charts) were available in the SurveyMonkey program. A SPSS output file was created for download to the analytical program, SPSS, to perform more complicated analyses. The email address was useful only for sending the survey web link. To maintain anonymity within the collected data, the web link did not allow for collection of the participant's email and the SPSS file did not retain the participants' email address. The data were secured on the researcher's password protected PC. A copy of the SPSS data file and the analytical analysis file were stored on a secured external drive kept in the researcher's lockbox for backup purposes. The data will be retained by the researcher under

password protection for three years, as required by the IRB. After three years all data will be deleted.

Summary of data collection. The data collection design was approved by the Liberty IRB. The survey instrument was administered via online to members of local PMI Chapters and the researcher's professional network. Participation was strictly volunteer and a consent form describing the research as part of an educational dissertation was provided at the beginning of the survey. The survey used a portion of the validated research instrument originally administered by the FB2015 research. The data were collected using the SurveyMonkey.com program until the desired number of completed responses was reached. Data were gathered anonymously, secured on the researcher's PC during analysis, and will be kept for a maximum retention of three years.

Data Analysis

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The quantitative non-experimental correlational research design used inferential statistics to examine the relationships between the variables of interest. One primary directional hypothesis was tested in the study. The study is correlational because it seeks to determine the direction and degree of association between the two variables of interest (Creswell, 2008). Directional hypotheses make predictions of expected outcomes based on prior literature and studies (Creswell, 2014). Data were analyzed using the statistical package, SPSS. Frequency distributions and cross-tabulations were used to understand the data for preliminary analysis, data completeness, and data quality.

Variables used in the study. The independent variable tested was project manager confidence and the dependent variable tested was project manager risk awareness. The methodology used correlation analysis to test the relationship between the independent variable and dependent variable. Because the hypothesis being tested assumed a linear relationship between confidence and risk awareness, the a priori statistic expected to be used to measure the strength of the correlation was Pearson correlation coefficient *r* (Mendenhall & Sincich, 2012). Because the data actually collected were non-parametric, Spearman's rho was used to test for significance. Demographic respondent data were collected to test for explanatory relationships with the independent and dependent variables in the research model: age, gender, level of education, years working as a project manager, project management certifications held, intentions to obtain certifications, functional area of the company in which worked, and company industry. The demographic questions used closed-ended answer choices.

Primary hypothesis. The study addressed the problem statement that a project manager's confidence level (IV) may lead to insufficient risk awareness (DV) during the planning phase of a new product development project, contributing to project failure. The researcher wished to test the hypothesis to determine correlation between variables. The hypothesis was linked to the overarching research question: What is the relationship between a project manager's confidence level and risk awareness among project manager practitioners? The hypothesis is:

- Ho1: There is no statistically significant relationship between the confidence level and risk awareness in project manager practitioners.
- Ha1: There is a statistically significant relationship between the confidence level and risk awareness in project manager practitioners.

The confidence variable was calculated by asking respondents to estimate numerical intervals (scale variable) for time durations within the given level of accuracy. Interval estimates were chosen because they are commonly used by project managers in estimating duration of project activities, referred to as optimistic (best-case scenario) and pessimistic (worst-case scenario) estimating (PMI, 2013). Respondents were shown pictorial furniture instructions for five different pieces of ready-to-assemble furniture and asked to estimate at the most (best case) the number of minutes and at the least (worst case) the number of minutes it would take to assemble each individual piece of furniture. Respondents were asked to make the estimates based on being 80% sure that the actual time is within the two estimates they provided. A confidence level in the 80% plus range would indicate a high confidence level of probability when project managers estimate durations (PMI, 2013). Based on the work of Moore and Healy (2008), one of the ways in which overconfidence exhibits itself is in excessive certainty, or over precision, when people are too sure of their own answers when calculating within high probability confidence levels. It should be noted that the overconfidence scores were not measuring whether the estimated assembly times were too long or too short, rather the scores were measuring respondents' abilities to make accurate estimates. The risk awareness variable resulted in a mean score calculated from six sub-questions measuring the project manager's attitude toward project risk measured on a 7-point Likert scale (ordinal variable). The correlation analysis used a bivariate model. The sample size of 257 was found sufficient for a two-tailed test with a 6% +/- margin of error at the 95% confidence level.

Table 1

Correlational Model Variables

Variable	Variable Type
Confidence	Scale using interval estimates
Risk Awareness	Ordinal using a 7-point Likert scale

Summary of data analysis. The statistical package SPSS was used to analyze the data. The study used a correlational analysis design, calling for simple linear regression to measure the relationship between the two variables of interest: project manager confidence and project manager risk awareness. The bivariate non-normal model used the Spearman's rho correlation coefficient to test for significance.

Reliability and Validity

When conducting research both reliability and validity are important. However, while measures must first be reliable to be valid, reliability does not ensure validity (Robson, 2002). Reliability speaks to the consistency of the instrument and its ability to provide accurate data, whereas, validity speaks to the generalizability of the study findings to the broader population of interest (Vogt, Gardner, & Haeffele, 2012). The current study used an instrument already validated in prior research and proven to be relevant to project manager practitioners.

Reliability. The FB2015 original research questionnaire was used two times by the authors: once among business students and once among project management practitioners, increasing the reliability of the instrument. The risk awareness variable used a closed-response Likert-scale question. According to Johnson and Morgan (2016), closed-response questions have the advantage of consistency for statistical analysis to increase reliability (repeatability). The proper test for Likert scales is Cronbach's alpha score for internal reliability (Croasmun &

Ostrom, 2011). The FB2015 original research produced model variables with a Cronbach's alpha of 0.75 and the current study Cronbach's alpha was .795, which are considered acceptable levels of reliability (Bonnett & Wright, 2014).

The questionnaire in this study used questions from the FB2015 instrument. The current study instrument was pre-tested by seven current project manager practitioners. All testers were PMI Project Management Professionals (PMPs), having at least 3,500 hours of project management work experience and having passed the PMP certification test. In addition, the online version was also pre-tested among 10 PMPs to ensure the online questionnaire functionality was working as intended.

Validity. There are three types of validity: content (i.e., representativeness of the instrument), criterion-related (i.e., predictive ability of an outcome), and construct (i.e., purposeful, significant, and meaningful; Creswell, 2008). All three types of validity were important to the current study. The questions were relevant to the project managers who participated in the current study since they focused on activities pertinent to their experience as a project manager. Criterion validity was of particular importance in the current study because of the correlational nature of the hypothesis being tested. Construct validity was important to the current study because determining the influence of the project manager's confidence level on assessing risk during the planning phases of a project would have significant meaning for potential ways to improve project success.

Of importance to the validity of the current study was the FB2015 research that was conducted among practicing project managers in Germany. The questions used to calculate the independent variable, project manager confidence level, involved estimating duration intervals, which is a common activity among project managers. The FB2015 research chose an 80%

confidence level for the duration interval estimates because it was the most commonly used level in project management. The authors also confirmed interval estimates supported their overconfidence measure in a business environment by surveying 27 companies prior to development of their original instrument. Whereas, the questions used to calculate the dependent variable, project manager risk awareness, measured the project manager's experiential attitudes toward project risk. Therefore, both variables used to test the research hypothesis were relevant measurements to project managers, thus, increasing the likelihood of instrument validity.

Summary of reliability and validity. By using the FB2015 instrument, the quality of the current study instrument was enhanced in terms of both reliability and validity. The two key variables used to test the research hypothesis used measurements that were relevant to the sample being studied. The dependent variable was calculated using duration intervals -- an activity commonly used in project management. The independent variable was calculated using a closed-response Likert-scale measurement (a measurement known to increase reliability) that measured the project manager's attitudes toward project risk based on their own experience.

Transition and Summary of Section 2

The purpose of this quantitative study was to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The researcher's primary role was to provide a study with practical real-world application to the project management discipline. The researcher replicated a portion of the FB2015 study that showed a project manager's level of confidence influences his/her risk assessments and ultimate expectations of project success, namely, that overconfidence leads to insufficient risk assessment leading to potential project failures.

The current study examined the relationship between project manager confidence and risk awareness using a quantitative non-experimental correlational study design with bi-variate regression analysis. The study was administered to project management practitioners who belonged to local PMI Chapters and the researcher's personal network. The study used an online survey instrument with data being collected automatically as part of survey execution during six weeks from June 1-July 20, 2018. Data were analyzed using SPSS. The research results are presented in the following section. The presentation of findings, the data analysis, applications to professional practice, recommendations for action and for further study, reflections, and summary and study conclusions are all discussed.

Section 3: Application to Professional Practice and Implications for Change

The following section provides the findings from the research and the implications for the practice of project management. The section begins with an overview of the study to explain its practical application to project management practice, to remind the reader of the purpose of the research and the hypothesis addressed, and to provide the methodology used to conduct the study. The presentation of the findings provides a description of the sample composition, outlines the research responses using frequencies and descriptive statistics, highlights key correlations of variables using crosstabulations, and provides an in-depth analysis of the correlational variables and hypothetical model tested. Based on the findings conclusions are presented for evaluation, recommendations are offered for applying the findings by current project management practitioners, and suggestions are provided to researchers for future research studies. The final discussion in this section reflects upon the researcher's lessons learned through this process and Biblical integration.

