A Path to Motivation: A Mediated Moderation Analysis of the Relationships Between Task-Contingent Rewards, Psychological Ownership, and Intrinsic Motivation Using Path Analysis

by

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DEDICATION

To My Wife Jennifer

&

My Daughter Charlotte

My two greatest sources of motivation

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Abstract

Private sector businesses employ performance pay compensation plans in order to incentivize increased employee effort. Legislation offers opportunities for school districts to experiment with performance pay plans in an attempt to encourage teacher effort, productivity, competition, and recruitment. Despite the potential benefits of performance pay, providing a task-contingent reward for an interesting activity has the tendency to undermine an individual's intrinsic motivation for a task. This study sought to assess psychological ownership as a potential moderator for the undermining effect, which may shield an individual's feelings of autonomy, competence, and relatedness, allowing for intrinsic motivation in light of a task-contingent reward. This study analyzed data from 127 undergraduates and graduate students enrolled at Long Island University, CW Post Campus and an additional 27 teachers from Brooklyn, New York. Full and trimmed path analyses were conducted on a series of Likert-type scales to test three primary hypotheses. The findings confirmed that a task-contingent reward undermined intrinsic motivation for an interesting task. This study's psychological ownership intervention and the combination of the intervention with a task-contingent reward also negatively effected intrinsic motivation. Job-based psychological ownership, a measurement of feelings of possession, however, did positively effect intrinsic motivation providing evidence that feelings of psychological ownership lead to feelings of intrinsic motivation. This study contributes to the fields of psychological ownership theory and self-determination theory by presenting empirical evidence connecting these two theories. Recommendations are offered for the improvement of teacher motivation, job design, compensation and educational policy.

Keywords: education, mediated moderation, performance pay, psychological ownership theory, self-determination theory

CHAPTER I: BACKGROUND AND CONTEXT

General Statement of the Problem

Often, when offering an example to illustrate the negative effects of external reward on intrinsic motivation, researchers and authors refer to Mark Twain's *Tom Sawyer* (Pink, 2009). Tom Sawyer is instructed to whitewash a fence by his Aunt Polly (Twain, 1876). Perceiving this task as undesirable work, clever Tom recruits passing boys to complete the task in his stead by feigning excitement and interest in the task conjuring an image of play rather than work. This manipulation of the boys' motivational drives convinces them to take over Tom's undesirable chore. This story demonstrates a basic tenet of self-determination theory; that a task motivated by external controls, whether in the form of a verbal command, monetary incentive, or internal feeling of pressure, will diminish an individual's intrinsic motivation for the task (Deci, 1971). In order to manipulate the boys, Tom portrays Aunt Polly's task as intrinsically interesting motivating the boys to view the whitewashing as engaging and exciting leading to an intrinsic internalization where the boys feel that they are whitewashing with gusto as a result of their own free will (Ryan, 1982). The boys do not perceive their participation in the painting as forced upon them, despite the fact that Tom manipulates them to complete this task, so their intrinsic motivation to complete the task is not diminished.

Past Evidence of the Negative Effects of Rewards on Intrinsic Motivation

Studies over the past 40 years have confirmed this literary depiction of external control negatively impacting intrinsic motivation (Deci, 1971; Deci, 1972; Deci & Ryan, 2008a; 2008b; Firestone, 2014; Ryan & Deci, 2000) in both laboratory (Deci, Nezlek, & Sheinman, 1981) and field studies (Deci, Ryan, & Connell, 1989). Although some researchers have offered contrary explanations and developed alternative theories (Eisenberger, Pierce, & Cameron, 1999), current

research on motivation through the framework of self-determination theory explains a negative relationship (Deci, Koestner, & Ryan, 1999; Deci & Ryan, 2008a). This relationship seems counterintuitive. Task-contingent rewards, the epitome of an externally controlling force, often are employed to great effect as a means of incentivizing hard work and increased effort (Firestone, 2014). Although studies and recent news demonstrate that task-contingent rewards can have harmful effects on a worker's motivational drive (Firestone, 1991; Elliott, 2010) and, if pursued due to negative motives, a worker's subjective well-being (Srivastava, Locke, & Bartol, 2001), pay for performance is still widely employed (Pink, 2012).

Contrary Evidence Suggesting Rewards are Not Negative

Some empirical research, however, suggests that task-contingent rewards may have a neutral effect on intrinsic motivation if individuals concentrate on methods of increasing autonomy in the situation (Koestner, 2008; Deci & Ryan, 2008a) or if the environment where the reward is offered is structured so that workers feel autonomous instead of controlled. For teachers, the debate regarding the positive, neutral, or negative effect of performance pay on intrinsic motivation is of paramount importance as federal and state educational departments are embracing performance pay as a way to reward teachers who have the greatest impact on increasing student achievement. The decision to link performance pay with student achievement scores begs the question, are federal and state education departments making bonuses task-contingent, and potentially harmful to intrinsic motivation, or will performance pay serve as an incentive for increased effort?

Psychological Ownership: A Shield for Intrinsic Motivation

One means of shielding intrinsic motivation from the negative effects of externally controlling, task-contingent rewards is through psychological ownership. Psychological

ownership is a mental and emotional state in which a person feels in possession of an object. These feelings develop as a result of the exercise of control over an object, an intimate knowledge of an object, and the opportunity for self-investment in an object. A teacher's self-developed curriculum demonstrates psychological ownership. Teachers who create their own lessons have an intimate and thorough understanding of their content and the standards by which they must teach. Teachers who personalize their lessons by including antidotes and personal stories will feel psychological ownership over their curriculum too. This is opposed to teachers who are handed a prefabricated curriculum and directed to teach lessons for which they have no control over, intimate knowledge of, or personal connection to. The difference between these two curriculums is that teachers will go to great lengths to strengthen a self-developed curriculum by applying innovative teaching strategies, self-reflection, and spending personal time on its development. These teachers will feel a great deal of responsibility for this curriculum as opposed to a prefabricated curriculum that they will feel alienated from.

If teachers are presented with the means and time to develop a deep sense of psychological ownership over their profession the resulting feeling of psychological ownership may diminish the negative effects of externally controlling, task-contingent rewards and controlling environments. Rather than feeling controlled by the reward and perceive themselves as teaching for the sake of a performance bonus, teachers who feel psychological ownership over their work may perceive a reward as a positive reinforcement of a job well done and maintain their intrinsic motivation.

To further illustrate this proposed relationship, a twist on the traditional Tom Sawyer story is proposed: Tom Sawyer is instructed to whitewash a fence by his Aunt Polly. Tom grabs his bucket of whitewash and his paintbrush and readily engages in the task because just the week

before he designed the fence posts, cut the wood and built the fence around the property. Tom feels intrinsically motivated to complete the task under his own volition and feels great psychological ownership over the fence. Aunt Polly's control is not viewed as a command but rather as an opportunity to improve upon his creation and enrich his feelings of self-esteem and self-actualization.

Performance Pay For Teachers

Examining the potential of psychological ownership to shield a teacher's intrinsic motivation from the negative effects of task-contingent rewards is a timely endeavor because of the increasing prevalence of performance pay plans in the field of education. Performance pay compensation plans are making an appearance in state and federal education policy and practice (ESSA, 2015, § 2211-2212). Performance pay is a means of emphasizing teacher accountability and incentivizing teacher productivity. Advocates of performance pay for teachers note that this system would align teacher compensation to human resource practices prevalent in the private sector (Elpus, 2011; WorldatWork & Vivient Consulting, 2014) and increase teacher output as measured by standardized assessment and student growth. A primary goal of performance pay systems is to address the issues of teacher accountability and student achievement in American public schools by linking pay levels to the ability to effectively raise student achievement (Rothstein, 2009).

Traditional Teacher Compensation Plans

Although federal and state legislators allocate money for the creation of performance pay plans, traditionally, and almost universally, teacher compensation plans in public schools are determined by a district salary schedule that compensates teachers based upon years of experience teaching, level of education, and certifications held (Podgursky, 2006). This

compensation system has received criticism for not aligning compensation with teacher output or performance (Johnson, 1984), for example salary schedules primarily reward teacher qualities that increase professional knowledge but not professional accomplishments. Another criticism is that little evidence exists that graduate degrees, licenses, and credentials have significant positive effect on student achievement (Hanushek, 2003). Due to these perceived deficiencies policymakers have funded federal programs to encourage states to experiment with performance pay pilot programs to determine whether rewarding a teacher's output rather than a teacher's seniority would have a positive effect on student achievement.

Race to the Top and the Teacher Incentive Program

One example of a federal program was in President Obama's Race to the Top grant program (American Recovery and Reinvestment Act, 2009) that included a mandate that states develop a performance pay based system tied to teacher evaluations in order to receive grant money. The federal government encouraged performance pay systems by creating the Teacher Incentive Program (The Departments of Labor, Health and Human Services, and Education and Related Agencies Appropriation Act, 2006) that appropriated $100 million annually in grant money for projects that aimed to design performance pay systems within schools. States employed the Teacher Incentive Program grants to develop performance pay compensation systems for public school teachers that reward individual student achievement gains as well as teaching in hard to staff schools, hard to staff subjects, and aggregate school gains in achievement.

Although few states have taken advantage of Teacher Incentive Program funds, many state education departments support performance pay systems paired with traditional salary schedules to some degree. This support is, in part, due to a desire to parallel public

compensation practices with private practices. This desire is influenced by the previous work experiences of the majority of legislators in the federal government and state governments who come from private sector backgrounds (Manning, 2015) where bonuses are utilized as one method of increasing worker motivation, productivity, and accountability.

Performance Pay for Teachers: Applying Principal Agency Theory

Teacher productivity and accountability were part of previous reform initiatives like the No Child Left Behind Act (No Child Left Behind Act, 2002), Race to the Top, and the Every Student Succeeds Act (ESSA, 2015, § 2211-2212) because America's students have progressively fallen behind other countries on international assessments (e.g., Program for International Assessment, OCED, 2012; Trends in International Mathematics and Science Study, 2012). This regression is despite billions of dollars in education funding and comprehensive education reforms mandating increased rigor in teacher training and student learning standards. The attractiveness of a performance pay systems is that it has the ability to directly effect teacher productivity in an immediate way and in a manner that larger, countrywide reforms may take several years to achieve.

Theoretically, a teacher who has the potential to receive a bonus at the end of a school year for raising student achievement scores will immediately work harder and increase their effort in order to attain their end of the year bonus. Larger reform movements take longer to achieve their goals because reforms require a trickle-down period for teachers to eventually align their pedagogy to desired federal and state goals.

Principal Agency Theory

The application of performance pay as a means of increasing worker motivation, productivity, and accountability is a proven method that private sector businesses have applied

for decades. A management theory that explains the benefits of performance pay is principal agency theory. Principal-agent theory (Smith, 1776; Stiglitz, 1987) explains the financial relationship between employees and employers and predicts that both sides have contrary goals (Baron & Kreps, 1999). Principal agency theory describes employees as effort adverse; employees will exert as little effort as possible to receive their compensation. Employees are also described as risk adverse; they prefer a fixed salary that is dependent on effort exerted but not output produced. Employers, on the other hand, desire to achieve the highest net-profit margin from employee output and do not want to bear all of the risk in their relationship with the employee, specifically the risk that the employee is being paid despite not achieving an established level of output. The goal of an incentive in principal agency theory is to act as an external force to motivate risk sharing between the employee and employer and increase employee accountability for their output.

Principal Agency Theory Applied to Education

The relationship between a teacher and an administrator highlights principal agency theory well. Teachers, the agent, who receive compensation defined by a salary schedule are paid for the amount of effort they exert in their teaching each year as measured by time spent in the classroom and not productivity, which for a teacher is typically assessed by student achievement gains on end-of-the-year assessments. The school administrator, the principal, pays a salary and hopes that the teacher is working hard and will monitor this exertion of effort through periodic performance reviews. In this fixed-salary relationship the school administrator holds the risk of an ineffective teacher exerting as little effort as possible throughout the day and the additional risk that students will make minimal gains on end-of-the-year exams. The school administrator holds all the risk because a teacher's pay is not directly linked to student

performance. If a teacher holds tenure the risk is magnified because there is added protection against termination and increased ability for decreased effort.

Risk Sharing in Schools

Performance pay is a way of risk sharing between the principal and the teacher. Effort adverse teachers who now have a large monetary bonus linked to their level of productivity to work towards will exert additional energy and effort in order to obtain the bonus. With performance pay the teacher shares in the risk of low effort and productivity because if they do not invest additional effort they run the risk of not obtaining the bonus and thus receiving a smaller income relative to other teachers and below their market value as a teacher. The school administrator benefits from this relationship because they are sharing the risk of the students not learning, and the teachers not investing enough effort, with the teachers.

Principal agency theory explains that risk sharing places equal responsibility on both the employer and employee for production. The employer will provide a base salary for the employee taking the risk that a certain level of output will be produced on effort alone and the employee shares in the risk that he will not receive a bonus, and receive a market valued salary, unless additional effort is exerted to increase output. Incentives then act as a monitor of the amount of effort an employee exerts and embraces the first assumption of principal agency theory that employees are effort adverse. Incentives also serve as an efficient monitor and replace other monitors, whether technological surveillance of workers or human monitors who conduct performance evaluations, and encourages employees to internalize the consequences of their own effort, that is increased financial gain (Baron & Kreps, 1999). In a school context, this monitoring effect also reduces the number of personal performance reviews administrators must conduct freeing up their time to focus on other business.

Addressing the Shortcomings of Salary Schedules

In education, the introduction of performance pay can be viewed as a step towards applying the ideas of principal agency theory into teacher compensation practices and an attempt to share the risk that students are not learning and tax money is being wasted between schools and the public (Figlio & Loeb, 2011). Performance pay could also address the drawbacks of salary schedule based compensation systems. One drawback is that salary schedules do not incentivize teachers to incorporate novel pedagogical practices in their classrooms that could increase student achievement (Ladd, 2001). Performance pay, linked to teacher productivity, could lead teachers to learn new approaches for hard-to-reach students or modify curriculums to provide accessibility to students of different reading levels. Without the potential for a bonus there is a greater likelihood of a teacher employing the same curriculum year after year with little consideration of individual student needs. Another drawback is that salary schedules typically link pay raises to the number of years teaching experience a teacher has and their level of education. For instance, the New York City salary schedule awards raises in pay in a series of one-year steps and for the number of graduate level credits gained despite the fact that neither years teaching experience nor college credits have strong correlations with student achievement (Hanushek, 2003; 2005; Muralidharan & Sundararaman, 2011).

Demerits of Principal Agency Theory

A drawback to principal agency theory is the assumption that all workers are effort adverse, which is not always true, and there are countless examples of teachers sacrificing their time and personal resources to help their students. In education, however, the potential for even a portion of teachers being effort adverse is grave because of the importance and value of education on many facets of life ranging from social mobility, to future earning potential, to the

value of homes near good schools (Black, 1999; Figlio & Lucas, 2004). The risk that the taxpayers and school community members bare that teachers are effort adverse is quite large; their children may not receive the best education possible (Figlio & Loeb, 2011). Policy makers, in acknowledgement of this large risk, see financial incentives for teachers as a means of sharing the risk between the community and its teachers. Incentives also encourage teachers to exert additional effort in order to meet heightened output standards and, in the case of education specifically, improved student achievement gains.

Financial Incentives as an External Monitor

An added benefit of financial incentives is that they would serve as an external monitor of effort, alongside traditional school based monitors, and increase teacher accountability. Traditionally, principal observations and end-of-year assessments are the primary monitors of a teacher's effort throughout the school year. These monitors, however, are not always consistent, are prone to manipulation and bias, and are infrequent. In New York State, for example, untenured teachers are observed six times a year for fifteen minutes each, while tenured teachers have the option to choose between three or four fifteen minute observations, or one full-period observation (New York State Education Law, 2015).

Although rubrics attempt to reduce subjectivity of the monitoring process, relationships between administrators and teachers, time constraints, and bias inevitably impact rating decisions (Figlio & Loeb, 2011). End of the year assessment results also serve as a monitor of teacher effort by providing a measurement of student knowledge comparable to students across the city. This allows a comparison between teachers from different schools across the city and, when paired with principal evaluations, provides insight into the effectiveness of a teacher. End of the year assessments are also prone to criticism concerning their inability to evaluate immeasurable

indicators of teacher effectiveness and effort in the classroom, for example, the ability to manage classroom behavior, develop student's social-emotional skills, or to act as a role model.

Currently in schools, monitoring teacher effort is inefficient, easily manipulated and does little to reduce the risk school administrators have of paying ineffective, effort adverse teachers. The allocation of monies to develop performance pay systems by federal and state governments is a recognition that one means of improving student achievement may be increasing teacher motivation and effort through extrinsic rewards like performance pay (Figlio & Loeb, 2011).

Performance Pay: Not a Silver Bullet

Many in the education sector are quick to dismiss performance pay plans because of the well-documented pitfalls that accompany them. For example, financial incentives tend to incentivize particular practices at the sacrifice of non-incentivized ones. This is observable in the narrowing of curriculums to topics most prominently tested and pedagogical practices that emphasis memorization and drilling of individual topics most likely to show up on the test instead of teaching content in a broader, more comprehensive manner that emphasizes deeper understanding of themes (Deere & Strayer, 2001; Hamilton, Berends, & Stechter, 2005; Hennessey, 2015; Koretz & Hamilton, 2003; Linn, 2000). Rewarding teachers based solely on student achievement on end-of-the-year assessment also ignores the complexity of a teacher's role in the classroom (Levacic, 2009; Rothstein, Jacobson, & Wilder, 2008). Also, not meeting performance benchmarks to receive incentives diminishes teacher self-efficacy (Tryankowski, Henry, & Verrall, 2012).

Incentives also lead to short term thinking encouraging teachers to focus on immediate gains through rout memorization rather than developing more difficult critical thinking skills that would benefit students' long-term success (Ryan & Weinstein, 2009). Incentives may lead to

competition and social comparisons between workers that are particularly harmful in schools where a culture of cooperation and support is beneficial for administrators, teachers, and students alike (Fleisher, 2013). Incentives may lead to cheating (Jacobs & Levitt, 2003; Strauss, 2011), gamesmanship, and goal distortion (Campbell, 1976; Rothstein, 2009) as is evident in examples of insider trading and short term thinking in America's financial sector (Elliott, 2010), and incentives may undermine other motivators, for instance a teacher's intrinsic motivation to work (Deci & Ryan, 2008a). Incentives also have psychological implication for workers, for example increased stress, decreased job satisfaction, and work overload (Hussain, Lei, Abideen, & Hussain, 2015). It is telling, too, that teacher unions vocalize these concerns most prominently demonstrating a schism between the view of policymakers and policy facilitators. This disconnect makes the development and implementation of performance pay plans difficult and likely to be internalized by teachers as controlling and prone to resistance.

Self-Determination Theory and the Undermining Effect

Self-determination theory provides an explanation for the previously mentioned negative psychological and motivational consequences. The propensity of workers who are offered monetary incentives for the completion of a task to lie, cheat, cut corners, and to view work as a means to a bonus rather than an enjoyable and intrinsically motivating pursuit is a result of the undermining of a person's previously held intrinsic reasons for completing a task by the offered reward. Evidence also suggests that rewards diminish a person's ability to complete complex tasks (Pittman, Emery, & Boggiano, 1982), think creativity (Amabile, Hennessey, & Grossman, 1986), and tend to lead to increased competition instead of cooperation (Tauer & Harackiewicz, 2004). This is potentially detrimental to teaching which is a complex task, requires cooperation among teachers, requires creative pedagogical approaches to influence the most hard to teach

students, and is a profession marked by high levels of intrinsic motivation (Gregg, Grout, Ratcliffe, Smith, & Windmeijer, 2008).

The Importance of Intrinsic Motivation for Teachers

The potential for external rewards to undermine intrinsic motivation is bad because intrinsic motivation is a quality beneficial to teachers. Teachers who enjoy teaching and teach for intrinsic reasons have a greater impact on student achievement (Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982), experienced decreased burnout (Fernet, 2013), provide increased opportunities for student choice (Flowerday & Schraw, 2000), and can help diminish student dropout rates in schools (Vallerand, Fortier, & Guay, 1997). A lack of intrinsic motivation is linked to teachers who are more controlling of their students, witness subsequent lower student achievement, and increased burnout. Increased teacher control in the classroom also has the added effect of decreasing student intrinsic motivation to learn and can alter a student's internalization of the value of learning to that of meeting externally set benchmarks of success and increasing their own frequency of cheating, gamesmanship, and student burnout (Anderson & Applebome, 2011; Moller, Deci, & Ryan, 2015). For students, correlations exist between intrinsic motivation and greater perceived competence (Deci et. al., 1981), higher mastery motivation (Ryan & Grolnick, 1986), enhanced creativity (Koestner, Ryan, Bernieri, & Holt, 1984), a preference for optimal challenge over easy success (Shapira, 1976), increased conceptual understanding (Benware & Deci, 1984), active and deeper information processing (Grolnick & Ryan, 1987), greater engagement (Reeve, Jang, Carrell, Barch, & Jeon, 2004), and enhanced psychological well-being (Black & Deci, 2000).

Drawbacks to Salary Schedules

A conundrum, however, is that many teachers would appreciate bonuses to supplement their salaries (Amrein-Beardsley & Collins, 2012). Also, when balanced, extrinsic and intrinsic factors combined can be a very powerful motivational tool (Le Grand, 2003; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Although money may not be the primary reason many people become teachers, compensation is still an important consideration for those entering the profession particularly considering the rising cost of college tuition and student loan burdens. Other considerations like starting a family, buying a home, and saving for the future weigh on many potential teachers' decisions to enter the field, particularly for new teachers who make the least money and are the most prone to attrition after only a few years teaching.

The salary schedule of most public school systems makes a financial bonus appealing to many teachers. For example, once becoming a teacher, the most highly effective, and highly paid teacher makes less than the lowest paid administrator (Fryer, 2013; Goodman & Turner, 2011), and teachers often have to invest 20-30 years on the job before reaching peak salary as opposed to other private sector professions where pay increases are substantial and take place much earlier in the career (National Education Association, 2015; Roza, 2015a; 2015b).

Although opponents of performance pay for teachers argue that teacher motivation derives more from intrinsic reasons like love of job rather than extrinsic ones like pay (Lortie, 2002; Yuan, Le, McCaffrey, Marsh, Hamilton, Stecher, & Springer, 2013), research demonstrates that when teachers grow frustrated in their positions compensation becomes a salient factor for continued employment so much so that low salary is ranked as the number two-reason for teachers leaving the education field (Goodlad, 1984). This low salary opportunity has driven teachers, particularly in the science and math fields, towards the private sector in pursuit of more substantial salaries and is one factor for high attrition rates for teachers nationwide

(Djonko-Moore, 2015; Goldring, Taie, & Riddles, 2014; United States Department of Education, 2015).

Performance pay is a double-edged sword; how do policy makers ensure that incentive plans benefit teachers, that the most talented and productive teachers are retained, that both extrinsic and intrinsic motivators are optimally utilized, and that teacher output is increased, but that financial incentives do not undermine their intrinsic motivation to teach?

Psychological Ownership as a Moderator

One potential solution to this conundrum is to encourage teachers to develop psychological ownership for their work. Psychological ownership theory derives from the management field and Hackman and Oldman's (1980) work on job characteristics theory and has extended into the marketing, advertisement, and business fields. Psychological ownership theory explains that workers have three distinct desires in their jobs: (a) effectance and efficacy of their job, (b) self-identity with their job, and (c) having a place to dwell, a desire to feel at home and comfortable in their job. Psychological ownership develops through three pathways: (a) having control over a job, (b) intimately knowing a job, and (c) investing oneself in a job (McIntyre, Srivastava, & Fuller, 2009; Pierce, Kostova, & Dirks, 2001; Pierce, Kostova, & Dirks, 2003). Workers who have these experiences will develop feelings of psychological ownership of their organization, job, or an object similarly to actual legal ownership of a portion of the company, for example via an employee stock ownership plan or being a family member in family run business (Bernhard & O'Driscoll, 2011). Psychological ownership is seen as a strong alternative to legal ownership in a company because it does not rely on a financial link, but rather an emotional and cognitive link to a company or a particular role within a company, that prompts a myriad of beneficial employee behaviors like extra role behaviors, increased citizenship

behaviors, increased stewardship and personal responsibility, and affective commitment (O'Driscoll, Pierce, & Coghlan, 2006).

There are strong theoretical links connecting psychological ownership theory with self-determination theory suggesting that a person who experiences psychological ownership of their work may then also feel intrinsically motivated to complete this work. Even in light of a task-contingent reward, the feeling of psychological ownership could act as a moderator between the reward and the three mediating variables of autonomy, competence, and relatedness that cause feelings of intrinsic motivation, and avoid the negative consequences of the undermining effect.

Purpose of This Study

The purpose of this study was to determine whether a person's sense of psychological ownership over a task could moderate the undermining effect of task-contingent rewards on the mediating variables of intrinsic motivation and intrinsic motivation itself. This study sought to provide empirical evidence for the performance pay debate, and, if psychological ownership demonstrated itself a successful moderator, offer a potential prerequisite condition for teachers before performance pay is applied. To achieve this goal, and address this study's research hypotheses, this study used an experimental design to test the role of psychological ownership as a moderating variable, quantitatively analyze the path coefficients between this study's variables using path analysis, and assessed the over all mediated moderation effect of this study's research model.

Key Terms and Definitions

The following definitions are provided to ensure understanding of these terms throughout the study.

Intrinsic Motivation

Completing an activity for internal reasons (e.g., out of sheer interest, for personal enjoyment). Feeling internal volition for completing the activity without the need for external inducement for completion.

Extrinsic Motivation

Completing an activity for external reasons (e.g., seeking monetary reward, internal or external inducement, pressure, external surveillance, following orders). Feeling external volition for completing the activity and diminished intrinsic reasons for completion.

Psychological Ownership

Feeling in possession of a tangible or intangible object without any necessary legal claim to it. These feeling lead to increased responsibility for the object and increased stewardship practices toward it. Psychological ownership develops from the ability to exercise control over the object, having intimate-knowledge about the object, and having the ability to invest one's personality and character into the object.

Performance Pay

"A system of compensation for teachers, principals, or other school leaders; (A) that differentiates levels of compensation based in part on measurable increases in student academic achievement; and (B) which may include—(i) differentiated levels of compensation, which may include bonus pay, on the basis of the employment responsibilities and success of effective teachers, principals, or other school leaders in hard-to-staff schools or high-need subject areas; and (ii) recognition of the skills and knowledge of teachers, principals, or other school leaders as demonstrated through—(I) successful fulfillment of additional responsibilities or job functions, such as teacher leadership roles; and (II) evidence of professional achievement and mastery of

content knowledge and superior teaching and leadership skills." (Title II, Every Student Succeeds Act, § 2211, 20 USC 6632).

Task-Contingent Reward

A reward obtained only by completion of a task.

Moderator Variable

"A moderator variable specifies when or under what conditions a predictor variable influences a dependent variable. A moderator variable may reduce or enhance the direction of the relationship between a predictor variable and a dependent variable, or it may even change the direction of the relationship between the two variables from positive to negative or visa versa" (Kim, Kaye, & Wright, 2001, p. 1).

Mediator Variable

"Mediation indicates that the effect of an independent variable on a dependent variable is transmitted through a third variable, called a mediator variable" (Edwards & Lambert, 2007, p.1).

Mediated Moderation

"A moderating effect is transmitted through a mediator variable" (Edwards & Lambert, 2007, p. 1).

Plan of This Study

The next chapter will review the literature on self-determination theory, psychological ownership theory, and the theoretical relationships between these two theories. The third chapter will describe the research design, the methodology used, the measurements, experimental protocol, human subject protections, and limitations of the experimental design in the study. The fourth chapter presents the empirical findings of this study including tables and figures that

address this study's hypotheses. The final chapter discusses the implications and contributions of this research for teacher motivation, compensation plans, and recommendations for educational policy as well as for future research.

CHAPTER II: REVIEW OF THE LITERATURE

Overview of Extant Literature

Discussing motivation is not a simple task because there is no singular pathway or trick to motivate people. Proposing the questions, "How do I motivate a worker to be more productive?" or, "How do I motivate a student to learn?" offer dozens of answers, each of which is supported by academics wielding reams of empirical evidence (Deci et al., 1999). One of the most commonly employed motivation tools by practitioners, and one that, on face value, appears effective is the traditional "carrot and stick" model. If a person does something good they get a carrot; if they do something bad they receive the stick. This model is so common and relatively effective, in fact, that schools and businesses employ it regularly, although through different versions of the carrot and of the stick.

A second common tool for motivation is not so much a tool but rather an attitude. Intrinsic motivation is the innate desire to complete a task because of the perception that the task is worth the effort. Intrinsic motivation, deriving from internal interest and an internal perception of control, is different from the carrot and stick model; that model is an extrinsic motivation, deriving from external forces. Both forms of motivation can increase productivity in workers, students, teachers, or anyone in need of a nudge, albeit in different ways. One would assume that a savvy manager would harness both motivational drives by fostering an environment that supports feelings of intrinsic motivation while also applying positive and negative reinforcement, carrots and sticks, to the behavioral reinforcement of their workers through a reward system. This, however, is not the case because of the effect each motivational drive has on one another (Deci et al., 1999).

The Carrot and the Stick Model

The effective combination and simultaneous use of extrinsic and intrinsic motivators does not happen often because they are the Cain and Abel of motivational mindsets. Although not always the case, meta-analyses have found a moderate effect size in this negative relationship (Deci et al., 1999; Lepper, Keavney, & Drake, 1996). Intrinsic motivation has the tendency to decrease when extrinsic motivators are applied. Workers who perceive their job as intrinsically motivating believe that they work because they make the conscious decision to do so due to interest in the task, and as self-determination theorists will say, because of an internal sense of autonomy, competence, and relatedness they perceive in their actions (Deci & Ryan, 2008a). Extrinsic motivation changes this perception. When a carrot (a bonus) or a stick (a reprimand) is introduced, the reason for working now becomes to gain the carrot or to avoid the stick. The opposite relationship between intrinsic motivation and extrinsic motivators, where feelings of intrinsic motivation grows in the absence of extrinsic motivators and diminishes in its presence, is dubbed the "undermining effect" by self-determination theory researchers (Deci & Ryan, 2008a).

The Undermining Effect

The undermining effect, so called because of the tendency of rewards to undermine and diminish a person's intrinsic motivation, has been documented extensively (Deci et al., 1999). Employers of carrots and sticks have witnessed the negative side effects of reducing the intrinsic reasons for their employees to complete a task. Researchers have found evidence suggesting that the application of the carrot and stick model leads to disinterest in academic pursuits (Vallerand et al., 1997), maladaptive behavior (Ryan & Grolnick, 1986), and cheating and short-cut taking (Balasubramanian, Bennett, & Pierce, 2016) in order to receive the carrot. Beginning in the 1970s (Deci, 1971; 1972; Lepper et al., 1973), researchers firmly stated that the behaviorist

model of motivation, the carrot and stick model, promoted by Thorndike (1905), Taylor (1911) and Skinner (1953) over the past century, was incompatible with an individual's intrinsic motivation for working. The evidence supporting the undermining effect led to a schism between the behaviorist and cognitive branches of psychology concerning the role of extrinsic motivators in a work place.

The undermining effect is now considered dogma by self-determination theory researchers (Deci & Ryan, 2008a). Although researchers have developed a theory for how certain forms of extrinsic motivations can be internalized in a manner that will lessen the undermining of intrinsic motivation (Ryan & Connell, 1989), the arch nemesis of intrinsic motivation is still the task-contingent reward, completing a task in order to obtain the carrot or avoid the stick, that is perceived as an externally controlling force.

Psychological Ownership

This study proposes a reconciliation between the two motivational strategies and the two branches of motivational psychology by incorporating a relatively new, and not widely examined moderating variable, that of psychological ownership. Psychological ownership was first discussed in the 1990s (Dirks, Cummings, & Pierce, 1996) and eventually codified into a theory in the early 2000s (Pierce et al., 2001; 2003). A central focus of psychological ownership theory is the universal desire for the possession of objects. Psychological ownership feelings develop when a person has the opportunity to control an object, has an intimate understanding of an object, and has the opportunity to self-invest within the object through personalization and customization.

There are many similarities between how psychological ownership and intrinsic motivation develop; both theories explain the importance of information for increasing feelings

of psychological ownership and intrinsic motivation. If a school provides teachers access to information, for example teaching standards, school guidelines, student test scores, and performance evaluations, these teachers will develop a deep understanding of their school, of their individual students, and understand how they can contribute specifically to the improvement of the school. As a result of having an intimate knowledge of their school they will feel a sense of psychological ownership over it.

Likewise, teachers will feel increased intrinsic motivation for teaching when they have access to information. Teachers that receive informational feedback from their administrators, colleagues, and students will increase their competence as a teacher because they are provided with advice for how to improve professionally. This advice allows for reflection and refinement of pedagogy and will increase their self-efficacy in teaching. This increased feeling of competence will lead to increased feelings of intrinsic motivation to teach. Both theories also explain the importance of relationships in a person's environment. For example, psychological ownership develops when a person is allowed to invest themselves into their jobs, in a sense establishing a relationship with their job by personalizing it, and intrinsic motivation grows most effectively when a person feels capable of relating emotionally to their environment. Together, these similarities suggest that an environment that provides the opportunity for the development of psychological ownership may also lead to increased intrinsic motivation.

Differences Between Psychological Ownership Theory and Self-Determination Theory

One difference between the two theories (psychological ownership theory and self-determination theory) concerns the role of control. Psychological ownership develops partially as a result of physically exercising control over an object. Intrinsic motivation partially develops as a result of perception of autonomy, or freedom of action. The difference between these two

forms of control is that one is a physical action while the other is a perception. Teachers can physically create classroom instructional material and have tangible proof of their control over the class. A teacher's perception of autonomy is intangible and susceptible to the undermining effect.

This is because task-contingent rewards have the potential to take away a person's perception of autonomy in an action and replace it with an external reason for completing the task, for example a reward, undermining the intrinsic motives for its completion. Task-contingent rewards have this potential effect because they create feelings of outside pressure for completing a task. Without the presence of task-contingent rewards, the decision to complete a task is perceived as internally derived and autonomously guided. Despite these differences with relation to task contingent rewards, a person who has the opportunity to exercise control over an object in a self-determined manner will perceive their actions as autonomous (Freehan & Enzle, 1999).

The importance of information, relationships, and control in both psychological ownership theory and self-determination theory leads to the belief that if people feel psychological ownership over a task, as a result of exercising control, having intimate knowledge, and self-investing in a task, they will also feel intrinsic motivation for that task because the three mediating variables of autonomy, competence, and relatedness are satisfied by their feeling of psychological ownership. Another belief is that psychological ownership will moderate the relationship between external reward and intrinsic motivation. This moderating effect is the result of a person's feeling of psychological ownership over a task having a positive effect on the mediating variables of autonomy, competence, and relatedness despite the presence of an externally controlling force and shielding intrinsic motivation from the undermining effect.

Gaps in the Literature

This study aimed to address certain gaps in the motivation literature, for example no research has yet to address the theoretical relationship between psychological ownership theory and self-determination theory. Brown, Pierce, and Crossley (2014) recognize this gap in the literature and prescribe future research to, "position this construct [psychological ownership] alongside other work-based psychological states such as job involvement or intrinsic motivation" (p. 335).

This study aimed to address similarities, for example the underlying constructs of both psychological ownership and intrinsic motivation, and to observe whether conditions that allow for the development of psychological ownership also allow for the development of intrinsic motivation.

This study intended to address the limited methodological approaches used in the study of psychological ownership theory. Researchers have relied solely on self-reported data to examine it (Bernhard & O'Driscoll, 2011; Dirks et al., 1996; Karahanna et al., 2015; Mayhew, Ashkanasy, Bramble, & Gardner, 2010; Mustafa et al., 2015). Psychological ownership has also yet to be applied to the field of education, primarily staying in the business and management fields. This study aimed to address this limitation.

Figure 2.1 and Figure 2.2 displays this study's models. In the following sections, each variable's relationship to the other will be explained and empirical evidence presented that support the development of this study's hypotheses.

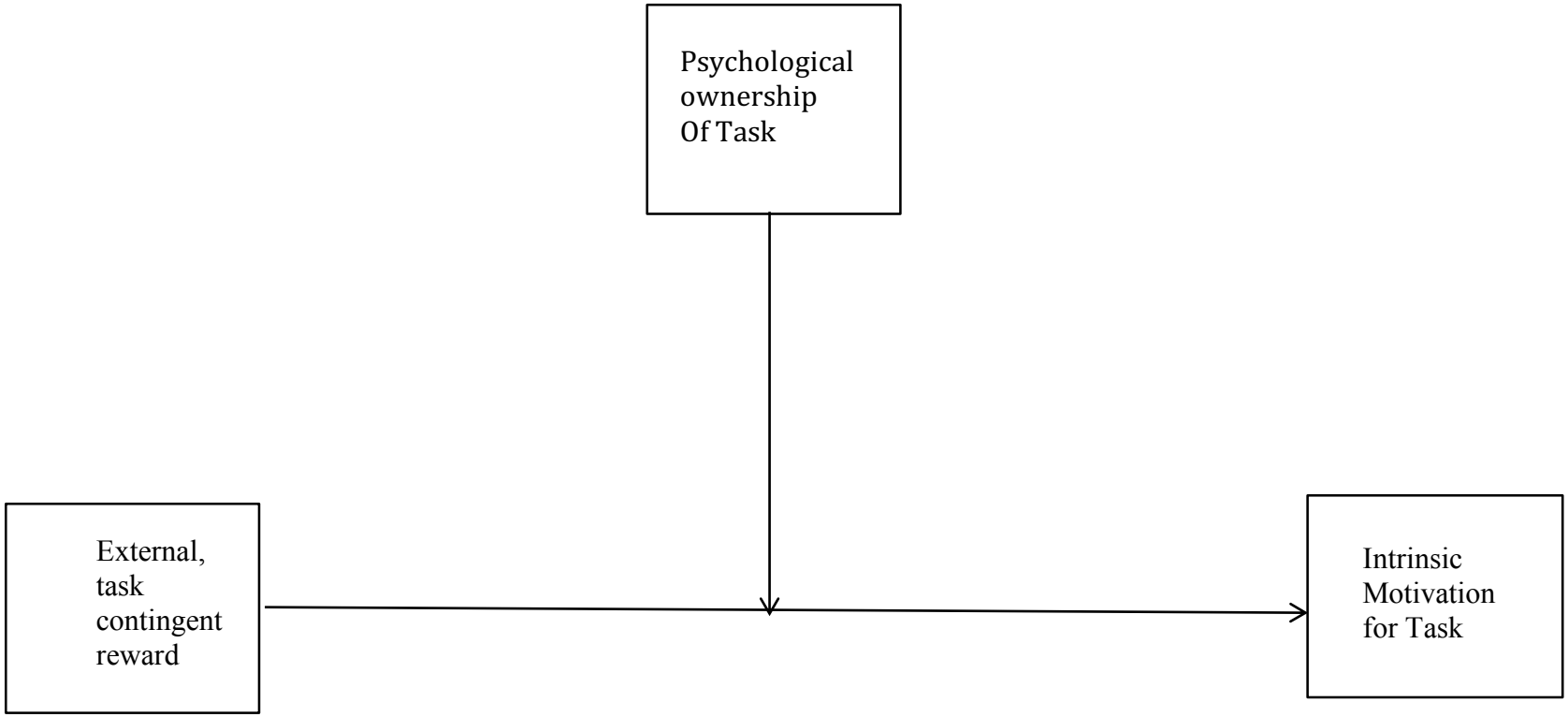

Figure 2.1. Theoretical model of psychological ownership as a moderator between a task-contingent reward and intrinsic motivation.