Overview of the Study

Project management is becoming increasing important to businesses for new product development, innovation, and risk mitigation (Bergman et al., 2013; Jensen et al., 2016; Nguyen et al., 2013; Oehman et al., 2014), and the project manager plays a key role in the success or failure of projects (PMI, 2017a; Jugdev et al., 2015; Patel et al., 2013; Sols, 2015). The current study expands on published research which found higher levels of project manager confidence correlate with lower levels of risk awareness, positing that overly confident judgments lead to underestimation of project deviations and risks, thus leading to potential project failure (FB2015).

The cognitive psychology construct of overconfidence (i.e., overoptimism) and its association with serious decision-making judgment is a current topic of interest (Markovitch et al., 2014) in the context of risk management (Teller et al., 2014; Aleksic et al., 2017) and project success (de Bakker et al., 2011). Prevalent probabilistic theories provide insight into cognitive biases and heuristics that explain perceived risk considering overoptimism (Abatecola, 2014; Garret & Sharot, 2017; Pachur et al., 2013; Prater et al., 2016; Virene, 2014; Söderlund & Müller, 2014). Specifically related to the field of project management, research shows optimism bias surfaces in the planning and execution of projects (Akkermans & van Oorschot, 2016; Meyer, 2014; Tyebjee, 1987; Weise et al., 2016).

The purpose of this quantitative study is to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new project in a business environment. The primary research question addressed in this study is: What is the relationship between a project manager's confidence level and risk awareness level among project manager practitioners? The hypothetical model proposed is represented by the diagram in Figure 4 and correlational variables in Table 2.

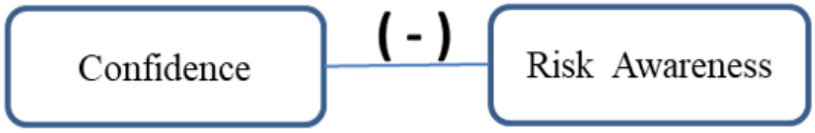

Figure 4. Relationship between Confidence (IV) and Risk Awareness (DV).

Table 2

Correlational Model Variables

Variable	Variable Type
Confidence	Scale using interval estimates
Risk Awareness	Ordinal using a 7-point Likert scale

The problem to be addressed is that a project manager's confidence level may lead to insufficient risk awareness (FB 2015). The current research utilized a portion of the FB2015 survey instrument to simulate the new product development planning process using an exercise that used numerical interview estimates for completion times of five easy-to-assemble furniture products. Since the current study sought to replicate this portion of the FB2015 study, it was desirable to use the furniture assembly exercise. Further, the exercise was relevant because project managers typically are responsible for determining durations of activities within projects. The exercise seemed to be equally applicable to a broad spectrum of project managers within the US.

The study was conducted among project manager practitioners who identified themselves as either currently working as a project manager or as having worked as a project manager in the past. The sample also included those working in management within the project management field (e.g., PMOs (Project Management Offices), managers of project managers, and consulting). A quantitative, online survey was administered to members of local PMI Chapters and project managers in the researcher's professional network. The study examined the relationship of key variables using inferential statistical analyses and crosstabs with respondent demographic data to provide discussion of the findings on the pages that follow.

While a primary analysis showed no statistically significant relationship, the findings from the secondary analysis showed that there is a relationship between confidence level and risk awareness among project managers. The secondary correlation analysis showed that overconfidence was inversely related to risk awareness, indicating there is some empirical evidence to show that during the planning phase overconfident project managers may exhibit less awareness of risks to be encountered during project execution. In this way, the current research conducted in the US among US project managers came to the same conclusion as the FB2015 research conducted in Germany among German project managers.

Presentation of the Findings

Data collection. The study used a convenience sampling methodology that was successful for gaining access and willing participation from a highly targeted segment of the population (i.e., project management practitioners). The convenience methodology is a useful tool for answering questions and testing the hypothesis posed in this study (Creswell, 2008). The researcher contacted PMI Chapter presidents to gain permission to distribute the online survey link through Chapter newsletters, postings on Chapter websites, and directly to respondents via email distribution lists.

The survey link was hosted by SurveyMonkey. The field was opened on June 1, 2018 and remained active for six weeks with field close on July 20, 2018. The online survey took an average (mean) of eight minutes to complete. An open-ended question at the end of the survey allowed respondents to provide any additional comments they would like for the researcher to know. In total, 26 rather miscellaneous responses were provided, with the overwhelming majority being positive responses. No comments indicated difficulty in completing the tasks or in understanding the instructions.

Incidence rates are difficult to calculate considering the survey link was distributed through several methods. However, based on the timing of the solicitation for participation, acceptance of Chapters on an ongoing basis throughout fielding, and the associated SurveyMonkey daily completion monitoring, some observations can be provided. Distribution through the Chapter newsletters was least effective, garnering the least completions, followed closely by Chapter website postings. Both of these methods yielded insufficient sample for analysis. Distribution through direct email was the most successful, with spikes in completions observed immediately following major email distributions by the Chapters or to the researcher's network of practitioners. Qualitative conversations with Chapter presidents added some explanation, with one president saying a one percent incidence rate was typical for similar requests for participation to his Chapter's membership through the website or newsletter.

The researcher first contacted PMI.org to obtain a randomly generated list of members within the US. The contact at PMI.org informed the researcher that although the organization had offered purchased lists of members as recent as 2013, due to privacy concerns the organization no longer offered that option. However, the contact suggested the researcher contact local Chapters directly using the contact information posted on the local Chapter websites. In total, 40 PMI Chapters within the US were contacted using the email addresses listed on the Chapter websites. Initially, Chapters in the Southeastern US were contacted as the researcher belongs to a Southeastern US Chapter. However, as participation and incidence proved low as the fielding lingered on, to expedite data collection larger metropolitan areas across the US were contacted. Follow up calls to personally introduce the researcher and request participation were made to those Chapters listing telephone numbers. In total, 12 Chapters contacted by phone and three Chapters confirming via email to the initial email request agreed to

distribute the survey to members. It is possible that other Chapters either posted or distributed the survey, but failed to confirm with the researcher, despite several attempts to confirm participation for incidence calculation purposes.

With a conservative estimated average of 250-500 members per Chapter, a conservative estimate is the survey went out to 3,750-7,500 PMI members. Another approximately 200 emails were sent through the researchers' own professional network. In total, 263 responses were received by field close, with an estimated incidence of 3.5-7%. Of the 263 completed surveys, six respondents were identified as non-qualified from the screening questions (either under 18 or not a project manager practitioner), bringing the total sample for analysis to 257. The a priori sample size calculator indicated a 322 sample was necessary for a 5% confidence interval (margin of error) at the 95% confidence level. The resulting 257 qualified sample yielded a 6% confidence interval (margin of error) at the 95% confidence level, which is considered standard, therefore the researcher continued with the analysis of the sample.

Sample Description. The sample obtained represented the research target of interest, namely project manager practitioners. Demographic data and project management work experience details were collected to provide a richer description of the sample. These variables were also used throughout the analysis to provide understanding of the findings and provide conclusions and application to the project management practice.

Respondents were asked to provide demographic data using categorical variables for gender (nominal), age (ordinal), and education level (ordinal). The sample is fairly equally composed of women (46%) and men (53%). The majority of respondents are between the ages of 45-64 (69%), with the largest group being 45-54 (39%), followed by 55-64 (30%) and 35-44

(23%). The sample is highly educated, with 92% having college degrees (55% Master degrees, 35% Bachelor degrees, and 2% Doctorate degrees; Appendix A).

Information about project management experience was gathered using categorical variables for current role (nominal), years working as a project manager (ordinal), project management certifications obtained (nominal), and desire to obtain certifications in the future (nominal). The majority of respondents are currently working as a project manager (67%), a quarter (25%) are not currently working as a project manager but have in the past, and another eight percent are working in supervisory roles (e.g., PMOs, management of project managers, and consulting). The huge majority (98%) of the sample had greater than three years' experience, with half (52%) having worked in project management greater than 15 years. Years of experience break down as: under 3 years (2%), 3-5 years (8%), 6-10 years (14%), 11-15 years (23%), 16-20 years (20%), 21-25 years (18%), 26-30 years (9%), and more than 30 years (5%; Appendix B). The majority (69%) of the respondents currently hold a project management certification, and approximately 12% have more than one project management certification. The most common certification held is the PMP (64%). When asked if they planned to get any type of project management certification in the future, 39% of the sample do not, however, 27% indicated they do plan to obtain some type of certification within the next three years (Appendix C).

Information about the respondents' work environment was gathered using categorical variables for functional area (nominal) and the industry (nominal) in which respondents are currently working. Respondents reported currently working in the categories of Information Technology positions (35%), followed by Marketing/PR positions (22%). The next largest category was *other* (25%). A review of the open-ended responses in the *other* category indicated

respondents were currently working in engineering positions (11 responses), administration positions (9 responses), and product development positions (8 responses). Respondents are currently employed in the largest categories of Transportation and Warehousing (34%), Health Care and Social Assistance (8%), and Information Services and Data Processing (8%). A review of the *other* category responses was miscellaneous, with no single open-ended response greater than three responses (Appendix D).

Data Preparation. SurveyMonkey provides frequencies of the data displayed in histograms that give a good sense of the distributions of responses for each question. However, for the analysis necessary to answer the research question an output file to SPSS was created. Logic was embedded into the online questionnaire that required respondents to provide an answer for each question. For those questions where respondents could have a potential choice other than given, a not specified or other category was provided. Therefore, there were no missing data points within the data set. The dataset required several calculations to prepare for the analysis. The overconfidence and risk awareness scores were created for use in the correlation analysis. Certain categories of answer choices were condensed for greater understandability (i.e., condensed categories for respondent age, years working in project management, and the multiple choice question for PM certification). See Appendix E for original coding of each question item and Appendices A-D for frequencies by original item categories.

Sample Descriptive Statistics. Several crosstabulations highlighting respondents' project management experience compared with demographic descriptive statistics of the sample provide further understanding of the respondents in the study. The sample is comprised almost equally of females (46%) and males (53%). More males than females have been working longer

as project managers (21-25 years, 61% males and 39% females; > 26 years, 65% males and 35% females). However, the relationship between gender and years working as a project manager is not statistically significant at α (.05) ($\chi 2 = 4.333$, df = 4, p = .363) (Table 3).

Table 3

Crosstabulation of Gender and Years Working as a Project Manager

Gender	Years Working As A Project Manager					
	< 10 Years	11-15 Years	16-20 Years	21-25 Years	26 > Years	Total
Female	33 (52%)	29 (50%)	25 (50%)	18 (39%)	13 (35%)	118 (46%)
Male	30 (48%)	29 (50%)	25 (50%)	28 (61%)	24 (65%)	136 (53%)
n =	63	58	50	46	37	254

Information on project management certifications was collected using a multiple response question. The most common certification among respondents was the Project Management Professional (PMP) certification, with 64% of respondents having obtained a PMP. Slightly more males (59%) had a PMP certification than females (41%). Of those respondents with a PMP certification, 60% had a Master's degree. Those respondents without any project management certification tended to be female (54%) and had fewer years working as a project manager (60% had 15 years or less project management work experience; Table 4).

Table 4

Crosstabulation of Project Management Certification and Demographic Statistics

Demographics		PMP	Other	None	Total
Age					
	< 34	6 (4%)	4 (9%)	9 (11%)	17 (7%)
	35-44	30 (18%)	7 (17%)	25 (31%)	58 (23%)
	45-54	73 (45%)	20 (48%)	24 (30%)	100 (39%)
	> 55	55 (33%)	11 (26%)	23 (28%)	81 (31%)
	n =	164	42	81	256
Gender					
	Female	67 (41%)	19 (32%)	43 (54%)	119 (46%)
	Male	97 (59%)	39 (68%)	37 (46%)	136 (53%)
	n =	164	58	80	255
Education					
	Bachelor degree	57 (37%)	15 (38%)	28 (39%)	90 (38%)
	Master degree	93 (60%)	24 (60%)	43 (60%)	141 (59%)
	Doctorate	5 (3%)	1 (2%)	1 (1%)	6 (3%)
	n =	155	40	72	237
Years Working as a PM					
	< 10 Years	29 (17%)	11 (26%)	28 (34%)	63 (25%)
	11-15 Years	37 (23%)	5 (12%)	21 (26%)	59 (23%)
	16-20 Years	37 (23%)	10 (24%)	12 (15%)	51 (20%)
	21-25 Years	37 (23%)	7 (17%)	8 (10%)	46 (18%)
	26 > Years	24 (14%)	9 (21%)	12 (15%)	37 (14%)
	n =	164	42	81	256

Note: Excludes not specified; Project management certification multiple response question

Correlational Model Variables. Two primary constructs were measured and tested in this research: confidence and risk awareness. Confidence in the study is measured using interval estimates in which the survey participant is asked to provide best-case and worst-case estimates of the average time it would take to assemble each of five items of easy-to-assemble furniture products. Respondents are provided with a pictorial instruction sheet for each piece of furniture and asked to estimate the least amount of time in minutes (best) and most amount of time in minutes (worst) to assemble each of the five pieces of furniture. The respondents are asked to

give the estimates based on being 80% certain the actual assembly time is within the range of the estimates they provided. The actual completion times for each of the five pieces of furniture were provided by the FB2015 authors to the researcher. In the FB2015 study, the authors state the actual completion times were determined by having eight non-survey participants assemble the actual pieces of furniture and record the times for each piece. An average (mean) number of minutes it took to assemble each actual piece of furniture was calculated across the eight people.

The overconfidence effect is present when a person's predictions exceed accuracy of actual occurrence, and a person's confidence estimates are more prone to error when the person is highly confident (Pulford & Colman, 1996). In order to test the relationship of confidence level and awareness level of risks during planning, an overconfidence score was calculated using the *traditional* formula (Moore & Healy, 2008) for overconfidence: OC=certainty percentage (80% in this study) - the ratio of correct responses (the number of estimated ranges that contain the actual completion times divided by the number of pieces of furniture (five in this study). For example, given 80% certainty and three out of five correct, the overconfidence calculation is OC =.80 - .60 = .20. An OC score was calculated for each respondent for the confidence level construct and for understandability is referred to as the *overconfidence* score for the remainder of the analysis.

Project risk management seeks to minimize the negative impacts of uncertainty and the probability of an event even occurring (Teller et al., 2014). The risk awareness variable is defined as a measure of the respondent's generic attitude toward the extent to which risks pose a threat to project success in project management practice (defined by the FB2015 study). Based on their experience managing projects, respondents were asked their agreement with six items that describe risks associated with projects. Data were collected using a 7-point Likert scale (1 =

totally agree and 7 = totally disagree) for each of the six items comprising the risk awareness measure. A resulting mean score was produced for each respondent across the six items used for the measure. The mean score is used as the composite score in the analysis of the dependent variable (DV) of the risk awareness construct.

Reliability and Validity. Cronbach's alpha is used to measure the internal consistency of a multi-item psychometric instrument within a given sample (de Vet, Mokkink, Mosmuller, & Terwee, 2017). The Cronbach's alpha was used in this study to test the reliability used to measure the dependent variable of risk awareness among project manager practitioners. The Cronbach's alpha was .795, indicating the items used to measure risk assessment represent a high level of internal consistency within this sample (Table 5). An inter-item correlation analysis showed a mean of 2.8, all items positively correlated, the lowest item correlation in the six-item correlation matrix .148 (indicating the two items least correlated), and the highest .724 (indicating the two items most correlated; Table 6). The corrected item-total correlation Cronbach's alpha was computed to evaluate potential items for deletion. None of the items were deleted for the risk awareness construct since the original Cronbach's alpha (.795) would be reduced by dropping any one of the six items (Table 7). It should be noted the FB2015 study reported a Cronbach's alpha for the six-item risk awareness measure of .75.

Table 5

Scale Reliability Statistics for Risk Awareness Measurement

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.795	.801	6

Table 6

Summary Item Statistics for Risk Awareness Measurement

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	2.876	1.872	4.241	2.37	2.266	1.024	6
Item Variances	1.918	1.379	2.488	1.108	1.803	.231	6
Inter-Item Covariances	.752	.265	1.736	1.47	6.538	.113	6
Inter-Item Correlations	.401	.148	.724	.576	4.880	.026	6

Table 7

Corrected Cronbach's Alpha Inter-Item Correlation for Risk Awareness Measurement

Item description	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Problems not considered in planning	15.385	26.824	0.481	0.377	0.778
Risk occurence underestimated	15.012	25.144	0.542	0.455	0.765
Process disruptions underestimated	15.082	25.021	0.653	0.546	0.744
Small issues cause delays	14.560	23.700	0.567	0.331	0.759
Projects behind schedule	13.230	23.029	0.565	0.552	0.76
Projects over budget	13.016	24.086	0.515	0.538	0.773

Cronbach's alpha was also used to test the reliability of the instrument used to measure the confidence level. The resulting score was used for the composite measure in the analysis of the independent variable of the confidence level construct. Cronbach's alpha was .902, indicating the items used to measure confidence level have a high level of internal consistency within this sample (Table 8). An inter-item correlation analysis showed a mean of 43 minutes, all items positively correlated, the lowest item correlation in the five-item correlation matrix .619 (indicating the two items least correlated), and the highest .828 (indicating the two items most

correlated; Table 9). The corrected item-total correlation showed all higher, more similar scores between .746 and .864. One item indicated a potential item for evaluation for deletion, furniture piece 5, slighting improving Cronbach's alpha from the original total (Table 10). The item had a positive correlation and improvement would be only slight, so it was not deleted from the analysis. It should be noted the FB2015 study reported a Cronbach's alpha for the six-item risk awareness measure of .70.