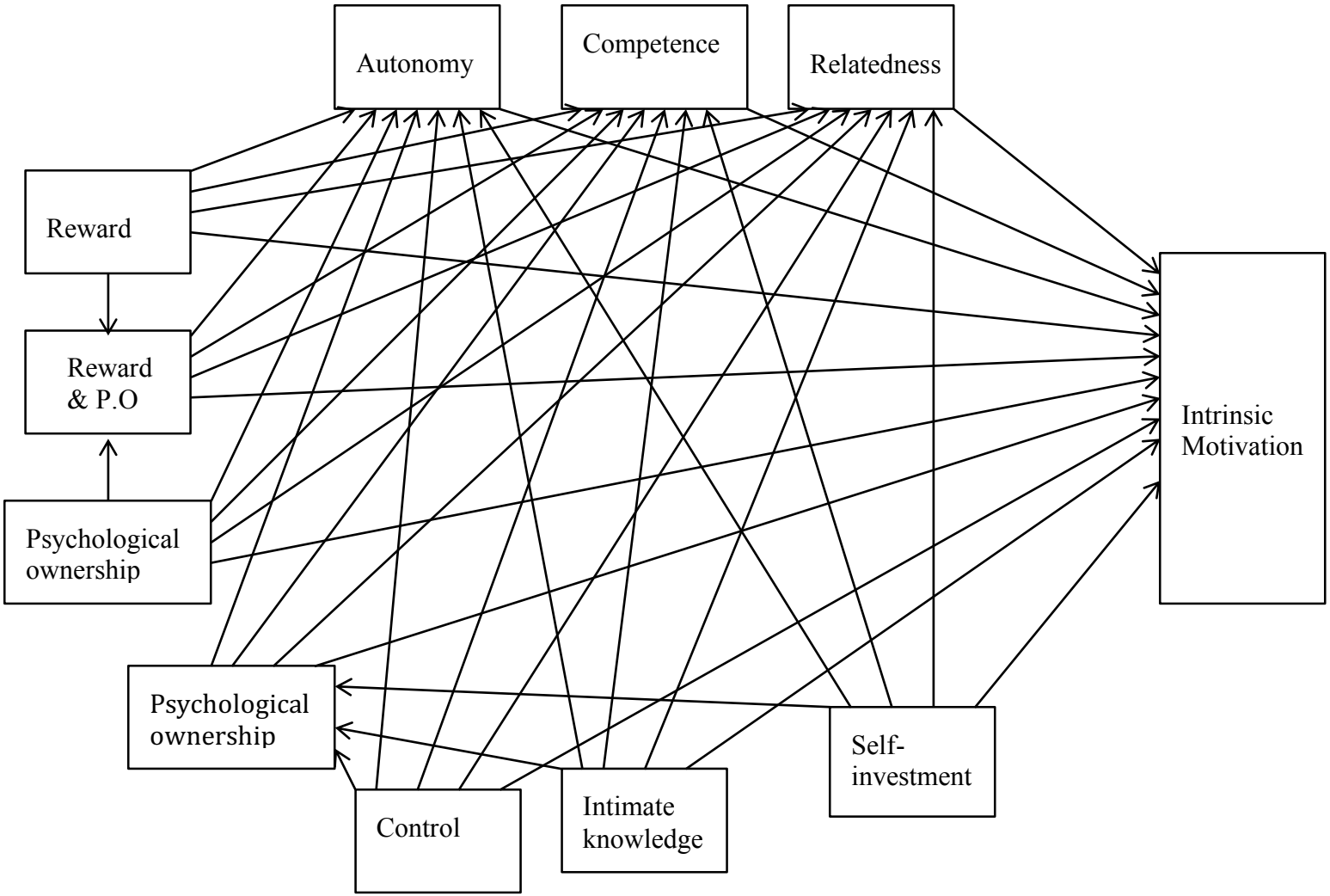

Figure 2.2. Hypothesized model demonstrating the independent variables and their causal relationships with the mediating variables and dependent variables.

Organization of the Chapter

This chapter provides a review of relevant research on self-determination theory and psychological ownership theory, and their relation to the variables incorporated into this study's hypotheses. Hypotheses will follow each section of the literature review.

Motivation

A myriad of motivation theories exist because motivation is a latent construct that cannot be directly observed or measured. Without direct measurement, researchers look for the manifest, observable variables motivated individuals possess and develop theories around this evidence. Abraham Maslow (1942) explained a hierarchy of needs, and Viktor Frankl (1946) highlighted the resilience of the human spirit, both theories approaching motivation as an internal, unconscious development. Thorndike (1905) and Skinner (1953) developed operant conditioning and the law of effect both of which approached motivation from a behavioral psychology perspective. Vroom (1964) developed expectancy theory and Herzberg (1968) the two-factor theory for motivating workers through both intrinsic and extrinsic incentives. Self-determination theory stands out from previous motivation theories because it considers the mental processes and psychological prerequisites necessary for either supporting or diminishing intrinsic motivation.

Self-Determination Theory

Originally researchers addressed how various external forces effect intrinsic motivation, for example, the effect of task-contingent rewards on a person's intrinsic motivation for an interesting task. As results from Deci's (1971) original experiment were replicated (Deci, 1972; Deci & Cascio, 1972; Deci et al., 1981; Deci et al., 1982) self-determination theory emerged and grew into a psychological framework for explaining the causal relationships in a person's

environment that mediate these relationships and either suppress or promote a person's psychological well-being. Researchers defined psychological well-being as feeling engaged, active, interested in tasks, and having the ability to optimally function; all of the qualities that allow a person to feel intrinsic motivation for an activity. Building upon the work of DeCharms (1968) and White (1959), self-determination theory researchers proposed that, as shown in figure 2.3, people have specific psychological needs that, if satisfied, will lead to this state of well-being and the ability to feel intrinsic motivation. The three mediating psychological needs are autonomy, competence, and relatedness.

Figure 2.3 portrays the three psychological needs of autonomy, competence, and relatedness that, when provided for, allow a person to feel self-determined in their actions. One consequence of this is the ability to feel intrinsic motivation.

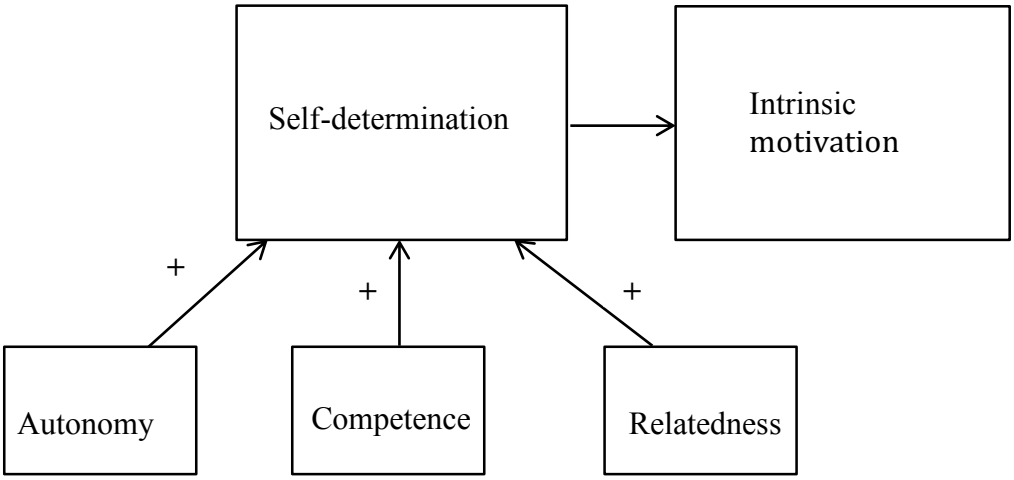

Figure 2.3. Self-determination theory's three psychological needs. An individual's psychological needs for autonomy, competence, and relatedness mediate the relationship of external forces on intrinsic motivation.

Three Psychological Needs of Self-Determination Theory

Autonomy. DeCharms (1968) discussed the concept of perceived locus of causality, that people desire autonomy in their actions, and the perception that their actions derive internally

and are undertaken due to personal desire or choice. This is in contrast to an externally perceived locus of causality, where people perceive themselves as forced to action by an external force. Examples of external forces range from monetary rewards for the completion of a task (Deci, 1971), to commanding language like, "should" or "must" (Reeve, 2009; Ryan & Niemiec, 2009), surveillance (Lepper & Greene, 1975), deadlines, and promised rewards (Lepper et al., 1973). Autonomy is best achieved in an environment that offers choice opportunities, and the ability to determine the actions they desire to take (Flowerday & Schraw, 2000; Freehan & Enzle, 1999), so that a person can perceive their actions as internally determined.

Competence. White (1959) described competence as a familiarity and mastery of an environment that develops as a result of informational feedback received from the environment. White (1959) observed the tendency of children to interact with their environment with no external prompting or reward but rather due to innate curiosity and interest in their surroundings. He observed that a child's competence and intelligence grow as a result of feedback they receive from their environment, for example: if a child touches something hot the pain feedback teaches them to avoid hot surfaces. When children successfully finish a puzzle, they receive positive feedback in the form of joy and happiness teaching them the value of patience, reinforcing the value of certain problem-solving skills, and increasing their self-efficacy in puzzle completion. White (1959) describes this process as one method by which children learn. Competence feedback, when completing an interesting task, leads to a deeper understanding and interest in that activity (Bandura, 1977; White, 1959).

Relatedness. Relatedness derives from feelings of personal connection and familiarity to individuals and the environment. Bowlby (1979) found evidence that children's' innate tendency to explore their environment was enhanced when researchers observed that the child

had a close attachment to a parent. Frodi, Bridges, and Grolnick (1985) observed that child feelings of security and parental autonomy lead to increased exploration by infants.

In classrooms, students who experienced teachers as cold and unconcerned with their students exhibited decreased engagement in the class (Ryan & Grolnick, 1986). Teachers who built rapport with their students increase student engagement and convey the relevance of learning activities to their students' lives and educations.

Three Psychological Needs as Mediators

The three psychological needs of self-determination theory mediate the relationship between external forces and a person's ability to feel intrinsically motivated. When autonomy, competence, and relatedness are supported a person has the ability to feel intrinsically motivated to complete an action. When these psychological needs are suppressed a person will feel diminished intrinsic motivation.

Autonomy. Deci, Schwartz, Sheinman, and Ryan (1981) demonstrated that a teacher who exerts a great deal of control over their students suppresses the students' feelings of autonomy in the classroom, intrinsic motivation to learn, and self-esteem. The opposite was true for students whose teachers' pedagogical practices were autonomy-oriented. Deci et al. (1981) found a similarity between the levels of intrinsic motivation for education of students whose teachers were control-oriented as with teachers who offered task-contingent rewards for completion of classwork. Suppressing autonomy in the classroom either by using controlling language, not offering opportunities for student choice, or by using rewards all diminished intrinsic motivation because autonomy was suppressed.

When autonomy is supported, intrinsic motivation grows. In a longitudinal study, Jang, Kim, and Reeve (2012) found that students who are taught by autonomy-supportive teachers and

felt intrinsically motivated to learn in the beginning of a school year experienced greater student achievement gains than students without the autonomy-support. Kaur, Hashim, and Noman (2015) further demonstrated that students who experienced autonomy-supportive pedagogy in the beginning of the year that was later discontinued mid-way through the year still demonstrated greater student achievement gains than students with no exposure to the intervention at all.

Competence. Deci (1975) observed that positive performance feedback enhanced intrinsic motivation while negative performance feedback diminished it. Vallerand and Reid (1984) demonstrated that the type of performance feedback received and its impact on intrinsic motivation was mediated by a subject's perceived competence. The researchers explained that positive performance feedback, especially when paired with feedback that will lead to future growth, increases feelings of competence and self-efficacy. Negative feedback, especially when presented without any feedback, diminishes competence and self-efficacy and the motivation to complete a similar task again in the future. The availability of informational feedback allows a person to take concrete steps to improve on future performance and allows for feelings of competence, and a belief in one's ability to succeed and ability to grow.

Relatedness. The lack of relatedness in an environment leads to feelings of alienation and estrangement and a diminished intrinsic interest to continue with a given activity. A lack of relatedness is most frequently observed in competitive environments. Schools that emphasize status, ranking, and grade competition can diminish feelings of relatedness and cooperation among students (Kai, 2012). Employers that utilize bonus pools that distribute rewards relative to performance and effort standards, or in tournament or benchmarking form, increase the salience of the reward relative to the value of the task and sacrifices relationships between coworkers within an organization (Barons and Kreps, 1999). When feelings of relatedness are

diminished a person's intrinsic motivation will diminish too. When people feel relatable to their environment, though, a person can feel intrinsically motivated.

Relatedness in the classroom. Cordova and Lepper (1996) demonstrated that feelings of relatedness supported the process of learning for elementary students and increased feelings of intrinsic motivation through three distinct processes: those of contextualizing, personalizing, and providing choice for the method of learning, all of which built strong connections between the students and their educational material. Relatedness was also found to act on an individual level as well as a class level. Similarly, in classrooms where students experienced teachers as cold and unconcerned, students exhibited decreased engagement in their education (Ryan & Grolnick, 1986). Relatedness was also shown to increase intrinsic motivation in an experimental activity when subjects were in the room with a friendly experimenter as opposed to a cold, non-communicative one (Anderson et al., 1976). Feeling relatable to one's environment can lead to increase intrinsic motivation because it helps a person feel comfortable and confident in their surroundings. Feelings of alienation and estrangement have an opposite effect. The psychological needs of relatedness, competence, and autonomy all mediate the effects of external forces on a person's intrinsic motivation.

All three psychological needs can be influenced through social and contextual factors and cognitive evaluation theory was developed in order to explain the specific conditions that either support or diminish autonomy, competence, relatedness, and subsequent intrinsic motivation.

Cognitive Evaluation Theory

Cognitive evaluation theory was developed to explain the conditions that support, sustain, subdue, or diminish the innate tendency for people to be intrinsically motivated for an interesting task (Deci & Ryan, 1985). Cognitive evaluation theory proposes that social and contextual

factors can either promote or undermine a person's sense of autonomy, competence, and relatedness and thus have a negative causal effect on intrinsic motivation.

Social and contextual factors. Social and contextual factors that support a person's need for autonomy, competence, and relatedness have a positive causal effect on intrinsic motivation. Tasks completed in an environment where a person has opportunities to make choices, perceives that their feelings are acknowledged by others, and has opportunities for self-direction in their decisions are conducive of intrinsic motivation because they provide for autonomy and allow a person to perceive that their actions stem from an internal locus of control. Social and contextual factors that do not support autonomy, competence, and relatedness will diminish intrinsic motivation. Tasks completed in an environment where a person is threatened, forced to work to a deadline, given strict directions, or is under surveillance will experience diminished intrinsic motivation because they feel controlled and perceive their actions stem from an external locus of control.

Empirical support of cognitive evaluation theory. Evidence that task-contingent rewards undermine intrinsic motivation because they are perceived as controlling rather than supportive of an individual's autonomy further support cognitive evaluation theory (Ryan, Mims, & Koestner, 1983; Vallerand & Reid, 1984). If people are told that they will receive a cash payment upon completion of a task they will then undertake that task because they are being paid to do so, not because they choose to do so out of interest, curiosity, or personal desire. Even if people initially are intrinsically motivated towards the task, future levels of motivation will diminish and the salience of the cash reward will grow. An example of this occurrence is described in *The Adventure's of Tom Sawyer* (Twain, 1876). Mark Twain writes, "Work consists of whatever a body is OBLIGED [sic] to do, and that play consists of whatever a body is not

obliged to do" (p. 33). Twain further goes on to give an example, "There are wealthy gentlemen in England who drive four-horse passenger-coaches twenty or thirty miles on a daily line, in the summer…but if they were offered wages for the service, that would turn it into work and then they would resign" (p. 33).

Autonomy Suppression

Empirical research substantiates Twain's anecdotes. In two seminal investigations, Deci (1971; 1972) found that task-contingent rewards in the form of money and negative verbal feedback reduced time spent on an interesting activity during a post intervention, free-choice period. Further confirmatory experiments supported these findings, for example: the negative relationship between task-contingent reward and intrinsic motivation to teach (Deci et al., 1982), to play (Lepper et al., 1973), to learn (Deci, Nezlek, & Sheinman, 1981), to think creatively (Amabile et al., 1986), and to make good ethical decisions in white collar jobs (Gagné & Forest, 2008).

Non-Monetary rewards. The effect of non-monetary rewards on intrinsic motivation were examined by Kruglanski, Freedman, and Zeevi, (1971) and Lepper et al. (1973) and both demonstrated that the desire for a promised reward can undermine intrinsic motivation just as actual reception of a reward can. In these experiments subjects were promised a reward for completion of a task and experienced diminished intrinsic motivation and enjoyment in the task without actually receiving the reward. Researchers also found evidence that different means of control beyond tangible rewards also reduced intrinsic motivation. Avoidance of undesirable pressure was shown to undermine intrinsic motivation, for example the avoidance of potential punishments (Deci & Cascio, 1972). Externally controlling forces such as close supervision (Lepper & Greene, 1975), and time deadlines (Amabile, DeJong, & Lepper, 1976) all undermine

intrinsic motivation for the same reason that task-contingent rewards do, because subjects feel controlled and not autonomous in their actions.

A self-determination theory meta-analysis. Deci et al. (1999) undertook a meta-analysis of 128 studies that examined the effects of extrinsic rewards on intrinsic motivation combining the myriad of methodologies, sample sizes, and professional fields that have manipulated these variables. As hypothesized by the researchers, rewards that were engagement-contingent (rewards provided for participating in the task), completion-contingent (rewards provided for completing a task), and performance-contingent (rewards provided for achieving a certain level of performance at the task) all significantly undermined intrinsic motivation during the free-choice, post-experiment period or as recorded in exit surveys. The researchers found similar results for all types of rewards, for example monetary rewards, gold stars, trophies, and for both received and promised rewards. The meta-analysis also revealed that positive verbal feedback had a small positive effect on intrinsic motivation as demonstrated by increased time spent on tasks during the post-experiment free choice time and higher responses of interest on post-experiment surveys. In Deci et al. (1999), the dependent variables were free-choice behavior and self-reported interest and enjoyment that reflect the traditional dependent variables used to measure intrinsic motivation in a task.

The explanation for this interaction concerns a person's perceived locus of causality and whether they feel as though their actions are autonomous and a result of their own free will or the result of an extrinsic, external force, and thus in conflict with intrinsic motivation. In each of these studies, the suppression of autonomy was achieved because people felt that the goal of an interesting task was to obtain a reward and not completion of a task for its innate value. When

autonomy is suppressed there is a negative causal relationship between an external factor and intrinsic motivation. When autonomy is promoted there is a positive causal relationship present.

Competence Suppression

The suppression of competence and relatedness can likewise undermine intrinsic motivation. Pink (2009) describes the ideal task as a "goldilocks" task, one which is not too difficult or too easy but that is just the right amount of challenge so that a person is able to complete the task and grow competent through its completion. From a practical perspective, people feel frustrated, overwhelmed, and disengaged when they lack competence in how to complete a task. Similarly, if a task is too easy a person will consider it non-consequential and unimportant. Both situations provide little to no informational feedback that leads to competence growth and encourages a person to disengage from the task because it is either too hard or too easy. This disengagement enables the reconceptualization of the goal of the task as either being completed for intrinsic reasons or for extrinsic reasons. Vallerand and Reid (1984) demonstrated that the type of performance feedback received and its impact on intrinsic motivation was mediated by a subject's perceived competence. Even positive feedback in this experiment would not support intrinsic motivation if a person lacked competence in their actions. This may be due to low self-efficacy where the person receiving praise believes that it is disingenuous, because they do not believe that they are capable, thus diminishing their intrinsic motivation for the task.

Relatedness Suppression

The lack of relatedness has a negative impact on intrinsic motivation because it leads to feelings of alienation and estrangement. These two qualities are prevalent in many competitive educational environments (Kai, 2012) and are related to decreased intrinsic motivation in education. Schools that emphasize status, ranking, and grade competition value individualism

and can diminish feelings of relatedness and cooperation among students resulting in diminished intrinsic motivation (Kai, 2012). In a competitive setting, the goal of education for a student is not to foster relationships with others through cooperation but rather to attain the highest academic ranking. This mentality creates an extrinsic motivation for ranking highest in academic achievement reducing the intrinsic value of the education and increasing burnout (Kai, 2012).

Organizations that utilize bonus pools create a similarly competitive environment between workers. When bonuses are distributed relative to performance and effort standards, or in tournament or benchmarking form, they increase the salience of the reward relative to the value of the task, and sacrifice relationships between coworkers within an organization (Barons and Kreps, 1999). The effect of these standards is to create competition between coworkers and pressure to outperform others and has the potential to undermine intrinsic motivation at work (Deci & Ryan, 1985).

Competence and relatedness mediate the effects of external factors on intrinsic motivation in that the suppression of either results in a negative causal relationship and the promotion of either result in a positive causal relationship.

The Problem with the Undermining Effect

Although the undermining effect has received a great deal of empirical support, teachers often rely on task-contingent rewards as useful tools to motivate reluctant learners. In a classroom, introducing a reward system, for example stamps, candy, or gold stars, in exchange for cooperation, concentration, or completion of a task may lead to the completion of a task but ultimately undermine the perceived value of the educational material. When the time comes to complete a new task without the reward system, students will protest or lack motivation. This

results from the perception that the goal of learning is receiving a reward, not learning a skill or comprehending new material. If students feel uncomfortable with the task because they lack competence, if students feel forced, and if their sense of relatedness is diminished due to increased pressures to do well, any intrinsic interest in the learning material will quickly vanish. Deci et al. (1999) found too that student achievement, engagement, and deep understanding of educational material subsequently declined when students experienced reduced intrinsic motivation towards their education.

A problem with the undermining effect is that extrinsic forms of motivation can be useful tools for teachers. Teachers often rely on candy, extra credit points, or homework passes to reinforce specific classroom behaviors. There are also examples of task-contingent rewards being useful in the private sector; managers have often pair extrinsic and intrinsic motivation because of the perceived value of employing both (Baron & Kreps, 1999; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007). Although the undermining effect is a possible outcome, not all students and workers are devoid of intrinsic motivation as a result of task-contingent rewards (Deci et al., 1999).

Researchers (Ryan & Connell, 1989) approached the conflicting evidence by proposing that reward systems will not always undermine intrinsic motivation if the reward, or whatever form of extrinsic motivation is applied, is internalized in a way that supports the perception that actions are guided by one's own autonomous choices, as explained by organismic integration theory.

Organismic Integration Theory

Organismic integration theory was developed to explain the process by which a person internalizes an extrinsic form of motivation with their perception of autonomy so that their

intrinsic motivation for a task is not undermined. Ryan and Connell (1989) found that the degree to which a person internalizes an extrinsically motivated activity with their own perception of autonomy determines the extent to which intrinsic motivation is either supported or subdued.

The degrees by which a person can internalize the reason for completing an action lay along a continuum of causality. Causality is the perception of what causes the undertaking of an action. Ryan and Connell (1989) created a continuum of motivation to demonstrate the range of a person's motivation and the various degrees by which a person can internalize an extrinsic form of motivation.

Figure 2.4 portrays the continuum of motivation and the various degrees of extrinsic motivation internalization along with the perceived locus of causality of each form of motivation.

Degrees of extrinsic motivation internalization. On one extreme of the continuum is intrinsically motivated behavior in which a person engages in an activity for its own sake because it is interesting or novel. This form of motivation is entirely self-determined because the action is driven by an internal causality. On the other extreme is amotivation denoting a complete lack of motivation for a task. In between these two extremes are degrees of extrinsic motivation. Extrinsic motivation can be experienced by a person in different ways and will have a range of impacts on a person's intrinsic motivation depending on how controlled a person feels by the extrinsic motivator. The most extreme degree of control is called external regulation and lays to the right of amotivation on Figure 2.4.

External regulation of behavior. Extrinsic motivators that are perceived as least autonomous and most controlling lead people to believe that their behavior is externally regulated. When behavior is externally regulated people act in order to satisfy an external demand, for example in pursuit of a monetary reward, due to being under surveillance, or to

avoid punishment (Deci & Ryan, 2008a). Behavior that is externally regulated will lead people to feel controlled externally and experience an external perceived locus of causality (DeCharms, 1968). External regulation for behavior will undermine intrinsic motivation for a task because the goal of the task is to satisfy the external demand.

Introjected regulation of behavior. To the right of external regulation on Figure 2.4 is introjected regulation. Behaviors that are regulated through introjection result from internal pressures controlling a people's action. Introjection regulated behavior is an acceptance of the reasons for completing a task but not accepting it as one's own. This regulation of behavior can be due to internal pressures like feelings of guilt, shame, peer pressure, or ego involvement (Deci & Ryan, 2008a). Although internally driven, introjected regulation of behavior is still perceived as an external locus of causality. This is a result of something external being the source of the guilt, shame, or peer pressure. Since the source of pressure is external this form of motivation is unsupportive of autonomy and will undermine intrinsic motivation.

Both external and introjected regulations of behavior undermine a person's psychological need for autonomy because they provide no opportunity for control. A person acts as a result of an extrinsic motivator and feels no intrinsic desire to do otherwise.

Identified regulation of behavior. To the right of introjected regulation on Figure 2.4 is the first extrinsically motivated behavior that can be internalized in a manner that shifts volition internally and does not have as negative an impact on the intrinsic reasons for a behavior. When a person undertakes a behavior for external reasons and then personally identifies with the importance of the action then a person's behavior is regulated by identified regulation. Identified regulation of behavior allows a person to experience internal causality for their actions. This regulation of behavior dampens the undermining of intrinsic motivation because the extrinsic

motivator aligns with a person's own interests and personal values. A person can perceive their actions as somewhat internally caused because they can identify with the reason for completing the actions.

Integrated regulation of behavior. In a similar manner, when a person undertakes a behavior due to external reasons and then integrates and assimilates the activity with their own values and beliefs then a person's behavior is regulated through integrated regulation. Integrated regulation of behavior allows a person to experience internal volition for their actions. Integrated regulation is immediately to the left of intrinsic motivation on Figure 2.4 and represents the greatest degree of intrinsic internalization of an extrinsic motivator. Integration is achieved when a person integrates the reasons for completing a task that is extrinsically motivated with their own sense of self. Identified and integrated regulation for behaviors satisfies a person's psychological needs for autonomy and competence because they support feelings of competence and growth.

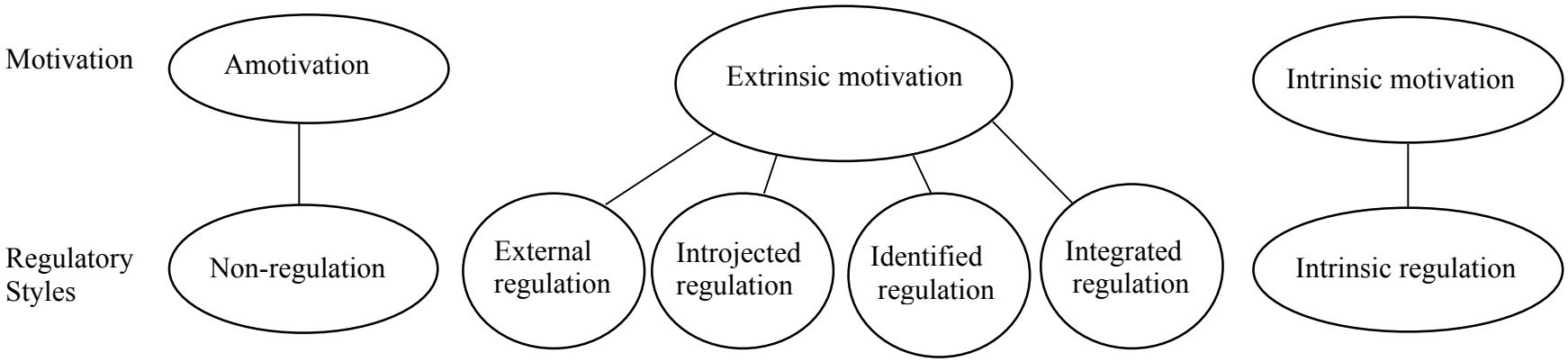

Figure 2.4. The self-determination continuum showing types of motivation with their regulatory styles, loci of causality, and corresponding processes. Adapted from Ryan and Deci (2000), p. 72. The oval shapes are not indicative of latent variables.

Summary of the Undermining Effect

For intrinsic motivation to flourish within a person for an interesting task the environment must satisfy the person's psychological needs for autonomy, competence, and relatedness. These three psychological needs mediate the effects of external factors on a person's intrinsic motivation. Extrinsic motivational tools that are externally regulated, for example a task-contingent reward, will undermine intrinsic motivation because a person will feel that this reward is controlling their actions and their psychological needs will not be satisfied. Researchers have suggested that creating environments that are supportive of a person's autonomy, competence, and relatedness and are not controlling can ameliorate the undermining of intrinsic motivation by extrinsic reward. A remaining question is how can intrinsic motivation be preserved within a controlling environment when a task-contingent reward is presented?

This leads to this study's first hypothesis and sub hypotheses:

H1: A task contingent reward will lead to decreased intrinsic motivation for an interesting task.

H1a: A task contingent reward will have a negative effect on a person's feeling of autonomy.

H1b: A task contingent reward will have a negative effect on a person's feeling of competence.

H1c: A task contingent reward will have a negative effect on a person's feeling of relatedness.

Psychological Ownership Theory

Psychological ownership theory offers a solution to the undermining effect by describing the environmental conditions by which psychological ownership feelings can develop over a task and support a person's intrinsic motivation, even when a task-contingent reward is offered for its

completion. The concept of psychological ownership developed out of work in the psychology of possession. Psychologists ascribed the desire to possess objects as universal and one that takes root in infancy. The desire for possession drives infants to explore their environment and grow as a result of these explorations. Possession leads to feelings of ownership and can be experienced both mentally and emotionally.

The difference between legal ownership and psychological ownership originated as a result of observations that people can develop ownership feelings, and take responsibility for the growth of a target of ownership, for an object that someone else legally owns. An example of this is of a person's job. A person can feel ownership of their job without having any legal claim or physical stake in the company they work for. Early investigation of psychological ownership examined the role of workers in family-owned businesses and found that non-family workers with no legal claim to ownership experienced psychological ownership in a similar manner similar to the actual family owners (Bernhard & O'Driscoll, 2011; Mustafa, Ramos, & Man, 2015).

Psychological Ownership and Job Characteristics Theory

The concept of psychological ownership developed too as an evolution of job characteristics theory (Hackman & Lawler, 1971; Oldman & Hackman, 1980; 2005). Whereas Oldman and Hackman explained that three psychological states acted as mediators between core job characteristics and a worker's personal and work outcomes, Pierce, Jussila, and Cummings (2009) explained that the three routes of psychological ownership could replace these mediators. The reasoning behind this substitution is that the similarities between the three routes of psychological ownership and the three psychological states of job characteristics theory allow for their substitution. Hackman and Oldman (1980) explain that a worker needs to experience

meaningfulness in their work, responsibility for the outcome of their work, and knowledge of the results of their work activity. Pierce et al. (2009) suggested that the routes of exercise of control, intimate knowledge, and self-investment could substitute for these.

Root Motivations for Psychological Ownership Development

Psychological ownership develops due to the desire to feel in possession of objects and in order to fulfill certain innate human motivations (Pierce et al., 2001). The root motivations for psychological ownership derive from a core desire to possess objects. Dittmar (1992) describes possession as a means to, "Shape our consciousness, our self-awareness, and our perception of the world" (p. 65) and can serve as an assertion of self-identity (Porteous, 1976). Possession of an object is influenced by three root motivations: (a) effectance and efficacy, (b) self-identity, and (c) having a place to dwell, described as a place where a person can reside and/or identify with either physically or metaphorically (Pierce et al., 2001). These three motives in turn facilitate the development of psychological ownership over an object and have been described by psychological ownership researchers as the "why" in the question, "Why does psychological ownership develop in people (Pierce et al., 2003)?" Figure 2.5 portrays the three root motivations people have that lead to the development of ownership feelings.

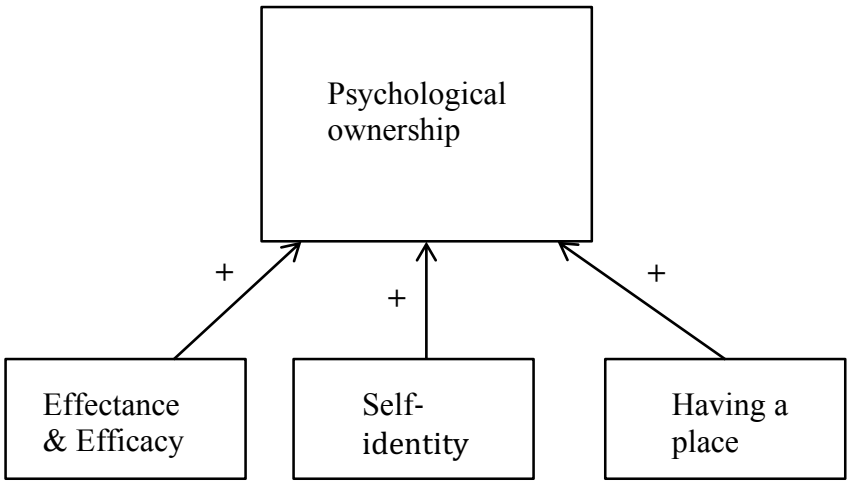

Figure 2.5. Three root motives for the development of psychological ownership.

Effectance and efficacy. Effectance is being in control of an object in a manner that allows for personalization, exploration, and manipulation. White (1959) describes the development of causal efficacy and effectance as a result of observing the effects of one's actions on their environment and through exploration and control over one's environment. Exploring and controlling one's environment leads to self-efficacy and produces feelings of pleasure that derive from being the cause of one's own actions. Control leads to intrinsic pleasure and extrinsic satisfaction when objects are acquired as a result of control (Beggan, 1991). Furby (1978) describes the innate desire people feel to control their environments and that possession of an object is the quickest and most effective way of controlling one's environment. Pierce et al. (2001; 2003) synthesize these ideas into the concept that people are motivated to be efficacious in relation to their environment. Also, the more efficacious a person becomes through their ability to exert control the more a person feels in possession of an object (Issacs, 1933).

Self-Identity. Close interaction with an object, which leads to effectance and efficacy, also leads to the investment of one's own identity into the object. People have a tendency to personalize objects that they have close interactions with. Dittmar (1992) describes this relationship as, "Our sense of identity, our self-definitions, are established, maintained, reproduced and transformed" (p. 86) due to the process of personalization and subsequent reflection on the value of personalized objects. Possessions can thus define a person by embodying and projecting elements of their personality and act as a means of expressing themselves to others.

Having a place to dwell. Psychological ownership partially develops due to a person's desire to possess a space of his or her own like a home or a place to dwell (Duncan, 1981; Porteous, 1976). Heidegger describes the importance of home as, "When we inhabit something, it is no longer an object for us, but becomes part of us" (quotes in Dreyfus, 1991: p. 45). The connection between having a place to call home and ownership is most easily demonstrated in the impact a work environment can have on a person's organizational commitment, or the emotional and psychological attachments people can develop with their childhood homes and neighborhoods (Cram & Paton, 1993). People desire a place to call home for the relative safety and comfort this provides and this home becomes part of a person's self-identity through either tangle or intangible possession. Porteous (1976) describes possessions that are associated with a sense of home as ones that have received considerable emotional investment. These objects carry a strong sense of identification with the person and serve to promote a sense of security, identity, and individualism.

Routes for Psychological Ownership Development

The three root motivations for the development of psychological ownership are the reasons why people desire to feel ownership over objects. The means by which psychological ownership is established is through three routes or pathways. The routes for the development of psychological ownership are: (a) controlling the object, (b) coming to intimately know the object, and (c) investment of self in the object (McIntyre et al., 2009; Pierce et al., 2001; Pierce et al., 2004) and act independently and interdependently in the development of psychological ownership. For psychological ownership to develop, an object must be attractive, accessible, and open to manipulation so that a person has the ability and opportunity to control, learn, and self-invest in the target of ownership (Pierce et al., 2003). Personality factors influence the development of psychological ownership too because different people will pursue ownership for different reasons. People with high self-esteem or high self-actualization may pursue ownership of intrinsic targets, and people with a weaker self-concept may pursue ownership of materialistic targets. People with authoritarian personalities may pursue ownership through the exercise of control and power rather than through the cultivation of a close relationship or investment of self-identity (Kasser and Ryan, 1993). Psychological ownership researchers describe the three routes by which ownership develops as the "how" in the question, "How does psychological ownership develop in people (Pierce et al., 2003)?" Figure 2.6 portrays the three routes to psychological ownership.

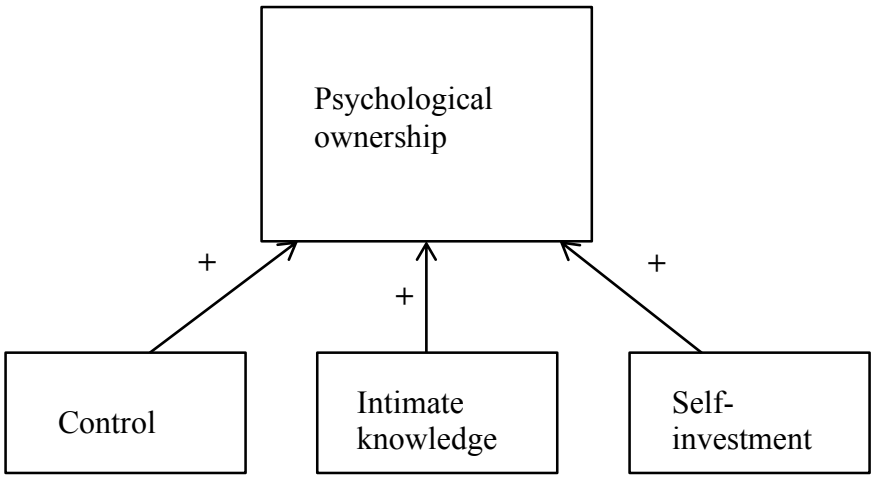

Figure 2.6. Three routes for the development of psychological ownership.

Exercising control over the object. Exercising control over the object is described as feeling autonomy in relation to it so that an individual can manipulate, create or change as object as one sees fit (Rudmin & Berry, 1987). An object in this sense must be malleable so that a person can manipulate and mold it. Researchers have empirically demonstrated the relationship of control and the development of ownership (Csikszentmihalyi & Rochberg-Halton, 1981; Sartre, 1969) and how this control creates the perception that an object is an extension of oneself (Furby, 1978; McClelland, 1951). Employees who are allowed to exercise control over their work because of job design autonomy develop feelings of ownership within their organization (Hackman & Oldham, 1980; Pierce, Jussila, & Cummings, 2009; Pierce, O'Driscoll, & Coghlan, 2004). Organizations that stress standardization and do not allow for employee input or opportunities for control diminish feelings of ownership because an employee does not have the opportunity to develop a sense of possession. Exercising control over an object is a physical activity and differentiates from autonomy in that autonomy is a cognitive perception. For

psychological ownership to develop a worker must be capable of exercising physical control over their job and have the ability to manipulate it.

Coming to intimately know the object. Intimate knowledge manifests due to a close association that develops over time and through personal emotional and cognitive investment with an object. Through close association with an object a person can feel like it is theirs and will have the opportunity to learn a great deal about the object (Beggan & Brown, 1994). If a person has ample information that enables them to make decisions regarding that object a person will feel greater self-efficacy in these decisions. The more information a person has about an object the more they come to understand it and the deeper a person's relationship will become, building the sense of ownership.

Organizations provide opportunities for employees to come to intimately know their jobs by setting clear expectations, sharing company information with employees (e.g. central goals and company performance data), and by making information accessible to all employees. Tenure and experience within a company is another means of coming to intimately know a job due to the close association that develops over time (Pierce et al., 2001).

Self-Investment in the object. If individuals can self-identify with the object they will perceive themselves as invested in the object and will perceive the object as an extension of themselves (Pierce et al., 2001). The investment of energy, time, effort, and attention into an object causes the self to become one with the object leading to the development of ownership feelings (Csikszentmihalyi & Rochberg-Halton, 1981). Beaglehole (1932) describes how workers may feel ownership of their work, the actual products they create, and machines they use to create them. Investment of self is not simply an outcome of time or physical toil but also derives from the emotional and cognitive effort exerted through the completion of the work.

Jobs that offer opportunities for discretion and personal decision-making lead to greater self-investment. These jobs are usually complex and often involve the creation of something. Pierce et al. (2001) describe the process of creation as involving the investment of time, energy, one's values and identity resulting in the creation of an object that reflects the creator. These objects can be tangible, for example the products of an engineer, or intangible, like a teacher's pedagogy (Pierce et al., 2001).

Certain possession rituals exhibit the pride people tend to feel after investing themselves in an object and subsequent feelings of psychological ownership. McCracken (1986) describes certain rituals such as displaying, showing off, using, and personalizing possessions as emphasizing the self-identity inherent in possession. McCracken (1986) suggests that these actions openly claim the object as one's own and, "Attempts to draw from the object the qualities that have been given to it" (p. 79).

Benefits of Psychological Ownership for an Organization

These three routes to psychological ownership allow an individual to feel in possession of an object. Possession has many benefits for both the individual and for the improvement of the object, for example: having access to information and decision making, feeling responsibility towards it, feelings of stewardship, increased citizenship behaviors, personal sacrifice, and assumption of risk of the target (Park, Song, Yoon, & Kim, 2013; Pierce et al., 2001; Pierce et. al., 2009). Psychological ownership is associated with extra-role and inter-role behaviors and affective commitment, organizational citizenship (O'Driscoll et al., 2006), greater psychological well-being and job retention (Chung-Yan, 2010), increased intrinsic motivation and feelings of self-determination (Brown et al., 2014), and improved effort and performance at work (Pierce et al., 2009).

Object Attributes for Psychological Ownership Development

Research into psychological ownership has determined the attributes necessary for psychological ownership to develop over an object. Figure 2.7 depicts the overall model of psychological ownership adapted from Jussila, Tarkiainen, Sarstedt, and Hair (2015).

This model depicts the three root motives for the development of psychological ownership and the three routes through which ownership develops. Proximity of the three routes is important because the greater extent to which a person feels in control, has greater intimate knowledge, and can self-invest increases the magnitude of psychological ownership feelings. The conditions by which psychological ownership develops are described within the circle of the figure. As mentioned previously, a person can develop feelings of psychological ownership over myriad objects; tangible objects like: organizations, jobs, tasks, or ideas, and an article of clothing, or intangible objects like: an organization, idea, artistic creation, or another person (McCarthy, Reeves & Turner, 2010; Pierce et al., 2003; Pierce & Jussila, 2011).

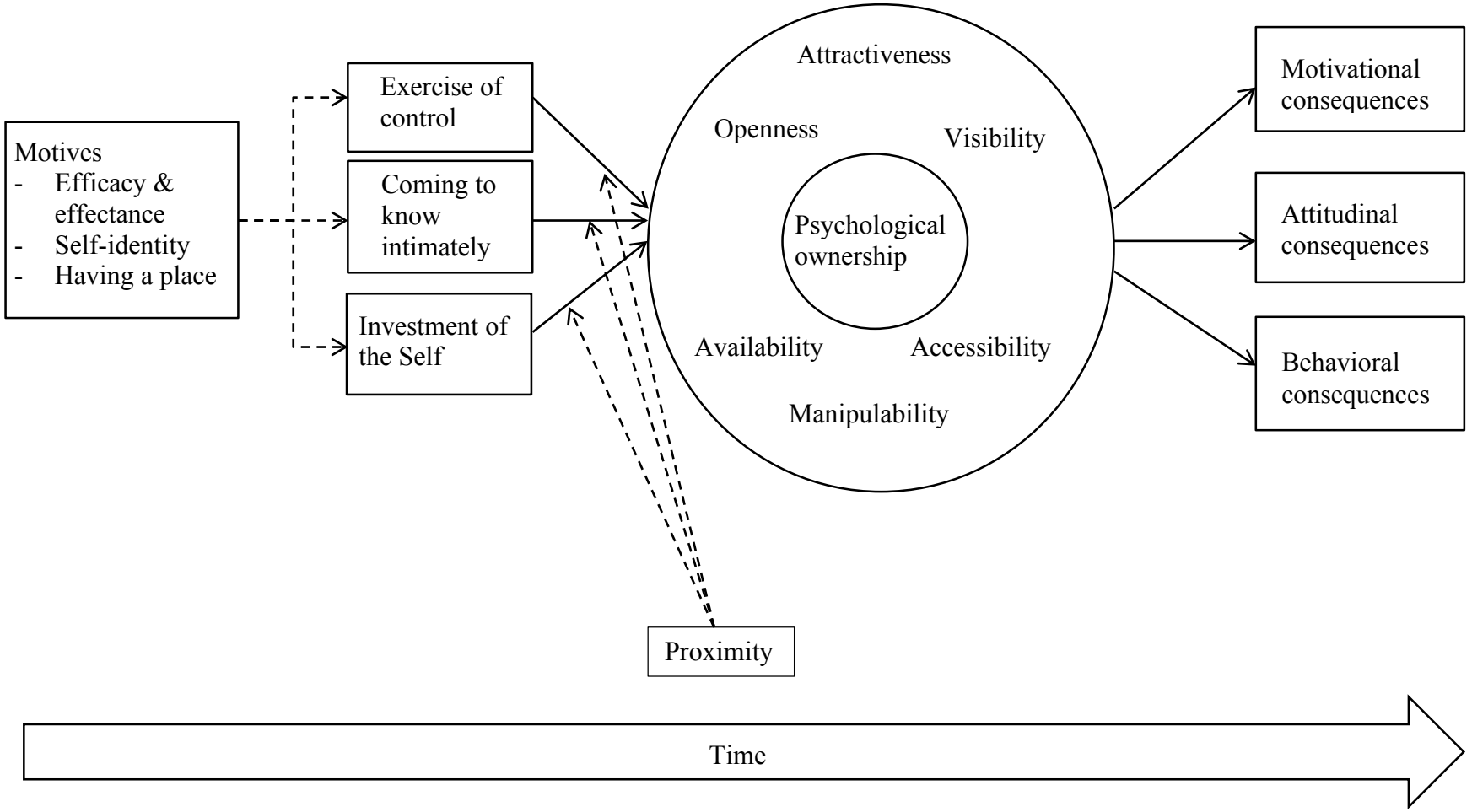

Figure 2.7. Theory of psychological ownership. Adapted from Jussila et al. (2015), p. 122.

Certain conditions must exist for psychological ownership to develop. To be able to exercise control, an object must be open to control and attractive to the person. In a work context this is an obvious idea; a teacher will not develop ownership over another teacher's curriculum, particularly if a teacher teaches a subjectively uninteresting subject. Coming to know an object intimately requires visibility, availability, and accessibility. If teachers are unaware of the standards by which they must teach or have limited access to professional development and curriculum resources it will be difficult for these teachers to have information enough to become intimately familiar with teaching and to develop psychological ownership over it. Self-investment requires manipulability; a person must be able to customize and personalize their object of psychological ownership in a manner that will allow for an investment of their personality. If teachers are presented with a prefabricated curriculum and directed to teach to the test without deviation there will be little chance of psychological ownership developing.

Jussila et al. (2015) hypothesized that there will be motivational, attitudinal, and behavioral consequences from the development of psychological ownership. One motivational consequence is the feeling of intrinsic motivation (Brown et al., 2014). Although a consequence, the way intrinsic motivation develops as a result of psychological ownership feelings has yet to be examined nor has the theoretical similarities between the routes to development of psychological ownership and the three psychological needs that mediate external forces on intrinsic motivation been examined.

Theoretical Similarities Between Psychological Ownership Theory and Self-Determination Theory

Psychological ownership and intrinsic motivation develop in a similar fashion as a result of similarities in their respective paths to development. Table 2.1 and Figure 2.8 demonstrate the similarities between the manifest variables that constitute psychological ownership and the three variables that mediate external forces on intrinsic motivation.

Table 2.1

Theoretical Similarities Between the Manifest Variables of Psychological Ownership Theory and the Mediating Variables of Self-Determination Theory

	SDT	*POT Route*	*POT Root*
Control	Autonomy	Controlling the object	Effectance & efficacy
Information	Competence	Intimately knowing	Self-Identity
Association	Relatedness	Investment of Self	Having a place to dwell

Note. SDT = self-determination theory; POT = psychological ownership theory.

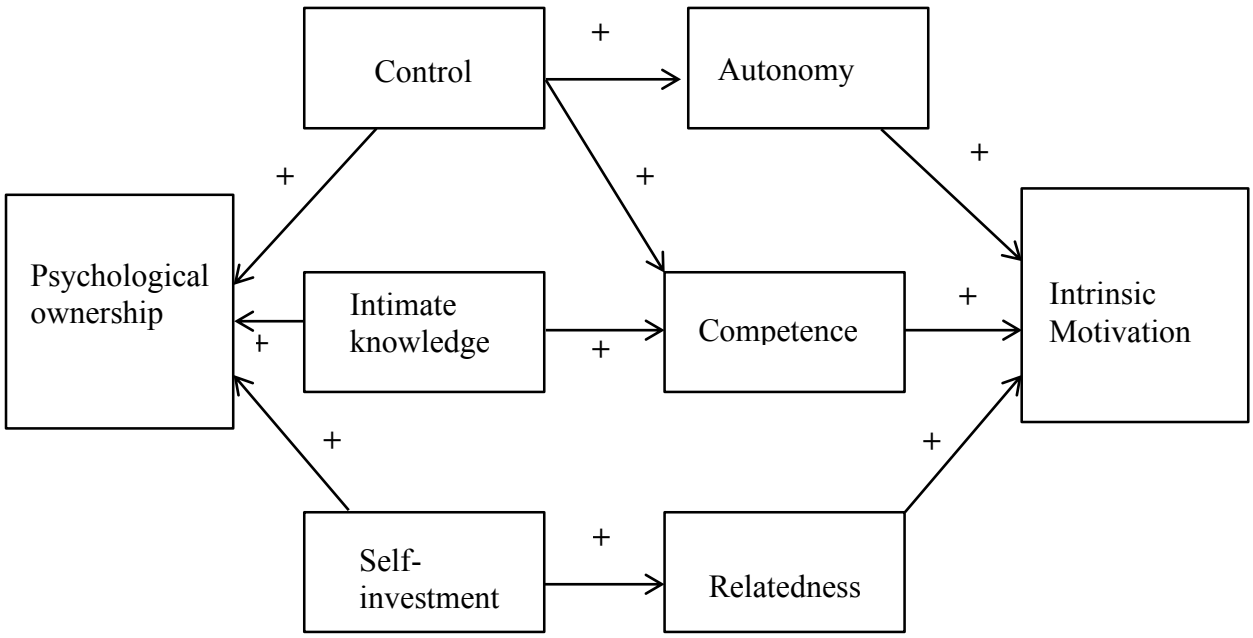

Figure 2.8. Theoretical and logical relations between three psychological needs of self-determination theory and three routes for the development of psychological ownership feelings.

Exercise of control and autonomy. One similarity between self-determination theory and psychological ownership theory is the role of control. Intrinsic motivation develops in part as a result of an individual feeling autonomy in their actions. Autonomy, the perception of internal causality for one's actions, is the notion that one's actions derive from an internal desire rather than the perception of being controlled by an external force. The perception of causality is a cognitive process. This is different from psychological ownership that develops in part due to an individual exercising control over an object. The exercise of control is the physical manipulation of an object. In both cases contextual factors can help promote intrinsic motivation and psychological ownership. If a person is allowed to exercise control over an object feelings of psychological ownership will begin to develop. If the person also perceives their actions as autonomous and internally driven, and not the consequence of an outside power forcing them to act, that person will feel intrinsically motivated to act.

McIntyre et al.'s (2009) investigation into the beliefs of people who feel psychological ownership of an organization demonstrates the importance of control in both theories. People who experience an internal locus of causality (their actions are autonomous) versus an external locus of causality (their actions derive from an external force) are more likely to have their effectance motive, the motive to feel in control, satisfied and as a result feel psychological ownership for their job. Mcintrye et al.'s (2009) data suggest that autonomy leads to feelings of psychological ownership because autonomy satisfies the root motivation of effectance.

Wagner, Parker, and Christiansen (2003) provided further evidence that the feeling of self-determination and autonomy in one's actions is an antecedent for psychological ownership in a work environment. People feeling self-determined in their actions were shown to develop psychological ownership and consequently perform better at work and have improved attitudes

because they perceived their actions as internally driven. Freehan and Enzle (1999) demonstrated that choice opportunities are an effective way to increase autonomy. If an environment allows a person to choose how they exercise control over an object, theoretically, both the need for exercise of control and autonomy would be satisfied.

Control, efficacy and competence. A root motivation for why people feel psychological ownership over objects is the desire for effectance and efficacy; people develop the desire to control and master their environments and through control develop feelings of ownership (Belk, 1988; Dittmar, 1992; Furby, 1978; White, 1959). In a similar vain, self-determination theory explains that people have the psychological need for competence in their environments. Both theories cite the motivation theory of White (1959) suggesting a philosophical similarity.

White (1959) suggests that babies are motivated to explore their environment due to a desire to learn and possess. As a child becomes more competent and feels increased efficacy towards her environment she intellectually grows and becomes further motivated to explore. Growth is managed through the feedback children receive from explorations and as a result of effectance over the environment. Children receive feedback that strengthens neural pathways as a result of physical feedback or verbal feedback by parents, peers, teachers, and, later on in life, employers.

The means by which efficacy is established is by exercising control over an object of ownership. Bandura (1977) explains that with increased control comes increased self-efficacy particularly when control leads to recognition, praise, or reward. Increased self-efficacy also increases a person's feeling of competence in relation to the object under their control (Bandura, 1977). An environment that allows a person to exercise control over an object should satisfy the

need for control in psychological ownership theory as well as the need for competence in self-determination theory.

Intimate knowledge and competence. Another similarity is in the role of information. Competence is a central variable in the development of intrinsic motivation and, similar to autonomy, is a cognitive process. Competence develops when a person feels capable of mastering their environment and growing from this mastery. Psychological ownership partially develops as a result of coming to intimately know the object of ownership. Intimate knowledge comes from having access to information that allows for greater competence building (Jussila et al., 2015). Having information and having the opportunity to process it in a manner that leads to growth results in increased ownership and motivation in both self-determination theory and psychological ownership theory.

An example of this is an employee developing psychological ownership over an organization because they have intimate knowledge of the company's mission statement, goals, financial information, compensation criteria, and specific job requirements. This knowledge allows the employee to align their actions and effort to the growth of the company and subsequently personally grow in competence and self-efficacy. Similarly, teachers who understand the needs of their students, the standards to which they must teach, the resources they have to work with, and their pedagogical preferences will feel psychological ownership of their classrooms, of their schools, and feel competent in their pedagogical decision-making. In both examples, feeling competent will foster intrinsic motivation and having an intimate knowledge of a job facilitates psychological ownership.

Self-Investment and relatedness. Relatedness is the desire to be loved and cared for and to love and care (Deci & Ryan, 2008a). This psychological need reflects the desire for

attachment to other people and the desire for emotionally supportive environments (Baumeister & Leary, 1995; Deci & Ryan, 2000). Relatedness is similar to the root motivation of having a place to dwell in psychological ownership theory in its reflection of the significance of relationships that are either cognitive or physical. The route that leads to satisfaction of having a place to dwell is self-investment of one's identity into an object. Self-investment results in an object becoming an extension of one's self (Dittmar, 1992) and thus will be supported and taken care of in a nurturing fashion. Self-investment builds a relationship between a person's ego and the object of ownership creating a sense of relatedness between the two because of the effort and care that goes into strengthening this relationship.

Self-Investment and complex jobs. The tendency of people to feel motivated towards, and psychological ownership of, complex jobs demonstrates the importance of relatedness and self-investment. Complex jobs and organizations that require problem solving allow for this investment to take place frequently due to the high level of responsibility and personalization innate in these roles. Job complexity correlated with higher performance due to the increased effort workers invested in their work (Zacher & Frese, 2011). Increased job complexity leads to greater intrinsic motivation and other positive performance-related behaviors resulting from the increased personal involvement workers invest in complex tasks. Complex tasks are also malleable and require workers to exercise control, self-invest themselves, and have intimate knowledge to complete the task successfully (Brown et al., 2014).

Self-Identity and motivation. Pierce and Jussila (2011) reason that psychological ownership and intrinsic motivation are positively related due to the intertwined nature of a person's identity with the object of psychological ownership. Self-identity is one of the root motivations for why people develop psychological ownership for objects and reflects the internal

desire people feel to personalize objects that they interact with as a means of self-expression (Mead, 1934). Through the exercise of control, coming to intimately know, and self-investment in the object, a person's identity becomes reflected in the object of ownership and that object reciprocally becomes part of a person's self-identity.

Pierce and Jussila (2011) reason that an individual will be intrinsically motivated to support, protect, and advance feelings of psychological ownership because such acts support self-esteem. A teacher who designs their own curriculum, for example, and has invested themselves into their work will be intrinsically motivated to improve upon this curriculum because of its reflection of their professional prowess. Extrarole behaviors like increased stewardship and feelings of responsibility displayed in workers who feel psychological ownership for their jobs and organizations also portray this motivation. Workers who participate in extrarole behaviors do not receive extra compensation but rather complete these actions because they want to and because they identify the success of the company with personal success (Brown et al., 2014; O'Driscoll et al., 2006; Pierce et al., 2009).

Psychological ownership motivation. Karahanna et al. (2015) built upon this relationship by developing the concept of psychological ownership motivation. The authors propose that people who feel psychological ownership over a target will then be motivated to engage in behaviors that satisfy the motives that underlie psychological ownership. Karahanna et al.'s (2015) reasoning supports the belief that the mediating psychological needs that foster intrinsic motivation for an activity will be fulfilled by a person who feels psychological ownership of that activity because of the continuous support of control, competence, and relatedness as a byproduct of psychological ownership motivation behaviors. Karahanna et al. (2015) does not make the theoretical connection between psychological ownership theory and

intrinsic motivation and does not bring self-determination theory into their discussion overlooking the symbiotic relationship between the three routes to psychological ownership and the three mediating psychological needs for the support of intrinsic motivation.

Self-determination theory and psychological ownership theory also share a similarity in the internalization process of extrinsic motivators explained in organismic integration theory and the desire for possession inherent in psychological ownership.

Possession and internalization. Developing feelings of possession over an object involves the internalization of something external with one's beliefs. An example of this is a teacher feeling psychological ownership over a classroom. A classroom is an object that a teacher has no legal ownership of; however, on a teacher's first day of teaching in a particular classroom this teacher can feel as if the classroom where, "Mine". Teachers feeling in possession of classrooms are a result of the internalization of this object with their own perception of how they will teach in it, how they will decorate it, and how they will organize the seats. Teachers form an emotional attachment with an object because they align their own beliefs with it. The means by which teachers begin to feel in possession, and psychological ownership, of their classrooms is through the exercise of control; they are able to move desks around and decorate beginning the process of internalizing the room as their own, having intimate knowledge of how to arrange a classroom, and the opportunity to invest their personality to the classroom through customization and personalization (Belk, 1988; Dittmar, 1992; Furby, 1978).

Psychological ownership and psychological well-being. Hillenbrand and Money (2015) propose a framework of psychological ownership that explains the importance of self-investment in an object for the development of psychological ownership. If people invest into an object

because it is in congruence with their own core values and beliefs the resulting psychological ownership is strong and psychologically healthy. If people invest in an object as a result of external pressures, for example feeling as if they ought to invest into certain objects, the resulting psychological ownership will be incongruent with their self-identities and create psychological tension. Referring back to the classroom example, teachers who invest themselves into their rooms by arranging the seats into groups because they believe that this is the best seating arrangement for students will develop a stronger, healthier sense of psychological ownership than if they were directed by their principal to arrange the seats into rows against their will and pedagogical beliefs. Hillenbrand and Money (2015) explain a third option that is to integrate external pressures with one's self-identity where teachers are instructed to use rows and go on to integrate this seating arrangement with their own perception of classroom management.

This process of integration is similar to the internalization of an extrinsic motivation through identified or integrated regulation of behavior explained in organismic integration theory (Ryan & Deci, 2000). In both cases an external force will not always undermine intrinsic motivation or psychological ownership as long as the external force is integrated with one's own self-identity (for psychological ownership) or internal sense of causality (for intrinsic motivation).

The Three Routes to Psychological Ownership Satisfy the Three Psychological Needs of Self-Determination Theory

In these examples of similarities, psychological ownership develops as a result of three behaviors that in turn satisfy the three mediating psychological needs necessary for the development of intrinsic motivation. If a person is provided with the opportunity to exercise control over an object, this control could then satisfy a person's need for autonomy. If a person

comes to intimately know an object, this information will satisfy a person's need for competence. If a person is able to invest into an object, this self-investment will satisfy a person's need for relatedness. These similarities could allow a person to be offered a task-contingent reward for completion of an interesting activity and maintain intrinsic motivation for that task because instead of the worker feeling controlled they will continue to perceive internal causality for their actions. If a person feels psychological ownership of the task that they are instructed to complete these feelings will moderate the undermining effect of task-contingent rewards on intrinsic motivation.

Psychological ownership will aid people in internalizing the reason for completing an externally rewarded task. Psychological ownership could lead to the internalization of the reward through identified or integrated regulation rather than external regulation along the organismic integration continuum, because they will identify the reasons for completing the task as further manipulating an object that they have invested their time, effort, and emotions into. Instead of feeling that the goal of the task is to receive the reward they will feel that they are being rewarded for completing a task that they know well and have personally invested into.

An organization that encourages people to develop psychological ownership will reap the benefit of having workers who are subsequently intrinsically motivated for their jobs and will maintain this motivation even if a task-contingent reward is offered for its completion.

Due to these similarities and reasoning, the following hypotheses are presented:

H2: Psychological ownership will serve as a moderator between a task-contingent reward and a person's intrinsic motivation for an interesting task. The combination of a task-contingent reward and the psychological ownership intervention will have a positive moderating effect on intrinsic motivation.

H2a: As the value of the moderator increases, a positive relationship between a task-contingent reward and intrinsic motivation will develop and grow.

H2b: The combination of a task-contingent reward and the psychological ownership intervention will have a positive effect on the mediating psychological need of autonomy.

H2c: The combination of a task-contingent reward and the psychological ownership intervention will have a positive effect on the mediating psychological need of competence.

H2d: The combination of a task-contingent reward and the psychological ownership intervention will have a positive effect on the mediating psychological need of relatedness.

H3: The three routes to psychological ownership will positively relate to and satisfy the three mediating psychological needs of autonomy, competence, and relatedness and will have a positive effect on feelings of intrinsic motivation for an interesting task.

H3a: Feelings of psychological ownership will have a positive effect on feelings of intrinsic motivation.

H3b: The route of exercise of control will have a positive effect on the psychological need of autonomy.

H3c: The route of exercise of control will have a positive effect on the psychological need of competence.

H3d: The route of exercise of control will have a positive effect on intrinsic motivation.

H3e: The route of intimate knowing will have a positive effect on the psychological need of competence.

H3f: The route of intimate knowledge will have a positive effect on intrinsic motivation.

H3g: The route of investment of self will have a positive effect on the psychological need of relatedness.

H3h: The route of investment of self will have a positive effect on intrinsic motivation.

Chapter Summary

The review of the literature presented in this chapter described the three mediating psychological needs of self-determination theory that, when satisfied, lead to intrinsic motivation. It further reviewed the three root motives that lead to the development of psychological ownership and the three routes by which a person develops psychological ownership over an object. This chapter reviewed the theoretical similarities between the two theories, the effects of a task-contingent reward on intrinsic motivation, and the potential for psychological ownership to moderate the undermining effect of a task-contingent reward on intrinsic motivation when psychological ownership is experienced for the task.

Chapter III presents the specific hypotheses addressed in this study and describes the data collection approach, experimental protocol, and research methods with which this study was implemented. It also describes the technique of path modeling that was employed in the analysis in this study.

Chapter IV presents the findings of the research, and the final chapter offers the study's conclusions as well as implications for teacher motivation, compensation plans, and educational policy.

CHAPTER III: METHODOLOGY

In Chapters I and II the context of this study was presented and the extant literature on self-determination theory and psychological ownership theory was discussed. This chapter focuses on the research design of the study that was developed and conducted to determine whether feelings of psychological ownership for a task moderate the undermining effect of a task-contingent reward on autonomy, competence, and relatedness that mediate the effect on a person's intrinsic motivation for an interesting task. This chapter first presents the purpose and research hypotheses that guided this study. Next, it covers the recruitment of participants. It will then discuss how data were collected. Also, it discusses the structure of the survey and the number of items it contains. The next section introduces the independent variables, moderating variables, mediating variables, and dependent variables that were included in the path analysis and manipulated in this study's experiment. Ethical considerations and the treatment of human subjects are discussed. The procedure section discusses the development and implementation of this study's experiment. Finally, limitations and potential benefits of the study are discussed.

Purpose and Research Hypotheses

The present study focuses on the potential for feelings of psychological ownership for a task to moderate the undermining effect of a task-contingent monetary reward on autonomy, competence, and relatedness that mediate a person's intrinsic motivation for that task. Path analysis was applied to examine the causal relationships between task-contingent rewards, the three routes to psychological ownership, the combination of a psychological ownership intervention with a task-contingent rewards, the three mediating psychological needs for intrinsic motivation, and a person's intrinsic motivation.

This study proposes the following research hypotheses:

- H1: A task-contingent monetary reward (reward) will reduce intrinsic motivation (intrinsic) for an interesting task. This will be reflected by a negative total effect on the path analysis.
    - H1a: After controlling for the effects of gender (gender), and experience with Legos (legoexp), a task-contingent reward (reward) will have a negative total effect on the psychological need of autonomy (autonomy) on the path analysis.
    - H1b: After controlling for the effects of gender (gender), and experience with Legos (legoexp), a task-contingent reward (reward) will have a negative total effect on the psychological need of competence (competence) on the path analysis.
    - H1c: After controlling for the effects of gender (gender), and experience with Legos (legoexp), a task-contingent reward (reward) will have a negative total effect on the psychological need of relatedness (relatedness) on the path analysis.
- H2: The psychological ownership intervention (pointervention) will moderate the relationship between a task-contingent reward (reward) and intrinsic motivation (intrinsic) for an interesting task. This will be reflected by a positive total effect of the combination of a task-contingent reward with the psychological ownership intervention (rewxpsy) on intrinsic motivation (intrinsic) on the path analysis.
    - H2a: As the value of the moderator (rewxpsy) increases, a positive relationship between task-contingent reward (reward) and intrinsic motivation (intrinsic) will develop and grow.
    - H2b: After controlling for the effects of gender (gender), and experience with Legos (legoexp), the combination of a task-contingent reward with the

psychological ownership intervention (rewxpsy) will have a positive total effect on the mediating psychological need of autonomy (autonomy) on the path analysis.

- H2c: After controlling for the effects of gender (gender), and experience with Legos (legoexp), the combination of a task-contingent reward with the psychological ownership intervention (rewxpsy) will have a positive total effect on the mediating psychological need of competence (competence) on the path analysis.
- H2d: After controlling for the effects of gender (gender), and experience with Legos (legoexp), the combination of a task-contingent reward with the psychological ownership intervention (rewxpsy) will have a positive total effect on the mediating psychological need of relatedness (relatedness) on the path analysis.

- H3: The three routes to psychological ownership will positively relate to and satisfy the three mediating psychological needs of autonomy, competence, and relatedness and will have a positive effect on feelings of intrinsic motivation for an interesting task.
  - H3a: After controlling for the effects of gender (gender), and experience with Legos (legoexp), feelings of job-based psychological ownership (psyown) will have a positive total effect on feelings of intrinsic motivation (intrinsic) on the path analysis.
  - H3b: After controlling for the effects of gender (gender), and experience with Legos (legoexp), exercise of control (control) will have a positive total effect on the psychological need of autonomy (autonomy) on the path analysis.

- H3c: After controlling for the effects of gender (gender), and experience with Legos (legoexp), exercise of control (control) will have a positive total effect on competence (competence) on the path analysis.
- H3d: After controlling for the effects of gender (gender), and experience with Legos (legoexp), exercise of control (control) will have a positive total effect on the psychological need of intrinsic motivation (intrinsic) on the path analysis.
- H3e: After controlling for the effects of gender (gender), and experience with Legos (legoexp), intimate knowing (knowledge) will have a positive total effect on the psychological need of competence (competence) on the path analysis.
- H3f: After controlling for the effects of gender (gender), and experience with Legos (legoexp), intimate knowing (knowledge) will have a positive total effect on intrinsic motivation (intrinsic) on the path analysis.
- H3g: After controlling for the effects of gender (gender), and experience with Legos (legoexp), investment of self (investment) will have a positive total effect on relatedness (relatedness) on the path analysis.
- H3h: After controlling for the effects of gender (gender), and experience with Legos (legoexp), investment of self (investment) will have a positive total effect on intrinsic motivation (intrinsic) on the path analysis.

Study Participants

The population of interest was undergraduate and graduate students enrolled at Long Island University, C.W. Post Campus (LIU/Post). A non-random, convenience sample of students enrolled at LIU was constructed by inviting students to participate on a voluntary basis. Long Island University, C.W. Post Campus is a private university with an enrollment of

approximately 7,000 students. 127 LIU students participated in the experiment (Male = 63, Female = 58). An additional convenience sample of New York City public schools (n = 25, Male = 12, Female = 13) was recruited in order to achieve the necessary minimum subject threshold. For path analysis, Heise (1975) recommended acquiring a minimum sample of 100 participants in order to minimize errors of parameter estimates. The research design in this study has a goal of at least 160 participants providing all participants complete the full experimental protocol including exit survey. The sample size of 152 subjects was deemed sufficient for this study.

Data Collection and Instrumentation

Data Collection

After successfully defending the dissertation proposal, institutional review board (IRB) from LIU/Post reviewed the design of the proposed study. This study received approval from the full IRB review board. Written permission from instructors teaching undergraduate and graduate courses at LIU/Post was obtained prior to data collection and the professors' participation was entirely voluntary.

After IRB approval had been granted, recruitment emails were sent to instructors (see Appendix B). The letters requested permission from instructors to allow entrance into their classrooms at the end of class to offer students the opportunity to take part in an approximately 40-minute experiment. Students who wished to take part in the experiment stayed after class and received instructions (see Procedures). This study was anonymous with no names, ages, college majors, or other distinguishing characteristics recorded. Additional subjects were recruited from a New York City Public School. Teachers in this school were asked to voluntarily participate in a research experiment after school hours. No names or distinguishing characteristics were

recorded for the teachers. The survey was typed using Microsoft Word version 14.5.7 and administered at the conclusion of the experiment. A copy of the survey is included in Appendix C.

Instrumentation

In order to provide maximum privacy protections for the participants and because the personal identities of the subjects were not essential to the purposes of the study, the survey was conducted on an anonymous basis. To minimize the burden and inconvenience to subjects, the survey was designed to be completed within a ten-minute period. This survey was administered at the conclusion of the experimental period (approximately 45 minutes in total).

The first page of the survey presented an introductory letter to the participants (see Appendix C) that described the purpose of the study, projected completion time, and the anonymous, voluntary nature of the survey. The next portion of the survey included a series of Likert-type items. The final portion of the survey included questions about the participants' gender and past experience with Lego building blocks.

New alpha coefficients were generated for all multi-item scales to test for reliability and discriminant validity. A pilot study was conducted with high school students to further support the reliability and validity of this study's measurements and experimental protocol.

The research measures analyzed in this study are discussed in detail in the following section.

Research Measures

Dependent Variable

Dependent variables or endogenous variables are variables that are only affected by other variables in the model. There is one dependent variable in this study measured by a multi-item

scale designed to measure undergraduate subjects' intrinsic motivation for an interesting task. Validity studies have been conducted in the past for this scale and new alpha coefficients were calculated for all scale items after data collection was concluded to test for reliability and discriminant validity. The a priori minimum acceptance level of $\alpha = .71$ was established for validity standards for all scales (Cronbach, 1951).

Intrinsic motivation. The intrinsic motivation inventory scale is a measurement device intended to assess subjects' subjective experience related to a target activity in laboratory experiments. It has been used in several experiments related to intrinsic motivation (Deci, Eghrari, Patrick, & Leone, 1994; Plant & Ryan, 1985; Ryan, 1982; Ryan, Connell, & Plant, 1990; Ryan, Koestner, & Deci, 1991; Ryan, Mims, & Koestner, 1983). The full version of this scale assesses subjects' interest/enjoyment, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice while performing a given activity. Four of these subscales have been the focus of validity studies, most notably by McAuley, Duncan, and Tammen (1987) who found a Cronbach's (1951) alpha of $\alpha = .85$ for the combined four subscales. The subscale of relatedness has yet to receive validity support and this study aimed to calculate an alpha coefficient for it. Because of the length of the entire intrinsic motivation inventory (at 45 items) researchers have selected individual subscales to incorporate into their research depending on the goals and hypotheses of their experiments (Deci et al., 1994; Ryan, Koestner, & Deci, 1991).

The interest/enjoyment subscale from the intrinsic motivation inventory was included into this study's survey to provide general self-reported measurements of intrinsic motivation. This scale measured the dependent variable of the study. This scale contains seven Likert-type

items ranging from Strongly disagree (1) to Strongly agree (7). The Cronbach's alpha coefficient calculated for the overall interest/enjoyment scale was $\alpha = .88$.

Four additional items were added with high face validity to serve as an insurance policy in the event that the intrinsic motivation inventory scale failed to achieve an adequate alpha coefficient. These questions were intrinsic08: "I would complete this task again in the future on my own without a reward"; intrinsic09: "I felt pressured to complete the task"; intrinsic10: "I found this task engaging"; and intrinsic11: "If I had more time I would continue working on this task."

Table 3.1 portrays a subscale of the intrinsic motivation inventory and the additional items created with high face validity incorporated into this study to measure the dependent variable. The newly generated Cronbach's alpha coefficients for each item and for the overall scale are listed on the table next to each item label. Permission to use the Intrinsic Motivation Inventory scale was obtained through registration at http://selfdetermination.org where members have access to surveys, questionnaires, and scales employed in previous intrinsic motivation research.

Table 3.1

Scale Item, Sources, and Alpha Coefficients for the Interest/Enjoyment Subscale

Variable	Source	Variable	Scale Items	α
			Interest/enjoyment (INT/ENJ)	.89
Intrinsic Motivation	McCauley et. al., 1989	intrinsic01	While I was working on the task I was thinking about how much I enjoyed it.	.88
		intrinsic02	I found the task very interesting.	.87
		intrinsic03	Doing the task was fun.	.87
		intrinsic04	I enjoyed doing the task very much.	.86
		intrinsic05	I thought the task was very boring. (R)	.88
		intrinsic06	I thought the task was very interesting.	.87
		intrinsic07	I would describe the task as very enjoyable.	.86
	Morey (2017)	intrinsic08	I would complete this task again in the future on my own without a reward.	.87
		intrinsic09	I felt pressured to complete the task. (R)	.91
		intrinsic10	I found this task engaging.	.88
		intrinsic11	If I had more time I would continue working on this task.	.88

Note. This table shows the subscale of interest/enjoyment, a subscale of the Intrinsic Motivation Inventory. Overall alpha = .89. intrinsic = intrinsic motivation.

Mediating Variables

Autonomy, competence, and relatedness. Three additional subscales from the intrinsic motivation inventory measured the three psychological needs that mediate the relationship between a task-contingent reward and intrinsic motivation. These subscales are: (a) perceived choice ($\alpha = .80$), (b) perceived competence ($\alpha = .83$), and (c) relatedness ($\alpha = .75$). New alpha coefficients were calculated for all scale items after data collection was concluded to ensure reliability and discriminant validity. The relatedness scale, which had yet to be validated as a reliable scale, was found to be reliable with $\alpha = .75$. The a priori minimum acceptance level of $\alpha = .71$ was established for validity standards for all scales (Cronbach, 1951). These three subscales contain 17 Likert-type items ranging from Strongly disagree (1) to Strongly agree (7).

Two additional items were added to each of the subscales with high face validity to serve as an insurance policy in the event that these subscales fail to achieve an adequate alpha coefficient. These questions were autonomy06: "I felt a great deal of autonomy in my actions during this task"; autonomy07: "I felt forced to complete the task"; competence05: "I felt competent in my actions during this task"; competence06: "I did not understand how to complete the task"; relatedness09: "I felt relatable to the researcher during this task"; relatedness10: "I felt pressured to complete the task."

Table 3.2 portrays the three subscales of the intrinsic motivation inventory and the additional items created with high face validity incorporated into this study to measure the mediating variables. The newly generated Cronbach's alpha coefficients for each item and for the overall scale are listed on the table next to each item label.

Table 3.2

Scale Items, Sources, and Alpha Coefficients for the Perception of Choice Subscale, the Perception of Competence Subscale, and the Relatedness Subscale

Psychological Need	Source	Variable	Scale Items	α
			Perception of choice (autonomy)	.80
Autonomy	Ryan, 1982	autonomy01	I felt that it was my choice to do the task.	.78
		autonomy02	I didn't really have a choice about doing the task. (R)	.74
		autonomy03	I felt like I was doing what I wanted to do while I was working on the task.	.78
		autonomy04	I felt like I had to do the task. (R)	.74
		autonomy05	I did the task because I had no choice. (R)	.74
	Morey (2017)	autonomy06	I felt a great deal of autonomy in my actions during this task.	.83
		autonomy07	I felt forced to complete the task. (R)	.76
			Perception of competence (competence)	.83
Competence	McCauley et. al., 1989	competence01	I think I am pretty good at this task.	.78
		competence02	I think I did pretty well at this activity, compared to other students.	.78
		competence03	I felt pretty skilled at this task.	.77
		competence04	After working at this task for awhile, I felt pretty competent.	.79
	Morey (2017)	competence05	I felt competent in my actions during this task.	.77
		competence06	I did not understand how to complete the task. (R)	.89

			Relatedness (relatedness)	.75
Relatedness		relatedness01	I felt really distant to this person. (R)	.77
		relatedness02	I felt like I could really trust this person.	.72
		relatedness03	I'd like a chance to interact with this person more often.	.7
		relatedness04	I'd really prefer not to interact with this person in the future. (R)	.72
		relatedness05	I don't feel like I could really trust this person. (R)	.72
		relatedness06	I feel close to this person.	.74
		relatedness07	I really doubt that this person and I would ever be friends. (R)	.73
		relatedness08	It is likely that this person and I could become friends if we interacted a lot.	.71
	Morey (2017)	relatedness09	I felt relatable to the research during this task.	.72
		relatedness10	I felt pressured to complete the task.	.79

Note. This table shows the subscale of perception of choice, perception of competence, and relatedness, all subscales of the Intrinsic Motivation Inventory. Perception of choice overall alpha = .80, perception of competence alpha = .83, relatedness alpha = .75.

Independent Variables

Independent variables, or exogenous variables, are variables that affect other variables in the model.

Task-Contingent reward. A task-contingent reward (reward) was administered in the form of two $5 bills presented to two experimental groups for participation in the experiment. Money rewards have been used throughout the intrinsic motivation literature to act as an externally controlling variable and a conduit to the undermining of subjects' intrinsic motivation. Reward amounts have varied but typically range from $1 to $2 (Deci, 1971; 1972). This study's use of $10 payments aligns the reward to Deci's original reward amounts after accounting for inflation. This is a binary variable where "receiving reward = 1" and "not receiving reward = 0."

Psychological ownership intervention. A psychological ownership intervention was designed to provide selected subjects with specific directions paired to a 15-minute planning period aimed at fostering psychological ownership (see Procedures). The independent variable psychological ownership intervention (pointervention) represented subjects who specifically received this 15-minute intervention and measured the effect of this experimental protocol on intrinsic motivation and its mediating variables. This is a binary variable where "receiving the psychological ownership intervention = 1" and "not receiving the intervention = 0".

Psychological ownership. Four multi-item scales were used to assess psychological ownership as an additional measurement separate from the psychological ownership intervention. The intention of this measurement was to assess the effects of psychological ownership for the whole study sample and not specifically tied to the intervention. These scales have been validated in previous psychological ownership studies. This study aimed to provide

further validity coefficients after the conclusion of data collection. The a priori minimum acceptance level of $\alpha = .71$ was established for validity standards for all scales.

There is no singular scale established to measure psychological ownership; however, Brown et al. (2014) combined two previously validated scales with two of the researcher's own validated scales to measure the manifest variables of psychological ownership along with general job-based psychological ownership feelings. This new scale is not officially named but for the purpose of this study was titled the "Brown, Pierce, and Crossley psychological ownership scale".

These subscales were designed to determine job-based, rather than organization-based, psychological ownership, experience of control, investment of self and intimate knowing because of confusion between job-based and organization-based ownership in previous studies. The term "job" and "work" remain in this scale to maintain its authenticity and validity and subjects were instructed to assume that the terms "job" and "work" referred to the task completed during the experiment.

Experienced control scales. This scale (Tetrick & LaRocco, 1987) measures the exercise of control route of psychological ownership. This is 6-item scale has an alpha coefficient of $\alpha = .86$. A new alpha was generated for this study ($\alpha = .82$) that takes into account the addition of three self-generated items with high face validity.

Investment of self and intimate knowing scales. These two scales (Brown et al., 2014) measure the routes of intimate knowing and investment of self to psychological ownership. Intimate knowing is a 4-item scale and investment of self is a 5-item scale with alpha coefficients of $\alpha = .83$ and $\alpha = .86$ respectively. A new alpha was generated for this study for intimate knowledge ($\alpha = .75$) that takes into account the addition of three self-generated items with high

face validity. A new alpha was generated for investment of self (α = .87) that takes into account the addition of two self-generated items added.

Job-Based psychological ownership scale. This scale (Van Dyne & Pierce, 2004) measures general job-based feelings of psychological ownership. This scale has an alpha coefficient of α = .92. A new alpha was generated during this study for job-based psychological ownership (α = .90) that took into account the addition of three self-generated items with high face validity.