Table 8

Scale Reliability Statistics for Confidence Level Measurement

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.902	0.927	5

Table 9

Summary Item Statistics for Confidence Level Measurement

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Means	43.371	23.07	61.117	38.047	2.649	242.401	5
Item Variances	935.372	196.542	1492.145	1295.6	7.592	290564	5
Inter-Item Covariances	606.064	247.789	1105.864	858.076	4.463	87337.3	5
Inter-Item Correlations	0.717	0.619	0.828	0.209	1.337	0.004	5

Table 10

Corrected Cronbach's Alpha Inter-Item Correlation for Confidence Level Measurement

Item Description	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Furniture Piece 1	155.7374	9351.252	0.797	0.703	0.879
Furniture Piece 2	164.0311	9716.415	0.864	0.768	0.856
Furniture Piece 3	184.9767	12079.671	0.806	0.722	0.878
Furniture Piece 4	168.8872	9806.29	0.825	0.712	0.866
Furniture Piece 5	193.784	14117.653	0.746	0.608	0.910

Exploration of the data. The first step in the data analysis called for a test of normality to determine the distribution of the data for choosing the correct test statistic. The distribution was assumed normal and, therefore, the a priori test statistic assumed was Pearson's correlation coefficient (r) for testing the null hypothesis (Ho: there is no statistically significant relationship between confidence and risk awareness). However, in order to use Pearson's r, three assumptions must hold: the variables are scale, there is a linear relationship between the variables, and data are normally distributed.

For the overconfidence score, the data are interval. A plot of the data suggests a non-linear relationship, whereas the histogram shows a visible negative skew with a long tail to the left indicating potential outliers (Figure 5). For the risk awareness score, the data are ordinal. A plot of the data suggests a non-linear relationship, whereas the histogram appears fairly normally distributed with a slightly longer right tail indicating a potential positive skew with potential outliers on the right tail of the distribution (Figure 6).

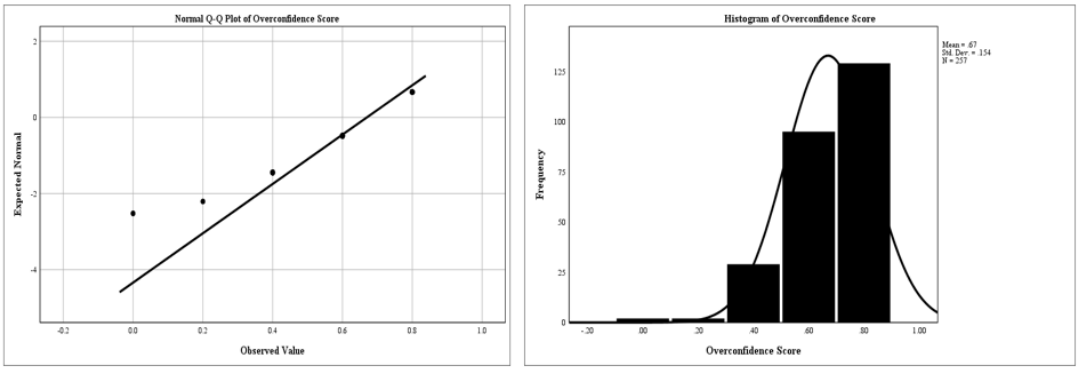

Figure 5. Normality Plot and Histogram for Overconfidence Score

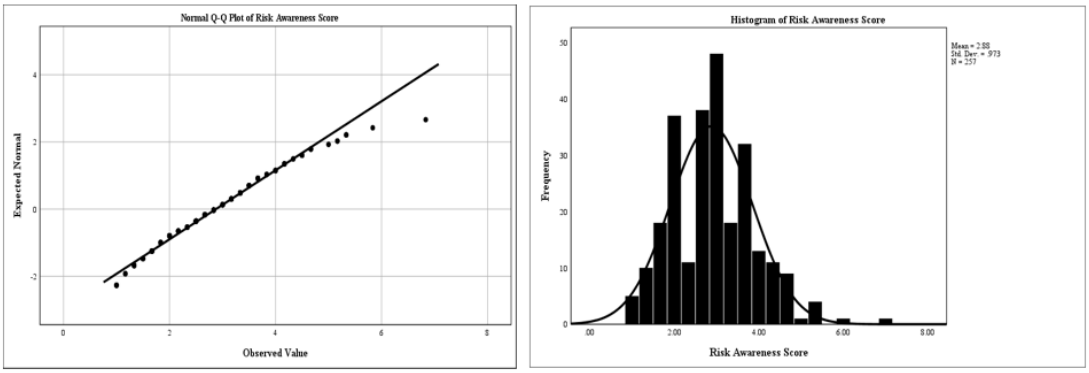

Figure 6. Normality Plot and Histogram for Risk Awareness Score

The statistical tests for normality of distributions in SPSS are Kolmogorov-Smirnov (K-S) and Shapiro-Wilk. Both of the tests validate the visual plots with a statistically significant finding at the α (.05) confidence level (i.e., both the overconfidence score and risk awareness score distributions) are significant with p values at approximately 0.001. Therefore, the null hypothesis that the data are normally distributed is rejected and the Pearson's r assumptions of normality have been violated (Table 11).

Table 11

Test of Normality for Hypothetical Model Correlation Variables

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Overconfidence	0.302	257	0.000	0.755	257	0.000
Risk Awareness	0.058	257	0.034	0.980	257	0.001

a. Lilliefors Significance Correction

For the risk awareness score a review of the descriptive statistics indicates skewness is not a significant issue since the statistic is between 1 and -1 and the mean and median are virtually the same. A review of the descriptive statistics for the overconfidence score validates the visual observations in that the overconfidence score distribution has a negative skewness statistic (-1.210) and the median (0.8000) is greater than the mean (0.6700). Because the skewness statistic is less than -1, the distribution is highly skewed (Table 12).

Table 12

Descriptive Statistics for Overconfidence and Risk Awareness Scores

							Skewness		Kurtosis	
	N	Minimum	Maximum	Mean	Median	Std. Dev.	Statistic	Std. Error	Statistic	Std. Error
Overconfidence	257	0.00	0.80	0.6700	0.8000	0.15435	-1.210	0.152	1.854	0.303
Risk Awareness	257	1.00	6.83	2.8761	2.8333	0.97289	0.466	0.152	0.576	0.303

Because the data are not normally distributed, a non-parametric statistic is required for the correlation analysis to test the null hypothesis for this sample. The statistics offered for non-parametric distributions in SPSS are Spearman rho and Kendall tau. The results of the analysis were not significant for either measure. Therefore, the researcher failed to reject the null hypothesis (i.e., meaning there is no evidence to suggest there is a relationship between the overconfidence score and risk awareness score: Table 13).

Table 13

Correlation Analysis Statistics for Overconfidence and Risk Awareness Scores

Correlations

			Risk Awareness Score	Overconfidence Score
Kendall's tau_b	Risk Awareness Score	Correlation Coefficient	1.000	-0.077
		Sig. (2-tailed)		0.126
		N	257	257
	Overconfidence Score	Correlation Coefficient	-0.077	1.000
		Sig. (2-tailed)	0.126	
		N	257	257
Spearman's rho	Risk Awareness Score	Correlation Coefficient	1.000	-0.098
		Sig. (2-tailed)		0.115
		N	257	257
	Overconfidence Score	Correlation Coefficient	-0.098	1.000
		Sig. (2-tailed)	0.115	
		N	257	257

Discrepancy discussion. Since the FB2015 study found a statistically significant inverse relationship between the two variables and the current research did not, other exploration of the data was performed to potentially explain the discrepancy. One noted difference in the two studies is the percentage of the respondents having experience with assembling the depicted furniture. In the FB2015 study, 95.6% of project managers reported having experience with the furniture line depicted in the questionnaire. Whereas, 59.1% of respondents in the current study reported having experience with furniture line assembly used in the estimated durations exercise (Table 14).

Table 14

Respondents with Experience Assembling Furniture Line Products

Experience Level	Frequency	Percent	Cumulative Percent
No experience	105	40.9	40.9
Negative	5	2	42.9
Mixed	53	20.5	63.4
Positive	94	36.6	100
Total	257	100	

Note. This study was not conducted in conjunction with IKEA; no support was provided by the company.

To test whether experience with assembling the furniture line products used for the exercise to estimate durations made any difference in the respondents' answers, an analysis was conducted among the subsample of respondents with experience (152, 59% of the sample) and those without experience (105, 41% of the sample). The results of the correlation analysis showed no statistically significant relationships at α (.05) across any of the segments -- total respondents, those with furniture assembly experience, and those without furniture assembly experience. Therefore, we fail to reject the null hypothesis, meaning there is no evidence to suggest there is a relationship between overconfidence and risk awareness, regardless of whether the respondent has experience with assembling the furniture line used for the exercise (Table 15).

Table 15

Correlation Analysis of Respondent Experience with Furniture Line Assembly

Correlation by IKEA experience

			Risk Awareness Score	Overconfidence Score
Kendall's tau_b	Risk Awareness Score	Correlation Coefficient	**1.000**	**-0.043**
		Sig. (2-tailed)		**0.511**
		N	**152**	**152**
	Overconfidence Score	Correlation Coefficient	**-0.043**	**1.000**
		Sig. (2-tailed)	**0.511**	
		N	**152**	**152**
Spearman's rho	Risk Awareness Score	Correlation Coefficient	**1.000**	**-0.057**
		Sig. (2-tailed)		**0.484**
		N	**152**	**152**
	Overconfidence Score	Correlation Coefficient	**-0.057**	**1.000**
		Sig. (2-tailed)	**0.484**	
		N	**152**	**152**

Correlations No IKEA Experience

			Risk Awareness Score	Overconfidence Score
Kendall's tau_b	Risk Awareness Score	Correlation Coefficient	**1.000**	**-0.124**
		Sig. (2-tailed)		**0.118**
		N	**105**	**105**
	Overconfidence Score	Correlation Coefficient	**-0.124**	**1.000**
		Sig. (2-tailed)	**0.118**	
		N	**105**	**105**
Spearman's rho	Risk Awareness Score	Correlation Coefficient	**1.000**	**-0.158**
		Sig. (2-tailed)		**0.107**
		N	**105**	**105**
	Overconfidence Score	Correlation Coefficient	**-0.158**	**1.000**
		Sig. (2-tailed)	**0.107**	
		N	**105**	**105**

Another discrepancy noted from FB2015 research indicated the traditional calculation of overconfidence (subtracting the percentage of accurate answers from the given level of confidence) may produce distorted results due to outliers (i.e., those scores that are fundamentally too high or too low based on the estimated duration times). The authors massaged their data set by calculating a corrected measure of overconfidence using regression analysis. The authors regressed the estimated average task-completion time (DV) onto the traditional overconfidence calculation (IV), a method suggested by Anderson and Brion (2012). The estimated average task-completion time is simply the average of the least minutes and the most minutes estimation durations provided by the respondents for each piece of furniture across the five pieces of furniture. The regression of the scores rendered by the two methods of calculating an overconfidence score produced several residual scores in SPSS. Since it was not stated in the FB2015 article which scores were used for the corrected measure, all were chosen for output. The residual scores (corrected calculation) for overconfidence were used for the correlation with risk awareness. Using the non-parametric statistics of Kendall's tau and Spearman's rho, no statistically significant relationships of risk awareness and the corrected overconfidence score

emerged, and the researcher failed to reject the null hypothesis. Therefore, the discrepancy in the FB2015 finding and this current research is not explained by using a residual score for the overconfidence score rather than using the score generated by the traditional calculation of overconfidence (Table 16).

Table 16

Correlation Analysis of Risk Awareness and Corrected Overconfidence Score Using Regression Residuals

				Overconfidence		
			Risk Awareness	Unstandardized Residual	Standardized Residual	Studentized Residual
Kendall's tau_b	Risk Awareness	Correlation Coefficient	1.000	-0.031	-0.031	-0.031
		Sig. (2-tailed)		0.465	0.465	0.464
		N	257	257	257	257
Spearman's rho	Risk Awareness	Correlation Coefficient	1.000	-0.044	-0.044	-0.044
		Sig. (2-tailed)		0.486	0.486	0.486
		N	257	257	257	257

A secondary analysis was investigated because the distributions of the two correlational variables were non-parametric with observable potential outliers, and the current study correlation outcome was different from the FB2015 study. First, a boxplot analysis was run to determine the significant outliers for the two variables of overconfidence score and risk awareness score. The plots identified six cases that should be evaluated to understand why they are flagged as outliers. Typically, there are two types of outliers: those occurring due to invalid responses (e.g., data errors) and to valid responses occurring as a result of the inherent variability in the data (Osborne & Overbay, 2004). Types of data errors may include miscoding, social desirability, and sampling error due to inclusion of respondents outside the intended target

population. In the case of the current study, the outliers are valid and appear to be due to inherent variability in which sample size may play a role. The boxplots indicate the six cases identified to be outliers that should be considered for elimination from the dataset, with one outlier significantly out of bound identified by an asterisk. These outliers are three standard deviations from the mean (Figure 7).

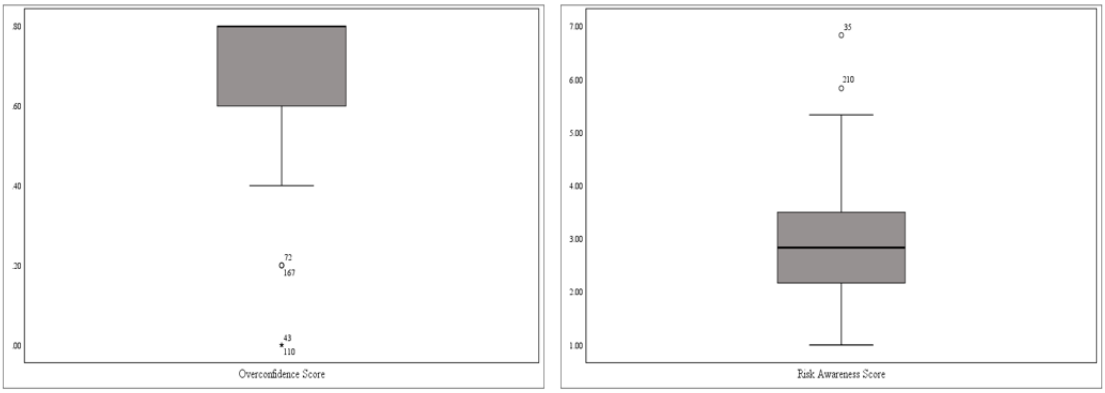

Figure 7. Boxplots Identifying Outliers in Overconfidence Score and Risk Awareness Score

While there is debate in the research community on how to handle outliers, Osborne and Overbay (2004) provided empirical evidence that removal of outliers can improve the accuracy of inferential analyses such as correlations. As a focus of inquiry, the researcher chose to explore a common practice of eliminating the outliers to see if there is a difference in the correlation analysis outcome. The secondary correlation excluding the six outliers revealed a significantly significant outcome at α (.05) based on the Spearman's rho statistic (-1.24) where p = .049 (Table 17). Therefore, under this secondary analysis scenario we reject the null hypothesis. Under this scenario the finding is consistent with the FB2015 study. The finding would indicate there is empirical evidence of an inverse relationship between confidence level and risk awareness (i.e., the conclusion that overconfidence on the part of project managers leads to lower awareness of project risks during the project planning phase).

Table 17

Correlation of Overconfidence Score and Risk Awareness Score (Excluding Outliers)

			Risk Awareness Score	Overconfidence Score
Kendall's tau_b	Risk Awareness Score	Correlation Coefficient	1.000	-0.098
		Sig. (2-tailed)		0.054
		N	251	251
	Overconfidence Score	Correlation Coefficient	-0.098	1.000
		Sig. (2-tailed)	0.054	
		N	251	251
Spearman's rho	Risk Awareness Score	Correlation Coefficient	1.000	-.124*
		Sig. (2-tailed)		0.049
		N	251	251
	Overconfidence Score	Correlation Coefficient	-.124*	1.000
		Sig. (2-tailed)	0.049	
		N	251	251

* Correlation is significant at the 0.05 level (2-tailed).

By comparing the correlation output from the full dataset with the outliers excluded dataset, this finding makes logical sense. Although no statistical inference can be made on the six cases identified as outliers, a simple observation of the respondents' scores qualitatively validate the finding. These respondents that were more accurate in estimating the range containing the actual completion times had the lowest overconfidence scores.

Summary of the findings. The initial correlation analysis did not show a statistically significant result, leading the researcher to fail to reject the null hypothesis and surmise there is no evidence to suggest there is a relationship between overconfident project managers and their assessment of project risk in the initial stages of project planning. The distribution of the data was not normally distributed and required non-parametric exploration and analysis. The analysis

showed the dataset contained six outliers that had a significant effect on the correlational findings. A secondary correlation analysis conducted excluding outliers showed a statistically significant result leading the researcher to reject the null hypothesis. The secondary correlation analysis showed that overconfidence was inversely related to risk awareness, indicating there is some empirical evidence to show that during the planning phases of a new product development project overconfident project managers may exhibit less awareness of risks to be encountered during project execution. In this way, the current research conducted in the US among US project managers came to the same conclusion as the FB2015 research conducted in Germany among German project managers.

The demographic descriptives show the current research was conducted among highly seasoned project managers, with half of the sample having worked in project management for more than 15 years and the majority certified as a PMP. The sample was comprised equally of women and men. In addition, the majority of the sample is currently working in some type of project manager role. While analyses were conducted among the correlational model variables of confidence level and risk awareness and demographic respondent data, no statistically significant relationships were exhibited.

Applications to Professional Practice

As customer demand grows for new and innovative products and services, businesses have embraced project management as a core discipline vital to managing new product development (Bergman et al., 2013; Flyberg, 2013; Nguyen et al., 2013; Lloyd-Walker et al., 2016). However, new product development projects involve inherent risk and uncertainty that require project risk management for success (Teller et al., 2014; Kock et al., 2016; Oehmen et al., 2014; Botezatu, 2016). Considering that costs of project failure can be staggering, mounting

into the billions of dollars (Patel et al., 2013; McKay et al., 2015), understanding potential underlying root causes of project failure have direct application to project management practitioners. Since the primary responsibility for project management lies with the project manager (Kutsch et al., 2014; Firmenich, 2017), capabilities and the methodologies project managers employ are important to studying project success and failure (Apostolopoulus et al., 2016; Dalcher, 2016).

The current study is applicable to the project management field by expanding the conversation that touches on key topical areas of interest: high project failure rates in businesses, mitigating and managing project risk, and the role and influence of the project manager. The study aims to fill in the gap in the literature that ties project failure to inadequate risk assessment influenced by project manager confidence during the planning phase of a new product development project. Further, Müller and Jugdev (2012) proposed project manager practitioner research focus on constructs for understanding project success that build incrementally on others' contributions to the topic.