Additional items were added to each of the subscales with high face validity to serve as an insurance policy in the event that the Brown, Pierce, and Crossley psychological ownership scale fails to achieve an adequate alpha coefficient. These questions were control07: "I felt in control of my actions during this job"; control08: "I was able to complete the job the way I wanted to"; control09: "No one controlled me while I completed this job"; knowledge05: "I felt knowledgeable about this job's expectations, goals, and outcomes"; knowledge06: "I did not have a good understanding of the expectations and goals of the job"; knowledge07: "Important information was accessible and available to me while completing this job"; investment06: "I felt like I invested myself into this job"; investment07: "I feel like I was able to personalize this job"; psyown07: "I felt like this job is uniquely my own"; psyown08: "I feel responsible for my achievements at my job"; and psyown09: "I feel little ownership over my job." This scale contains 32 Likert-type items ranging from Strongly disagree (1) to Strongly agree (7).

Table 3.3 portrays the four subscales of the Brown, Pierce, and Crossley psychological ownership scale and the additional items created with high face validity incorporated into this study. The newly generated Cronbach's alpha coefficients for each item and for the overall scale

are listed on the table next to each item label. Permission to use this scale was obtained by the copyright holder (see Appendix D).

Table 3.3

Scale Items, Sources, and Alphas for the "Brown, Pierce, and Crossley Psychological Ownership Scale"

Route to Psychological ownership	Source	Variable	Scale Items	α
			Experienced Control (C)	.82
Control	Tetrick and LaRocco, 1987	control01	To what extent do you have influence over the things that affect you on the job?	.81
		control02	To what extent do you have influence over the tasks or parts of tasks that you will do?	.80
		control03	To what extent do you influence job-related decisions that will affect you?	.80
		control04	To what extent do you set your own work deadlines?	.80
		control05	To what extent to you control the pace and scheduling of the work that you do?	.80
		control06	In general, to what extent do you have control over your job?	.78
	Morey (2017)	control07	I felt in control of my actions during this job.	.80
		control08	I was able to complete the job the way I wanted to.	.81
		control09	No one controlled me while I completed this job.	.81
			Intimate Knowing (K)	.75
Intimate Knowing	Brown, Pierce, and Crossley, 2014	knowledge01	I am intimately familiar with what is going on with regard to my job.	.70
		knowledge02	I have a depth of knowledge as it relates to the job.	.69

		knowledge03	I have a comprehensive understanding of the work that I am asked to do.	.69
		knowledge04	I have a broad understanding of this job.	.71
	Morey (2017)	knowledge05	I felt knowledgeable about this job's expectations, goals, and outcomes.	.68
		knowledge06	I did not have a good understanding of the expectations and goals of this job. (R)	.82
		knowledge07	Important information was accessible and available to me while completing this job.	.76
			Investment of Self (I)	.87
Investment of Self	Brown, Pierce, and Crossley, 2014	investment01	I have invested a major part of "myself" into this job.	.85
		investment02	I have invested many of my ideas into this job.	.84
		investment03	I have invested a number of my talents into this job.	.84
		investment04	I have invested a significant amount of my life into this job.	.85
		investment05	In general, I have invested a lot in my job.	.84
	Morey (2017)	investment06	I felt like I invested myself into this job.	.84
		investment07	I feel like I was able to personalize this job.	.88
			Job-based Psychological Ownership (P)	.90
Job-based Psychological Ownership	Van Dyne and Pierce, 2004	psyown01	I sense that this job is MINE.	.88
		psyown02	I feel a very high degree of personal ownership for this job.	.88
		psyown03	I sense that this is MY job.	.88
		psyown04	I sense that the work I do as part of my job is MINE.	.87

	psyown05	I feel a very high degree of personal ownership for the work that I do.	.89
	psyown06	The work I do at this job is MINE.	.88
Morey (2017)	psyown07	I feel like this job is uniquely my own.	.88
	psyown08	I feel responsible for my achievements at my job.	.89
	psyown09	I feel little ownership over my job. (R)	.93

Note. This table shows the subscale of experienced control, intimate knowing, self-investment, and job-based psychological ownership that are all part of the "Brown, Pierce, and Crossley psychological ownership scale". Experienced control overall alpha = .82, intimate knowing alpha = .75, self-investment alpha = .87, job-based psychological ownership alpha = .90. Control = exercise of control; knowledge = intimate knowledge; investment = investment of self; psyown = job-based psychological ownership.

Moderating Variables

The moderating variable in this study is composed by the combination of the two independent variables. The combination of a task-contingent reward (reward) with the psychological ownership intervention (pointervention) composed the independent, moderating variable (rewxpsy) and was input into the path analysis to demonstrate the effect of both variables on a subject and the potential moderating effect of psychological ownership on intrinsic motivation. This is a binary variable where receiving "the combination of the task-contingent reward and the psychological ownership intervention = 1" and "not receiving the combination of a task-contingent reward and the psychological ownership intervention = 0."

Mediated Moderation

The causal relationship between the moderator and mediator variables was assessed using a piecemeal approach (Baron & Kenny, 1986). The piecemeal approach analyzes moderation and mediation in piecemeal and then interprets their results jointly (Edwards & Lambert, 2007). By examining the combination of the independent variables and their impact on the mediator and dependent variable the nature and direction of causal relationships will be illustrated (Preacher, Rucker, & Hayes, 2007).

Covariates

Covariates were included in the model to control for the influence of potentially confounding effects with the predictor variables. Each covariate is discussed in turn below.

Gender. Gender (gender) was included because differences in gender have been noted with respect to experimental protocols where subjects receive positive and negative verbal feedback (Deci, 1972). Although feedback was not considered in this study, subjects in each of the experimental groups interacted with the experimenter for a 15-minute planning period or 15-

minute filler activity where the experimenter and subjects discussed the goals of the task, or participate in a filler activity. Gender was controlled and coded as a binary variable where "female = 1" and "male = 0."

Experience with Lego building blocks. Experience with Lego building blocks (legoexp) was included because of the potential for the lack of a priori efficacy and interest to bias some subjects against Legos and to view the experimental activity as not intrinsically interesting. Lego building blocks were chosen as the experimental tool for this study because they demonstrated high a priori base rates of intrinsic interest in previous studies (Feehan & Enzle, 1991). Lack of previous experience, however, may diminish this interest. Subjects rated their past experience with Legos on a Likert scale ranging from "1 = no past experience with Legos" to "7 = a great deal of past experience with Legos."

Figure 3.1 presents a visual summary of the reliability of all multi-item scales used in this study.

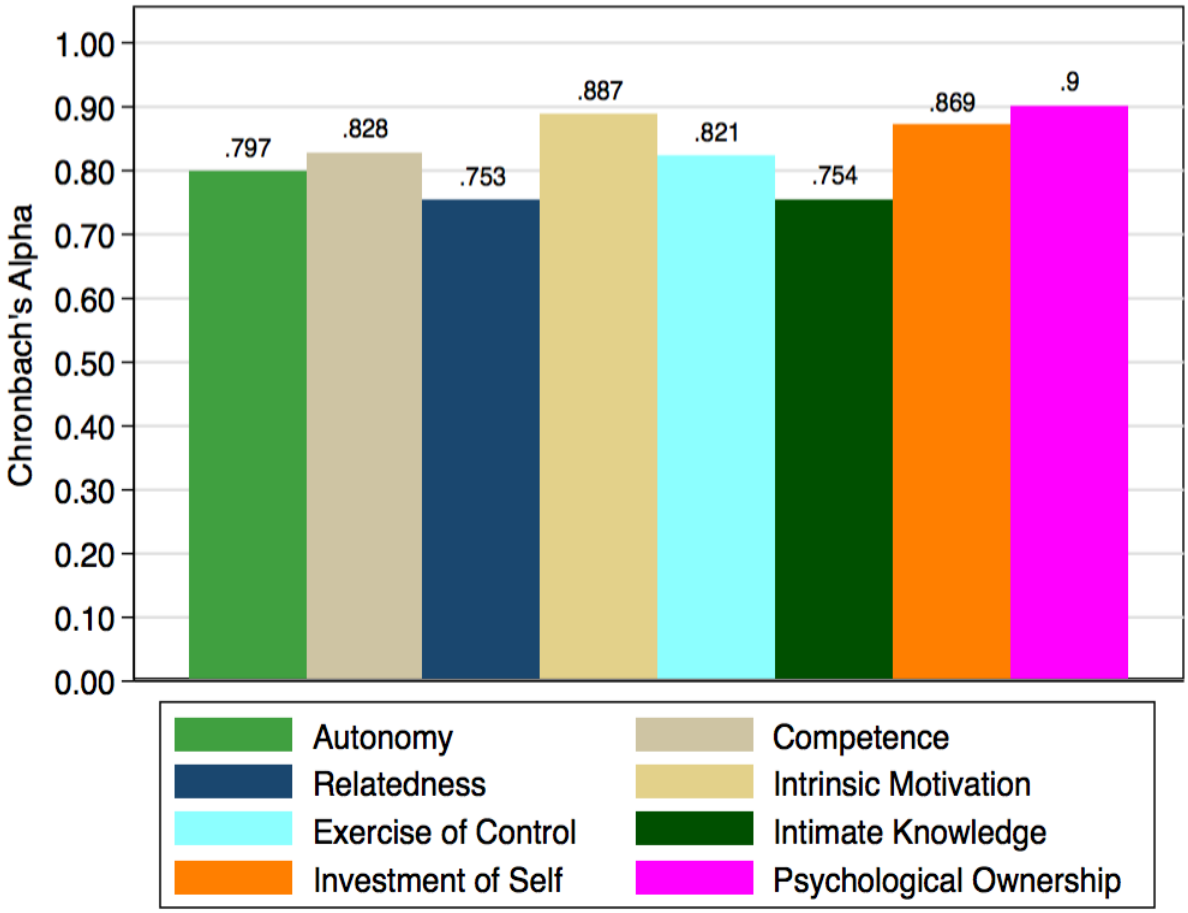

Figure 3.1. Bar graph indicating Cronbach's alpha for multi-items scales within the path model.

Research Design and Data Analysis

Data Analysis

The observational research design employed in this study was path analysis using scaled manifest data collected through an anonymous survey.

Path Analysis. Path analysis was chosen to show the paths between the independent variables, covariate variables, and dependent variables. Using Stata/IC version 14.1, the path model shown in figure 3.2 was estimated with reported standardized path coefficients and was evaluated for goodness of fit based on the proportion of explained variance (R^2) for each of the

endogenous variables as well as for the overall model. The direct, indirect, and total effects from the analysis were then used to test the hypotheses and to control for the direct and indirect effects of the two covariates. The path model further portrays non-causal/spurious effects to differentiate between causal and non-causal relationships between the study's variables. Causal relationships demonstrate a direct relationship between two variables in that one causes the other. Non-causal/spurious effects are a false assumptions where a correlation is demonstrated between two variables; however, one variable does not directly cause the other, but rather a third variable causes both effects. This is demonstrated by calculating the difference between the Pearson correlation coefficient and the total effect coefficient in the path analysis.

After estimating the full model with all the paths shown in Figure 3.2, the initial results were examined and those paths found to be not statistically significant ($p > .05$) were removed from the model in a theory trimming process (Heise, 1969). The trimmed model was then estimated and used as the basis for calculating direct, indirect, and total effects necessary to provide empirically grounded responses to the hypotheses developed for this study. Model trimming is a visual way of demonstrating the statistically significant findings of the study, offering a comparison with the hypothesized model.

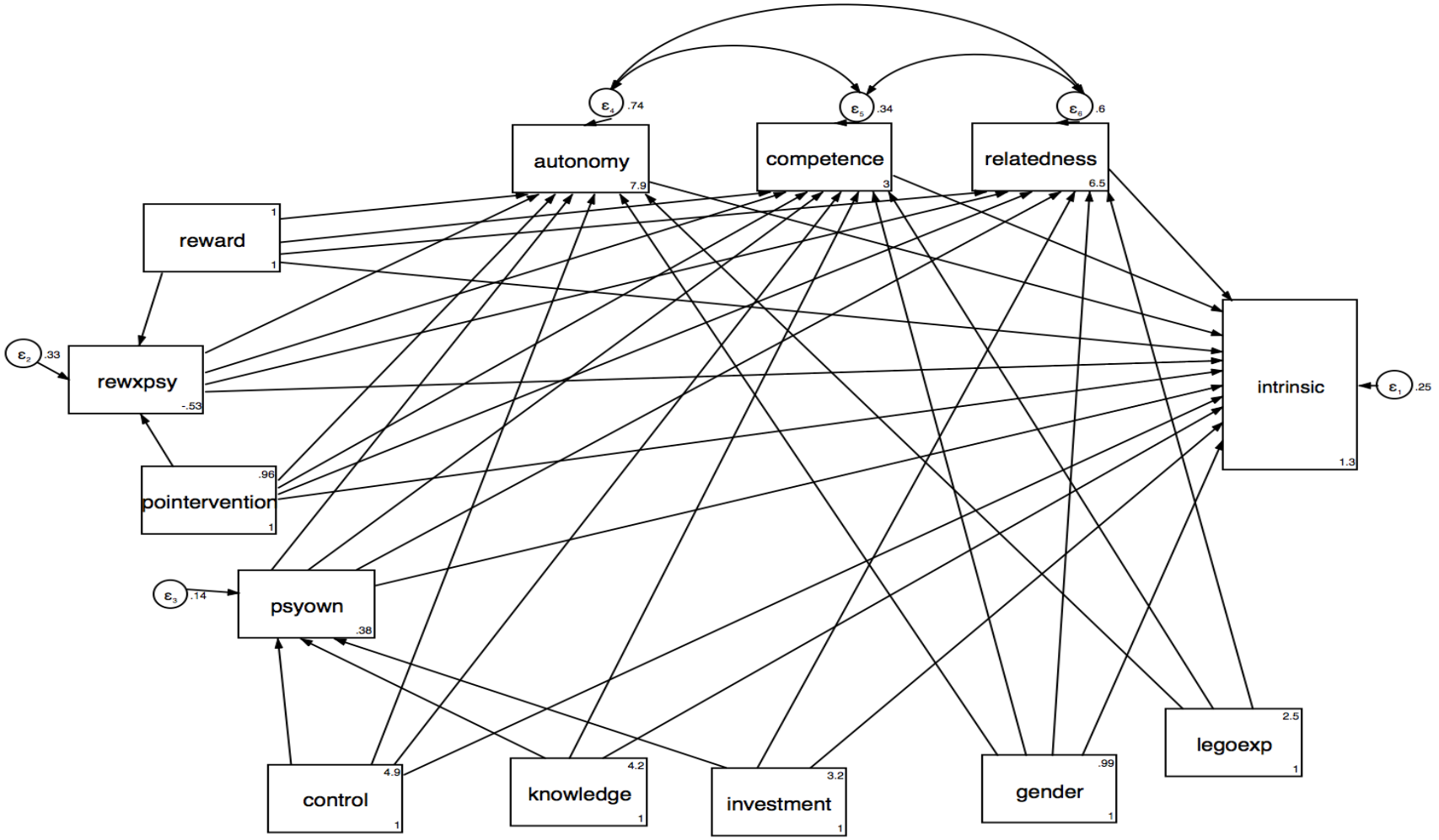

Figure 3.2. Hypothesized operational path model showing the effects of a task-contingent reward on this study's manifest variables, the effects of the manifest variables on each other, the combination of independent variables, and the confounding effects of the covariates gender, and experience with Lego building blocks. Psyown = job-based psychological ownership; pointervention = the psychological ownership intervention; rewxpsy = the combination of a task-contingent reward with psychological ownership.

Experimental Groups

This experiment required four experimental groups. Table 3.3 provides an overview of the experimental groups and their conditions. The first group neither received a task-contingent reward nor the psychological ownership intervention. The second group received a task-contingent reward but no psychological ownership intervention. The third group did not receive a task-contingent reward and received the psychological ownership intervention. The fourth group received a task-contingent reward and received the psychological ownership intervention.

Table 3.4

Experimental and Control Groups

Group	Intervention	Reward
Group 1 (*n* = 37)	No psychological ownership	No task-contingent reward
Group 2 (*n* = 40)	No psychological ownership	Task-Contingent reward
Group 3 (*n* = 37)	Psychological ownership	No task-contingent reward
Group 4 (*n* = 38)	Psychological ownership	Task-Contingent reward

Note. *N* = 152.

The psychological ownership intervention consisted of a planning period before the experiment. This planning period lasted for fifteen minutes. In order to control for this extra period of time that subjects who received the psychological ownership intervention had with the experimenter, a filler activity was presented to the non-psychological intervention groups. This activity aimed to have students emulate the directions read aloud during the psychological ownership intervention without manipulating any of the intervention's targeted variables. The monetary reward for the reward groups was administered in two stages: at the completion of the experimental activity and after completing an exit survey. This follows the Deci (1971) protocol

of administering a reward before a task and Lepper et al. (1973) who demonstrated that anticipated rewards equally undermine intrinsic motivation.

Group assignment. This study aimed to have two classes per experimental condition for a total of eight classes participating in the experiment. An equal number of classes and subjects per condition were recruited for the experiment. Class assignments were randomly determined. Ultimately, group 1 contained 37 subjects, group 2 contained 40 subjects, group 3 contained 37 subjects, and group 4 contained 38 subjects for a total sample size of 152 subjects.

Procedures

After receiving full IRB approval, and after receiving permission from LIU professors to enter their classrooms, the following steps were taken to conduct the experiment and collect data.

Group 1: No Task-Contingent Reward/No Psychological Ownership Intervention

1. At the beginning of class, the professor advised students that a doctoral candidate was making an announcement at the conclusion of class about an experiment opportunity. At the conclusion of class, the professor introduced the researcher as a doctoral candidate looking for students to participate in an experiment directly after class. The professor instructed students that those who were interested in learning more, and possibly participating, should stay in their seats and that the doctoral candidate will begin his introduction after a five minute interval during which time the students could decide whether they would like to listen to the overview or not.
2. The researcher then addressed the students by reviewing the goal of the study, the parameter of the study, and the expected time frame of the study. The researcher said:

> "Hello, my name is Raphael Morey and I am a doctoral candidate in the college of education and I would like to recruit participants for an experiment about motivation to play with Lego building blocks. If you agree to take part in this experiment we will begin

immediately. This experiment should take approximately 40-45 minutes and includes an introduction activity, a Lego building period, and a final survey. A quick debrief will follow when you leave the room at the completion of the experiment. No identifying information will be collected and your identities will remain anonymous. If you would like to participate in this voluntary study please stay in your seats. If you do not want to take part in this anonymous experiment you may leave now and thank you for your time."

3. Adequate time was provided for non-participating students to leave the room. The remaining students were instructed to fill in seats towards the front of the classroom so that all subjects were sitting close to each other to control feelings of exclusion from sitting away from groups of students and to account for the possessive feelings some students develop towards "their" seat in class. Another rationale was that work is typically conducted around other people and not in isolation. Having subjects work individually but in close proximity to each other provided a more authentic feeling for this experiment. The researcher said:

"For all students participating in this experiment please find a desk towards the front of the classroom."

After seats were filled the experimenter introduced the filler activity upon completion of the consent form.

4. The 15-minute filler activity asked subjects to follow directions in order to construct an origami twirling bird (see Appendix A). Subjects completed three consecutive twirling birds, measuring the time it took to fall to the floor from shoulder height after each new construction. Subjects completed the first twirling bird as the researcher read out directions. The second and third birds were completed at their own pace. At the conclusion of the third twirling bird the subjects described their experience with the activity by writing three adjectives and one verb on

an index card. At the conclusion of the 15-minutes, index cards, twirling birds, and consent forms were collected and the study's experiment began. The experimenter directed potential subjects to read the consent form and to sign it if they wished to participate in the experiment. Subjects who decided not to participate in the experiment had the opportunity to leave the room. The experimenter said:

> "When you return back to your seat please read the experiment consent form and, if you choose to participate in the experiment, please sign and date at the bottom of the form. Anyone who wishes to not participate in the experiment may now leave."

After signing the consent form the experimenter walked around the room to collect the forms. After forms were collected, the experimenter said:

> "Before the experiment begins we are going to spend 15 minutes on an activity that I am field testing as a part of a future research project. I will hand out 3 pieces of origami paper, an index card, and a consent form to each of you. The goal of this activity is to build three origami-twirling birds and to measure the time it takes for each bird to fall to the floor after construction. I will read you the directions for folding your first bird. Please follow each step of folding as I read them. At the conclusion of the first origami figure you will stand up and drop the bird from shoulder level, counting in Mississippi seconds (one Mississippi, two Mississippi, etc.) as it falls to the ground. Following the first construction, everyone will individually repeat the process twice more. Following the third bird, retrieve your index card and write 3 adjectives and 1 verb on it that describes your experience during the activity. I will have a timer on the desk that shows the time remaining in this activity."

The experimenter read the origami instructions while standing in the front of the room and offered no individual instruction or advice to subjects during the activity but reread instructions if asked to do so. After reading the directions, the experimenter sat in the front of the room, set the countdown clock (Digi-Sense Giant-Digit Countdown Digital Timer) for 15 minutes and took a book out to occupy his time. The experimenter kept track of time elapsed and give a 2-minute warning and then a 30-second warning for completion of the origami activity. At the conclusion of the 15-minute filler activity, the experimenter collected twirling birds and index cards from the subjects before beginning the Lego building block activity.

5. Each of the subjects was instructed to retrieve a Lego building set from the front of the room but to not open the set until further instructions were read:

> "Please collect a Lego building set from the front of the classroom and take it back to your seat. Please do not open the building set until directed to do so."

The Lego building sets used for this experiment contained assorted Lego pieces of various shapes and sizes and in enough quantity to allow for a large object to be constructed (see Appendix E). The Lego building set was specifically unrelated to an established Lego design to provide an extra level of difficulty in designing a Lego house.

6. The researcher then began the experiment. The researcher said:

> "I will now read the directions for the experiment. Upon completion of these instructions I will leave the room. The clock on the front desk will show you the time remaining in the experiment. When I say to begin you will build a house using as many of the Legos at your disposal as possible. You will have 15 minutes to build your house. After the building period, a research assistant will come back into the room with a brief survey for you to take and to assess your finished product. You can now begin the experiment."

7. The researcher will leave the room and close the door. When the door is closed, the researcher will set a countdown clock for 15 minutes.

8. At the completion of the experimental period, a research assistant entered the room to administer the survey. The researcher did not interact with the subjects during the survey to avoid bias. The research assistant said:

> "Hello, my name is [insert name of assistant] and I am Mr. Morey's research assistant. Mr. Morey asked me to have you fill out this survey regarding your experience during this activity. Please read through the introduction and then complete the questions on the following pages. When you are completed with the survey, please come up to the front of the room, hand me your survey and place your Lego house on the desk. When you leave the room, Mr. Morey will be in the hall to provide you with a quick debriefing."

9. The research assistant visually inspected each Lego house before handing over a survey saying to the subject:

> "Thank you, here is a survey to fill out".

The research assistant sat at the front of the classroom by a table and collected surveys upon completion. The research assistant checked that the consent form was signed and, if not, directed the subject to sign it if they agreed to have their data included in the study. The research assistant directed the subject to deposit their Lego house onto the table and thanked subjects saying:

> "Thank you for your participation, you may now leave to meet Mr. Morey in the hall for your debriefing."

10. The researcher was stationed outside of the classroom with a debriefing paper (see Appendix I) for each subject explaining the overall goal of the study, their role within the study as

experimental group 1, and an explanation for why they did not receive a monetary reward for completion of the building task although the other experimental groups did receive the reward. To ensure fairness between subjects, control group participants received a gift card as compensation for their participation.

Group 2: Task-Contingent Reward/No Psychological Ownership Intervention

1. At the beginning of class, the professor advised students that a doctoral candidate would make an announcement at the conclusion of class about a paid experiment opportunity. At the conclusion of class, the professor introduced the researcher as a doctoral candidate looking for students to participate in a paid experiment directly after class. The professor instructed students that those who are interested in learning more, and possibly participating, should stay in their seats and that the doctoral candidate will begin his introduction after a five minute interval during which time the students could decide whether they would like to listen to the overview or not.

2. After five minutes, the researcher addressed the students by reviewing the goal of the study, the parameters of the study, the reward for taking part in the study, and the expected time frame of the study. The researcher said:

> "Hello, my name is Raphael Morey and I am a doctoral candidate in the college of education and I would like to recruit participants for an experiment about motivation to play with Lego building blocks. If you agree to take part in this experiment we will begin immediately. This experiment should take approximately 40-45 minutes and includes an introduction activity, a building period, and a final survey. The experiment includes up to a $10 reward for building a Lego structure and will be paid out in two phases: once after you successfully build your Lego house and once at the conclusion of the survey.

> Receiving the reward is contingent on your completion of the task. No identifying information will be collected and your identities will remain anonymous. If you would like to participate in this voluntary study, please stay in your seats. If you do not want to take part in this anonymous, paid experiment you may leave now and thank you for your time."

3. Adequate time was provided for non-participating students to leave the room. The remaining students were instructed to fill in seats towards the front of the classroom so that all subjects were sitting close to each other to control feelings of exclusion from sitting away from groups of students and to account for the possessive feelings some students develop towards "their" seat in class. Another rationale was that work is typically conducted around other people and not in isolation. Having subjects work individually but in close proximity to each other provided a more authentic feeling for this experiment. The researcher said:

> "For all students participating in this experiment please find a desk towards the front of the classroom."

After seats were filled the experimenter introduced the filler activity upon completion of the consent form.

4. The 15-minute filler activity asked subjects to follow directions in order to construct an origami twirling bird (see Appendix A). Subjects completed three consecutive twirling birds, measuring the time it took to fall to the floor from shoulder height after each new construction. Subjects completed the first twirling bird as the researcher read out directions. The second and third birds were completed at their own pace. At the conclusion of the third twirling bird the subjects described their experience with the activity by writing three adjectives and one verb on an index card. At the conclusion of the 15-minutes, index cards, twirling birds, and consent

forms were collected and the study's experiment began. The experimenter directed potential subjects to read the consent form and to sign it if they wished to participate in the experiment. Subjects who decided not to participate in the experiment had the opportunity to leave the room. The experimenter said:

> "When you return back to your seat please read the experiment consent form and, if you choose to participate in the experiment, please sign and date at the bottom of the form. Anyone who wishes to not participate in the experiment may now leave."

After signing the consent form the experimenter walked around the room to collect the forms. After forms were collected, the experimenter said:

> "Before the experiment begins we are going to spend 15 minutes on an activity that I am field testing as a part of a future research project. I will hand out 3 pieces of origami paper, an index card, and a consent form to each of you. The goal of this activity is to build three origami-twirling birds and to measure the time it takes for each bird to fall to the floor after construction. I will read you the directions for folding your first bird. Please follow each step of folding as I read them. At the conclusion of the first origami figure you will stand up and drop the bird from shoulder level, counting in Mississippi seconds (one Mississippi, two Mississippi, etc.) as it falls to the ground. Following the first construction, everyone will individually repeat the process twice more. Following the third bird, retrieve your index card and write 3 adjectives and 1 verb on it that describes your experience during the activity. I will have a timer on the desk that shows the time remaining in this activity."

The experimenter read the origami instructions while standing in the front of the room and offered no individual instruction or advice to subjects during the activity but reread instructions

if asked to do so. After reading the directions, the experimenter sat in the front of the room, set the countdown clock (Digi-Sense Giant-Digit Countdown Digital Timer) for 15 minutes, and took a book out to occupy his time. The experimenter kept track of time elapsed and gave a 2-minute warning and then a 30-second warning for completion of the origami activity. At the conclusion of the 15-minute filler activity, the experimenter collected twirling birds and index cards from the subjects before beginning the Lego building block activity.

5. Each of the subjects was instructed to retrieve a Lego building set from the front of the room but to not open the set until further instructions were read:

> "Please collect a Lego building set from the front of the classroom and take it back to your seat. Please do not open the building set until directed to do so."

The Lego building sets used for this experiment contained assorted Lego pieces of various shapes and sizes and in enough quantity to allow for a large object to be constructed (see Appendix E). The Lego building set specifically was unrelated to an established Lego design to provide an extra level of difficulty in designing a Lego house.

6. The researcher then began the experiment. The researcher said:

> "I will now read the directions for the experiment. Upon completion of these instructions I will leave the room and reenter when your time is up. The clock on the front desk will show you the time remaining in the experiment. When I say to begin you will build a house using as many of the Legos at your disposal as possible. Only if you build a house successfully within 15-minutes will you receive your cash reward [holds up a stack of $5 bills]. You must build a house using as many pieces of Legos as possible to receive the cash reward. Receiving the reward is contingent on your completion of the task. After

the building period, I will come back into the room with a brief survey for you to take before I assess your finished product. You can now begin the experiment."

7. The researcher left the room and closed the door. When the door was closed, the researcher set a countdown clock for 15 minutes.

8. At the completion of the experimental period, the researcher and a research assistant entered the room to administer the first round of cash rewards. The researcher introduced the researcher assistant:

"This is Ms. S and she will help me in evaluating your Lego houses."

The two people walked to each subject and visually inspected their Lego house and said:

"Here is your task-contingent reward for completing your Lego house."

The researcher then said to the subjects:

"I am leaving the room momentarily; my research assistant will now distribute a brief survey for you to take."

The researcher left the room during the survey to avoid bias. The research assistant said:

"Hello, my name is [insert name of assistant] and I am Mr. Morey's research assistant. I will now distribute a brief survey for you to complete regarding your experience during this activity. Please read through the introduction and then complete the questions on the following pages. When you have completed the survey, please come up to the front of the room, hand me your survey, deposit your Lego house and information folder, and collect your remaining $5 reward. The final step will be to sign the top of your consent form upon reception of the $5 reward."

9. The research assistant sat at the front of the classroom by a table and collected surveys upon completion. The research assistant checked that the consent form was signed, and if it was not

asked the subject to sign the consent form. The research assistant directed the subjects to deposit their Lego house onto the table and to take a $5 bill as a reward.

10. After handing each subject the remaining $5 bill the research assistant said:

"Thank you for your participation, you may now leave."

Group 3: No Task-Contingent Reward/Psychological Ownership Intervention

1. At the beginning of class, the professor advised students that a doctoral candidate would make an announcement at the conclusion of class about an experiment opportunity. At the conclusion of class, the professor introduced the researcher as a doctoral candidate looking for students to participate in an experiment directly after class. The professor instructed students that those who were interested in learning more, and possibly participating, should stay in their seats and that the doctoral candidate would begin his introduction after a five minute interval during which time the students could decide whether they would like to listen to the overview or not.

2. The researcher addressed the students by reviewing the goal of the study, the parameter of the study, and the expected time frame of the study. The researcher said:

"Hello, my name is Raphael Morey and I am a doctoral candidate in the college of education and I would like to recruit participants for an experiment about motivation to play with Lego building blocks. If you agree to take part in this experiment we will begin immediately. This experiment should take approximately 40 to 45-minutes and includes a planning period, a building period, and a final survey. A quick debrief will follow when you leave the room at the completion of the experiment. No identifying information will be collected and your identities will remain anonymous. If you would like to participate in this voluntary study please stay in your seats. If you do not want to take part in this anonymous experiment you may leave now and thank you for your time."

3. Adequate time was provided for non-participating students to leave the room. The remaining students were instructed to fill in seats towards the front of the classroom so that all subjects are sitting close to each other to control feelings of exclusion from sitting away from groups of students and to account for the possessive feelings some students develop towards "their" seat in class. Another rationale was that work is typically conducted around other people and not in isolation. Having subjects work individually but in close proximity to each other provided a more authentic feeling for this experiment. The researcher said:

> "For all students participating in this experiment please find a desk towards the front of the classroom."

After seats were filled the experiment began upon completion of the consent form.

4. Each of the subjects was instructed to retrieve a Lego building set and information folder from the front of the room but to not open the set until further instructions were read:

> "Please collect a Lego building set and information folder from the front of the classroom and take it back to your seat. Please do not open the building set until directed to do so."

The Lego building sets used for this experiment contained assorted Lego pieces of various shapes and sizes and in enough quantity to allow for a large object to be constructed (see Appendix E). The Lego building set specifically was unrelated to an established Lego design to provide an extra level of difficulty in designing a Lego house. The information folder had a copy of the experiment consent form (see Appendix F) stapled to its front, contained a piece of grid paper with lines drawn to enumerate the specific Lego pieces used (see Appendix G), and a guide with bullet points reviewing what to do during the planning period (see Appendix H). The experimenter directed potential subjects to read the consent form and to sign it if they wished to

participate in the experiment. Subjects who decided not to participate in the experiment had the opportunity to leave the room. The experimenter said:

> "When you return back to your seat please read the experiment consent form and, if you choose to participate in the experiment, please sign and date at the bottom of the form. Please leave the consent form stapled to your folder. Anyone who wishes to not participate in the experiment may now leave."

After signing the consent form the students left it stapled to the folder.

5. Subjects sat down with their Lego building sets and information folders and the experimenter began the psychological ownership intervention. The researcher said:

> "I will now review the goals of this experiment. The goal is to create a house out of Lego building blocks using as many of the Legos at your disposal as possible. You will have 15 minutes to complete this task.
>
> Before the experiment begins, you will have an opportunity to plan how you will build your house. You are in complete control of how you design the house, however the house should incorporate as many of the Lego pieces in your bag as possible. This planning stage aims at providing you with a deep understanding of how to use Legos and what tools you have at your disposal.
>
> I will now review the step for the planning period. You may follow along by reading the planning period guide located in your folder. To plan how you will build your house, I am going to ask you to draw a diagram on the piece of grid paper located in your folder. Imagine that each square on the grid paper equals one Lego square. Please draw an approximate model displaying what your house will look like and how many, and what kind, of specific Lego pieces will be used. Please provide an approximate

count of how many pieces of each building block you will use. Finally, I encourage you to personalize your house by investing yourself into the design of your house through one specific feature. By investing yourself, I encourage you to let me see a little bit of your personality and creativity in your design in one specific way. On your planning paper please draw an arrow to the area of your house that reflects your personalization.

Each one of these steps will help you build your Lego house; remember though that you are in control of how you design a Lego house. You will now have 15-minutes to plan how you will build your Lego house. Please begin."

6. During the planning phase of the experiment, the researcher sat in the front of the classroom and had a book open, occupying his time while the subjects plan. The researcher stayed in the room during this time in case questions arose regarding the parameters of the experiment, or specific instructions for the planning time and did so in order to be a source of extra information. The researcher did not provide advice though about the building plans of subjects. The researcher kept track of time elapsed and gave a 2-minute warning and then a 30-second warning for completion of the planning time. During this time, the researcher placed a large countdown clock (Digi-Sense Giant-Digit Countdown Digital Timer) on the front desk for use during the experiment. Upon completion of the planning phase the researcher said:

"Please place all Lego building blocks back into their container and dismantle any objects you have built. You may keep any drawings or diagrams out on your desk."

7. The researcher then began the experiment. The researcher said:

"I will now read the directions for the experiment. Upon completion of these instructions I will leave the room. The clock on the front desk will show you the time remaining in the experiment. When I say to begin you will build a house using as many of the Legos

pieces as possible. You will have 15 minutes to build your house. After the building period, a research assistant will come back into the room with a brief survey for you to take and to assess your finished product. You can now begin the experiment."

8. The researcher left the room and closed the door. When the door was closed, the researcher set a countdown clock for 15 minutes.

9. At the completion of the experimental period, a research assistant entered the room to administer the survey. The researcher did not interact with the subjects during the survey to avoid bias. The research assistant said:

"Hello, my name is [insert name of assistant] and I am Mr. Morey's research assistant. Mr. Morey asked me to have you fill out this survey regarding your experience during this activity. Please read through the introduction and then complete the questions on the following pages. When you are completed with the survey, please come up to the front of the room, hand me your survey, information folder, and place your Lego house on the desk. When you leave the room, Mr. Morey will be in the hall to provide you with a quick debriefing."

10. The research assistant visually inspected each Lego house before handing over a survey saying to the subjects:

"Thank you, here is a survey to fill out".

The research assistant sat at the front of the classroom by a table and collected surveys upon completion. The research assistant checked that the consent form was signed and if not directed the subjects to sign it. The research assistant directed the subjects to deposit their Lego house onto the table and thanked each subject saying:

> "Thank you for your participation, you may now leave to meet Mr. Morey in the hall for your debriefing."

11. The researcher was stationed outside of the classroom with a debriefing paper (see Appendix I) for each subject explaining the overall goal of the study, their role within the study, and an explanation for why they did not receive a monetary reward for completion of the building task although other groups did receive the reward. To ensure fairness between subjects, these participants received a gift card as compensation for their participation.

Group 4- Task-Contingent Reward/Psychological Ownership Intervention

1. At the beginning of class, the professor advised students that a doctoral candidate would make an announcement at the conclusion of class about a paid experiment opportunity. At the conclusion of class, the professor introduced the researcher as a doctoral candidate looking for students to participate in a paid experiment directly after class. The professor instructed students that those who were interested in learning more, and possibly participating, should stay in their seats and that the doctoral candidate will begin his introduction after a five minute interval during which time the students could decide whether they would like to listen to the overview or not.

2. After five minutes, the researcher then addressed the students by reviewing the goal of the study, the parameters of the study, the incentive for taking part in the study, and the expected time frame of the study. The researcher said:

> "Hello, my name is Raphael Morey and I am a doctoral candidate in the college of education and I would like to recruit participants for an experiment about motivation to play with Lego building blocks. If you agree to take part in this experiment we will begin immediately. This experiment should take approximately 40-45 minutes and includes a

planning period, a building period, and a final survey. The experiment includes up to a $10 reward for building a Lego structure and will be paid out in two phases: once after you successfully build your Lego house and once at the conclusion of the survey. No identifying information will be collected and your identities will remain anonymous. If you would like to participate in this voluntary study, please stay in your seats. If you do not want to take part in this anonymous, paid experiment you may leave now and thank you for your time."

3. Adequate time was provided for non-participating students to leave the room. The remaining students were instructed to fill in seats towards the front of the classroom so that all subjects were sitting close to one another to control feelings of exclusion from sitting away from groups of students and to account for the possessive feelings some students develop towards "their" seat in class. Another rationale is that work is typically conducted around other people and not in isolation. Having subjects work individually but in close proximity to each other provided a more authentic feeling to this experiment. The researcher said:

"For all students participating in this paid experiment please find a desk towards the front of the classroom."

After seats were filled the experiment began upon completion of the consent form.

4. Each of the subjects were instructed to retrieve a Lego building set and information folder from the front of the room but to not open the set until further instructions were read:

"Please collect a Lego building set and information folder from the front of the classroom and take it back to your seat. Please do not open the building set until directed to do so."

The Lego building sets used for this experiment contained assorted Lego pieces of various shapes and sizes and in enough quantity to allow for a large object to be constructed (see

Appendix E). The Lego building set specifically was unrelated to an established Lego design to provide an extra level of difficulty in designing a Lego house. The information folder had a copy of the experiment consent form (see Appendix F) stapled to its front, contained a piece of grid paper with lines drawn to enumerate the specific Lego pieces used (see Appendix G), and a guide with bullet points reviewing what to do during the planning period (see Appendix H). The experimenter directed potential subjects to read the consent form and to sign it if they wished to participate in the experiment. Subjects who decided not to participate in the experiment had the opportunity to leave the room. The experimenter said:

> "When you return back to your seat please read the experiment consent form and, if you choose to participate in the experiment, please sign and date at the bottom of the form. Please leave the consent form stapled to your folder, as we will return to it later. Anyone who wishes to not participate in the experiment may now leave."

After signing the consent form, the students' left it stapled to the folder. After the experiment, when students received the final installment of their reward, they indicated reception by signing the top of the consent form.

5. Subjects sat down with their Lego building sets and information folders and the experimenter began the psychological ownership intervention. The researcher said:

> "I will now review the goals of this experiment. The goal is to create a house out of Lego building blocks using as many of the Legos at your disposal as possible. You will have 15-minutes to complete this task. If your house meets these criteria you will receive a $5 dollar bill for completion of your house and another $5 bill after you complete a brief survey at the conclusion of the experiment. Receiving the reward is contingent on your completion of the task.

Before the experiment begins, you will have an opportunity to plan how you will build your house. You are in complete control of how you design the house, however the house should incorporate as many Lego pieces as possible. This planning stage aims at providing you with a deep understanding of how to use Legos and what tools you have at your disposal.

I will now review the steps for the planning period. You may follow along by reading the planning period guide located in your folder. To plan how you will build your house, I am going to ask you to draw a diagram on the piece of grid paper located in your folder. Imagine that each square on the grid paper equals one Lego square. Please draw an approximate model displaying what your house will look like and how many, and what kind, of specific Lego pieces will be used. Please provide an approximate count of how many pieces of each building block you will use. Finally, I encourage you to personalize your house by investing yourself into the design of your house through one specific feature. By investing yourself, I encourage you to let me see a little bit of your personality and creativity in your design in one specific way. On your planning paper please draw an arrow to the area of your house that reflects your personalization.