The study expands on the research conducted by Fabricius and Büttgen (2015). In their study, the researchers' theoretical model findings showed the relationship between overconfidence on risk impact and risk occurrence through the mediating variable of risk awareness in explaining anticipated project success. The authors concluded overconfident project managers do not engage in sufficient project risk management because they do not expect the project to deviate from what is forecasted in planning and that the project will be executed successfully, therefore, underestimating potential risks (FB2015). Further, the authors concluded there may be a reduced availability of risks that lead to perceptions of risks not likely to occur and not being a threat (FB2015).

Of most interest to this researcher was the statistically significant inverse relationship between project manager confidence and risk awareness found in the FB2015 study. While confidence, particularly, overconfidence and over optimism, seems to have been researched extensively in the field of psychology, less evidence was found in the literature review for research studies conducted in businesses and, particularly, in the project management field. Applicable to project managers, overconfidence produces a bias in estimating probabilities that leads to risk taking (Virine, 2014), is problematic in the planning phase of a project (Tybjee, 1987), and serves to blind the project manager to the magnitude of risk threats and impacts (Van Zant & Moore, 2013). For all these reasons, studies like the current research are important to practitioners in understanding how to identify, mitigate, and manage risk in order to improve project success.

The findings of the current research indicate there is evidence to reject the null hypothesis that there is no statistically significant link between the project manager confidence level and risk awareness. In fact, the two constructs appear to have an inverse relationship, meaning as overconfidence increases the awareness of risks decreases. This finding is important to project management practitioners because there tends to be overly optimistic projections of success during planning phases of a new project that cloud judgment (Kutsch et al., 2011). Overly optimistic judgments may inhibit project managers from conducting robust risk assessments and contingency plans to mitigate the risks should the risks occur. Further, without a robust risk assessment, project managers may continue to execute projects that should not move forward. One final observation is that overconfidence and risk awareness do not appear to be associated with age, gender, or education level.

Recommendations for Action

The purpose of this quantitative study was to examine the relationship between project manager confidence and risk assessment during the early planning stages for a new product development project in a business environment. The null hypothesis tested whether there is a relationship between confidence level and risk awareness among US project managers working as practitioners. The results of the secondary correlation analysis (exclusion of outliers) rejected the null hypothesis, indicating there is evidence of an inverse relationship, meaning higher levels of confidence (overconfidence) is related to lower levels of risk awareness. This finding has several practical recommendations for action for project management practitioners.

Because projects may take months, or even years, to complete, uncertainty and risk are natural parts of the process. Not paying close attention to conducting sufficient risk analysis during the critical planning phase in the project could prove detrimental to the project during execution. Projects require robust risk assessment and contingency planning that help project managers ensure their projects have the greatest chance of success should risks occur. Conducting robust project risk assessment at the beginning of the project may prevent project managers from executing projects that may ultimately fail, thus saving the company money in the form of valuable time and resources. Project managers should review the training on risk management offered by organizations such as PMI and take full advantage of tools and templates to guide them in risk assessment activities.

As project management practitioners continually seek process improvement measures, taking a realistic check by the project manager on his/her confidence level is a must. To aid in a realistic assessment, the project manager should review past project failures and lessons learned which could bring to mind past project performance that would increase the awareness of risks.

One recommendation is to create an enterprise-wide lessons learned database within the project manager's company that all new projects are required to review during the planning phase of new projects.

During training classes for project management certifications, candidates are taught that project managers are *large and in charge*. In many organizations, holding the position of a project lead brings both great responsibility and great power. Since project managers do not typically want to disappoint executive sponsors, project managers may exhibit an overly optimistic behavior that is actually overconfidence. Therefore, it is important for project managers to take on each new project challenge with a measure of humility. One recommendation is to create an environment where team members are encouraged to challenge the status quo and ask questions when they see a potential risk that the project lead may not.

It is beneficial for project manager practitioners to learn from research conducted on the discipline. Some of the chapters have requested the findings of this dissertation be disseminated among their membership. For the local PMI Chapter for which this researcher is a member, the findings will be presented at a chapter meeting upon publication. For other chapters that have requested a copy of the findings, the link to the publication will be emailed to the chapter president upon publication. Finally, the researcher plans to speak with the researcher's PMI.org contact in hopes that PMI.org will be interested in publishing the findings from this research on the website or in a future conference proceeding.

Recommendations for Further Study

The purpose of this study was to replicate a portion of the original FB2015 research and expand on the findings by studying project managers in a difference region of the world and by focusing in on the correlational test of the inverse relationship of overconfidence and risk

awareness found in the original research study. The researcher noted four things over the course of the study and during the analysis of data that are offered for further study. It is the hope of the researcher these recommendations may stimulate creative ideas among other researchers for studying the important constructs of overconfidence and risk awareness that are even more directly specific to the project management discipline than in this study.

First, qualitative research among project manager practitioners exploring the measures project managers take (or do not take) in identifying and documenting potential risks during the planning phase of a new project and how and why they perceive it is (or is not) important to do so would be beneficial. This type of research would provide the depth to better understand risk awareness, especially in the area of availability of potential risks and how project managers bring those risks to mind. The research would also provide practitioners with best practices for documenting project performance with regard to risks encountered that were not identified during the planning phase to use as lessons learned reminders in future project planning.

Second, it would be beneficial to explore qualitatively why project manager practitioners are overconfident. By better understanding what overconfidence is linked to, the discipline can better identify the behavioral and intrinsic factors that may lead to project manager overconfidence. This exploration would lead to understanding the underlying factors contributing to overconfidence and, once identified, these factors can be used to evaluate project managers when assigning project leads for new projects.

Third, while the furniture assembly exercise simulated project activity duration estimations – a normal function of project manager capabilities -- there may be a more natural, yet equally broadly applicable, setting that would be even more relevant to project managers. Further, this researcher found the traditional method of calculating overconfidence (used in

conjunction with the furniture assembly exercise) to be neither intuitive nor straightforward. Again, although not a part of this study, one recommendation is to conduct qualitative research that would allow the researcher to observe characteristics of project manager behavior that could then be used to develop a direct measurement instrument. This instrument could then be tested and validated for determining overconfidence specifically applied to the field of project management versus the traditional measurement of overconfidence used in the FB2015 study and the current study.

Fourth, project managers practicing in two separate countries of the world have now been studied. The project management practice is a global profession. The PMI.org homepage boasts over 500,000 global members in over 207 countries internationally, reaching over 2.9 million working professionals, and holding over 1.2 million certifications worldwide (PMI.org, 2018). Therefore, it would be interesting to replicate this study in other regions of the world to see if similar conclusions are found and, if differences are found, what are the drivers of those differences.

Reflections

One of the biggest lessons learned in this study is in the data collection process. In an online world, personal contact still matters. When working with organizations (e.g., PMI local chapters), that will further distribute a survey to members, a personal call to gain participation is a must in order to be successful. While participation was completely anonymous, spikes were noted in the daily monitoring dashboard provided by SurveyMonkey after personal contact was made. The chapter presidents said it made a difference that the researcher personally called to request participation versus only sending the email request because cyber security is such a threat today and recipients want to make sure survey weblinks are legitimate. After the survey was

sent out to the local chapter for which the researcher belonged, very few responses were completed. An in-person reminder was given at the local PMI Chapter monthly meeting, which resulted in a spike in responses over the following three-day period. Even within the researcher's own network, emails and calls were received requesting verification that the survey actually was from the researcher.

Another data collection lesson learned is to include an exact cut-off date in the email invitation, which appeared to improve timely response rates. Three to five day spikes in respondent completes were evident after waves of the survey went out by the chapters. The initial invitation asked respondents to respond *in the next couple of days*. As the field close target date approached, any additional chapter invitations and any reminders included a field end date in the invitation emails. This small change improved the timeliness of completed responses.

One last observation on data collection is provided. Whether the increase skepticism of unsolicited emails and focus on cybersecurity noted in this study are problems for researchers in general are beyond the goals of this study. However, the incidence in this study may uncover an opportunity for project management researchers and behavioral science researchers, in general. Based on the experience of this study, there seems to be a great opportunity for legitimate professional organizations such as PMI.org to build database panels of known practitioners that researchers can access to draw samples for conducting research. While companies like SurveyMonkey do offer database samples for many professions, the target sample estimation tool on the SurveyMonkey site indicated the database contained insufficient numbers of available project managers to have conducted this survey at the time of the study.

The FB2015 research tested a formative measure of anticipated project success. The current research took a portion of the FB2015 research and expanded on the findings for the two

variables of most interesting to this researcher – the inverse relationship of overconfidence to risk awareness. This relationship formed the foundation of the FB2015 work, as interpreted by this researcher, since risk assessment was the moderating variable through which overconfidence was found to affect risk occurrence and risk impact assessments. By taking only a portion of the FB2015 to replicate, the original study could be simplified to focus only on these two constructs for further study. This simplification allowed the researcher to focus on the most critical part of the model to isolate the correlational variables and to understand any differences based on having conducted the research in a different region.

The Bible provides examples of rightly placed confidence as well as overconfidence and the results of each. Of importance to the topic of this dissertation, three particular examples of overconfidence are discussed in Section 1 of the dissertation: Joshua's conquest of Ai (Joshua 7), Peter's denial of Jesus (Matthew 26), and the Church of Laodicea (Revelation 3). In each of these examples documented in his Word for our edification, God provides the warning that overconfidence can lead to failure. What we learn from these examples is that a rightfully placed confidence in God, while surveying the risks associated with action or inaction, is the path to success.

The last reflection to be offered is of a personal nature and a confession. Pracademics are those researchers that are working as full-time project management practitioners while at the same time obtaining doctoral degrees. This researcher is very fortunate to have worked in the project management field for some 25 years, with the past 10 years as a PMP. That experience led to a passion to research the project management field for this doctoral challenge and, in particular, the constructs and relationships studied in the FB2015 research. However, at the conclusion of this journey, this researcher has realized that she is the epitome of the very subject

of her research – the overconfident project manager that underestimated the risks associated with the project at hand. Balancing a full-time, demanding management position that manages project managers while at the same time pursuing the dissertation portion of this degree has been, to say the least, challenging. This researcher offers the following advice to future pracademics – first, read Peg Boyle Single's *Demystifying the Dissertation Process* before you begin. Second, and most importantly, for believers, remember who you belong to and who is the source of your strength. Jesus has promised to never leave us nor forsake us (Hebrews 13:5), that we can do all things through Him (Philippians 4:13), we can be confident that He will finish what He started (Philippians 1:6), and keep our eyes fixed on Him – the author and perfecter of our faith (Hebrews 12:2).

Summary and Study Conclusions

The purpose of this quantitative study is to examine the relationship between project manager confidence and the ability to assess risk during the early planning stages for a new product development project in a business environment. The study was conducted among 257 project manager practitioners in the US. The practitioners were highly seasoned project managers, with half having worked more than 15 years in the field, and the majority certified as a PMP. The sample was equally comprised of women and men, the majority was between the ages of 45-64, and virtually the entire sample held college degrees.

The problem addressed was that a project manager's confidence level may lead to insufficient risk awareness, a conclusion from the FB2015 research. Having been a validated instrument in the original FB2015 research, a portion of the instrument was used as the basis for the current study. The Cronbach's alpha was sufficiently high for the correlational variables tested in the study among the current study sample. While the sample size was less than

originally planned, the 257 sample was sufficient to conduct the analysis at α (.05) confidence level and 6% margin of error. The sample was found to be non-normally distributed and required non-parametric analysis.

The primary correlation analysis led the researcher to fail to reject the null hypothesis, indicating there is no evidence to suggest there is a relationship between overconfident project managers and their assessment of project risk in the initial stages of project planning. However, an outlier analysis showed the dataset contained six cases that had a significant effect on the primary correlation analysis. A secondary correlation analysis excluding the outliers showed a statistically significant result leading the researcher to reject the null hypothesis. Further, this final analysis showed an inverse relationship between confidence level and risk awareness, validating the finding from the FB2015 research. Therefore, the conclusion of the study is that there is evidence to show that overconfident project managers exhibit lower risk awareness.

This study accomplishes several goals. First, it fulfils the aim to help close the gap in the literature that ties project failure to inadequate risk assessment influenced by project manager confidence during the planning phase of a new product development project. Further, as Müller and Jugdev (2012) proposed, the current study builds incrementally on the contribution of others (namely, the FB2015 research) by conducting research among project manager practitioners that will benefit the discipline in improving project success. Second, as the project management practitioner strives for continuous improvement, the findings and conclusions provide immediate application in the area of proper risk management. Third, the study encourages the researcher to study what he/she is passionate about and remain curious by expanding and building the knowledge base in their own discipline. Fourth, for followers of Jesus Christ, a DBA obtained at

Liberty University provides an opportunity to share the Gospel with others through their dissertations.

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Appendix A: Frequencies of Demographic Categorical Data (N=257)

Age

	Frequency	Percent	Cumulative Percent
18-24	1	0.4	0.4
25-34	16	6.2	6.6
35-44	58	22.6	29.2
45-54	100	38.9	68.1
55-64	78	30.4	98.4
65 or older	3	1.2	99.6
Not specified	1	0.4	100
Total	257	100	

Gender

	Frequency	Percent	Cumulative Percent
Female	119	46.3	46.3
Male	136	52.9	99.2
Not specified	2	0.8	100
Total	257	100	

Level of Education

	Frequency	Percent	Cumulative Percent
Less than college	0	0	0
Some college, no degree	7	2.7	2.7
Associate degree	9	3.5	6.2
Bachelor degree	90	35	41.2
Master degree	141	54.9	96.1
Doctorate degree	6	2.3	98.4
Professional degree	4	1.6	100
Total	257	100	

Appendix B: Frequencies of Project Management Categorical Data (N=257)

Current Project Management Role

	Frequency	Percent	Cumulative Percent
Currently working as a project manager	172	66.9	66.9
Worked as a project manager in the past	65	25.3	92.2
Other	20	7.8	100
Total	257	100	

Years Working as a Project Manager

	Frequency	Percent	Cumulative Percent
Under 3 years	6	2.3	2.3
3-5 years	21	8.2	10.5
6-10 years	35	13.6	24.1
11-15 years	59	23.0	47.1
16-20 years	51	19.8	66.9
21-25 years	46	17.9	84.8
26-30 years	23	8.9	93.8
More than 30 years	14	5.4	99.2
Not specified/None	2	0.8	100
Total	257	100	

Appendix C: Frequencies of Project Management Certifications Categorical Data (N=257)

Project Management Certification

	Frequency	Percent	Cumulative Percent
Project Management Professional (PMP)	165	64.2	64.2
Program Management Professional (PgMP)	0	0	64.2
Portfolio Management Professional (PfMP)	0	0	64.2
Certified Associate in Project Management (CAPM)	4	1.6	65.8
PMI Professional in Business Analytics (PMI-PBA)	2	0.8	66.5
PMI Agile Certified Practitioner (PMI-ACP)	10	3.9	70.4
Other	26	10.1	80.5
None	81	31.5	112.1
Total	257		

Note: Multiple choice question, i.e., some respondents had multiple certifications

Plans to Obtain Project Management certification

	Frequency	Percent	Cumulative Percent
The next 6 months	20	7.8	7.8
The next year	34	13.2	21.0
The next 3 years	16	6.2	27.2
Do not plan to obtain	100	38.9	66.1
Not specified	87	33.9	100
Total	257	100	

Appendix D: Frequencies of Area and Industry Categorical Data (N=257)

Current Area Work In

	Frequency	Percent	Cumulative Percent
Information Technology	91	35.4	35.4
Human Resources	3	1.1	36.5
Operations	30	11.7	48.2
Marketing/PR	56	21.8	70.0
Finance	11	4.3	74.3
Not specified	2	0.8	75.1
Other	64	24.9	100
Total	257	100	

Current Industry Work In

	Frequency	Percent	Cumulative Percent
Arts, Entertainment, and Recreation	1	0.4	0.4
Computer and Electronics Manufacturing	3	1.2	1.6
Construction	5	1.9	3.5
Finance and Insurance	13	5.1	8.6
Government and Public Administration	12	4.7	13.2
Health Care and Social Assistance	20	7.8	21.0
Hotel and Food Services	3	1.2	22.2
Information Services and Data Processing	20	7.8	30.0
Legal Services	3	1.2	31.1
Mining	1	0.4	31.5
Publishing	1	0.4	31.9
Real Estate, Rental and Leasing	2	0.8	32.7
Retail	4	1.6	34.2
Scientific or Technical Services	4	1.6	35.8
Software	6	2.3	38.1
Telecommunications	11	4.3	42.4
Transportation and Warehousing	86	33.5	75.9
Utilities	13	5.1	80.9
Other Information Industry	2	0.8	81.7
Other Manufacturing	13	5.1	86.8
Other	28	10.9	97.7
Military	3	1.2	98.8
Retired	1	0.4	99.2
Not specified	2	0.8	100
Total	257	100	

Appendix E: Survey Questionnaire

(From the PMI Chapter email distribution, the participant will be redirected here to the survey.)

Thank you for participating in the survey. As a project management practitioner, your feedback is important.

CONSENT FORM

Project Manager Confidence and Risk Awareness
Carol S. Davis
Liberty University
School of Business

You are invited to participate in a research study among project management practitioners to explore project manager confidence and risk awareness during the project planning phase. You were selected as a possible participant because of your current or past role as a practitioner in a project management capacity. Please read this form and ask any questions you may have before agreeing to be in the study.

Carol S. Davis, a doctoral candidate in the School of Business at Liberty University, is conducting this study.

Background Information: The purpose of this study is to provide insight into potential ways to improve project success.

Procedures: If you agree to be in this study, I would ask you to do the following things:

1. Complete the following anonymous online survey by answering questions providing your expertise as a project manager in estimating completion times and providing opinions on project risk.
2. Provide anonymous general demographic and career data. The survey should not take more than 10 minutes of your time.

Risks: The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

Benefits: Participants should not expect to receive a direct benefit from taking part in this study. The researcher will also receive no financial reward.

Compensation: Participants will not be compensated for participating in this study.

Confidentiality: The survey data will be kept private. In any sort of report I might publish, I will not include any information that will make it possible to identify participants. Research records

will be stored securely, and only the researcher, the researcher's chair, and the researcher's mentor will have access to the records.