Each one of these steps will help you build your Lego house; remember though that you are in control of how you design a Lego house. You will now have 15-minutes to plan how you will build your Lego house. Please begin."

6. During the planning phase of the experiment, the researcher sat in the front of the classroom and had a book open, occupying his time while the subjects planed. The researcher stayed in the room during this time in case questions arose regarding the parameters of the experiment, or specific instructions for planning time and did so in order to be a source of extra information.

The researcher did not provide advice though about the building plans of subjects. The researcher kept track of time elapsed and gave a 2-minute warning and then a 30-second warning for completion of the planning time. During this time, the researcher placed a large countdown clock (Digi-Sense Giant-Digit Countdown Digital Timer) on the front desk for use during the experiment. Upon completion of the planning phase the researcher said:

> "Please place all Lego building blocks back into their container and dismantle any objects you have built. You may keep any drawings or diagrams out on your desk."

7. The researcher then began the experiment. The researcher said:

> "I will now read the directions for the experiment. Upon completion of these instructions I will leave the room and reenter when your time is up. The clock on the front desk will show you the time remaining in the experiment. When I say to begin you will build a house using as many pieces of Legos as possible. Only if you build a house successfully within 15-minutes will you receive your cash reward [holds up a stack of $5 bills]. You must build a house using as many pieces of Legos as possible to receive the cash reward. Receiving the reward is contingent on your completion of the task. After the building period, I will come back into the room with a brief survey for you to take before I assess your finished product. You can now begin the experiment."

8. The researcher left the room and closed the door. When the door was closed, the researcher set a countdown clock for 15 minutes.

9. At the completion of the experimental period, the researcher and a research assistant entered the room to administer the first round of cash rewards. The researcher introduced the researcher assistant:

> "This is Ms. S and she will help me in evaluating your Lego houses."

The two people walked to each subject and visually inspected their Lego house and said:

> "Here is your task-contingent reward for completing your Lego house."

The researcher then said to the subjects:

> "I am leaving the room momentarily; my research assistant will now distribute a brief survey for you to take."

The researcher left the room during the survey to avoid bias. The research assistant said:

> "Hello, my name is [insert name of assistant] and I am Mr. Morey's research assistant. I will now distribute a brief survey for you to complete regarding your experience during this activity. Please read through the introduction and then complete the questions on the following pages. When you have completed the survey, please come up to the front of the room, hand me your survey, deposit your Lego house and information folder, and collect your remaining $5 reward. The final step will be to sign the top of your consent form upon reception of the $5 reward."

10. The research assistant sat at the front of the classroom by a table and collected surveys upon completion. The research assistant checked that the consent form was signed, and if it was not asked the subject to sign the consent form. The research assistant directed the subjects to deposit their Lego house onto the table and to take a $5 bill as a reward.

11. After handing each subject the remaining $5 bill the research assistant said:

> "Thank you for your participation, you may now leave."

Theoretical rationale for experimental protocol

The experiment script provided specific directions using language identified in the literature related to the development of psychological ownership feelings. Table 3.4 portrays the script language and its theoretical foundations.

Table 3.5

Theoretical Rationale for Experimental Protocol

Routes to psychological ownership over an object	Object characteristics	Operationalized in experiment script
Control over the object	Openness	"You are in complete control of how you design the house, however the house should incorporate as many Lego pieces as possible." "I am going to ask you to draw a diagram on the piece of grid paper." "Each one of these steps will help you build your Lego house; remember though that you are in control of how you design a Lego house."
	Attractiveness	Feehan and Enzle (1991) high a priori intrinsic interest in Lego building blocks.
Intimate knowledge of the object	Visibility	Lego pieces are presented in a clear plastic bag. "List how many, and what kind, of specific Lego pieces will be used."
	Availability	"A successfully constructed Lego house will incorporate as many of the Legos pieces as possible."
	Accessibility	"This planning stage aims at providing you with a deep understanding of how to use Legos and what tools you have at your disposal."
Investment of self into the object	Manipulability	"I encourage you to personalize your house by investing yourself into the design of your house through one specific feature. By investing yourself, I encourage you to let me see a little bit of your personality and creativity in your design in one specific way." "On your planning paper please draw an arrow to the area of your house that reflects your personalization."

Ethical Considerations and Human Subjects Protection

Ethical concerns were afforded serious consideration and attention in this study and every effort was taken to assure the ethical integrity of this research. A full and complete explanation of the purpose of this study was provided to all participants in the introductory letter who were also provided the email address of the researcher and invited to contact the researcher with any questions or concerns at the completion of the experiment. The survey was voluntary and anonymous. No identifying information was collected and no participant's identity was at risk of exposure. This study did not pose any known or anticipated risks to the participants. The proposed study was reviewed by the executive staff of the Long Island University Post Institutional Review Board to determine whether the study meets its standards for human subject protection and was approved for completion.

Methodological Limitations

The study's primary limitation derived from its reliance on a non-random, voluntary, convenience sample. The nature of the sample, which was further limited to a private university in a specific region of New York State, limits the generalizability (e.g., external validity) of the study's findings. Although not generalizable, the results of this experiment provided a basis of empirical evidence that can be transferable to other groups and influence the performance pay debate. Future research can extend the research to larger, more random populations to further examine this study's hypotheses.

Another limitation was the time provided to subjects during the experiment. Pierce et al. (2001) described a key component to the development of psychological ownership as the investment of time. No research has been conducted into how much specific time must be spent with an object before psychological ownership feelings develop, so in one sense this study will

address this gap in the literature; however, methodologically, subjects may not be provided adequate time for strong psychological ownership feelings to develop. The experiment did provide for all three psychological ownership routes at once, though, that may have a positive, more immediate impact towards its development. Although time is a limitation, if this study's experiment was able to manipulate the routes to psychological ownership effectively, the results may suggest that time is not as important a factor for its development as explicitly promoting the three routes.

Another limitation is the object characteristic of attractiveness. Jusilla et al. (2015) explained that a person must find an object of psychological ownership attractive if a relationship will develop. Attractiveness was operationalized in this study by asking subjects to participate in a Lego building block activity. Feehan and Enzle (1991) explained that Lego building block manipulation is a task that subjects are naturally intrinsically motivated to engage in. The concept of attraction and the concept of interesting are similar and may have led to an overlap where subjects experienced increased psychological ownership and intrinsic motivation as a result of the Lego building blocks rather than the experimental design. Although an overlap in the methodology, the similarity between the two variables is unavoidable considering that a person will typically be attracted to activities that are interesting and enjoyable and thus intrinsically motivating versus an activity that is unattractive and prone to be less interesting and enjoyable.

Despite these methodological and theoretical limitations, the study aimed to recruit a variety of participants and provide empirical evidence that will be sufficient to develop empirically grounded hypotheses, to conduct preliminary tests of those hypotheses with a

relatively large convenience sample, and to contribute to the empirical literature of psychological ownership theory and self-determination theory.

Expected Benefits and Contributions of the Study

The empirically grounded and tested hypotheses generated as a result of this study will provide important new insights about teacher motivation and compensation policy. If psychological ownership feelings serve as a moderator between task-contingent rewards and intrinsic motivation, then teacher performance pay could have a roll in teacher compensation policies provided that teachers are allowed to exercise control over their job, develop intimate knowledge of their job, and self-invest in their job. Alternatively, if psychological ownership is not an effective moderator and the undermining effect persists, performance pay practices may be inadvisable even if teachers are given the opportunity to develop strong psychological ownership feelings. This study's findings will provide empirical evidence that can be introduced into the teacher performance pay debate.

This study further contributes to the research methodology in the area of psychological ownership theory and self-determination theory. Psychological ownership theory has yet to be assessed in a laboratory experimental design so this study's Lego building block activity provides a new method of building psychological ownership feelings during an experiment instead of relying on self-reports of preexisting levels of psychological ownership within an organization. This study also contributes to the self-determination theory literature by providing further validation for the intrinsic motivation inventory scale as a primary measurement of both intrinsic motivation and its component variables instead of relying on a post-experiment free-choice period that is not a valid or reliable measurement of intrinsic motivation (Eisenberger et al., 1999).

This study also contributes to the extant body of literature of psychological ownership theory and self-determination theory by providing empirical evidence linking psychological ownership theory with self-determination theory and by proposing a reconciliation of operative conditioning with self-determination branches of motivation psychology.

The results and conclusions of this study also contribute to improvements in education policy, leadership, and practice on a federal, state, and local level by providing empirical evidence about the nature of teacher motivation, psychological ownership, workplace environment, and compensation.

CHAPTER IV: RESULTS

Chapter I introduced the undermining effect, performance pay, and psychological ownership, and chapter II reviewed the extant literature on self-determination theory and psychological ownership theory. Chapter III described the participants, research design, methods, and experimental protocols in the current study. The purpose of this chapter is to report the findings of this study in terms of the effects of a task-contingent reward, the psychological ownership intervention, and the combination of the two, on autonomy, competence, relatedness, and intrinsic motivation for an interesting task.

This chapter is structured to provide insight into the most important results generated by each of the statistical analyses. To achieve this, an overview of important findings is presented at the beginning of each section followed by a more in-depth description of the results.

This chapter begins with descriptive analyses of the key endogenous variables. It then discusses the zero-order correlations between the study's dependent variables (intrinsic motivation, autonomy, competence, relatedness, and job-based psychological ownership) and their hypothesized exogenous variables and covariates. Those descriptive and comparative analyses provide a foundation for analyzing the results of this study's path analyses.

This chapter then presents the standardized path coefficients and effects found in the estimation of the full path model (see Figure 3.1). It goes on to discuss the causal and non-causal effects produced by that model. The results of the estimates in the full model are then used to create a theory-trimmed path model that only keeps statistically significant relationships in the full model. The trimmed model is then used to identify the remaining causal and non-causal effects after model trimming.

The final section of this chapter employs the findings from the full path model and the trimmed path model in testing the hypotheses stated in Chapter III.

Descriptions of Selected Endogenous Variables

This section provides descriptive statistics for four key dependent variables in the study. It then presents the results of a two-way factorial ANOVA of each of the key dependent variables and each of the independent variables. In the tables below, the term "constant" represents the mean scores of subjects who did not receive a task-contingent reward, the psychological ownership intervention, or the combination of the two. This group will be referred to as the "control group".

Statistically significant ANOVA results suggest that the variable measured has a distinct impact on the subjects who received it because there is greater variance within the experimental group than between the experimental groups.

Intrinsic Motivation

Overview of univariate statistics. Mean intrinsic motivation scores were highest for subjects who received the psychological ownership intervention. Subjects who received the task-contingent reward experienced intrinsic motivation to a lesser extent; however, felt greater motivation for the task than subjects who did not receive the reward or the intervention. Subjects who received the combination of the task-contingent reward and the psychological ownership intervention had the lowest mean intrinsic motivation scores.

Interest/Enjoyment subscale of the intrinsic motivation inventory (intrinsic). The overall mean of intrinsic motivation (intrinsic) for all subjects is 5.66 (SD = 1.06) on a scale ranging from 2.45 to 7 (25^{th} percentile = 4.81, Mdn = 5.81, 75^{th} percentile = 6.63). Table 4.1 shows the mean intrinsic motivation scores of subjects by each of the experimental conditions.

Table 4.1

Mean Intrinsic Motivation Score and SD by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Variable	*Mean*	*S.D.*
reward	5.70	1.00
pointervention	6.14	0.75
rewxpsy	5.37	1.31
Constant	5.46	0.97

Note. Constant = intrinsic motivation of subjects who received no reward and no intervention.

The results show that subjects who received a task-contingent reward have a mean intrinsic score of 5.70 (*SD* = 1.00) on a scale ranging from 2.63 to 7. Subjects who received the psychological ownership intervention have a mean intrinsic score of 6.14 (*SD* = 0.75) on a scale ranging from 4.54 to 7. Subjects who received both a task-contingent reward and the psychological ownership intervention have a mean intrinsic score of 5.37 (*SD* = 1.31) on a scale ranging from 2.45 to 7. Subjects who received neither a task-contingent reward nor the psychological ownership intervention have a mean intrinsic score of 5.45 (*SD* = 0.97) on a scale ranging from 3.36 to 7.

The results of a two-way factorial ANOVA of intrinsic motivation by task-contingent reward, the psychological ownership intervention, and the combination of a task-contingent reward with the psychological ownership intervention shown in Table 4.2 indicates that the main effect of the psychological ownership intervention, $F_{(df=1,\ 150)} = 8.17$, $p = .004$, and the main effect of the combination of a task-contingent reward with the psychological ownership intervention, $F_{(df=1,\ 150)} = 9.16$, $p = .002$, are statistically significant but that the main effect of a task-contingent reward is not.

Table 4.2

Factorial ANOVA of Intrinsic Motivation by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Source	*Partial SS*	*df*	*MS*	*F*	*P*
Model	13.43	3	4.48	4.21	.007
reward	1.11	1	1.11	1.05	.308
pointervention	8.69	1	8.69	8.17	.005
rewxpsy	9.74	1	9.74	9.16	.003
residual	156.41	147	1.06		
Total	169.84	150	1.13		

Note. *R2* = .070. Adjusted *R 2*= .060.

Autonomy

Overview of univariate statistics. Mean autonomy scores were highest for subjects who received the psychological ownership intervention, although just slightly higher than the autonomy scores of subjects who received the combination of the task-contingent reward with the psychological ownership intervention. Subjects who received the task-contingent reward experienced the least autonomy during the experiment.

Autonomy subscale of the intrinsic motivation inventory (autonomy). The overall mean of autonomy (autonomy) for all subjects is 5.69 (*SD* = 1.08) on a scale ranging from 1.71 to 7 (25^{th} percentile = 5, *Mdn* = 5.85, 75^{th} percentile = 6.57). Table 4.3 shows the mean autonomy scores of subjects by each of the experimental conditions.

Table 4.3

Mean Autonomy Score and SD by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of the Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Variable	*Mean*	*S.D.*
reward	5.60	1.08
pointervention	5.80	1.11
rewxpsy	5.77	1.08
Constant	5.63	1.12

Note. Constant = autonomy of subjects who received no reward and no intervention.

Subjects who received a task-contingent reward have a mean autonomy score of 5.59 (*SD* = 1.07) on a scale ranging from 1.71 to 7. Subjects who received the psychological ownership intervention have a mean autonomy score of 5.79 (*SD* = 1.10) on a scale ranging from 3 to 7. Subjects who received both the task-contingent reward and the psychological ownership intervention have a mean autonomy score of 5.77 (*SD* = 1.08) on a scale ranging from 3.71 to 7. Subjects who received neither the task-contingent reward nor the psychological ownership intervention have a mean autonomy score of 5.62 (*SD* = 1.11) on a scale ranging from 2.1 to 7.

The results of a two-way factorial ANOVA of autonomy by task-contingent reward, the psychological ownership intervention, and the combination of a task-contingent reward with the psychological ownership intervention shown in Table 4.4 further indicates no statistically significant relationships with autonomy.

Table 4.4

Factorial ANOVA of Autonomy by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Source	*Partial SS*	*df*	*MS*	*F*	*P*
Model	1.13	3	0.38	0.31	.816
reward	0.01	1	0.01	0.01	.913
pointervention	0.53	1	0.53	0.44	.506
rewxpsy	0.00	1	0.00	0.00	.993
residual	175.56	146	1.20		
Total	176.69	149	1.19		

Note. *R2* = .006. Adjusted *R 2*= -.010.

Competence

Overview of univariate statistics. Mean competence scores were highest for subjects who received the psychological ownership intervention. Subjects who received the combination of a task-contingent reward with the psychological ownership intervention experienced the least competence during the activity. Subjects who only received a task-contingent reward experienced reduced competence compared to the subjects in the control group.

Competence subscale of the intrinsic motivation inventory (competence). The overall mean of competence (competence) for all subjects is 5.05 (*SD* = 1.19) on a scale ranging from 1.16 to 7 (25^{th} percentile = 4.16, *Mdn* = 5.16, 75^{th} percentile = 6.0). Table 4.5 shows the mean competence scores of subjects by each of the experimental conditions.

Table 4.5

Mean Competence Score and SD by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Variable	*Mean*	*S.D.*	Min	Max
reward	5.06	1.30	1.83	7
pointervention	5.12	1.19	2.67	7
rewxpsy	4.94	1.15	3.00	7
Constant	5.09	1.16	1.17	7

Note. Constant = competence of subjects who received no reward and no intervention

Subjects who received a task-contingent reward have a mean competence score of 5.06 (*SD* = 1.30) on a scale ranging from 1.83 to 7. Subjects who received the psychological ownership intervention have a mean competence score of 5.12 (*SD* = 1.18) on a scale ranging from 2.6 to 7. Subjects who received both a task-contingent reward and the psychological ownership intervention have a mean competence score of 4.94 (*SD* = 1.15) on a scale ranging from 3 to 7. Subjects who received neither the task-contingent reward nor the psychological ownership intervention have a mean competence score of 5.09 (*SD* = 1.15) on a scale ranging from 1.16 to 7.

The results of a two-way factorial ANOVA of competence by task-contingent reward, the psychological ownership intervention, and the combination of a task-contingent reward with the psychological ownership intervention shown in Table 4.6 further indicates no statistically significant relationships with competence.

Table 4.6

Factorial ANOVA of Competence by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Source	*Partial SS*	*df*	*MS*	*F*	*P*
Model	0.69	3	0.23	0.16	.924
reward	0.01	1	0.01	0.01	.920
pointervention	0.02	1	0.02	0.01	.911
rewxpsy	0.22	1	0.22	0.15	.700
residual	214.57	148	1.45		
Total	215.26	151	1.43		

Note. *R2* = .003. Adjusted *R2* = -.010.

Relatedness

Overview of univariate statistics. Mean relatedness scores were highest for subjects who received the psychological ownership intervention. Subjects who received the task-contingent reward experienced relatedness to a lesser extent; however, felt greater relatedness during the task than subjects who did not receive the reward or the intervention. Subjects who received the combination of the task-contingent reward and the psychological ownership intervention experienced an equal amount of relatedness to subjects in the control group.

Relatedness Subscale of the Intrinsic Motivation Inventory (relatedness). The overall mean of relatedness (relatedness) for all subjects is 4.56 (*SD* = 0.94) on a scale ranging from 2.1 to 6.9 (25^{th} percentile = 4.0, *Mdn* = 4.5, 75^{th} percentile = 5.2). Table 4.7 shows the mean relatedness scores of subjects by each of the experimental conditions.

Table 4.7

Mean Relatedness Score and SD by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward and the Psychological Ownership Intervention (rewxpsy)

Variable	*Mean*	*S.D.*	Min	Max
reward	4.49	1.06	2.10	6.8
pointervention	4.91	0.90	3.20	6.9
rewxpsy	4.45	0.77	2.50	5.7
Constant	4.45	0.97	2.50	6

Note. Constant = relatedness of subjects who received no reward and no intervention

Subjects who received a task-contingent reward have a mean relatedness score of 4.49 (*SD* = 1.05) on a scale ranging from 2.1 to 6.8. Subjects who received the psychological ownership intervention have a mean relatedness score of 4.91 (*SD* = 0.89) on a scale ranging from 3.2 to 6.9. Subjects who received both a task-contingent reward and the psychological ownership intervention have a mean relatedness score of 4.45 (*SD* = 0.77) on a scale ranging from 2.5 to 5.7. Subjects who received neither the task-contingent reward nor the psychological ownership intervention have a mean relatedness score of 4.45 (*SD* = 0.96) on a scale ranging from 2.5 to 6.

The results of a two-way factorial ANOVA of relatedness by task-contingent reward, the psychological ownership intervention, and the combination of task-contingent reward with the psychological ownership intervention shown in Table 4.8 indicates that the main effects of the psychological ownership intervention, $F_{(df=1,\ 146)} = 4.27$, $p = .04$, and the combination of task-contingent reward with the psychological ownership intervention, $F_{(df=1,\ 146)} = 2.60$, $p = .10$, are statistically significant and approaching statistical significance but the main effect of task-contingent reward is not.

Table 4.8

Factorial ANOVA of Relatedness by a Task-Contingent Reward (reward), the Psychological Ownership Intervention (pointervention), and the Combination of a Task-Contingent Reward With the Psychological Ownership Intervention (rewxpsy)

Source	*Partial SS*	*df*	*MS*	*F*	*P*
Model	5.24	3	1.75	2.01	.115
reward	0.02	1	0.02	0.03	.868
pointervention	3.71	1	3.71	4.27	.041
rewxpsy	2.26	1	2.26	2.60	.109
residual	124.26	143	0.87		
Total	129.50	146	0.89		

Note. R^2 = .004. Adjusted R^2 = -.020.

Zero-Order Pearson Correlation Analyses

Pearson correlations indicate shared variance between two variables that is one of three requirements to demonstrate causality. Pearson correlations do not, however, take into account time (which variable comes before the other), and does not eliminate plausible alternative explanations of shared variance (a third variable that effects the other two), both of which are also necessary to demonstrate causality. Because Pearson correlations cannot portray causality, but only correlation, the following correlations serve as a foundation for establishing relationships between variables. Path analysis will then be used to address the remaining two criteria for causality and will demonstrate the propensity of Pearson correlations to overestimate and underestimate correlations with non-causal effects.

As a foundation for the path analyses, this section focuses on the zero-order correlations between all pairs of variables included in the hypothesized path model. These correlations are presented in Tables 4.9 to 4.13 below and accompanied by an overview of the statistically significance correlations.

In these tables a task-contingent reward is represented by the variable “reward”; the psychological ownership intervention is represented by the variable “pointervention”; the combination of a task-contingent reward with the psychological ownership intervention is represented by the variable “rewxpsy”; exercise of control is represented by the variable “control”; intimate knowledge is represented by the variable “knowledge”; investment of self is represented by the variable “investment”; job-based psychological ownership is represented by the variable “psyown”; experience with Lego building blocks is represented by the variable “legoexp”.

Zero-Order Pearson Correlations for Relationships With Intrinsic Motivation

The correlations indicate that those who received both the task-contingent reward and the psychological ownership intervention will experience less intrinsic motivation (r = -.162, p = .047) than those who did not receive these two conditions combined. The correlations also indicate statistically significant, positive relationships between autonomy (r = .523, p = <.001), competence (r = .524, p = <.001), and relatedness (r = .432, p = <.001) with intrinsic motivation. There are also positive relationships between exercise of control (r = .319, p = <.001), intimate knowledge (r = .453, p = <.001), investment of self (r = .456, p = <.001), and job-based psychological ownership (r = .529, p = <.001) with intrinsic motivation. Experience with Lego building blocks also has a positive relationship with intrinsic motivation (r = .196, p = .018).

A task-contingent reward, the psychological ownership intervention, and gender have no statistically significant relationships with intrinsic motivation. Table 4.9 portrays the Pearson correlations with intrinsic motivation.

Table 4.9

Zero-Order Pearson Correlation Coefficients for Hypothesized Relationships with Intrinsic Motivation (intrinsic)

Variable	*r*	*p*
autonomy	.523	<.001
competence	.524	<.001
relatedness	.432	<.001
control	.319	<.001
knowledge	.453	<.001
investment	.456	<.001
psyown	.529	<.001
reward	-.124	.128
pointervention	.080	.331
rewxpsy	-.162	.047
gender	-.061	.464
legoexp	.196	.018

Zero-Order Pearson Correlations for Relationships With Autonomy

The correlations indicate that intrinsic motivation (r = .523, p = <.001), competence (r = .231, p = .013), and relatedness (r = .448, p = <.001) positively correlate with feelings of autonomy, as do exercise of control (r = .174, p = .038), intimate knowledge, (r = .288, p = <.001), investment of self (r = .185, p = .025), and job-based psychological ownership (r = .355, p = <.001).

There are no statistically significant correlations between a task-contingent reward, the psychological ownership intervention, the combination of a task-contingent reward with the psychological ownership intervention, gender, or experience with Lego building blocks with autonomy. Table 4.10 portrays the Pearson correlations with autonomy.

Table 4.10

Zero-Order Pearson Correlation Coefficients for Hypothesized Relationships with Autonomy (autonomy)

Variable	*r*	*p*
intrinsic	.523	<.001
competence	.231	.013
relatedness	.448	<.001
control	.174	.038
knowledge	.288	<.001
investment	.185	.025
psyown	.355	<.001
reward	-.012	.883
pointervention	.079	.337
rewxpsy	.040	.632
gender	.063	.453
legoexp	.068	.413

Zero-Order Pearson Correlations for Relationships With Competence

Competence positively correlates with intrinsic motivation (r = .524, p = <.001), autonomy (r = .204, p = .013), exercise of control (r = .39, p = <.001), intimate knowledge (r = .417, p = <.001), investment of self (r = .405, p = <.001), job-based psychological ownership (r = .359, p = <.001), and experience with Lego building blocks (r = .466, p = <.001).

There are no statistically significant relationships between competence, a task-contingent reward, the psychological ownership intervention, the combination of a task-contingent reward with the psychological ownership intervention, and gender. Table 4.11 portrays the Pearson correlations with competence.

Table 4.11

Zero-Order Pearson Correlation Coefficients for Hypothesized Relationships with Competence (competence)

Variable	*r*	*p*
intrinsic	.524	<.001
autonomy	.204	.013
relatedness	.031	.709
control	.390	<.001
knowledge	.417	<.001
investment	.405	<.001
psyown	.359	<.001
reward	-.043	.602
pointervention	-.019	.819
rewxpsy	-.053	.511
gender	-.136	.101
legoexp	.466	<.001

Zero-Order Pearson Correlations for Relationships With Relatedness

The correlations indicate that intrinsic motivation (r = .432, p = <.001), and autonomy (r = .448, p = <.001) have positive, statistically significant relationships with relatedness. Similarly, exercise of control (r = .185, p = .028), intimate knowledge (r = .282, p = .001),

investment of self (r = .324, p = <.001), and job-based psychological ownership (r = .283, p = .001) correlate positively with relatedness at a statistically significant level.

There are no statistically significant relationships between relatedness, a task-contingent reward, the psychological ownership intervention, the combination of a task-contingent reward and the psychological ownership, gender, and experience with Lego building blocks. Table 4.12 portrays the Pearson correlations with relatedness.

Table 4.12

Zero-Order Pearson Correlation Coefficients for Hypothesized Relationships with Relatedness (relatedness)

Variable	*r*	*p*
intrinsic	.432	<.001
autonomy	.448	<.001
competence	.031	.709
control	.185	.028
knowledge	.282	.001
investment	.324	<.001
psyown	.283	.001
reward	-.108	.194
pointervention	.106	.201
rewxpsy	-.073	.383
gender	-.053	.525
legoexp	-.040	.634

Zero-Order Pearson Correlations for Relationships With Job-Based Psychological Ownership

The Pearson correlations indicate that those who received the psychological ownership intervention will experience greater feelings of job-based psychological ownership (r = .203, p = .012) than those who did not receive the intervention. The correlations also indicate statistically significant, positive relationships between intrinsic motivation (r = .529, p = <.001), autonomy (r = .355, p = <.001), competence (r = .359, p = <.001), relatedness (r = .283, p = <.001), exercise

of control (r = .675, p = <.001), intimate knowledge (r = .638, p = <.001), investment of self (r = .735, p = <.001), and experience with Lego building blocks (r = .219, p = .008) with job-based psychological ownership.

There were no statistically significant relationships between a task-contingent reward, the combination of a task-contingent reward and the psychological ownership intervention, and gender with job-based psychological ownership. Table 4.13 portrays the Pearson correlations with relatedness.

Table 4.13

Zero-Order Pearson Correlation Coefficients for Hypothesized Relationships with Job-Based Psychological Ownership (psyown)

Variable	*r*	*p*
intrinsic	.529	<.001
autonomy	.355	<.001
competence	.359	<.001
relatedness	.283	<.001
control	.675	<.001
knowledge	.638	<.001
investment	.735	<.001
reward	-.047	.565
pointervention	.203	.012
rewxpsy	.093	.254
gender	.098	.238
legoexp	.219	.008

The degree of spurious, non-causal correlation reflected in the zero-order correlations presented above will be determined and discussed after estimation of the full and trimmed path models. The path analyses are presented in the next section.

Estimation of the Full Hypothesized Theoretical Path Model

To test the hypotheses developed for this study, the hypothesized, theoretical path model (see Figure 3.2 in Chapter III) was estimated using Stata/IC version 14.2. The estimates of that model are shown as standardized path coefficients in Figure 4.1.

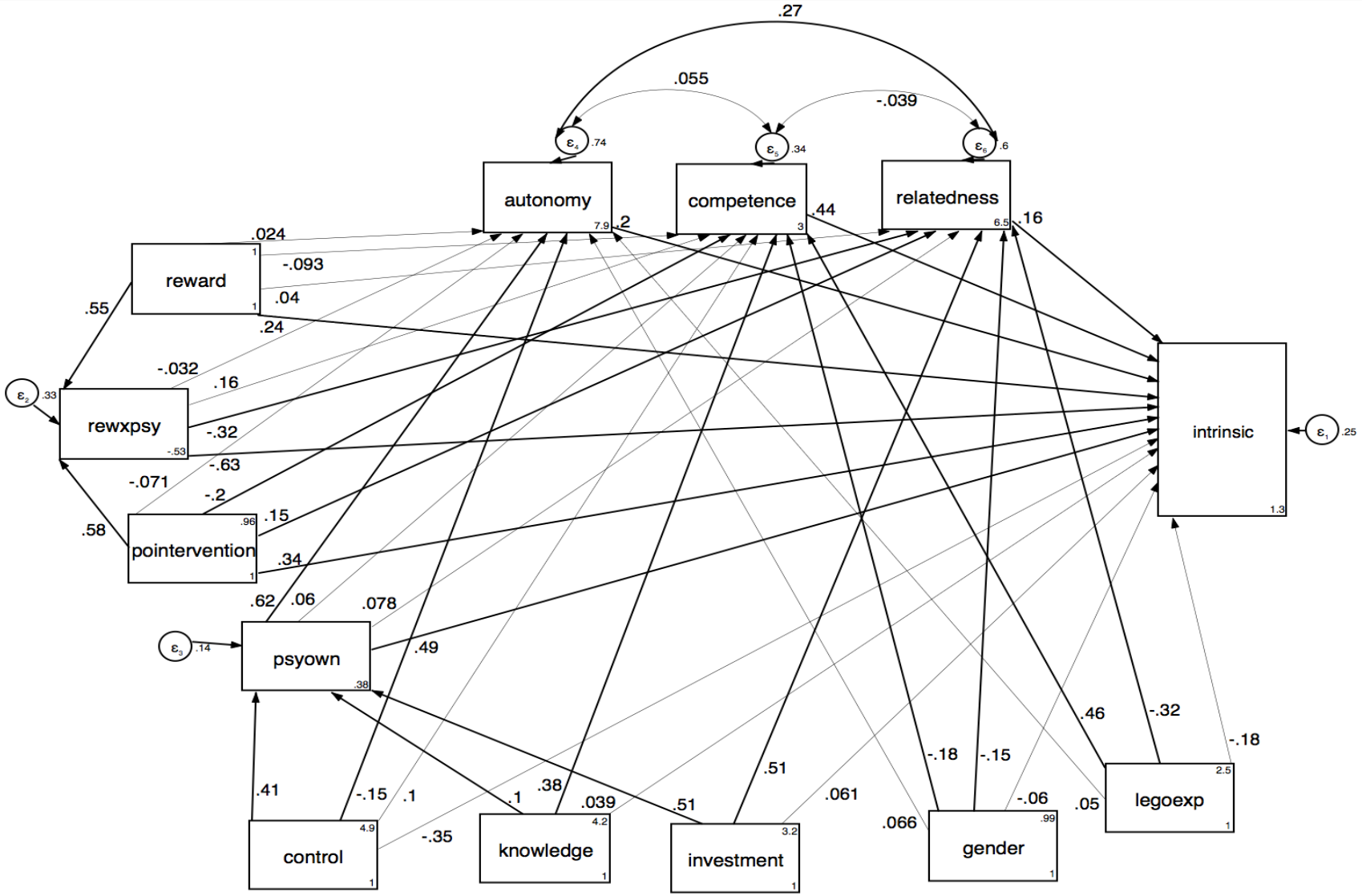

Figure 4.1. Hypothesized full path model estimated with standardized path coefficients. Coefficient values are at the base of each line and statistically significant paths are in bold. Psyown = job-based psychological ownership; pointervention = the psychological ownership intervention; rewxpsy = the combination of a task-contingent reward with psychological ownership.

The standardized path coefficients shown in Figure 4.1 are also presented in Table 4.14 along with their standard errors and 95% confidence intervals. Cronbach's alpha reliabilities were specified in the estimation for the Interest/Enjoyment Subscale (α = .887), the Autonomy Subscale (α = .797), the Competence Subscale (α = .828), the Relatedness Subscale (α = .753) and the Job-Based Psychological Ownership Scale (α = .900).

Full Path Model Description

The lines within the path model represent hypothesized relationships between the variables. Path model analysis takes into account the three criteria for causality and represents a holistic view on paths between variables. The relationships represented by the lines within the model take into account the variance shared between the two variables (similar to a Pearson correlation) and also account for the contribution other variables may have on that relationship. Table 4.14 presents a first glance at the direct effects of each variable in the full path model.

Table 4.14

Structural Relationships in the Full Path Model Estimated With Standardized Path Coefficients

Variable	Standardized Coefficients	*SE*	*z*	*p*	[95% CI]	
rewxpsy						
reward	.550	0.04	13.55	<.001	0.47	0.63
pointervention	.579	0.04	14.71	<.001	0.50	0.66
Constant	-.526	0.07	-7.57	<.001	-0.66	-0.39
autonomy						
rewxpsy	-.032	0.13	-0.23	.814	-0.30	0.23
psyown	.619	0.08	7.31	<.001	0.45	0.79
reward	.024	0.11	0.23	.820	-0.18	0.23
pointervention	-.071	0.11	-0.65	.514	-0.29	0.14
control	-.151	0.11	-1.41	.158	-0.36	0.06
gender	.066	0.08	0.84	.401	-0.88	0.22
legoexp	.050	0.08	0.62	.535	-0.11	0.21
Constant	7.931	0.65	12.26	<.001	6.66	9.20

Variable	Standardized Coefficients	*SE*	*z*	*p*	[95% CI]	
intrinsic						
rewxpsy	-.627	0.08	-7.75	<.001	-0.78	-0.47
autonomy	.203	0.03	6.98	<.001	0.15	0.26
competence	.443	0.04	10.22	<.001	0.36	0.53
relatedness	.160	0.04	4.54	<.001	0.09	0.23
psyown	.485	0.07	7.19	<.001	0.35	0.62
reward	.236	0.06	3.78	<.001	0.11	0.36
pointervention	.335	0.07	5.11	<.001	0.21	0.46
control	-.347	0.07	-4.92	<.001	-0.49	-0.21
knowledge	.039	0.07	0.53	.593	-0.10	0.18
investment	.061	0.08	0.76	.448	-0.10	0.22
gender	-.060	0.05	-1.29	.197	-0.15	0.03
legoexp	-.182	0.05	-3.56	<.001	-0.28	-0.08
Constant	1.302	0.38	3.46	.001	0.56	2.04
competence						
rewxpsy	.157	0.09	1.72	.085	-0.02	0.34
psyown	.060	0.07	0.90	.369	-0.07	0.19
reward	-.093	0.07	-1.28	.199	-0.24	0.05
pointervention	-.198	0.07	-2.71	.007	-0.34	-0.05
control	.101	0.08	1.24	.215	-0.06	0.26
knowledge	.382	0.07	5.29	<.001	0.24	0.52
gender	-.179	0.05	-3.41	.001	-0.28	-0.08
legoexp	.460	0.05	9.67	<.001	0.37	0.55
Constant	2.982	0.38	7.80	<.001	2.23	3.73
relatedness						
rewxpsy	-.321	0.12	-2.68	.007	-0.55	-0.09
psyown	.078	0.09	0.89	.371	-0.09	0.25
reward	.040	0.10	0.42	.678	-0.15	0.23
pointervention	.148	0.10	1.47	.142	-0.05	0.34
investment	.505	0.09	5.38	<.001	0.32	0.69
gender	-.146	0.07	-2.09	.036	-0.28	-0.01
legoexp	-.317	0.07	-4.77	<.001	-0.45	-0.19
Constant	6.467	0.47	13.63	<.001	5.54	7.40

Variable	Standardized Coefficients	*SE*	*z*	*p*	[95% CI]	
psyown						
control	.409	0.05	8.88	<.001	0.32	0.50
knowledge	.105	0.05	2.07	.038	0.01	0.20
investment	.514	0.05	10.99	<.001	0.42	0.61
Constant	.381	0.18	2.12	.034	0.03	0.73
Variance						
e.rewxpsy	.327	0.04			0.26	0.41
e.autonomy	.744	0.05			0.65	0.85
e.intrinsic	.250	0.02			0.21	0.30
e.competence	.336	0.03			0.28	0.40
e.relatedness	.602	0.05			0.51	0.71
e.psyown	.138	0.01			0.12	0.16
Covariance						
e.autonomy,e.competence	.055	0.03	1.68	.092	-0.01	0.12
e.autonomy,e.relatedness	.274	0.03	8.26	<.001	0.21	0.34
e.competence,e.relatedness	-.039	0.04	-1.10	.269	-0.11	0.03

Note. Psyown = job-based psychological ownership; pointervention = the psychological ownership intervention; rewxpsy = the combination of a task-contingent reward with the psychological ownership intervention.

Overview of the Full Path Model

The estimated path model portrays direct effects between variables. These effects are not as informative as total effects, which take into account the effects of other relationships too, but lay a foundation for causal relationships that will be expanded on in Table 4.16. The most important findings from the direct effects are that a task-contingent reward, the psychological ownership intervention, and job-based psychological ownership all positively effect intrinsic motivation. These results do not take into account the mediating effects of autonomy, competence, and relatedness though. The combination of a task-contingent reward with the psychological ownership intervention has a negative direct effect on intrinsic motivation.

Goodness of Fit of the Estimated Full Path Model

The full path model was evaluated for goodness of fit based on its degree of explained variance as reflected by the R^2 statistics for each endogenous variable as well as for the overall model. Goodness of fit is an indication of the total variance explained in the dependent variables by the independent, moderating, and mediating variables.

The full path model explained that the independent, moderator, and mediating variables were able to explain 75% of the causes for the subjects' intrinsic motivation during the experimental activity. The path model also explained 86% of the causes for the subjects' job-based psychological ownership feelings during the activity. The model shows that only 26% of the causes for subjects' experienced autonomy, and 40% of the causes for experienced relatedness were explained. Overall, the model explains 99% of the possible variance for the total model. The results of the indicators of goodness of fit are shown in Table 4.15.

Table 4.15

Variance Explained by the Estimated Full Path Model

Dependent Variable	R^2
rewxpsy	.67
autonomy	.26
intrinsic	.75
competence	.66
relatedness	.40
psyown	.86
overall	.99

Direct, Indirect, and Total Effects in the Estimated Full Path Model

Path analysis paints a real-world picture of the experience of subjects during the experiment. Whereas Pearson correlations demonstrate shared variance between two variables almost as if they were in a vacuum, path analysis portrays the shared variance after accounting for the influence of all the other variables in the model. This provides greater insight into the actual experience of subjects during the experiment and provides a more informative and

insightful measurement of the dependent variables. Total effects (that are calculated from the product of the direct and indirect effects) represent a comprehensive measurement of an independent variable on a dependent variable that also accounts for the effects of all other variables that impact them.

Overview of key results. The most important findings from the full path model are that job-based psychological ownership had a strong, positive total effect on subjects' intrinsic motivation. The greatest negative impact on intrinsic motivation for the experimental activity was the combination of a task-contingent reward and the psychological ownership intervention (findings similar to those of the Pearson correlation).

When total effects were considered, a task-contingent reward and the psychological ownership intervention (both of which had positive direct effects) negatively affected subjects' intrinsic motivation for the task. Below is overview of the total effects on each of the dependent variables.

Overview of total effects on intrinsic motivation. Job-based psychological ownership is the greatest determinant of intrinsic motivation for the experiment (*Total Effect* = .65, p = <.001) and two of the routes to psychological ownership, intimate knowledge (*Total Effect* = .276, p = <.001) and investment of self (*Total Effect* = .476, p = <.001), each have positive total effects as well.

Experiencing autonomy, competence, and relatedness during the experiment causes the subjects to feel greater intrinsic motivation for the task. Competence (*Total Effect* = .433, p = <.001) is more than twice as important than autonomy (*Total Effect* = .203, p = <.001) and relatedness (*Total Effect* = .16, p = <.001) for causing a subject to feel intrinsically motivated.