- No identifiable data (i.e. your email address) will be stored with the data set once you click on the "Take the survey" link.
- Data will be store on a password locked computer and may be used in future presentations. After three years, all electronic records will be deleted.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

How to Withdraw from the Study: If you choose to withdraw from the study, please exit the survey and close your Internet browser. Your responses will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Carol S. Davis. You may ask any questions you have prior to taking the survey, and **you are encouraged** to contact me now or later at csdavis5@liberty.edu. You may also contact the researcher's faculty advisor, Dr. David Duby, at dduby@liberty.edu.

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board, 1971 University Blvd., Green Hall Ste. 1887, Lynchburg, VA 24515 or email at irb@liberty.edu.

Please notify the researcher if you would like a copy of this consent form information for your records.

Statement of Consent: I have read and understood the above information. I have asked any questions I may have had and received answers. I consent to participate in the study.

Please click on the "Take the survey" button below. By clicking on the survey button, you agree to have your completed questionnaire included anonymously in the study.

Thank you for your participation!

Q1. Take the survey

1. Yes – proceed
2. No – terminate and thank

(Screening question)

Q2A. Which one of the following best describes your current role? (please choose only one answer)

1. I am currently working as a project manager
2. I have worked as a project manager in the past, but am not currently working as a project manager
3. I am working in academia
4. I am a student
5. Other _____ (please specify)
6. Non specified

Q2B. Please verify your age (please choose only one answer).

1. I am under the age of 18
2. I am 18 years of age or older

(Coding note)

Q2A. 3, 4, 6 – Terminate and thank:

Q2B. 1 – Terminate and thank:

Thank you for your time!

(SURVEY QUESTION 3: MEASURE OF CONFIDENCE (INDEPENDENT VARIABLE))

You are tasked with building five pieces of furniture. The following tasks examine your ability to estimate time. It is important to estimate the average setup times for someone to build certain IKEA products on their own. No power tools may be used. For each piece of furniture, please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Please enter a duration range ("at least" to "at most" in minutes) such that you are **80% sure** that the actual value is within your estimated duration range.

Q.3A The first of five pieces of furniture is the little Billy bookcase, 41 inches high, 15 inches wide and 11 inches deep.

[Images have been removed for copyright purposes.

Please find the images used in the questionnaire on the published link:

https://www.ikea.com/ms/en_US/customer_service/assembly/B/B20094088.pdf]

Please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Billy bookcase:

At least (in minutes)	
At most (in minutes)	

Q.3B The second of five pieces of furniture is the Lack TV stand, 31 inches high, 14 inches wide and 13 inches deep.

[Images have been removed for copyright purposes.

Please find the images used in the questionnaire on the published link:

https://www.ikea.com/ms/en_US/customer_service/assembly/L/L00105323.pdf]

Please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Lack TV stand:

At least (in minutes)	
At most (in minutes)	

Q.3C The third piece of furniture is the Hol storage cube, 20 inches wide by 20 inches high by 20 inches deep.

[Images have been removed for copyright purposes.

Please find the images used in the questionnaire on the published link:

https://www.ikea.com/ms/en_US/customer_service/assembly/H/H97322800.pdf]

Please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Hol storage unit:

At least (in minutes)	
At most (in minutes)	

Q.3D The fourth piece of furniture is the Bekvam step-stool, 20 inches high, 17 inches wide and 15 inches deep.

[Images have been removed for copyright purposes.

Please find the images used in the questionnaire on the published link:

https://www.ikea.com/ms/en_US/customer_service/assembly/B/B90098634.pdf]

Please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Beckvam step-stool:

At least (in minutes)	
At most (in minutes)	

Q.3E The fifth piece of furniture is the Marius stool, 18 inches high and 16 inches in diameter.

[Images have been removed for copyright purposes.

Please find the images used in the questionnaire on the published link:

https://www.ikea.com/us/en/assembly_instructions/marius-stool__AA-302068-7_pub.pdf]

Please enter the values in minutes then click on OK at the bottom of the page to go to the next page.

Marius stool:

At least (in minutes)	
At most (in minutes)	

(Q.4 EXPERIENCE WITH IKEA PRODUCTS)

(COMMENTS: 6-point Likert scale with increasing ordinal values
Very = 1; Mixed = 3; No experience = 6)

	Very		Mixed		Negative	No experience
What is your personal experience with the assembly of IKEA products?	○	○	○	○	○	○

(Q.5 RISK AWARENESS (DEPENDENT VARIABLE)

(COMMENTS: A mean score is calculated across the individual 6 sub questions asked.
7-point Likert scale, with an increasing ordinal value for each of the 7 rating choices:
Totally Agree = 1; Neither = 4; Totally Disagree = 7)

Please rate the following statements about projects, in general, as spontaneously as possible:

	Totally Agree			Neither			Totally Disagree
Often, unexpected problems arise in the projects that were not considered in planning	○	○	○	○	○	○	○
The probability of risk occurence is often underestimated	○	○	○	○	○	○	○
Project process disruptions are often underestimated	○	○	○	○	○	○	○
Small issues frequently cause delays	○	○	○	○	○	○	○
Projects are almost always behind schedule, as future developments cannot be predicted with certainty	○	○	○	○	○	○	○
Projects are almost always over budget, as future developments cannot be predicted with certainty	○	○	○	○	○	○	○

(DEMOGRAPHICS)

(Q.6 -- coded 1-7 begining wth 18-24)

Please enter your age

- ◯ 18-24
- ◯ 25-34
- ◯ 35-44
- ◯ 45-54
- ◯ 55-64
- ◯ 65 or older
- ◯ Not specified

(Q.7 -- coded 1-3 beginning with Female)

Please enter your gender

- ◯ Female
- ◯ Male
- ◯ Not specified

(Q.8 -- coded 1-9 beginning with less than high school)

Which one of the following best describes your highest level of education?

- ◯ Less than high school
- ◯ High school graduate (includes GED)
- ◯ Some college, no degree
- ◯ Associate's degree
- ◯ Bachelor's degree
- ◯ Master's degree
- ◯ Doctorate degree
- ◯ Professional degree
- ◯ Not specified

(Q.9 -- coded 1-10 beginning with no experience)

How many years have you been working professionally in project management?

- ◯ No experience
- ◯ Under 3 years
- ◯ 3-5 years
- ◯ 6-10 years
- ◯ 11-15 years
- ◯ 16-20 years
- ◯ 21-25 years
- ◯ 26-30 years
- ◯ More than 30 years
- ◯ Not specified

(Q.10 -- coded 1-8 beginning with PMP. Other verbatims to be coded upon completion based on frequency of verbatim responses)

Which, if any, of the following project management certifications do you have? (All that apply)

- ☐ Project Management Professional (PMP)
- ☐ Program Management Professional (PgMP)
- ☐ Portfolio Management Professional (PfMP)
- ☐ Certified Assocaiate in Project Management (CAPM)
- ☐ PMI Professional in Business Analysis (PMI-PBA)
- ☐ PMI Agile Certified Practioner (PMI-ACP)
- ☐ Not specified
- ☐ Other (please specify)

(Q.11 – coded 1-5 beginning with the next 6 months)

Do you plan to obtain a project management certification within…

- ◯ The next 6 months
- ◯ The next year
- ◯ The next 3 years
- ◯ Do not plan to obtain PMP certification
- ◯ Not specified

(Q.12 – coded 1-7 beginning with Information Tecnology)

Which area do you currently work in your company?

- ◯ Information Technology
- ◯ Human Resources
- ◯ Operations
- ◯ Other (please specify)
- ◯ Marketing/PR
- ◯ Finance
- ◯ Not specified

(Q.13 --coded 1-33 beginning with Agriculture...)

Which one of the following categories best describes the industry you currently work in (regardless of your current position)?

- Agriculture, Forestry, Fishing and Hunting
- Utilities
- Computer and Electronics Manufacturing
- Wholesale
- Transportation and Warehousing
- Software
- Broadcasting
- Other Information Industry
- Real Estate, Rental and Leasing
- Primary/Secondary (K-12) Education
- Health Care and Social Assistance
- Hotel and Food Services
- Legal Services
- Homemaker
- Religious
- Mining
- Construction
- Other Manufacturing
- Retail
- Publishing
- Telecommunications
- Information Services and Data Processing
- Finance and Insurance
- College, University, and Adult Education
- Other Education Industry
- Arts, Entertainment, and Recreation
- Government and Public Administration
- Scientific or Technical Services
- Military
- Other Industry
- Retired
- Unemployed
- Not specified

(Q.14)

Please leave any additional comments you would like in the space below.

Thank you for your time…your answers are greatly appreciated!

TERMINATE: END OF SURVEY

Appendix F: Permission to Publish Copyrighted Material

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Carol S. Davis
7168 Branford Pl
Germantown, TN, 38138

October 09, 2017

Dear Ms. Davis,

We are happy to hear that you are interested in using our case study and survey instruments from following publication:

Fabricius, G. & M. Büttgen (2015), Project managers' overconfidence: How is risk reflected in anticipated project success?, Business Research, 8(2), 239-263.

We hereby grant you permission to use case study and survey instruments for your research. You may publish both case study and instruments/measures used.

We wish you all the best for your research and are looking forward to hearing from you after successful publication!

Sincerely,

Dr. Golo Fabricius