As the full path model indicates, a task-contingent reward and the psychological ownership intervention both have a negative total effect on feelings of intrinsic motivation. The psychological ownership intervention has a slightly less negative total effect (*Total Effect* = -.100, p = .12) than the task-contingent reward (*Total Effect* = -.133, p = .035). Combining the task-contingent reward with the psychological ownership intervention (*Total Effect* = -.627, p = <.001) produces a negative effect on intrinsic motivation almost six times larger than the two conditions produce independently.

The path model also shows that males (*Total Effect* = -.149, p = .008) experience greater intrinsic motivation for the experiment activity than females. Exercise of control and experience with Lego building blocks is not found to have statistically significant relationships with intrinsic motivation.

Overview of total effects on autonomy. The greatest determinant for feelings of autonomy during the experiment is job-based psychological ownership (*Total Effect* = .619, p = <.001) with investment of self (*Total Effect* = .318, p = <.001) and intimate knowledge (*Total Effect* = .065, p = .048) influencing autonomy positively but to a lesser extent.

Competence, relatedness, exercise of control, gender, and experience with Lego building blocks has no statistically significant relationship with autonomy. None of the experimental conditions display statistically significant relationships either.

Overview of total effects on competence. The greatest determinant for feeling competent during the experiment is experience using Lego building blocks (*Total Effect* = .46, p = <.001). Feeling intimately knowledgeable about the activity had the second greatest effect on competence during the experimental activity (*Total Effect* = .388, p = <.001). This effect is three times greater than the effect of exercise of control on competence (*Total Effect* = .125, p = .084)

that approaches statistical significance. The path model also shows that males feel more competent (*Total Effect* = -.179, *p* = .001) than females during the experiment.

Subjects who only received the psychological ownership intervention (*Total Effect* = -.107, *p* = .090) experienced diminished competence for the experimental activity at a probability level approaching statistical significance. Subjects who received the psychological ownership intervention and the task-contingent reward combined (*Total Effect* = .157, *p* = <.001), however, experienced increased feelings of competence.

Job-based psychological ownership, a task-contingent reward, and investment of self are not found to have a statistically significant relationship with competence.

Overview of total effects on relatedness. The greatest determinant overall of relatedness is investment of self (*Total Effect* = .545, *p* = <.001). The opportunity to self-invest caused subjects to experience increase intrinsic motivation for the activity.

Subjects who received a task-contingent reward (*Total Effect* = -.137, *p* = .054) experience diminished feelings of relatedness during the experiment. The combination of a task-contingent reward with the psychological ownership intervention (*Total Effect* = -.321 *p* = .008) caused an even greater negative effect on relatedness.

The path model also shows that males (*Total Effect* = -.146, *p* = .040) experience greater relatedness to the researcher and to their environment during the experiment than females and that experience with Lego building blocks (*Total Effect* = -.317, *p* = <.001) has a negative effect on relatedness almost matching the negative effect of the combination of a task-contingent reward with the psychological ownership intervention.

The psychological ownership intervention, job-based psychological ownership, exercises of control, and intimate knowledge was not found to have a statistically significant relationship with intrinsic motivation.

Overview of total effects on job-based psychological ownership. Exercise of control, intimate knowledge, and investment of self all positively affect feelings of job-based psychological ownership. Investment of self is the greatest determinant of job-based psychological ownership (*Total Effect* = .514, p = <.001) with almost five times the positive impact of intimate knowledge (*Total Effect* = .105, p = .039). The exercise of control (*Total Effect* = .409, p = <.001) is the second greatest determinant.

The direct, indirect, and total effects of the estimated path model are shown in Table 4.16. In these tables a task-contingent reward is represented by the variable "reward"; the psychological ownership intervention is represented by the variable "pointervention"; the combination of a task-contingent reward with the psychological ownership intervention is represented by the variable "rewxpsy"; exercise of control is represented by the variable "control"; intimate knowledge is represented by the variable "knowledge"; investment of self is represented by the variable "investment"; job-based psychological ownership is represented by the variable "psyown"; experience with Lego building blocks is represented by the variable "legoexp".

Table 4.16

Direct, Indirect, and Total Effects in the Estimated Full Path Model

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
Direct effects						
rewxpsy						
reward	.550	0.04	10.91	<.001	0.39	0.57
pointervention	.579	0.04	11.50	<.001	0.42	0.59
autonomy						
rewxpsy	-.032	0.18	-0.23	.814	-0.38	0.30
psyown	.619	0.05	6.71	<.001	0.22	0.40
reward	.024	0.12	0.23	.820	-0.21	0.26
pointervention	-.071	0.12	-0.65	.515	-0.32	0.16
control	-.151	0.06	-1.43	.153	-0.20	0.03
knowledge						
investment						
gender	.066	0.09	0.84	.402	-0.10	0.25
legoexp	.050	0.03	0.62	.536	-0.03	0.07
intrinsic						
rewxpsy	-.627	0.13	-7.83	<.001	-1.31	-0.79
autonomy	.203	0.04	7.22	<.001	0.19	0.33
competence	.433	0.03	11.54	<.001	0.32	0.46
relatedness	.160	0.04	4.62	<.001	0.11	0.27
psyown	.485	0.04	7.40	<.001	0.23	0.39
reward	.236	0.09	3.76	<.001	0.16	0.52
pointervention	.335	0.10	5.08	<.001	0.30	0.68
control	-.347	0.05	-4.92	<.001	-0.34	-0.15
knowledge	.039	0.05	0.53	.594	-0.06	0.11
investment	.061	0.04	0.76	.450	-0.05	0.11
gender	-.060	0.07	-1.28	.200	-0.22	0.05
legoexp	-.182	0.02	-3.56	<.001	-0.12	-0.03

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
competence						
rewxpsy	.157	0.18	1.70	.090	-0.05	0.64
psyown	.060	0.05	0.90	.369	-0.05	0.14
reward	-.093	0.12	-1.27	.203	-0.39	0.08
pointervention	-.198	0.12	-2.64	.008	-0.57	-0.08
control	.101	0.06	1.24	.217	-0.05	0.21
knowledge	.382	0.05	5.00	<.001	0.16	0.38
investment						
gender	-.179	0.09	-3.34	.001	-0.47	-0.12
legoexp	.460	0.03	8.36	<.001	0.17	0.27
relatedness						
rewxpsy	-.321	0.17	-2.64	.008	-0.77	-0.11
psyown	.078	0.05	0.89	.373	-0.05	0.13
reward	.040	0.12	0.41	.678	-0.18	0.28
pointervention	.148	0.12	1.46	.145	-0.06	0.42
control						
knowledge						
investment	.505	0.04	4.93	<.001	0.13	0.30
gender	-.146	0.09	-2.05	.040	-0.35	-0.01
legoexp	-.317	0.02	-4.39	<.001	-0.16	-0.06
psyown						
control	.409	0.05	8.48	<.001	0.35	0.55
knowledge	.105	0.05	2.07	.039	0.01	0.20
investment	.514	0.04	10.26	<.001	0.34	0.49
Indirect effects						
rewxpsy						
reward						
pointervention						

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
autonomy						
rewxpsy						
psyown						
reward	-.017	0.08	-0.23	.814	-0.18	0.15
pointervention	-.018	0.09	-0.23	.814	-0.19	0.15
control	.253	0.03	5.26	<.001	0.09	0.19
knowledge	.065	0.02	1.98	.048	0.00	0.06
investment	.318	0.02	5.62	<.001	0.08	0.17
gender						
legoexp						
intrinsic						
rewxpsy	.012	0.10	0.21	.834	-0.17	0.21
autonomy						
competence						
relatedness						
psyown	.165	0.03	3.86	<.001	0.05	0.16
reward	-.368	0.09	-5.91	<.001	-0.72	-0.36
pointervention	-.435	0.09	-6.72	<.001	-0.82	-0.45
control	.280	0.04	5.01	<.001	0.12	0.27
knowledge	.237	0.03	4.79	<.001	0.09	0.21
investment	.414	0.03	7.70	<.001	0.16	0.27
gender	-.089	0.05	-2.62	.009	-0.23	-0.03
legoexp	.163	0.02	4.19	<.001	0.04	0.10
competence						
rewxpsy						
psyown						
reward	.086	0.09	1.68	.094	-0.02	0.31
pointervention	.091	0.09	1.68	.093	-0.03	0.33
control	.025	0.02	0.89	.371	-0.02	0.06
knowledge	.006	0.01	0.82	.410	-0.01	0.02
investment	.031	0.02	0.90	.370	-0.02	0.06
gender						
legoexp						

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
relatedness						
rewxpsy						
psyown						
reward	-.176	0.08	-2.56	.010	-0.38	-0.05
pointervention	-.186	0.09	-2.57	.010	-0.40	-0.05
control	.032	0.02	0.89	.376	-0.02	0.06
knowledge	.008	0.01	0.82	.413	-0.01	0.01
investment	.040	0.02	0.89	.375	-0.02	0.05
gender						
legoexp						
psyown						
control						
knowledge						
investment						
Total effects						
rewxpsy						
reward	.550	0.04	10.91	<.001	0.39	0.57
pointervention	.579	0.04	11.50	<.001	0.42	0.59
autonomy						
rewxpsy	-.032	0.18	-0.23	.814	-0.38	0.30
psyown	.619	0.05	6.71	<.001	0.22	0.40
reward	.007	0.09	0.09	.929	-0.16	0.18
pointervention	-.090	0.09	-1.16	.246	-0.27	0.07
control	.102	0.05	1.14	.255	-0.04	0.15
knowledge	.065	0.02	1.98	.048	0.00	0.06
investment	.318	0.02	5.62	<.001	0.08	0.17
gender	.066	0.09	0.84	.402	-0.10	0.25
legoexp	.050	0.03	0.62	.536	-0.03	0.07

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
intrinsic						
rewxpsy	-.615	0.16	-6.33	<.001	-1.35	-0.71
autonomy	.203	0.04	7.22	<.001	0.19	0.33
competence	.443	0.03	11.54	<.001	0.32	0.46
relatedness	.160	0.04	4.62	<.001	0.11	0.27
psyown	.650	0.05	8.74	<.001	0.32	0.51
reward	-.133	0.09	-2.11	.035	-0.37	-0.01
pointervention	-.100	0.09	-1.55	.120	-0.33	0.04
control	-.067	0.06	-0.82	.410	-0.16	0.07
knowledge	.276	0.05	3.24	<.001	0.07	0.28
investment	.476	0.04	5.86	<.001	0.16	0.33
gender	-.149	0.08	-2.64	.008	-0.38	-0.06
legoexp	-.018	0.02	-0.32	.752	-0.05	0.04
competence						
rewxpsy	.157	0.18	1.70	.090	-0.05	0.64
psyown	.060	0.05	0.90	.369	-0.05	0.14
reward	-.007	0.09	-0.13	.895	-0.18	0.16
pointervention	-.107	0.09	-2.02	.043	-0.35	-0.01
control	.125	0.06	1.73	.084	-0.01	0.21
knowledge	.388	0.05	5.20	<.001	0.17	0.38
investment	.031	0.02	0.90	.370	-0.02	0.06
gender	-.179	0.09	-3.34	.001	-0.47	-0.12
legoexp	.460	0.03	8.36	<.001	0.17	0.27
relatedness						
rewxpsy	-.321	0.17	-2.64	.008	-0.77	-0.11
psyown	.078	0.05	0.89	.373	-0.05	0.13
reward	-.137	0.09	-1.93	.054	-0.33	0.00
pointervention	-.038	0.09	-0.52	.600	-0.22	0.13
control	.032	0.02	0.89	.376	-0.02	0.06
knowledge	.008	0.01	0.82	.413	-0.01	0.01
investment	.545	0.03	7.03	<.001	0.17	0.30
gender	-.146	0.09	-2.05	.040	-0.35	-0.01
legoexp	-.317	0.02	-4.39	<.001	-0.16	-0.06
psyown						
control	.409	0.05	8.48	<.001	0.35	0.55
knowledge	.105	0.05	2.07	.039	0.01	0.20
investment	.514	0.04	10.26	<.001	0.34	0.49

Note. Cells that are empty indicate no paths within the model.

Spurious, Non-Causal Effects Identified by the Estimated Full Path Model

Overview of non-causal effects. Spurious, non-causal effects were calculated by subtracting the zero-order Pearson correlations discussed above in Tables 4.9-4.15 from the total causal effects estimated in the full path model shown in Table 4.16. Calculating the non-causal effects demonstrates the overestimate and underestimation of the Pearson correlations that, if used solely as an analysis of causality, could lead to false conclusions. The results of this analysis are shown in Tables 4.17-4.21.

In these tables a task-contingent reward is represented by the variable "reward"; the psychological ownership intervention is represented by the variable "pointervention"; the combination of a task-contingent reward with the psychological ownership intervention is represented by the variable "rewxpsy"; exercise of control is represented by the variable "control"; intimate knowledge is represented by the variable "knowledge"; investment of self is represented by the variable "investment"; job-based psychological ownership is represented by the variable "psyown"; experience with Lego building blocks is represented by the variable "legoexp".

Non-Causal effects on intrinsic motivation. The results indicate that the zero-order correlations overestimated the effects of autonomy (*Non-Causal Effect* = .32), competence (*Non-Causal Effect* = .081), relatedness (*Non-Causal Effect* = .272), and intimate knowledge (*Non-Causal Effect* = .177) with intrinsic motivation, showing the zero-order effects of autonomy, and relatedness overestimated by almost double their total effect size.

The investment of self (*Non-Causal Effect* = .02) is underestimated slightly with intrinsic motivation, although the total causal effects on job-based psychological ownership (*Non-Causal Effect* = .121) and the combination of a task-contingent reward and the psychological ownership intervention (*Non-Causal Effect* = .453) on intrinsic motivation are underestimated more substantially. Table 4.17 portrays the non-causal effects on intrinsic motivation.

Table 4.17

Non-Causal Effects of Intrinsic Motivation Observed in the Full Path Model

Variable	Zero-Order *r*	Total Effect	Non-Causal Effect
autonomy	**.523**	**.203**	.320
competence	**.524**	**.443**	.081
relatedness	**.432**	**.160**	.272
control	**.319**	-.067	-.386
knowledge	**.453**	**.276**	.177
investment	**.456**	**.476**	.020
psyown	**.529**	**.650**	.121
reward	-.124	**-.133**	.009
pointervention	.080	-.100	-.180
rewxpsy	**-.162**	**-.615**	.453
gender	-.061	**-.149**	.088
legoexp	**.196**	-.018	-.214

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Tables 4.9 and 4.16.

Non-Causal effects on autonomy. The Pearson correlation of intimate knowledge (*Non-Causal Effect* = .233) with autonomy is overestimated by almost double its stated effect size. The correlations between investment of self (*Non-Causal Effect* = .133) and job-based psychological ownership (*Non-Causal Effect* = .264) with autonomy underestimate the effect size by almost double for each of these variables. Table 4.18 portrays the non-causal effects on autonomy.

Table 4.18

Non-Causal Effects of Autonomy Observed in the Full Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.174**	.102	.072
knowledge	**.288**	**.065**	.223
investment	**.185**	**.318**	.133
psyown	**.355**	**.619**	.264
reward	-.012	.007	.019
pointervention	.079	-.090	-.169
rewxpsy	.040	-.032	-.072
gender	.063	.066	.003
legoexp	.068	.050	.018

Note. Bold indicates $p \leq .05$. Exact p values are shown in Tables 4.10 and 4.16.

Non-Causal effects on competence. The correlations of intimate knowledge (*Non-Causal Effect* = .029) with competence, and experience with Lego building blocks (*Non-Causal Effect* = .006) with competence are only slightly overestimated. Table 4.19 portrays the non-causal effects on competence.

Table 4.19

Non-Causal Effects of Competence Observed in the Full Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.390**	.125	.265
knowledge	**.417**	**.388**	.029
investment	**.405**	.031	.374
psyown	**.359**	.060	.299
reward	-.043	-.007	.036
pointervention	-.019	**-.107**	.088
rewxpsy	-.053	.157	.210
gender	-.136	**-.179**	.043
legoexp	**.466**	**.460**	.006

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Tables 4.11 and 4.16.

Non-Causal effects on relatedness. The zero-order correlation of investment of self (*Non-Causal Effect* = .222) with relatedness underestimates the relationship by almost half. Table 4.20 portrays the non-causal effects on relatedness.

Table 4.20

Non-Causal Effects of Relatedness Observed in the Full Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.185**	.032	.153
knowledge	**.282**	.008	.274
investment	**.324**	**.545**	.222
psyown	**.283**	.078	.205
reward	-.108	**-.137**	.029
pointervention	.106	-.038	-.144
rewxpsy	-.073	**-.321**	.249
gender	-.053	**-.146**	.093
legoexp	-.040	**-.317**	.277

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Tables 4.12 and 4.16.

Non-Causal effects on job-based psychological ownership. The Pearson correlations of exercise of control (*Non-Causal Effect* = .266), intimate knowledge (*Non-Causal Effect* = .533), and investment of self (*Non-Causal Effect* = .221) with job-based psychological ownership are all greatly overestimated. Specifically, the correlation with intimate knowledge is

overestimated six times the total causal effect size shown in the full path model. Table 4.21 portrays the non-causal effects on job-based psychological ownership.

Table 4.21

Non-Causal Effects of Job-Based Psychological Ownership Observed in the Full Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.675**	**.409**	.266
knowledge	**.638**	**.105**	.533
investment	**.735**	**.514**	.221

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Tables 4.13 and 4.16.

Estimation of the Path Model After Theory Trimming

The next step in the analysis was to trim the path model after removing those hypothesized paths that were not found to be statistically significant at $p \leq .05$ in the estimated full path model (Heise, 1969). Scholars disagree over the use of theory trimming in path analysis (McPherson, 1976), which some suggest offers an opportunity to cherry pick suitable data to fit hypotheses. To address this charge, and to also present the statistically significant findings of this study in a parsimonious manner, the results from the full path model and the trimmed model were used in the hypothesis tests described below. The benefit of including both models for comparison is that the statistically significant results are presented in a clear manner in the trimmed model and these results can then be compared to the results of the full model that offer a more real-world view of the experience of the subjects during the experiment. Results from both the trimmed and full path models were used to confirm or reject this study's hypotheses (see Table 4.30).

Statistically significant paths observed in the full model in Figure 4.1 and Table 4.16 are displayed in the re-estimated, trimmed path model shown in Figure 4.2. The estimates of the model are shown as standardized path coefficients in that figure and the standardized path

coefficients are also shown in Table 4.22 along with their standard errors and 95% confidence intervals. The trimmed path model incorporated the same scale reliability coefficients as the full path model.

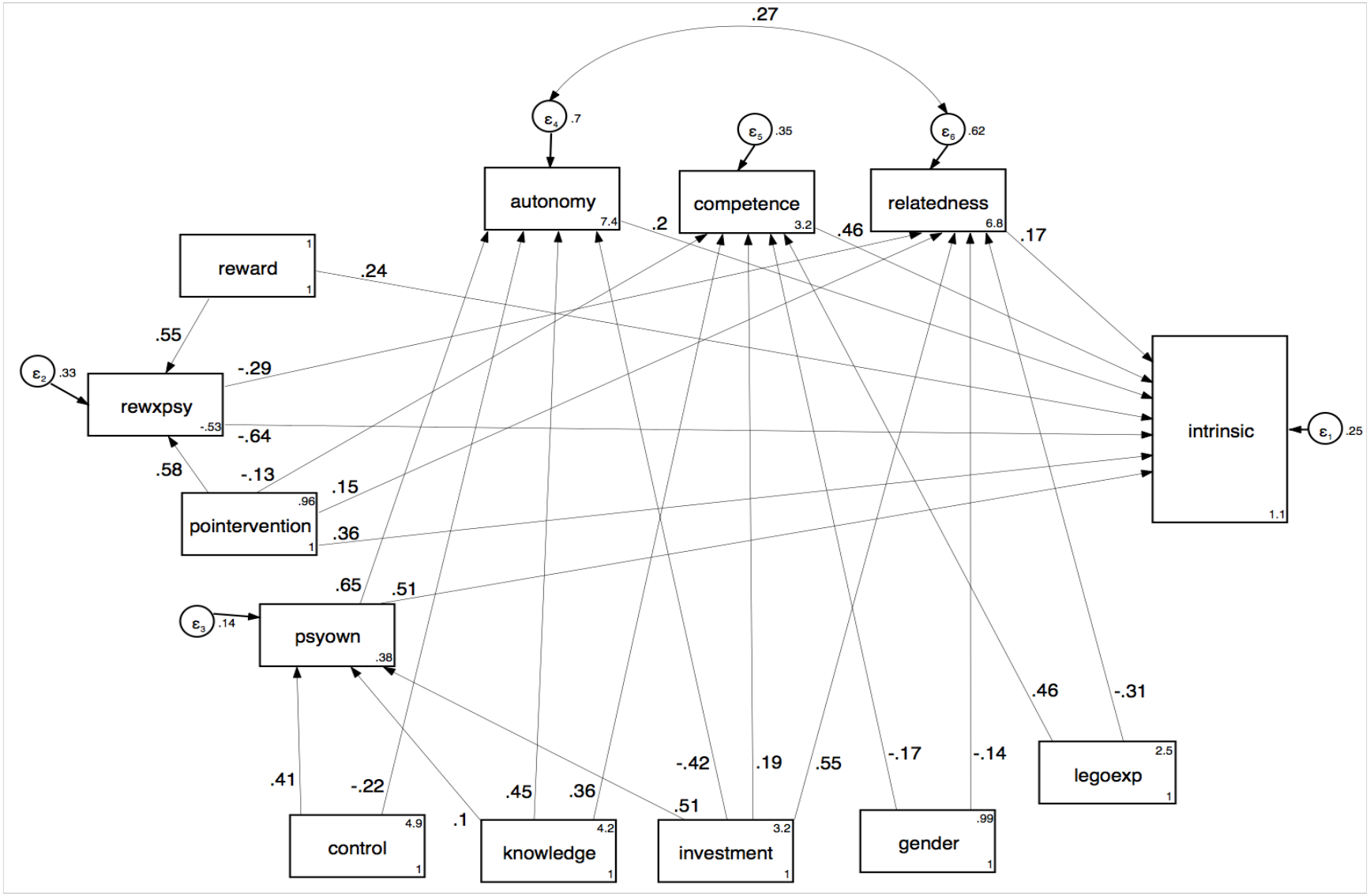

Figure 4.2. The trimmed path model estimated with standardized path coefficients. Coefficient values are at the base of each line and statistically significant paths are in bold. Psyown = job-based psychological ownership; pointervention = the psychological ownership intervention; rewxpsy = the combination of a task-contingent reward with the psychological ownership intervention.

Table 4.22

Structural Relationships in the Trimmed Path Model Estimated With Standardized Path Coefficients

Variable	Standardized Coefficients	*SE*	*Z*	*P*	[95% CI]	
rewxpsy						
reward	.550	0.04	13.55	<.001	0.47	0.63
pointervention	.579	0.04	14.71	<.001	0.50	0.66
Constant	-.526	0.07	-7.57	<.001	-0.66	-0.39
relatedness						
rewxpsy	-.286	0.08	-3.43	.001	-0.45	-0.12
pointervention	.145	0.09	1.67	.095	-0.03	0.32
investment	.550	0.06	9.72	<.001	0.44	0.66
gender	-.137	0.07	-2.05	.041	-0.27	-0.01
legoexp	-.313	0.06	-4.82	<.001	-0.44	-0.19
Constant	6.799	0.46	14.9	<.001	5.90	7.69
intrinsic						
rewxpsy	-.636	0.08	-8.10	<.001	-0.79	-0.48
relatedness	.174	0.03	5.31	<.001	0.11	0.24
competence	.457	0.04	11.81	<.001	0.38	0.53
psyown	.510	0.06	9.26	<.001	0.40	0.62
autonomy	.203	0.03	6.85	<.001	0.14	0.26
reward	.237	0.06	3.88	<.001	0.12	0.36
pointervention	.356	0.06	5.70	<.001	0.23	0.48
control	-.316	0.07	-4.81	<.001	-0.44	-0.19
legoexp	-.170	0.05	-3.35	.001	-0.27	-0.07
Constant	1.15	0.37	3.15	.002	0.43	1.87
competence						
pointervention	-.131	0.05	-2.45	.014	-0.24	-0.03
knowledge	.361	0.07	4.96	<.001	0.22	0.50
investment	.186	0.08	2.45	.014	0.04	0.34
gender	-.171	0.05	3.25	.001	-0.27	-0.07
legoexp	.462	0.05	9.68	<.001	0.37	0.56
Constant	3.238	0.36	9.00	<.001	2.53	3.94

Variable	Standardized Coefficients	*SE*	*Z*	*P*	[95% CI]	
psyown						
control	.409	0.05	8.88	<.001	0.32	0.50
knowledge	.105	0.05	2.07	.038	0.01	0.20
investment	.514	0.05	10.99	<.001	0.42	0.61
Constant	.381	0.18	2.12	.034	0.03	0.73
autonomy						
psyown	.650	0.10	6.69	<.001	0.46	0.84
control	-.219	0.11	-1.95	.051	-0.44	0.00
knowledge	.453	0.10	4.48	<.001	0.25	0.65
investment	-.421	0.12	-3.51	.089	-0.66	-0.19
Constant	7.394	0.62	11.84	<.001	6.17	8.62
var(e.rewxpsy)	.327	0.04			0.26	0.41
var(e.relatedness)	.622	0.05			0.53	0.73
var(e.intrinsic)	.252	0.02			0.21	0.29
var(e.competence)	.351	0.03			0.30	0.41
var(e.psyown)	.138	0.01			0.12	0.16
var(e.autonomy)	.697	0.05			0.60	0.81
cov(e.relatedness,e.autonomy)	.272	0.03	8.12	<.001	0.21	0.34

Note. Psyown = job-based psychological ownership; pointervention = the psychological ownership intervention; rewxpsy = the combination of a task-contingent reward with the psychological ownership intervention.

Overview of the Trimmed Path Model

Similar to the full path model, the estimated trimmed path model portrays direct effects between variables. The most important findings are that a task-contingent reward, the psychological ownership intervention, and job-based psychological ownership all positively effect intrinsic motivation in the trimmed model as well. These results do not take into account the mediating effects of autonomy, competence, and relatedness though. The combination of a task-contingent reward with the psychological ownership intervention has a negative direct effect on intrinsic motivation mirroring the results of the full path model.

Goodness of Fit of the Estimated Trimmed Path Model

The trimmed path model may be evaluated for goodness of fit based on its explanation of explained variance in R^2 statistics for each endogenous variable in addition to the overall model. The goodness of fit measurement indicates that the trimmed path model explained 75% of the causes for subjects' experiencing intrinsic motivation. The trimmed model explained 65% of the causes for subjects feeling competent during the activity, and 86% of the causes for subjects feeling job-based psychological ownership for the task. The model explained the variance of autonomy and relatedness to a lesser extent. The trimmed model explained 99% of the overall variance in the model. The goodness of fit results are shown in Table 4.23.

Table 4.23

Variance Explained by the Estimated Trimmed Path Model

Dependent Variable	R^2
rewxpsy	.67
autonomy	.30
intrinsic	.75
competence	.65
relatedness	.38
psyown	.86
overall	.99

Direct, Indirect, and Total Effects in the Estimated Trimmed Path Model

Overview of key results. The key findings from the trimmed model echo the results of the full path model. The most important findings from the trimmed path model are that job-based psychological ownership had a strong, positive total effect on subjects' intrinsic motivation. The greatest negative impact on intrinsic motivation for the experimental activity was the combination of a task-contingent reward and the psychological ownership intervention.

When total effects were considered, a task-contingent reward and the psychological ownership intervention caused decreases in the subjects' intrinsic motivation for the task. Below is overview of the total effects on each of the dependent variables in the trimmed model.

Overview of total effects on intrinsic motivation in the trimmed model. The greatest positive determinant of intrinsic motivation is job-based psychological ownership (*Total Effect* = .642, $p < .001$) that has almost exactly the opposite total effect on intrinsic motivation than the effects of combining the task-contingent reward with the psychological ownership intervention (*Total Effect* = -.686, $p < .001$).

Autonomy (*Total Effect* = .203, $p < .001$) and competence (*Total Effect* = .457, $p < .001$) both have positive effects on intrinsic motivation. People who feel that they have intimate knowledge (*Total Effect* = .324, $p < .001$) of the activity and invest themselves (*Total Effect* = .425, $p < .001$) in the activity experienced greater intrinsic motivation as well.

The trimmed path model portrays that a task-contingent reward (*Total Effect* = -.14, $p = .013$) has a negative effect on intrinsic motivation but that the psychological ownership intervention does not have a statistically significant effect. The trimmed model also shows that Males experience greater intrinsic motivation than females (*Total Effect* = -.102, $p < .001$).

Experience with Lego building blocks was not found to be statistically significant.

Overview of total effects on autonomy in the trimmed model. Job-based psychological ownership is the greatest determinant of autonomy (*Total Effect* = .65, $p < .001$) with intimate knowledge close behind (*Total Effect* = .521, $p < .001$). Exercise of control and investment of self were not found to be statistically significant.

Overview of total effects on competence in the trimmed model. Experience with Lego building blocks is the greatest determinant of competence feelings (*Total Effect* = .462, $p < .001$)

with intimate knowledge (*Total Effect* = .361, $p < .001$) and investment of self behind it (*Total Effect* = .186, $p = .016$). Additionally, males feel more competent during the experiment (*Total Effect* = -.171, $p = .001$) than females.

Subjects who received the psychological ownership intervention experienced diminished competence feelings (*Total Effect* = -.131, $p = .016$).

Overview of total effects on relatedness in the trimmed model. Subjects who received the task-contingent reward (*Total Effect* = -.157, $p = .001$) experience decreased relatedness to the researcher and to their environment during the experiment. The combination of a task-contingent reward with the psychological ownership intervention (*Total Effect* = -.286, $p = .001$) caused subjects to experience an even greater negative impact on feelings of relatedness. Experience with Lego building blocks (*Total Effect* = -.313, $p < .001$) also leads to decreased feelings of relatedness.

Investment of self (*Total Effect* = .55, $p < .001$) is the only variable with a positive, causal relationship to relatedness and has a large positive effect. Males (*Total Effect* = -.137, $p < .044$) are more likely to feel relatedness to the researcher and to their environment during the experiment than females. There was no statistically significant relationship between the psychological ownership intervention and feelings of relatedness.

Overview of total effects on job-based psychological ownership. Exercise of control, intimate knowledge, and investment of self each caused job-based psychological ownership. Investment of self (*Total Effect* = .514, $p < .001$) is the greatest determinant, followed by exercise of control (*Total Effect* = .409, $p < .001$), and intimate knowledge (*Total Effect* = .105, $p = .039$) having the smallest effect.

The direct, indirect, and total effects of the estimated trimmed path model are shown in Table 4.24. In these tables a task-contingent reward is represented by the variable "reward"; the psychological ownership intervention is represented by the variable "pointervention"; the combination of a task-contingent reward with the psychological ownership intervention is represented by the variable "rewxpsy"; exercise of control is represented by the variable "control"; intimate knowledge is represented by the variable "knowledge"; investment of self is represented by the variable "investment"; job-based psychological ownership is represented by the variable "psyown"; experience with Lego building blocks is represented by the variable "legoexp".

Table 4.24

Direct, Indirect, and Total Effects in the Estimated Trimmed Path Model

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
Direct effects						
rewxpsy						
reward	.550	0.04	10.91	<.001	0.39	0.57
pointervention	.579	0.04	11.50	<.001	0.42	0.59
relatedness						
rewxpsy	-.286	0.12	-3.35	.001	-0.62	-0.16
reward						
pointervention	.145	0.10	1.65	.098	-0.03	0.38
investment	.550	0.03	7.43	<.001	0.17	0.29
gender	-.137	0.08	-2.02	.044	-0.32	0.00
legoexp	-.313	0.02	-4.45	<.001	-0.15	-0.06
intrinsic						
rewxpsy	-.636	0.13	-8.00	<.001	-1.32	-0.80
relatedness	.174	0.04	5.35	<.001	0.13	0.29
competence	.457	0.03	12.49	<.001	0.34	0.47
psyown	.510	0.04	9.05	<.001	0.25	0.39
autonomy	.203	0.03	7.23	<.001	0.18	0.32
reward	.237	0.09	3.82	<.001	0.17	0.52
pointervention	.356	0.09	5.49	<.001	0.33	0.70
control	-.316	0.05	-4.85	<.001	-0.31	-0.13
knowledge						
investment						
gender						
legoexp	-.179	0.02	-3.36	.001	-0.11	-0.03

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
competence						
pointervention	-.131	0.09	-2.42	.016	-0.39	-0.04
knowledge	.361	0.05	4.75	<.001	0.15	0.36
investment	.186	0.04	2.42	.016	0.02	0.19
gender	-.171	0.09	-3.19	.001	-0.45	-0.11
legoexp	.462	0.03	8.35	<.001	0.16	0.27
psyown						
control	.409	0.05	8.48	<.001	0.35	0.55
knowledge	.105	0.05	2.07	.039	0.01	0.20
investment	.514	0.04	10.26	<.001	0.34	0.49
autonomy						
psyown	.650	0.05	6.57	<.001	0.23	0.43
control	-.219	0.06	-1.95	.051	-0.25	0.00
knowledge	.453	0.06	4.10	<.001	0.12	0.33
investment	-.421	0.05	-3.46	.089	-0.27	-0.08
Indirect effects						
rewxpsy						
reward						
pointervention						
relatedness						
rewxpsy						
reward	-.157	0.06	-3.20	.001	-0.30	-0.07
pointervention	-.166	0.06	-3.21	.001	-0.32	-0.08
investment						
gender						
legoexp						

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
intrinsic						
rewxpsy	-.050	0.03	-2.84	.005	-0.13	-0.02
relatedness						
competence						
psyown	.132	0.02	4.86	<.001	0.05	0.12
autonomy						
reward	-.377	0.08	-6.74	<.001	-0.70	-0.38
pointervention	-.432	0.09	-6.74	<.001	-0.80	-0.44
control	.218	0.03	4.97	<.001	0.08	0.21
knowledge	.324	0.03	5.83	<.001	0.13	0.27
investment	.425	0.03	6.52	<.001	0.14	0.27
gender	-.102	0.04	-3.60	<.001	-0.22	-0.06
legoexp	.157	0.01	4.60	<.001	0.04	0.09
competence						
pointervention						
knowledge						
investment						
gender						
legoexp						
psyown						
control						
knowledge						
investment						
autonomy						
psyown						
control	.266	0.03	5.19	<.001	0.09	0.21
knowledge	.068	0.02	1.97	.049	0.00	0.07
investment	.334	0.03	5.53	<.001	0.09	0.19
Total						
effects						
rewxpsy						
reward	.550	0.04	10.91	<.001	0.39	0.57
pointervention	.579	0.04	11.50	<.001	0.42	0.59

Variable	Standardized Coefficient	*SE*	*z*	*p*	[95% CI]	
relatedness						
rewxpsy	-.286	0.12	-3.35	.001	-0.62	-0.16
reward	-.157	0.06	-3.20	.001	-0.30	-0.07
pointervention	-.021	0.08	-0.29	.773	-0.19	0.14
investment	.550	0.03	7.43	<.001	0.17	0.29
gender	-.137	0.08	-2.02	.044	-0.32	0.00
legoexp	-.313	0.02	-4.45	<.001	-0.15	-0.06
intrinsic						
rewxpsy	-.686	-8.56	-8.56	<.001	-1.40	-0.88
relatedness	.174	0.04	5.35	<.001	0.13	0.29
psyown	.642	0.04	10.93	<.001	0.33	0.48
autonomy	.203	0.03	7.23	<.001	0.18	0.32
competence	.457	0.03	12.49	<.001	0.34	0.47
reward	-.140	0.08	-2.47	.013	-0.37	-0.04
gender	-.102	0.04	-3.60	<.001	-0.23	-0.07
knowledge	.324	0.03	5.83	<.001	0.13	0.27
investment	.425	0.03	6.52	<.001	0.15	0.28
pointervention	-.076	0.09	-1.20	.229	-0.29	0.07
competence						
pointervention	-.131	0.09	-2.42	.016	-0.39	-0.04
knowledge	.361	0.05	4.75	<.001	0.15	0.36
investment	.186	0.04	2.42	.016	0.02	0.19
gender	-.171	0.09	-3.19	.001	-0.45	-0.11
legoexp	.462	0.03	8.35	<.001	0.16	0.27
psyown						
control	.409	0.05	8.48	<.001	0.35	0.55
knowledge	.105	0.05	2.07	.039	0.01	0.20
investment	.514	0.04	10.26	<.001	0.34	0.49
autonomy						
psyown	.650	0.05	6.57	<.001	0.23	0.43
control	.047	0.06	0.43	.664	-0.09	0.15
knowledge	.521	0.06	4.54	<.001	0.15	0.37
investment	-.087	0.05	-0.75	.451	-0.13	0.06

Note. Cells that are empty indicate no paths within the model.

Spurious, Non-Causal Effects Identified by the Estimated Trimmed Path Model

Overview of non-causal effects. The spurious, non-causal effects were calculated by subtracting the zero-order correlations shown in Tables 4.5-4.9 from the total causal effects in the estimated trimmed path model shown in Table 4.20.

In these tables a task-contingent reward is represented by the variable "reward"; the psychological ownership intervention is represented by the variable "pointervention"; the combination of a task-contingent reward with the psychological ownership intervention is represented by the variable "rewxpsy"; exercise of control is represented by the variable "control"; intimate knowledge is represented by the variable "knowledge"; investment of self is represented by the variable "investment"; job-based psychological ownership is represented by the variable "psyown"; experience with Lego building blocks is represented by the variable "legoexp".

Non-Causal effects on intrinsic motivation. The results indicate that the zero-order correlations overestimate the relationship between autonomy (*Non-Causal Effect* = .32), competence (*Non-Causal Effect* = .067), and relatedness (*Non-Causal Effect* = .258) with intrinsic motivation. Similarly, intimate knowledge (*Non-Causal Effect* = .129) and investment of self (*Non-Causal Effect* = .031) are both overestimated.

Job-based psychological ownership (*Non-Causal Effect* = .113) and the combination of the task-contingent reward with the psychological ownership intervention (*Non-Causal Effect* = .524) and their correlations to intrinsic motivation are greatly underestimated. The non-causal effects on intrinsic motivation are shown in Table 4.25.

Table 4.25

Non-Causal Effects of Intrinsic Motivation Observed in the Trimmed Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
autonomy	**.523**	**.203**	.320
competence	**.524**	**.457**	.067
relatedness	**.432**	**.174**	.258
knowledge	**.453**	**.324**	.129
investment	**.456**	**.425**	.031
psyown	**.529**	**.642**	.113
reward	-.124	**-.140**	.016
pointervention	.080	-.076	-.156
rewxpsy	**-.162**	**-.686**	.524
gender	-.061	**-.102**	.041

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Tables 4.9 and 4.24.

Non-Causal effects on autonomy. The Pearson correlations between intimate knowledge (*Non-Causal Effect* = .233) and job-based psychological ownership (*Non-Causal Effect* = .295) with autonomy are both underestimated by about half their total effect as indicated by the trimmed path model. The non-causal effects on autonomy are shown in Table 4.26.

Table 4.26

Non-Causal Effects of Autonomy Observed in the Trimmed Full Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.174**	.047	.127
knowledge	**.288**	**.521**	.233
investment	**.185**	-.087	-.272
psyown	**.355**	**.650**	.295

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Table 4.10 and 4.24.

Non-Causal effects on competence. The zero-order correlations only slightly overestimate the relationship between intimate knowledge (*Non-Causal Effect* = .056) and experience with Lego building blocks (*Non-Causal Effect* = .004) with competence. More substantially overestimated is the correlation between investment of self (*Non-Causal Effect* = .219) with competence. The non-causal effects on competence are shown in Table 4.27.

Table 4.27

Non-Causal Effects of Competence Observed in the Trimmed Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
knowledge	**.417**	**.361**	.056
investment	**.405**	**.186**	.219
pointervention	-.019	**-.131**	.112
gender	-.136	**-.171**	.035
legoexp	**.466**	**.462**	.004

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Table 4.11 and 4.24.

Non-Causal effects on relatedness. The trimmed path model resulted in no remaining paths with statistically significant Pearson correlations. As a result, this model does not demonstrate overestimation or underestimation. The non-causal effects on competence are shown in Table 4.28.

Table 4.28

Non-Causal Effects of Relatedness Observed in the Trimmed Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
reward	-.108	**-.157**	.049
pointervention	.106	-.021	-.127
rewxpsy	-.073	**-.286**	.214
gender	-.053	**-.137**	.084
legoexp	-.040	**-.313**	.273

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Table 4.12 and 4.24.

Non-Causal effects on job-based psychological ownership. Similar to the spurious effects from the full path model, the spurious effects from the trimmed model show that the Pearson correlations greatly overestimate the effects of exercise of control (*Non-Causal Effect* = .266), intimate knowledge (*Non-Causal Effect* = .533) and investment of self (*Non-Causal Effect* = .221) with job-based psychological ownership. The non-causal effects on job-based psychological ownership are shown in Table 4.29.

Table 4.29

Non-Causal Effects of Job-Based Psychological Ownership Observed in the Trimmed Path Model

Variable	Zero-Order *r*	Total Effects	Non-Causal Effects
control	**.675**	**.409**	.266
knowledge	**.638**	**.105**	.533
investment	**.735**	**.514**	.221

Note. Bold indicates $p \leq .05$. Exact *p*-values are shown in Table 4.13 and 4.24.

Results of the Hypothesis Tests

Based on the total effects from the full path model and the trimmed path model the results of the tests of each of the research hypotheses are discussed below. Those results are summarized in Table 4.30.

Table 4.30

Total Effects Used in Hypothesis Testing Based on Full and Trimmed Path Models

		Full Path Model		Trimmed Path Model		
Hypothesis		*Total Effect*	*p*	*Total Effect*	*p*	Hypothesis Tests Conclusion
H1		-.133	.035	-.140	.013	Confirmed
	H1a	.007	.929			Rejected
	H1b	-.007	.895			Rejected
	H1c	-.137	.054	-.157	.001	Confirmed
H2		-.615	<.001	-.686	<.001	Rejected
	H2a	-.615	<.001	-.686	<.001	Rejected
	H2b	-.032	.814			Rejected
	H2c	.157	.090			Inconclusive
	H2d	-.321	.008	-.286	.001	Rejected
H3						
	H3a	.650	<.001	.642	<.001	Confirmed
	H3b	.102	.255	.047	.664	Rejected
	H3c	.125	.084			Inconclusive
	H3d	-.067	.410	-.097	.135	Rejected
	H3e	.388	<.001	.361	<.001	Confirmed
	H3f	.276	<.001	.324	<.001	Confirmed
	H3g	.545	<.001	.550	<.001	Confirmed
	H3h.	.476	<.001	.425	<.001	Confirmed

Note. The labels of the hypotheses in this table are included in the body of the text under "Results of the Hypothesis Testing." Cells that are empty indicate no path within the trimmed path model.

Hypothesis 1: A Task-Contingent Monetary Reward (reward) Will Reduce Intrinsic Motivation (intrinsic) for an Interesting Task. This Will Be Reflected by a Negative Total Effect on the Path Analysis.

The results of the path model support Hypothesis 1. A task-contingent reward does decrease intrinsic motivation for an interesting task (*Total Effect* = -.133, p = .035). The trimmed path model also confirms Hypothesis 1, indicating that a task-contingent reward decreases intrinsic motivation for an interesting task (*Total Effect* = -.14, p = .013).

Hypothesis 1a. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), there is insufficient, statistically significant evidence provided by the full and trimmed path models indicating that a task-contingent reward will have a negative effect on autonomy, leading to a rejection of Hypothesis 1a.

Hypothesis 1b. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), there is insufficient, statistically significant evidence provided by the full and trimmed path models indicating that a task-contingent reward will have a negative effect on competence, leading to a rejection of Hypothesis 2a.

Hypothesis 1c. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), a task-contingent reward does decrease feelings of relatedness (*Total Effect* = -.137, p = .054) towards the researcher and the environment that an interesting task takes place in. The trimmed path model also confirms Hypothesis 1c, indicating that a task-contingent reward decreases feelings of relatedness (*Total Effect* = -.157, p = .001).

Hypothesis 2: The Psychological Ownership Intervention (pointervention) will Moderate the Relationship Between a Task-Contingent Monetary Reward (reward) and Intrinsic Motivation (intrinsic) for an Interesting Task. This Will Be Reflected by a Positive Total Effect of the Combination of a Task-Contingent Reward with the Psychological Ownership Intervention (rewxpsy) on Intrinsic Motivation (intrinsic) on the Path Analysis.

The results of the path model reject Hypothesis 2. In the path model, the combination of a task-contingent reward with the psychological ownership intervention does not moderate the negative effects of a task-contingent reward on intrinsic motivation (*Total Effect* = -.615, p <.001). The trimmed path model rejects Hypothesis 2, indicating that the combination of the

task-contingent reward and the psychological ownership intervention does not act as a moderator (*Total Effect* = -.686, $p < .001$).

Hypothesis 2a. This subhypothesis predicted that, if the combination of a task-contingent reward and the psychological ownership intervention did indeed act as a moderator then the relationship between a task-contingent reward and intrinsic motivation would become a positive relationship instead of negative one. Hypothesis 2a is rejected because neither a task-contingent reward [95% *CI* = -0.37, -0.01] nor the combination of a task-contingent reward with the psychological ownership intervention [95% *CI* = -1.35, -0.71] ever developed a positive total effect on intrinsic motivation.

Hypothesis 2b. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), there is insufficient, statistically significant evidence provided by the full or trimmed path models indicating that the combination of a task-contingent reward with the psychological ownership intervention will have a positive effect on autonomy, leading to a rejection of Hypothesis 2b.

Hypothesis 2c. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), the results of the full path model and trimmed path model are inconclusive. The combination of a task-contingent reward with the psychological ownership intervention did have a positive effect on feelings of competence during the experiment at a probability level approaching statistical significance in the full path model (*Total Effect* = .157, $p = .09$). The relationship between the two variables was not statistically significant in the trimmed path model, leading to the inconclusive results for Hypothesis 2c.

Hypothesis 2d. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), the results of the path model and trimmed path model reject

Hypothesis 2d. The combination of a task-contingent reward with the psychological ownership intervention had a negative effect on a subject's feeling of relatedness to the researcher and to their environment during the Lego building task in both the full (*Total Effect* = -.321, p = .008) and trimmed (*Total Effect* = -.286, p = .001) models.

Hypothesis 3: The Three Routes to Psychological Ownership Will Positively Relate to and Satisfy the Three Mediating Psychological Needs of Autonomy, Competence, and Relatedness and Lead to Sustained or Increased Feelings of Intrinsic Motivation for an Interesting Task.

Hypothesis 3a. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), feelings of job-based psychological ownership do increase intrinsic motivation to complete an interesting task in the full path model (*Total Effect* = .65, p <.001) and in the trimmed path model (*Total Effect* = .642, p <.001). These results confirm Hypothesis 3a.

Hypothesis 3b. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), there is insufficient, statistically significant evidence provided by the full and trimmed path models to support the hypothesized positive relationship between exercise of control and autonomy, leading to a rejection of Hypothesis 3b.

Hypothesis 3c. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), the exercise of control did have a positive effect on feelings of competence during the experiment at a probability level approaching statistical significance (*Total Effect* = .125, p =.084). The relationship between the two variables was not statistically significant in the trimmed path model, leading to inconclusive results for Hypothesis 3c.

Hypothesis 3d. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), there is insufficient, statistically significant evidence provided by the full and trimmed path models to support the hypothesized positive relationship between exercise of control and intrinsic motivation, leading to a rejection of Hypothesis 3d.

Hypothesis 3e. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), feelings of intimate knowledge do increase feelings of competence for an interesting task (*Total Effect* = .388, p <.001). These results are paralleled by the trimmed path model that indicates similar conclusions (*Total Effect* = .361, p <.001), leading to a confirmation of Hypothesis 3e.

Hypothesis 3f. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), feelings of intimate knowledge do increase intrinsic motivation for an interesting task (*Total Effect* = .276, p <.001) in the full path model. The trimmed path model likewise indicates that intimate knowledge has a positive effect on intrinsic motivation (*Total Effect* = .324, p <.001) confirming Hypothesis 3f.

Hypothesis 3g. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), investing oneself into the experimental activity increases feelings of relatedness towards the researcher and the environment where the experiment takes place (*Total Effect* = .545, p <.001). The trimmed path model indicates similar, positive findings (*Total Effect* = .55, p <.001) confirming Hypothesis 3g.

Hypothesis 3h. After controlling for the effects of gender (gender), and experience with Lego building blocks (legoexp), investing oneself into the experimental activity increases feelings of intrinsic motivation for the Lego building block activity (*Total Effect* = .476, p

<.001). The trimmed path model indicates similar, positive findings (*Total Effect* = .425, *p* <.001) confirming Hypothesis 3h.

Chapter Summary

The central goal of this study was to observe whether psychological ownership and its three routes to development, operationalized by this study's psychological ownership intervention, would moderate the undermining effect of a task-contingent reward on intrinsic motivation. The findings of both the full path model and trimmed path model confirm that a task-contingent reward will diminish intrinsic motivation for an interesting task, the Lego building activity, but also indicate that the psychological ownership intervention, and the combination of the two variables also diminish intrinsic motivation for the interesting task.

Job-based psychological ownership had a strong, positive effect on intrinsic motivation suggesting that subjects who felt psychological ownership over their Lego house experienced greater intrinsic motivation for the activity as a result. The three routes to psychological ownership caused psychological ownership to develop. Also, two of these routes, intimate knowledge and investment of self, had strong, positive total effects on competence, relatedness, and intrinsic motivation.

Chapter V presents the implications of this chapter for teacher motivation, compensation, educational policy, and theory and more generally for the use of task-contingent rewards in organizations.

CHAPTER V: CONCLUSIONS AND IMPLICATIONS FOR TEACHER MOTIVATION, COMPENSATION, EDUCATIONAL RESEARCH, AND THEORY

This study focused on (a) the tendency of a task-contingent reward to undermine intrinsic motivation for an interesting task, (b) the theoretical and practical relationship between the three psychological needs identified by self-determination theory that enable people to feel intrinsically motivated for an interesting task and the three routes that lead to the development of psychological ownership, and (c) the potential for feelings of psychological ownership to moderate the undermining effect's potential negative impact on intrinsic motivation by satisfying a person's psychological need for autonomy, competence, and relatedness. This study approached these concepts by employing a novel experimental design aimed at fostering psychological ownership in a laboratory setting.

Chapters I and II provided background and a review of the extant research regarding self-determining theory, psychological ownership theory, and the role of performance pay in America's education system. Chapter III identified the research hypotheses that guided the research and described the participants, research design, methods, and experimental design in the study. Chapter IV presented the study's findings and the results of the hypothesis tests, reflecting on the results of both a full path model and trimmed model, showing only the statistically significant relationships.

This chapter discusses the implications of these findings for educational research and theory, school organization, educational leadership, teacher compensation plans, educational policy, and general performance pay compensation plans. This chapter applies this study's findings to teachers and their intrinsic motivation to teach. It is hoped that these findings

contribute to the field of education, particularly in the areas of teacher compensation and professional development.

Manipulating Motivation

Below are conclusions reached about each of the independent variables and covariates in this study. The most important results of this study's experiment will be reviewed followed by discussions about what these conclusions imply for practitioners (administrators and teachers in the education field, employers in the management field) and implications for education policymakers.

Conclusion: Task-Contingent Rewards Undermines Intrinsic Motivation

The guiding question of this study is, "How do you best motivate teachers to teach?" The results of this study's experiment indicate that task-contingent rewards are not the answer. As evidenced by past research into self-determination theory (Deci et al., 1999; Lepper, Keavney, & Drake, 1996), task-contingent rewards have the tendency to undermine intrinsic motivation for an interesting task. Subjects who received the $10 task-contingent reward for building a Lego house experienced decreased intrinsic motivation relative to those who did not receive the reward when the total effect of the reward on a person's autonomy, competence, and relatedness are taken into account. It is important to note that the total effect of the task-contingent reward is negative, although the direct effect on intrinsic motivation was positive and analysis of univariate statistics demonstrated a higher mean intrinsic motivation score for subjects who received the task-contingent reward versus the control group.

The total effect provides a clearer understanding of the reasons why task-contingent rewards undermine intrinsic motivation. The path analysis indicated a negative indirect effect between a task-contingent reward and intrinsic motivation, reflecting the reward's negative effect

on a person's sense of competence and relatedness. The path analysis indicates that subjects who received the task-contingent reward felt less competent in their actions and greater alienation towards the researcher and their environment. These two factors mediated the effect of the task-contingent reward creating a negative total effect on intrinsic motivation. These findings are similar to the findings of self-determination theory researchers (Deci et al., 1999).

Implications for practitioners. The implications for teachers are that task-contingent rewards, for instance performance pay, will have a detrimental affect on their intrinsic motivation to teach. This decrease in intrinsic motivation results from teachers feeling decreased interest and enjoyment in their work. Teaching is a profession that requires a great deal of intrinsic motivation because of the low extrinsic motivators (e.g., pay) provided relative to other professions. Teaching is also a profession that many people enter for intrinsic reasons. Although rewards may reinforce certain favorable behaviors, and some researchers provide evidence that task-contingent rewards have a tendency to increase rather than decrease intrinsic motivation, the findings from this study suggest that performance pay may ultimately decrease teachers' intrinsic motivation to teach.

The negative effect of a task-contingent reward on competence and relatedness implies that teachers may feel greater alienation from their administrators and less comfortable in their school. In particular this is detrimental to teachers, because teachers need to collaborate in order to effectively teach students across grade levels and in classrooms with multiple teachers. Collaboration is difficult, though, when teachers feel alienated from each other. Reduced relatedness may also increase feelings of distance or alienation towards administrators making it less likely for teachers to ask for help, build trust, or address concerns. This could isolate a teacher from potentially helpful sources of information, mentorship, and emotional support.

Implications for policymakers. Policymakers should recognize an additional consequence of diminished intrinsic motivation first observed by Deci (1971; 1972) that task-contingent rewards also effect subsequent free-choice decisions when the reward is later removed. A negative consequence of diminished intrinsic reasons for completing a task is that, when there are no longer extrinsic reasons provided to complete a task, a person will simply not complete the task any longer. If a teacher is provided performance pay based on student growth, and that teacher subsequently feels less intrinsically motivated to teach, that teacher may also no longer perform extra duties that are not directly rewarded.

Teachers spend countless hours developing novel approaches to teach difficult material when direct instruction is far easier to do and will have a more immediate, although fleeting, impact on a student's test scores. Teachers spend hours at home providing feedback on student work that they do not receive additional compensation for but do nonetheless because they observe the long-term benefit of informational feedback. There are countless unrewarded tasks that teachers complete that are driven by their intrinsic motivation for teaching. If this motivation decreases because teachers are only rewarded for actions that directly result in increased student growth on state tests, schools and students will suffer as a result.

Conclusion: The Psychological Ownership Intervention Undermines Intrinsic Motivation

Contrary to expectations, the experimental intervention developed to induce feelings of psychological ownership also had a negative affect on intrinsic motivation. This outcome was puzzling because the psychological ownership intervention specifically tied each direction during the 15-minute planning period to the three root motivations and three routes to psychological ownership (see Table 3.4). The undermining effect may help explain these results. Subjects may have perceived the directions as controlling because I dictated to them what specific steps to

follow in order to plan for the Lego house experiment. The negative total effects between the psychological ownership intervention and the subjects self-reported autonomy, competence, and relatedness support this explanation. The results suggest that psychological ownership cannot be forced onto people but rather has to develop organically.

Implications for practitioners. These results have important implications for schools and the implementation of professional development programs. Providing step-by-step directions may not be the best way to encourage teachers to embrace a new concept or strategy. Directing teachers to exercise control over an object in the hope that it will lead to psychological ownership may lead the teachers to feel externally controlled instead undermining the goal of the directions. Likewise, providing directions in a hope to influence teachers' knowledge may lead them to feel less competent or, perhaps, the directions will be internalized as condescending. Telling teachers to invest themselves into an object may also not take into account personal preferences and may actually alienate them from the administration.

Fostering psychological ownership among teachers may require a more hands-off approach, where administrators allow teachers the freedom and opportunity to exercise control, collect knowledge, and self-invest over the course of a school year and develop these feelings over objects or tasks that they identify for themselves and have a preference towards. A professional development program with this goal could breakdown each route to psychological ownership and incorporate them into the school culture by allowing teachers the independence to make decisions in their classroom, increase the availability of data and professional development opportunities, and encourage teachers to personalize their curriculums, classroom, and school. A more hands-off approach might take away the perception of being forced into something that my

experimental intervention may have induced in subjects and set the stage for psychological ownership to grow once a teacher has found an object attractive to them.

Implications for policymakers. For policymakers, the results of this study should offer guidance on how to approach the implementation of new initiatives. New practices should not be delivered from top-down with explicit guidance. Rather, policies may be accepted and integrated more readily if they are introduced as broad frameworks that teachers have opportunities to learn about, manipulate, and personalize without immediate pressure to excel. Encouraging teachers to first establish how they will incorporate their own self-generated curriculums and teaching material to a new policy initiative will lay a foundation of feelings of possession and psychological ownership. Forcing a policy on teachers without concern for their own preferences could build or reinforce resentment towards the new policy and diminish intrinsic motivation to teach.

The importance of preference. How can organizations help their workers feel psychological ownership if directly manipulating the three routes to it are perceived as coercive? One potential strategy could be to take into account the personal preferences of workers towards what they want to feel psychological ownership of. Making teachers take part in a professional development course aimed at learning a new pedagogical strategy may decrease intrinsic motivation to teach that way if teachers have no interest in that strategy. Also, assigning teachers courses to teach that they have no desire to teach could likewise eliminate the potential for psychological ownership of that course. Even if the professional development program or the newly assigned course is organized to allow teachers to exercise control over how they incorporate their existing curriculum into it and even if teachers are provided copious resources and allowed to personalize their work, teachers may not develop psychological ownership. If

teachers simply have no interest in something new and it is not salient or attractive to them, they may have decreased motivation to pursue it and not take the time to develop feelings of psychological ownership over it.

It is important for administrators to assess what is salient to teachers. Strong relationships and open dialogue between staff and administrators to identify what professional development opportunities best fit a teacher's character, pedagogical style, or content interest will allow schools to assign tasks and roles to the appropriate teachers. Likewise, open dialogue and strong relationships may encourage teachers to address a lack of interest that, if not addressed, may lead the teacher to begrudgingly accept the position, but with no beneficial outcome for the teacher, the students, and the school.

Conclusion: The Combination of a Task-Contingent Reward With the Psychological Ownership Intervention Undermines Intrinsic Motivation

When combined, the subjects who received both the task-contingent reward and the psychological ownership intervention experienced the greatest decrease in intrinsic motivation at a magnitude almost six times as great as a task-contingent reward or the psychological ownership intervention alone. This was contrary to the hypothesis that the psychological ownership intervention would provide a mindset that would shield a subject's sense of autonomy, competence, and relatedness from the external control of the task-contingent reward.

These results are not shocking though considering that the task-contingent reward and the psychological ownership intervention both independently had negative total effects on intrinsic motivation. Combining the two seems to have caused a snowball effect of controlling feelings leading subjects who received this combination to enjoy the Lego house activity the least and feel the most forced to participate.

Implications for practitioners. The implications for schools are clear: schools should not try to combine task-contingent rewards with structured schemes aimed at building psychological ownership as this combination has a very large negative impact on intrinsic motivation. Subjects who received both the task-contingent reward and the psychological ownership intervention experienced vastly decreased intrinsic motivation and decreased relatedness, although they did experience increased competence.

This suggests that the intervention, when paired with the $10 reward, may have appeared coercive to the subjects or increased the tension subjects felt before building their house. The decreased feelings of relatedness experienced by these subjects reflects increased tension and lack of comfort, although subjects clearly did feel greater competence towards the activity as a result of the planning period. The implications of this negative effect suggest to school administrators and policy makers that task-contingent rewards should not be directly paired with any intervention or program aimed at instructing teachers strategies for increasing their sense of psychological ownership as this is perceived as controlling and has a strong negative effect on intrinsic motivation. It may be equally detrimental to pay teachers to partake in any professional development as it diminishes the perception that the intervention is valuable by its own merit.

Conclusion: Job-Based Psychological Ownership Increases Intrinsic Motivation

The measurement of psychological ownership traditionally employed, without considering the three routes that lead to psychological ownership feelings, is the Van Dyne and Pierce (2004) scale. The items in the scale specifically use the term “Mine” to assess psychological ownership (e.g., item psyown01: “I sense that this job is MINE”). This scale embodies the theoretical framework of psychological ownership by measuring a subject’s sense of possession over an item that is not legally their own. Subjects across the entire study,

independent from the four experimental groups, who experienced feelings of job-based psychological ownership and a sense of possession over their Lego house, experienced the greatest intrinsic motivation for the task. Job-based psychological ownership also positively affected subjects' senses of autonomy suggesting that people who feel possessive of their Lego house also felt as though they were building it simply because they enjoyed the experience of building it.

Implications for practitioners. These findings have important implications for increasing teacher intrinsic motivation to teach. Self-determination theory researchers explain that autonomy is the most important psychological need for the development of intrinsic motivation (Koestner, 2008; Deci & Ryan, 2008a). Autonomy is quickly diminished, though, by externally controlling forces that include task-contingent rewards, time constraints, surveillance, and other forms of external pressures that many teachers experience at work. A way of increasing autonomy in light of these external forces may be to encourage teachers to develop job-based psychological ownership, and a strong sense of possession, over their work. As a cautionary rule, though, school administrators should allow these feelings to develop naturally in a teacher to avoid any negative outcomes from trying to force its development as demonstrated from this study's psychological ownership intervention.

The findings also question the importance of the three psychological needs of autonomy, competence, and relatedness for developing intrinsic motivation. Self-determination theory researchers (Deci et al., 1999) explain that environments that promote these psychological needs will increase the intrinsic motivation of workers. This study suggests, however, that a more direct method of increasing motivation is to encourage workers to feel possession of their jobs.

Encouraging workers to feel as if their work belongs to them will have a much greater impact on motivation than designing an environment that promotes the three psychological needs.

Implications for policymakers. Policymakers are also cautioned by these results, as over-regulation may reduce a teacher's sense of psychological ownership. The rollout of the Common Core Learning Standards in New York State demonstrated an ineffective, heavy-handed approach to implementing a new policy. Math and English teachers were handed prefabricated curriculums, Common Core aligned state tests were immediately created, and the professional development organized around the Common Core roll out was often rushed and uninformative. Standards were poorly created and teachers had little opportunity to invest themselves into their work. A lack of control, low self-efficacy, and the unavailability of informative resources diminished feelings of autonomy, competence, and relatedness in teachers towards their classes and schools. After the Common Core standards were implemented, I observed decreased motivation to teach, increased stress and burnout, and little feeling of possession for teaching in many of the Math and English teachers I worked with.

It is recommended that future policy initiatives allow schools to develop their own ideas for how to achieve broad educational goals. Rather than a nationally created set of standards, individual schools, districts, and states could develop their own standards that are then aligned to broad goals established for the whole country. No Child Left Behind (2002) could have established the national standard of proficiency in English and Math for all students and then allowed the states autonomy in how to achieve this. An individual school in-turn could generate interventions that incorporated teacher expertise and embraced the idiosyncrasies of their school to develop plans that best worked for the school's teachers and students. The resistance to No Child Left Behind faced, particularly the testing and accountability mandates, demonstrates the

consequences of over-regulation as this federal initiative was viewed as overly controlling and did little to build feelings of ownership or motivation for teachers, students, and parents.

The three routes to psychological ownership. Job-based psychological ownership developed during the experiment when subjects felt as though they could exercise control over their actions, had intimate knowledge available to them, and could invest themselves in their Lego house, albeit not necessarily as a result of the intervention that I developed to manipulate these variables. The full and trimmed path analyses indicated that the most influential of these routes to psychological ownership was investment of self, followed closely by exercise of control, and then intimate knowledge. This implies that administrators who want to encourage teachers to feel possessive of their curriculum, classroom, students, building, and school as a whole should first allow them to invest themselves into their work. Schools can help build job-based psychological ownership by following Jussila et al.'s (2015) guidance.

Jussila et al. (2015) explained that in order for a person to exercise control over an object, that object must be open to control and attractive to the person. For teachers, curriculums need to be open to change and manipulation; teachers should be allowed to teach in a manner they are confident with and make their own decisions. Teachers also must find their curriculums attractive. It would be counter productive to expect a teacher who loves United States history to develop psychological ownership over a less attractive subject.

In order for a person to know an object intimately requires important information to be readily, and easily, accessible and understandable. Schools can have resource rooms for teachers with books on pedagogy and content to provide accessible information to teachers. Schools can provide mentor teachers and encourage intervisitations in order to increase the visibility of different practices by modeling them throughout the school. In my own school, administrators

hold informal conversations three times a year with each teacher to talk about student data and derive plans for tailoring curriculums around it. This source of information on interpreting student data helps teachers who are perhaps less literate in its analysis to have a better understanding of how their students are doing quantitatively.

Self-investment is another important route to psychological ownership. Self-investment develops when teachers can manipulate their curriculums and their classrooms; a teacher must be able to customize and personalize their lessons, rooms, and even their desks in a manner that will allow for an investment of their personality. These strategies combined will help teachers feel in possession of their jobs and will result in increased intrinsic motivation to teach.

Can psychological ownership be instilled in others? The experimental intervention in this study that aimed to target the routes to psychological ownership in order to develop it failed to achieve its goal. If directly trying to manipulate the routes to psychological ownership does not work, and actually decreases intrinsic motivation, how then can an organization encourage their workers to develop this feeling?

Personal preferences. One way to increase job-based psychological ownership and perception of possession is to take into account personal preferences. In the experiment, subjects who participated may have simply not enjoyed the Lego building activity. Perhaps they took part in the experiment for the reward or perhaps they took part because they perceived the Lego activity as potentially enjoyable only to lose interest as the experiment progressed.

In an organization, personal preferences need to be accounted for before workers are asked to engage in an activity to ensure that psychological ownership has a chance to grow. This suggests that employers and employees need to communicate preferences with each other. For the field of education, administrators need to account for teacher interests and preferences before

assigning professional development opportunities and teaching assignments to them. If teachers find a teaching assignment initially interesting they will be more likely to self-invest into the design of the curriculum, seek additional knowledge about the material, and exercise control over it, all of which will then build a feeling of psychological ownership.

The investment of time is not that important. Jussila et al. (2015) explained that the investment of time was important for the development of intrinsic motivation. An initial assumption about a limitation of this experiment was that I only provided 15-minutes for subjects to develop feelings of psychological ownership over their Lego house during the planning period. Time does not seem to have had any observable impact on the experiment. The measurements of job-based psychological ownership, intimate knowledge, and investment of self (all which collect data from all subjects in the experiment) all positively relate to intrinsic motivation. This suggests that 30-minutes (15-minutes for the planning period or filler activity and 15-minutes to build a Lego house) may have been sufficient time for some subjects to develop psychological ownership over their Lego house.

This suggests that employers could have new workers feel possessive of their jobs by the end of their first day at work. This could be very beneficial for new teachers who have the highest attrition rate in education.

Conclusion: Psychological Ownership Has a Greater Effect on Intrinsic Motivation Than Autonomy, Competence, and Relatedness.

This study found that the greatest cause of intrinsic motivation during the activity is job-based psychological ownership, the feeling of being in possession of an object. Subjects across the entire experiment who felt possessive of their Lego house were more motivated than subjects who felt autonomy in their actions, competence in their decision-making, and relatedness to their

environment. This suggests that self-determination theory, which explains that intrinsic motivation is fostered in people when their psychological needs are satisfied, may not be the most effective way at promoting a person to feel intrinsically motivated. It may be quicker and easier to motive a person by encouraging them to feel possession of whatever task they are asked to complete.

Implications for practitioners. When I first explored self-determination theory I tailored my United States History curriculum to include opportunities for students to feel autonomous in their actions by providing choices in how they complete their homework and projects. I encouraged competence growth by providing informational feedback to students on all their assignments and I built rapport with my students to influence their sense of relatedness. As a result of my curricular changes, I have observed a high level of excitement to learn American history and increased engagement in my class. Also, my students performed well on their New York State Regents exams relative to the rest of the city. Although observing positive results, it takes a long time each year to offer opportunities for choice, provide feedback, and build strong relationships. However, these goals may take months to achieve.

The findings in this study suggest that a quicker, more immediate way to increase intrinsic motivation for my students could be to make the students feel that this class is their own. Students could feel possessive of the physical classroom, their work, or the entire curriculum. This can be achieved quickly, within the first week of school, by simple activities that encourage students to leave their mark on the classroom. Displaying student work on the walls of the classroom is one tried and true method of personalizing and customizing a classroom. Encouraging the students to choose what pieces of work they want to display may also encourage them to further self-invest in the classroom. Incorporating opportunities to feel

possessive in the first week of school may establish a high level of intrinsic motivation in students that can then further grow as a result of my other strategies throughout the year.

Gender: Males Experienced Greater Intrinsic Motivation, Competence, and Relatedness

The findings of the study suggest that males experienced greater intrinsic motivation for the Lego building activity, greater competence in their actions, and increased relatedness to the researcher and to their environment during the experiment than females. These findings suggest that males are more likely to feel intrinsic motivation because they experience greater self-efficacy and greater relatedness to a male researcher.

Applied to education, where 76% of teachers are female (National Center for Education Statistics, 2017), these findings suggest that female teachers may need extra support to build their self-perception of competence. Also, female teachers may be more prone to feeling alienated from their environment. Administrators could help support female teachers in feeling more connected and relatable to their school and to their colleagues by allotting time for weekly common planning sessions between teachers and delegating school leadership responsibilities to teacher teams to help build a sense of teamwork.

Experience with Lego Building Blocks Increases Competence and Decreases Intrinsic Motivation

Experience with Lego building blocks increased feelings of competence towards the activity but decreased feelings of relatedness. This may reflect frustration with the more experienced subjects in creating a relatively simple object with a limited supply of Legos. These same subjects, who were frustrated with the researcher, also felt more competent in their actions. These results highlight the important of experience in building self-efficacy.

For teachers, experience will build the perception of competence. This suggests that schools should assign teachers consistent content over the years of a career. Scheduling teachers each year for different content areas (e.g. a history teacher teaching United States History one year and then Global History the next) may diminish competence, and subsequent intrinsic motivation, because of a lack of previous experience.

These findings also suggest that inexperienced teachers may feel less competent, and thus, less motivated. It is important for administrators to support new teachers by providing mentors, frequent observations accompanied by feedback, and professional development opportunities in order to build competence and self-efficacy.

Self-Determination Theory and Psychological Ownership Theory

The only positive effects on intrinsic motivation in this study resulted from subjects who experienced job-based psychological ownership, intimate knowledge, investment of self, autonomy, competence, and relatedness. The positive effect of autonomy, competence, and relatedness confirms the findings of self-determination theory researchers who explain that these psychological needs, when satisfied, allow a person to feel intrinsically motivated for interesting tasks (Deci & Ryan, 2008). The extant literature on self-determination theory and psychological ownership theory suggests that feelings of psychological ownership will satisfy the three psychological needs and thus lead to increased intrinsic motivation. Although this study did not indicate that psychological ownership acts as a moderator for the undermining effect, several subhypotheses were confirmed based on the results of this study as explained below.

The Three Routes to Psychological Ownership and the Three Psychological Needs of Intrinsic Motivation

A review of the literature on the mediating psychological needs of autonomy and competence (Freehan & Enzle, 1999; McIntyre et al., 2009; Wagner et al., 2003) suggested that exercise of control would positively affect them. There was no statistically significant relationship between control and autonomy, although there was a positive relationship between control and competence at a probability level approaching statistical significance. Job-based psychological ownership positively related to autonomy at a statistically significant level suggesting that people who feel in possession of their jobs will feel as though they are more independent and autonomous at work.

As hypothesized, intimate knowledge satisfied the need for competence; subjects who felt that they had a greater understanding of the expectations of the experiment also experienced greater competence and efficacy in their actions. Likewise, subjects who felt as though they invested themselves into the construction of their Lego house also experienced greater feelings of relatedness to the researcher and their environment during the experiment. These results suggest that the routes that lead to a person feeling psychological ownership over a task will also satisfy a person's psychological needs that lead to intrinsic motivation

Intimate knowledge and investment of self also had a positive total effect on intrinsic motivation suggesting that competence and relatedness do serve as mediators and, when satisfied, lead to increased intrinsic motivation. In a school setting, teachers who are encouraged to gain knowledge and invest themselves into their work will also feel more competent in their pedagogy (because they have more information to support their understanding of their profession), more relatable to their environment (because they have invested their character and personality into their teaching), and greater intrinsic motivation to teach.

Psychological Ownership Leads to Intrinsic Motivation

These findings also establish an empirical link between the development of psychological ownership and intrinsic motivation. As the feeling of possession grows, a person will also feel greater autonomy in their work because they feel as though they are working on something they possess. As a person becomes more knowledgeable in their profession, they will experience greater confidence and competence as a result of a greater understanding and comprehension of their job. As employees become more invested in their work by personalization and customization, they will feel greater relatedness to their coworkers because they feel more comfortable in their environment. These findings are important for any organization that wants to increase their workers motivation without having to use external rewards or punishments. Managers can offer their workers opportunities to build psychological ownership feelings and will observe increased intrinsic motivation to work as a result.

By building an environment conducive to psychological ownership feelings, an organization will reap the benefits of workers who exhibit increased feelings of stewardship, increased citizenship behaviors, and increased personal sacrifice for the sake of the organization (Pierce et al., 2001; Pierce et. al., 2009). Workers will also take upon themselves extra-role and inter-role behaviors, affective commitment, organizational citizenship (O'Driscoll et al., 2006), experience greater psychological well-being and job retention (Chung-Yan, 2010), and improved effort and performance at work (Pierce et al., 2009). When workers feel invested and in possession of an organization, they will strive to take care of the organization because the work place success is tied to the worker's own sense of accomplishment.

Implementation strategies. To achieve these aims, managers should concentrate on the most important elements of psychological ownership that have the greatest impact on intrinsic motivation. Feeling of possession, as measured by the job-based psychological ownership scale,

and investment of self, have the two greatest impacts on intrinsic motivation. This suggests that workers who feel as though their work embodies their character and identity experience the most intrinsic motivation, much more so than if that worker is offered a task-contingent reward as a form of motivation instead.

Another means of growing psychological ownership in workers is by providing workers a stake in their jobs. This is reflected by research into family owned businesses (Bernhard & O'Driscoll, 2011; Mustafa et al., 2015), where workers feel as though they are part of the family and work to improve and grow the business despite not actually possessing any legal ownership. Offering opportunities to contribute to an organization in a manner that allows a worker to leave their mark may aid in the development of psychological ownership and increase motivation.

The route to psychological ownership of exercise of control had no statistically significant effect on intrinsic motivation; however, was important in the development of psychological ownership. This suggests that an organization that wants to motivate their workers may want to emphasize increasing worker knowledge and offering opportunities for self-investment because these qualities have a direct, positive affect on intrinsic motivation. Focusing on methods that increase the control workers feel over their jobs is not as important because it does not increase a worker's motivation.

A Teacher's Perspective

The results of this research are not surprising to me. I am lucky to teach at a school with a strong professional development program that emphasizes the acquisition of knowledge, the molding of pedagogy through reflection on student data, and provides open lines of communication between the teachers and administrators. This culture allows me to feel intimately knowledgeable about the goals of my school, my students' abilities, and what

opportunities exist to seek additional help. My school also allows a great deal of freedom to personalize my curriculum. I pride myself in my American History curriculum and enjoy teaching because my lessons are full of personal anecdotes and reflections. I am also able to exercise control within my school; I developed an international travel program from the ground up and have observed the successes of my efforts on the school culture and the lives of the students who travel with me. I feel a great deal of psychological ownership because of my school's environment and I see the successes of my school as reflective of my own successes. I feel that the school is, "Mine".

I also feel a great deal of intrinsic motivation to teach. I enjoy teaching; I find teaching interesting and challenging and look forward to going to work everyday. This motivation is consistent even in light of the pressure I feel for my students to succeed on their summative, end-of-the-year assessment, the New York State United States History and Geography Regents exam. Besides being a graduation requirement for my students, their scores reflect my skill as a teacher and represent a 50% contribution to my yearly teacher rating. I have felt pressure to perform over the years but have never felt a desire to stop teaching or leave the field of education as a result.

This motivation is not the same though for all teachers. I initially came across self-determination theory four years ago and, after learning about the undermining effect, I realized that externally controlling forces have a powerfully negative effect in a school setting. My second year teaching I taught in the same room as a math teacher who was tasked with teaching a Common Core Algebra class. There was a Regents exam at the end of the course that would significantly affect her rating. She was an untenured, relatively new to the school, and was handed a prefabricated Algebra curriculum. She was then instructed to teach word-for-word

from Common Core modules. As the year progressed, the math teacher became increasingly despondent and frustrated. Despite having professed her love for teaching earlier in the year, she began speaking about a desire to quit teaching and work in the service industry instead. At the conclusion of the school year, her students sat for the Algebra exam and performed well. The math teacher, however, had turned in notice that she was not returning to education the following year.

As a doctoral student, I was enlightened by self-determination theory and the mini case study taking place in my shared classroom each day. A series of external forces had conspired to sap the math teacher's intrinsic motivation to teach. She did not feel in control of her curriculum having been handed a prefabricated one. She did not feel intimately knowledgeable about the Common Core Learning Standards, New York having famously rushed modules and standards out with little time for trouble-shooting or for professional training. Also, she did not have an opportunity to invest herself into the curriculum. Lesson plans were someone else's creation. Stories were not her own. The math teacher did not feel in possession of the curriculum and had no feeling of psychological ownership to link her intrinsic motivation to teach to this particular subject. As a result, our school lost a good teacher and was deprived of the positive effects an intrinsically motivated teacher brings to the classroom.

I have avoided a similar outcome because I am allowed to build my curriculum and teach my lessons in a manner that I see fit. I have had the opportunity to develop a strong sense of psychological ownership over my profession and, as a result, I do not lose my intrinsic motivation to teach despite the pressure to have my students succeed on their New York State Regents exams.

This study provides evidence for why I continue teaching today, but the former math teacher does not. Psychological ownership leads to intrinsic motivation. Research suggests that schools that foster psychological ownership will build teachers who are willing to sacrifice and work hard for the improvement of their school and for their students because they enjoy doing so. Avoiding the lessons learned from this study and allowing teachers to feel external pressure to perform will only lead to increased teacher attrition, "teaching to the test", and, ultimately, lower student engagement and achievement.

Theoretical Implications and Future Research

As discussed in Chapter II, there are gaps in the existing research into psychological ownership theory and self-determination theory that this study addresses. Research into psychological ownership development has largely grown through case studies of family-owned businesses (Bernhard & O'Driscoll, 2011). More recently, in the field of marketing and advertising, psychological ownership has been assessed in relation to how shoppers develop feelings towards online products (Karahanna et al., 2015). Prior to this study, psychological ownership and its three routes of development have yet to be manipulated in a laboratory experiment. This study took the first step at addressing this gap by creating an experiment that specifically sought to manipulate these variables. An important finding of this study is that the psychological ownership *intervention* did not positively effect intrinsic motivation despite the independent job-based psychological ownership measurement indicating that there is a strong positive relationship between it and intrinsic motivation. This suggests that the experiment developed for this study did not correctly, or at all, generate psychological ownership, exercise of control, intimate knowledge, or investment of self in the targeted subjects. It is hoped that future researchers build upon this study's experiment in an effort to refine the protocol.

An additional gap in the literature was a lack of empirical evidence demonstrating a link between psychological ownership and intrinsic motivation. Jussila et al. (2015) hypothesized that there will be motivational, attitudinal, and behavioral consequences from the development of psychological ownership and that one motivational consequence is the feeling of intrinsic motivation. This study addressed this gap by showing a link between job-based psychological ownership, intimate knowledge, and investment of self with the psychological need for autonomy. A link was demonstrated between intimate knowledge and the psychological need for competence, and a connection between investment of self with the psychological need for relatedness. Job-based psychological ownership, intimate knowledge, and investment of self also positively effected intrinsic motivation. Future researchers may seek to confirm this observed structural relationship between the two theories and seek to examine their interaction in a field study. Identifying a school or organization with highly motivated workers and assessing their feelings of psychological ownership may shed light on the structural formula that encourages and maintains psychological ownership and intrinsic motivation.

Another interesting extension of this research would be to identify an organization that employs external forms of motivation but yet encourages workers to take psychological ownership of their jobs. It would be fascinating to test this study's hypotheses in a field study to observe how psychological ownership and intrinsic motivation react simultaneously to task-contingent rewards in an organization. This research could show whether the undermining effect diminished psychological ownership feelings as it does intrinsic motivation and, if not, why.

Future research into psychological ownership could assess the reasons some people develop psychological ownership and others do not. Applying discrete choice analysis, and Q-methodology may demonstrate that individuals value psychological ownership differently

because objects and tasks have different perceived value to different people. These techniques may lead to the development of profiles for different people and pair personality type with task preference for psychological ownership.

Implications for Educational Policy

With the appointment of Secretary Betsy DeVos, the hegemony of a majority Republican Senate and House of Representatives, and the increase of Federal leadership with strong business backgrounds and open-market philosophies, one can assume that future education policies will maintain or strengthen the assumption that external rewards and punishments will lead to greater student achievement and teacher work effort. With principal agency theory (Stiglitz, 1987) being a popular justification for the application of task-contingent rewards, increased federal efforts aimed at encouraging states to implement performance pay compensation systems could increase in scope and frequency in the coming years.

With the results of this study in mind, policy makers should seriously consider the effect on this country's education system and children if teachers start to lose their intrinsic reasons for teaching. Negative effects such as increased teacher attrition, increased teacher burnout and work overload (Fernet, 2013; Hussain et al., 2015), increased teaching to the test, increased cheating (Jacobs & Levitt, 2003; Strauss, 2011), increased gamesmanship and goal distortion (Campbell, 1976; Rothstein, 2009), and decreased student motivation, engagement, and performance (Deci et al., 1982) could occur if rewards and punishments are the primary tool to increase teacher motivation. It is recommended that policy makers concentrate on providing funds and opportunities for teachers to develop psychological ownership of their profession. This will directly lead to increased intrinsic motivation and all the positive extrarole behaviors and improved work outcomes associated with the two concepts.

Summary

Returning to the story of Tom Sawyer in Chapter I and applying the findings from Chapter IV, how could Aunt Polly best motivate Tom to whitewash her fence? The results of this study suggest that paying Tom for his actions would decrease any interest or enjoyment he would derive from the whitewashing, making it less likely that Tom would willingly work on the fence again in the future without the same reward. If Aunt Polly contrived some plan to manipulate Tom into whitewashing the fence by developing a set of directions aimed at encouraging Tom to feel psychological ownership of the fence, this too would backfire. If Aunt Polly paired her directions with a reward there is a good chance that Tom would never lift a finger to help his Aunt around the house again. So how does Aunt Polly, or any manager, teacher, or parent convince someone to complete an activity without coming off as externally controlling?

This study suggests the psychological ownership is the answer, but that it has to develop organically. Aunt Polly should first assess if Tom would even want to whitewash the fence. Perhaps his effort could be applied to some other household chore that Tom prefers. If Tom does decide to whitewash the fence, Aunt Polly could encourage Tom to exercise control over the design and construction of the fence, provide him with knowledge about fence building, allow him to personalize the fence, and encourage him to feel possessive of his work. These steps should develop feelings of psychological ownership, and subsequently, increase his intrinsic motivation for completing the task. The key for Aunt Polly, though, is to allow this to happen over time, take into account Tom's preferences, and avoid any perception of coercion.

Psychological ownership is a powerful feeling. It may moderate the undermining effect allowing workers to take advantage of performance pay without worrying that they will lose

interest in their jobs and find their work unenjoyable. Its confirmed link to intrinsic motivation reveals that organizations that want to function optimally and create highly motivated and productive workers should foster these feelings. Organizations can achieve this by allowing their workers to exercise control over their jobs, have access to information in order to have intimate knowledge, and encourage personalization so that workers invest themselves, feel possessive and, ultimately, embody their work.

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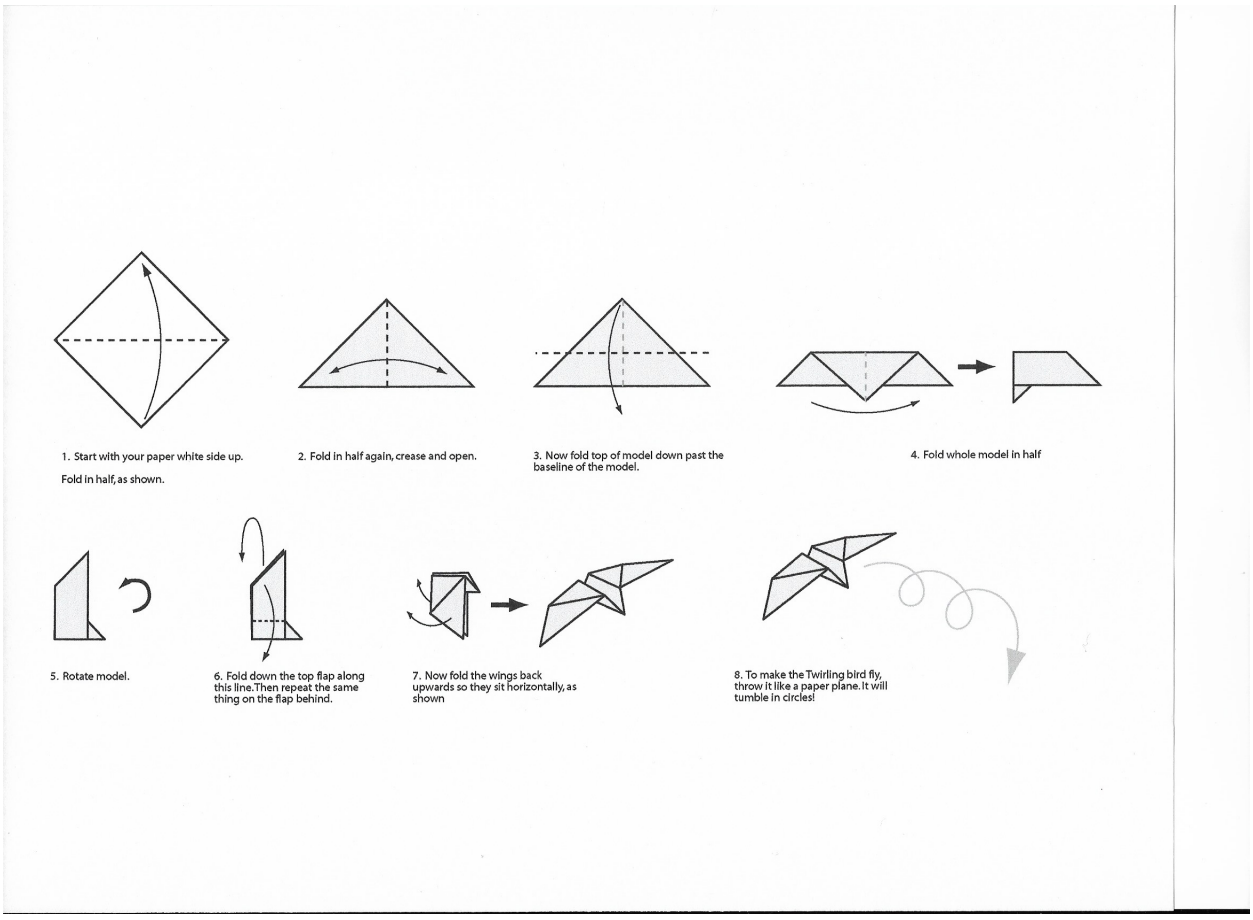
APPENDIX A

TWIRLING BIRD ORAGAMI FILLER ACTIVITY INSTRUCTIONS



APPENDIX B

LETTER TO UNDERGRADUATE AND GRADUATE PROFESSORS

Dear Colleague,

I am writing this letter to enlist your help in gathering data for my dissertation study entitled, *A Path to Motivation: A Mediated Moderation Analysis of the Relationships Between Task-Contingent Rewards, Psychological Ownership, and Intrinsic Motivation Using Path Analysis*. The purpose of this study is to apply path analysis to determine the direct, indirect, and total effects of the study's manifest variables. Specifically, I am focusing on how feelings of psychological ownership can provide a buffer for the undermining effect of a task-contingent reward on a person's intrinsic motivation. The context of my study is timely in that financial incentives are given increased attention in the field of education, which has traditionally relied upon intrinsically motivated teachers. To achieve this study's aims I plan to conduct an experiment followed by a survey.

I would like to enter your classroom to administer my experiment to your students at the conclusion of one of your class periods or, if convenient and acceptable, during one of your class periods. Participation is completely voluntary and confidential (no personally identifying information is being collected), and requires 40 minutes. This experiment has received full IRB approval. The experiment will take place in the student's classroom, so classes where the students can stay afterwards are preferable. Participants in two of the four group will receive $5-$10 as part of the experiment and as compensation for their time. The remaining groups will receive compensation during a debriefing period after the experiment, but will be told in the beginning of the experiment that there is no direct compensation for participation for the sake of the experiment.

If you have any questions regarding the experimental protocol, the survey, or this research project in general, please feel free to contact me at Raphael.Morey@my.liu.edu, or Dr. David Jalajas; david.jalajas@liu.edu, my dissertation chair.

Please respond via email (Raphael.Morey@my.liu.edu) stating that you are willing to have me administer my experiment and survey to your students after class on a day of your convenience. I thank you in advance for your collegial assistance and will send a follow-up email in a few days.

Sincerely,

Raphael Morey

APPENDIX C

INVITATION LETTER AND LEGO BLOCKS MOTIVATION SURVEY

Lego Blocks Motivation Survey

Hello,

Welcome to the "Lego Blocks Motivation Survey" that I am conducting for students at Long Island University, C. W. Post Campus. The purpose of this study is to better understand the motivational drive of college students towards a building task.

I believe this anonymous survey will take you only about 5 to 10 minutes to complete. It includes a series of statements related to your experience during the Lego building task, and I simply ask you to respond to questions about your experience in a series of reflective questions. I also ask that you provide some very basic background information.

I am conducting this survey as part of the research for my doctoral dissertation and also hope to report the findings in scholarly and professional publications. I respect your privacy, and the survey does not ask for your name or the name of your school. Please be assured that I have no way of knowing who completed this survey, and your identity and answers to the survey will be *completely anonymous*. If you give me permission to use your responses, they will be reported only in overall average results.

Thank you so much for your consideration and, hopefully, for your participation in my survey! If you have any questions or would like to discuss the study or survey with me personally, please feel free to email me at Raphael.Morey@my.liu.edu.

Sincerely,

Raphael Morey, Doctoral Candidate, Study Director
College of Education, Information & Technology
Long Island University

Part 2a. – Motivation during Lego Building Task

* In this section of the survey, I am interested in your motivation during the Lego building task.

Some of these questions refer to a "task", assume that this task was the Lego building task. Some questions refer to a "person", assume this person is the researcher (doctoral candidate).

Please respond to each of the following statements by circling the appropriate number that represents your feelings during the task.

Rank your responses below on a 1-7 scale with 1= "Strongly disagree" and 7= "Strongly agree".

Question	Strongly disagree						Strongly agree
1. While I was working on the task I was thinking about how much I enjoyed it.	1	2	3	4	5	6	7
2. I found the task very interesting.	1	2	3	4	5	6	7
3. I felt that it was my choice to do the task.	1	2	3	4	5	6	7
4. I think I am pretty good at this task.	1	2	3	4	5	6	7
5. I felt really distant to this person.	1	2	3	4	5	6	7
6. Doing the task was fun.	1	2	3	4	5	6	7
7. I think I did pretty well at this activity, compared to other students.	1	2	3	4	5	6	7
8. I felt like I could really trust this person	1	2	3	4	5	6	7

9. I enjoyed doing the task very much.	1	2	3	4	5	6	7
10. I'd like a chance to interact with this person more often.	1	2	3	4	5	6	7
11. I didn't really have a choice about doing the task.	1	2	3	4	5	6	7
12. I'd really prefer not to interact with this person in the future.	1	2	3	4	5	6	7
13. I thought the task was very boring.	1	2	3	4	5	6	7
14. I felt like I was doing what I wanted to do while I was working on the task.	1	2	3	4	5	6	7
15. I felt pretty skilled at this task.	1	2	3	4	5	6	7
16. I thought the task was very interesting.	1	2	3	4	5	6	7
17. I don't feel like I could really trust this person.	1	2	3	4	5	6	7
18. After working at this task for a while, I felt pretty competent.	1	2	3	4	5	6	7
19. I feel close to this person.	1	2	3	4	5	6	7
20. I would describe the task as very enjoyable.	1	2	3	4	5	6	7
21. I felt competent in my actions during this task.	1	2	3	4	5	6	7
22. I felt like I had to do the task.	1	2	3	4	5	6	7

23. I really doubt that this person and I would ever be friends.	1	2	3	4	5	6	7
24. I did the task because I had no choice.	1	2	3	4	5	6	7
25. I would enjoy completing this task again in the future.	1	2	3	4	5	6	7
26. It is likely that this person and I could become friends if we interacted a lot.	1	2	3	4	5	6	7
27. I felt a great deal of autonomy in my actions during this task.	1	2	3	4	5	6	7
28. I felt relatable to the researcher during this task.	1	2	3	4	5	6	7
29. I felt forced to complete the task.	1	2	3	4	5	6	7
30. I did not understand how to complete the task.	1	2	3	4	5	6	7
31. I felt comfortable in my environment while completing this task.	1	2	3	4	5	6	7
32. I felt pressured to complete the task.	1	2	3	4	5	6	7
33. I found this task engaging.	1	2	3	4	5	6	7
34. If I had more time I would continue working on this task.	1	2	3	4	5	6	7

Part 2b. – Ownership during Lego Building Task

* In this section of the survey, I am interested in your feeling of ownership during the Lego building task.

Some of these questions refer to a "job" or "work". Assume that this job or work was the Lego building task.

Please respond to each of the following statements by circling the appropriate number that represents your feelings during the task.

Rank your responses below on a 1-7 scale with 1= "Strongly disagree" and 7= "Strongly agree".

Question	Strongly disagree						Strongly agree
35. To what extent do you have influence over the things that affect you on the job?	1	2	3	4	5	6	7
36. I am intimately familiar with what is going on with regard to my job.	1	2	3	4	5	6	7
37. I have invested a major part of "myself" into this job.	1	2	3	4	5	6	7
38. I sense that this job is MINE.	1	2	3	4	5	6	7
39. I have a depth of knowledge as it relates to the job.	1	2	3	4	5	6	7
40. I have invested many of my ideas into this job.	1	2	3	4	5	6	7
41. To what extent do you have influence over the tasks or parts of tasks that you will do?	1	2	3	4	5	6	7
42. I feel a very high degree of personal ownership for this job.	1	2	3	4	5	6	7

43. I have invested a number of my talents into this job.	1	2	3	4	5	6	7
44. I sense that this is MY job.	1	2	3	4	5	6	7
45. To what extent do you influence job-related decisions that will affect you?	1	2	3	4	5	6	7
46. I have a comprehensive understanding of the work that I am asked to do.	1	2	3	4	5	6	7
47. To what extent do you set your own work deadlines?	1	2	3	4	5	6	7
48. I have invested a significant amount of my life into this job.	1	2	3	4	5	6	7
49. I sense that the work I do as part of my job is MINE.	1	2	3	4	5	6	7
50. To what extent to you control the pace and scheduling of the work that you do?	1	2	3	4	5	6	7
51. I feel a very high degree of personal ownership for the work that I do.	1	2	3	4	5	6	7
52. I have a broad understanding of this job.	1	2	3	4	5	6	7
53. In general, I have invested a lot in my job.	1	2	3	4	5	6	7
54. The work I do at this job is MINE.	1	2	3	4	5	6	7
55. In general, to what extent do you have control over your job?	1	2	3	4	5	6	7
56. I feel like this job is uniquely my own.	1	2	3	4	5	6	7
57. I felt like I invested myself into this job.	1	2	3	4	5	6	7

58. I felt knowledgeable about this job's expectations, goals, and outcomes.	1	2	3	4	5	6	7
59. I felt in control of my actions during this job.	1	2	3	4	5	6	7
60. I was able to complete the job the way I wanted to.	1	2	3	4	5	6	7
61. No one controlled my actions while I completed this job.	1	2	3	4	5	6	7
62. I did not have a good understanding of the expectations and goals of this job.	1	2	3	4	5	6	7
63. I feel like I was able to personalize this job.	1	2	3	4	5	6	7
64. Important information was accessible and available to me while completing this job.	1	2	3	4	5	6	7
65. I feel responsible for my achievements at my job.	1	2	3	4	5	6	7
66. I feel little ownership over my job.	1	2	3	4	5	6	7

Please continue to part 3 on the next page.

Part 3. – Background information

* In order to help me understand patterns of responses across all the completed surveys, I would appreciate your providing information about yourself and your background.

Choose one of the following answers

1. What is your gender?

Male ***or*** Female

---

2. On a scale from 1-7, rank your previous experience using Lego building blocks with 1 = “No experience” and 7 = “A great deal of experience”.

No Experience						A great deal of experience
1	2	3	4	5	6	7

APPENDIX D

PERMISSION TO REPRODUCE BROWN, PIERCE, CROSSLEY PSCYCHOLOGICAL OWNERSHIP SCALE

JOHN WILEY AND SONS LICENSE TERMS AND CONDITIONS

Mar 23, 2016

This Agreement between Raphael Morey ("You") and John Wiley and Sons ("John Wiley and Sons") consists of your license details and the terms and conditions provided by John Wiley and Sons and Copyright Clearance Center.

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Pages	21
Type of use	I don't see my intended use
Requestor Location	Raphael Morey 18 Frost Pond Drive ROSLYN, NY 11576 United States Attn: Raphael Morey
Billing Type	Invoice
Billing Address	Raphael Morey 18 Frost Pond Drive ROSLYN, NY 11576 United States Attn: Raphael Morey
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TERMS AND CONDITIONS

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APPENDIX E

INVENTORY OF LEGO BUILDING BLOCK PIECES FOR EXPERIMENT

Each Lego building set for the experiment contains exactly the pieces listed below, however with no uniform color coordination between sets. A total of 30 Lego building sets were compiled for use in this experiment.

1 10x10 Lego Classic Baseplate
60 2x4 bricks
20 2x6 bricks
10 1x4 double-sided bricks
10 1x4 bricks
20 1x2 bricks
10 1x1 slopped roof bricks
24 2x4 slopped roof bricks
4 1x2 Widow pieces

APPENDIX F

INFORMED CONSENT FORM FOR HUMAN RESEARCH SUBJECTS

Informed Consent Form for Human Research Subjects (Group 1)

You are being asked to volunteer in a research study called The Lego Building Blocks Task, conducted by Raphael Morey, School of Education, Information, and Technology. The purpose of this study is to assess a person's motivation for a Lego building block task.

As a participant, you will be asked to construct a house out of Lego building blocks during a 15-minute building period and then complete a brief survey. Prior to this task you will participate in a 15-minute origami activity to help test a future experiment protocol. Upon completion of the experiment, the researcher will meet you outside of the experiment room to deliver a quick debriefing. This task will take place in this classroom following your class and should take between 40-45 minutes. There are no known risks or potential for discomfort associated with this experiment. While there is no direct benefit to you for participation in the study, it is reasonable to expect that the results may provide information of value for the field of education, management, and psychology.

Your identity as a participant will remain confidential. Your name will not be included in any forms, questionnaires, etc. This consent form is the only document identifying you as a participant in this study; it will be stored securely in Roth Hall room 110 available only to the investigator. Data collected will be stored for further research. Results will be reported only in the aggregate. If you are interested in seeing these results, you may contact the principal investigator.

If you have questions about the research you may contact the investigator, Raphael Morey at Raphael.Morey@my.liu.edu or the faculty sponsor, Dr. David Jalajas at David.Jalajas@liu.edu. If you have questions concerning your rights as a subject, you may contact the Executive Secretary of the Institutional Review Board, Ms. Patricia Harvey at (516) 299-3591.

Your participation in this research is voluntary. Refusal to participate or discontinue participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled.

I am conducting this survey for my doctoral dissertation research and also hope to report the findings of this anonymous survey in scholarly and professional publications. My findings will be reported only as overall average results, and you will not be identified individually. Your signature below indicates that I have permission to use your responses on an anonymous basis in my dissertation and other publications.

Your signature indicates you have fully read the above text and have had the opportunity to ask questions about the purposes and procedures of this study. Your signature also acknowledges receipt of a copy of the consent form as well as your willingness to participate.

_____

Typed/Printed Name of Participant

_____	_____
Signature of Participant	Date
_____	
Typed/Printed Name of Investigator	
_____	_____
Signature of Investigator	Date

APPENDIX F

INFORMED CONSENT FORM FOR HUMAN RESEARCH SUBJECTS

Informed Consent Form for Human Research Subjects (Group 2)

You are being asked to volunteer in a research study called The Lego Building Blocks Task, conducted by Raphael Morey, School of Education, Information, and Technology. The purpose of this study is to assess a person's motivation for a Lego building block task.

As a participant, you will be asked to construct a house out of Lego building blocks during a 15-minute building period and then complete a brief survey. Prior to this task you will participate in a 15-minute origami activity to help test a future experiment protocol. This task will take place in this classroom following your class and should take between 40-45 minutes. There are no known risks or potential for discomfort associated with this experiment. You will receive a $10 payment during the experiment as compensation for your construction of a Lego house. This payment will be delivered in two installments of $5 bills, the first at the conclusion of the building period upon successful construction of the house, and the second at the conclusion of the exit survey. A successfully constructed Lego house will be the approximate size and shape as a model provided to you during the experiment. You will be asked to sign the receipt portion of this consent form upon reception of your final payment.

Your identity as a participant will remain confidential. Your name will not be included in any forms, questionnaires, etc. This consent form is the only document identifying you as a participant in this study; it will be stored securely in Roth Hall room 110 available only to the investigator. Data collected will be stored for further research. Results will be reported only in the aggregate. If you are interested in seeing these results, you may contact the principal investigator.

If you have questions about the research you may contact the investigator, Raphael Morey at Raphael.Morey@my.liu.edu or the faculty sponsor, Dr. David Jalajas at David.Jalajas@liu.edu. If you have questions concerning your rights as a subject, you may contact the Executive Secretary of the Institutional Review Board, Ms. Patricia Harvey at (516) 299-3591.

Your participation in this research is voluntary. Refusal to participate or discontinue participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled.

I am conducting this survey for my doctoral dissertation research and also hope to report the findings of this anonymous survey in scholarly and professional publications. My findings will be reported only as overall average results, and you will not be identified individually. Your signature below indicates that I have permission to use your responses on an anonymous basis in my dissertation and other publications.

Your signature indicates you have fully read the above text and have had the opportunity to ask questions about the purposes and procedures of this study. Your signature also acknowledges receipt of a copy of the consent form as well as your willingness to participate.

_____

Typed/Printed Name of Participant

_____	_____
Signature of Participant	Date
_____	
Typed/Printed Name of Investigator	
_____	_____
Signature of Investigator	Date

APPENDIX F

INFORMED CONSENT FORM FOR HUMAN RESEARCH SUBJECTS

Informed Consent Form for Human Research Subjects (Group 3)

You are being asked to volunteer in a research study called The Lego Building Blocks Task, conducted by Raphael Morey, School of Education, Information, and Technology. The purpose of this study is to assess a person's motivation for a Lego building block task.

As a participant, you will be asked to construct a house out of Lego building blocks during a 15-minute building period following a 15-minute planning period and then complete a brief survey. Upon completion of the experiment, the researcher will meet you outside of the experiment room to deliver a quick debriefing. This task will take place in this classroom following your class and should take between 40-45 minutes. There are no known risks or potential for discomfort associated with this experiment. While there is no direct benefit to you for participation in the study, it is reasonable to expect that the results may provide information of value for the field of education, management, and psychology.

Your identity as a participant will remain confidential. Your name will not be included in any forms, questionnaires, etc. This consent form is the only document identifying you as a participant in this study; it will be stored securely in Roth Hall room 110 available only to the investigator. Data collected will be stored for further research. Results will be reported only in the aggregate. If you are interested in seeing these results, you may contact the principal investigator.

If you have questions about the research you may contact the investigator, Raphael Morey at Raphael.Morey@my.liu.edu or the faculty sponsor, Dr. David Jalajas at David.Jalajas@liu.edu. If you have questions concerning your rights as a subject, you may contact the Executive Secretary of the Institutional Review Board, Ms. Patricia Harvey at (516) 299-3591.

Your participation in this research is voluntary. Refusal to participate or discontinue participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled.

I am conducting this survey for my doctoral dissertation research and also hope to report the findings of this anonymous survey in scholarly and professional publications. My findings will be reported only as overall average results, and you will not be identified individually. Your signature below indicates that I have permission to use your responses on an anonymous basis in my dissertation and other publications.

Your signature indicates you have fully read the above text and have had the opportunity to ask questions about the purposes and procedures of this study. Your signature also acknowledges receipt of a copy of the consent form as well as your willingness to participate.

_____

Typed/Printed Name of Participant

_____ _____

Signature of Participant Date

_____
Typed/Printed Name of Investigator

_____ _____
Signature of Investigator Date

APPENDIX F

INFORMED CONSENT FORM FOR HUMAN RESEARCH SUBJECTS

Informed Consent Form for Human Research Subjects (Group 4)

You are being asked to volunteer in a research study called The Lego Building Blocks Task, conducted by Raphael Morey, School of Education, Information, and Technology. The purpose of this study is to assess a person's motivation for a Lego building block task.

As a participant, you will be asked to construct a house out of Lego building blocks during a 15-minute building period following a 15-minute planning period and then complete a brief survey. This task will take place in this classroom following your class and should take between 40-45 minutes. There are no known risks or potential for discomfort associated with this experiment. You will receive a $10 payment during the experiment as compensation for your construction of a Lego house. This payment will be delivered in two installments of $5 bills, the first at the conclusion of the building period upon successful construction of the house, and the second at the conclusion of the exit survey. A successfully constructed Lego house will be the approximate size and shape as a model provided to you during the experiment. You will be asked to sign the receipt portion of this consent form upon reception of your final payment.

Your identity as a participant will remain confidential. Your name will not be included in any forms, questionnaires, etc. This consent form is the only document identifying you as a participant in this study; it will be stored securely in Roth Hall room 110 available only to the investigator. Data collected will be stored for further research. Results will be reported only in the aggregate. If you are interested in seeing these results, you may contact the principal investigator.

If you have questions about the research you may contact the investigator, Raphael Morey at Raphael.Morey@my.liu.edu or the faculty sponsor, Dr. David Jalajas at David.Jalajas@liu.edu. If you have questions concerning your rights as a subject, you may contact the Executive Secretary of the Institutional Review Board, Ms. Patricia Harvey at (516) 299-3591.

Your participation in this research is voluntary. Refusal to participate or discontinue participation at any time will involve no penalty or loss of benefits to which you are otherwise entitled.

I am conducting this survey for my doctoral dissertation research and also hope to report the findings of this anonymous survey in scholarly and professional publications. My findings will be reported only as overall average results, and you will not be identified individually. Your signature below indicates that I have permission to use your responses on an anonymous basis in my dissertation and other publications.

Your signature indicates you have fully read the above text and have had the opportunity to ask questions about the purposes and procedures of this study. Your signature also acknowledges receipt of a copy of the consent form as well as your willingness to participate.

_____

Typed/Printed Name of Participant

_____ _____

Signature of Participant Date

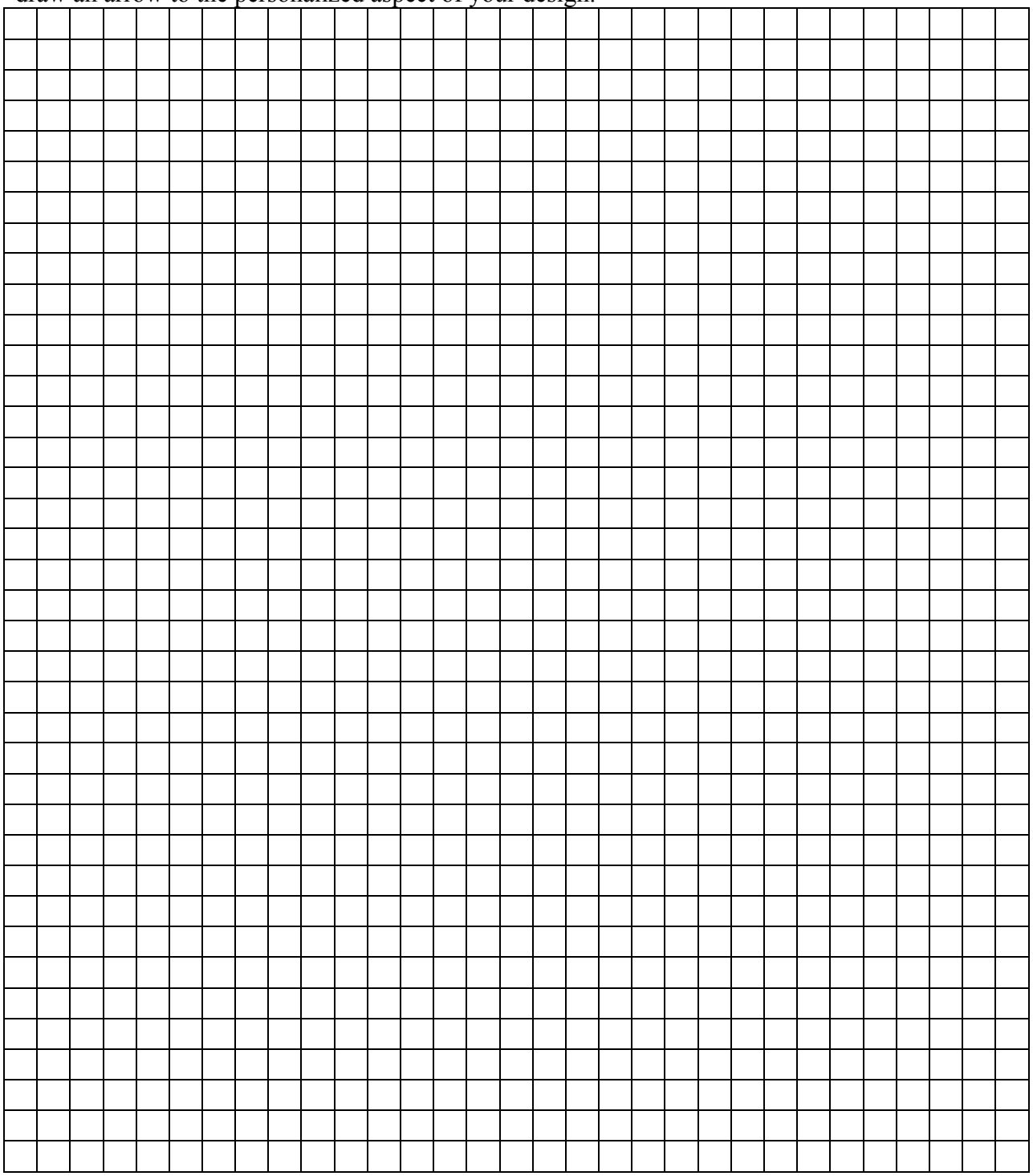
_____
Typed/Printed Name of Investigator

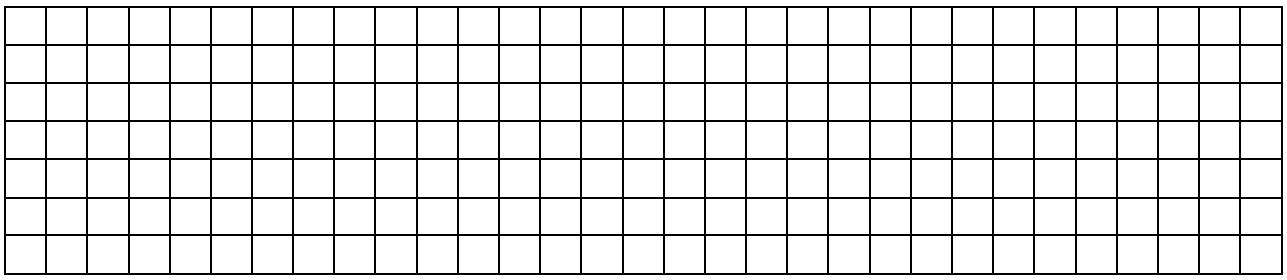
_____ _____
Signature of Investigator

APPENDIX G

LEGO BUILDNG BLOCKS PLANNING SHEET

Note: (a) use this grid paper to draw a diagram of your Lego House, (b) list the number of blocks you plan to use at the bottom, (c) imagine that each grid square equals one Lego square, and (d) draw an arrow to the personalized aspect of your design.





2x4 bricks:_____2x6 bricks:_____1x4 double-sided bricks:_____1x4 bricks:_____
1x2 bricks:_____1x1 slopped roof bricks:_____2x4 slopped roof bricks:_____

APPENDIX H

PLANNING PERIOD GUIDE FOR LEGO BUILDING BLOCK TASK

Goal reminder:

- You control how you build your house.
- You should use as many of the bricks in your bag as you can in its construction.

During the 15 minute planning period:

- Draw a diagram of your house on the piece of grid paper;
- Each square of the grid paper equals one Lego square;
- Provide an approximate count of the different pieces you will use;
- Fill in the spaces provided on the grid paper indicating how many of each size Lego piece you plan on using;
- Personalize your Lego house in one distinct way;
- Draw an arrow on your grid paper pointing to the personalized aspect of your house.

Reminder:

- Each one of these steps will help you build the Lego house.
- You are in control of your decisions.

You will have 15 minutes to plan your Lego house.

APPENDIX I

DEBRIEFING PAPER

This study is concerned with negative effects of task-contingent rewards on an individual's intrinsic motivation for an interesting task and whether feelings of psychological ownership can act as a buffer to maintain intrinsic motivation upon reception of a reward.

How was this tested?

In this study, you were asked to build a Lego house either after a preplanning period or a filler activity (origami-twirling bird construction).

If you participated in the preplanning period, the intention is to allow you to develop feelings of psychological ownership over your designed Lego house. If you did not preplan you're your group's data will act as a measurement of intrinsic motivation without psychological ownership. The filler activity acted as a control for the 15-minute psychological ownership intervention other groups received. Afterwards you were instructed to build a Lego house within a 15-minute time frame. Two experimental groups participated in the preplanning phase and two did not. One group performed these tasks after being told that they will receive a task-contingent reward upon finishing their house. This reward acted as the independent variable in this study. Your group did not receive the monetary reward during the experiment. As compensation for your participation you will receive a gift card.

Why is this important to study?

Performance pay is form of compensation used in many different fields. In the field of education, performance pay is becoming an alternative to traditional salary schedules. Theoretically, end of the year bonuses aligned to state test scores may undermine a teacher's intrinsic motivation to teach because their pay will now seem task-contingent (they receive a portion of their pay based upon the achievement of their students). Advocates say that this will increase teacher productivity, those opposed worry that this will lead to cheating, short cuts, and gamesmanship in order to achieve the highest pay possible. This study will provide evidence for this compensation debate and, if the primary hypothesis is supported, will suggest that teachers should be encouraged to develop feelings of psychological ownership over their jobs before receiving performance pay.

What if I want to know more?

If you are interested in learning more about the major theories supporting this study's primary hypothesis, you may want to consult:

Deci, E. L., Ryan, R. M. (2008a). Self-determination theory: A macrotheory of human motivation, development and health. *Canadian Psychology, 49*, 182-185. doi:10.1037//a00212801

Brown, G., Pierce, J. L., Crossley, C. (2014). Toward and understanding of the development of ownership feelings. *Journal of Organizational Behavior*, *35*, 318-338. doi:10.1002/job.1869

If you have concerns about your rights as a participant in this experiment, you may contact the Executive Secretary of the Institutional Review Board, Ms. Patricia Harvey at (516) 299-3591.

Thank you for your participation.

APPENDIX J

Institutional Review Board Approval

LONG ISLAND UNIVERSITY
UNIVERSITY OFFICE OF SPONSORED RESEARCH
BUSH-BROWN HALL, UNIVERSITY CENTER

NOTICE TO ALL RESEARCHERS:
Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

TO: Professor David Jalajas, Business
Mr. Raphael Morey, Student Investigator

FROM: Patricia Harvey, University IRB Administrator
LIU Post Institutional Review Board

DATE: July 2, 2016

PROTOCOL TITLE: Psychological ownership as a moderator between external control and intrinsic motivation

PROJECT ID NO: 16/04-498

ACTION: Approved

Thank you for sending the modified informed consent forms so quickly.

With the receipt of the additional information your project has been given **full approval.** Please note the following:

Please note the following:

1. Approval for sites other than Long Island University, if any, is given only for those indicated in the original application and from which appropriate letters of approval have been received by the IRB.

2. Your approval period for this project expires **July 1, 2017** unless you submit an appropriate continuation request. No activities involving human participants may take place after this expiration date.

3. The project must be conducted as presented in the application. No changes or alterations may be made to study methods, recruitment process, subject pool, test instruments, consent forms, etc. without prior IRB approval. Revisions and amendments to the research activity must be promptly reported to the IRB for review and approval prior to the commencement of the revised protocol (the only exception is in those situations where changes in the protocol are required to eliminate apparent, immediate hazards to the subject).

4. The IRB must be notified immediately of any unanticipated problems or adverse events affecting risk to subjects.

5. If consent form(s) have been approved for the research activity, only IRB approved, stamped consent forms may be used in the consent process (copy attached if appropriate). Please destroy all previous versions. Make sure to retain a copy of the approved, stamped consent document, as it must be submitted to the IRB at the time of submission of your annual renewal. One signed copy of the stamped form must be given to the subject, one must be placed in subject's file/chart (if appropriate), and the principal investigator must keep one. You are responsible for maintaining signed consent forms for a period of at least three years after study completion.

6. If consent is on-line, the on-line form should include language/indication of the IRB approval and expiration date as would be found on a hard-copy/paper form.

LIU
LONG ISLAND UNIVERSITY

Verification of Institutional Review Board (IRB) Approval

LIU Project ID: 16/04-498

Project Title: Psychological ownership as a moderator between external control and intrinsic motivation

Expiration Date: July 1, 2017

Signature: _____

Name/Title: Patricia Harvey, University IRB Administrator

APPENDIX K

Institutional Review Board Amendment Approval

LONG ISLAND UNIVERSITY
UNIVERSITY OFFICE OF SPONSORED RESEARCH
BUSH-BROWN HALL, UNIVERSITY CENTER

NOTICE TO ALL RESEARCHERS:
Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

TO: Professor David Jalajas, Business
Mr. Raphael Morey, Student Investigator

FROM: Patricia Harvey, University IRB Administrator
LIU Post Institutional Review Board

DATE: November 7, 2016

PROTOCOL TITLE: Psychological ownership as a moderator between external control and intrinsic motivation

***PROJECT ID NO: 16/04-498.A1* (Amendment#1)**

REVIEW TYPE: Administrative

***ACTION:* Protocol Amendment Approval**

Your request dated Friday, November 4, 2016 to amend your previous approved IRB application has been **approved** using the Institutional Review Board's administrative review process: This IRB Application ID No. now bears the amendment suffix ".A1"

This amendment indicates the following document has been slightly modified:

- Appendix A: Two groups will now be involved in a 15-minute origami twirling bird filler activity. See attached for details for activity script, and amended procedures.

- Appendix B: Minor changes have been made to the survey instrument.
  - (7) Items have been added to the scale. See questions 29, 30, 31, 61, 63, 64, 66.
  - Item 2 of part 3 was changed from yes/no to a Likert-type scale

- Appendix C: Informed Consent Form: Document has been amended.
  - Now includes the 15-miniute origami task (filler activity).
  - Total time to complete study has slightly increased to 40-45 minutes.

- Appendix D: Debriefing Form: Document has been amended.
  - Now includes the 15-miniute origami task (filler activity).
  - Also an explanation of filler activity task.

Please note the following:

1. Your **approval period for this project remains as July 1, 2017** unless you submit an appropriate continuation request. No activities involving human participants may take place after this expiration date.

2. Approvals for sites other than Long Island University, if any, is given only for those indicated in the original application and from which appropriate letters of approval have been received.

3. Revisions and amendments to the research activity must be promptly reported to the IRB for review and approval prior to the commencement of the revised protocol (the only exception is in those situations where changes in the protocol are required to eliminate apparent, immediate hazards to the subject).

4. The IRB must be notified immediately of any unanticipated problems or adverse events affecting risk to subjects.

5. Where consent form(s) have been approved for the research activity, only IRB approved, stamped consent forms may be used.

6. Make sure to retain a copy of the approved stamped consent document, as it must be submitted to the IRB at the time of your annual renewal. One signed copy of the stamped form must be given to the subject, one placed in subject's file/chart (if appropriate), and the principal investigator must keep one. You are responsible for maintaining signed consent forms for a period of at least three years after study completion.

*__Important__: Revisions and amendments to the research activity must be promptly reported to the IRB for review and approval prior to the commencement of the revised protocol.

Patricia.Harvey@liu.edu
(516) 299-3591
Fax: (516) 299-3101

LONG ISLAND UNIVERSITY

Verification of Institutional Review Board (IRB) Protocol Amendment Approval

LIU IRB ID: 16/04-498.A1 (Amendment #1)

Project Title: Psychological ownership as a moderator between external control and intrinsic motivation

Expiration Date: July 1, 2017

Signature: _____

Name/Title: Patricia Harvey, University IRB Administrator

Patricia.Harvey@liu.edu
(516) 299-3591
Fax: (516) 299-3101