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Dyadic analyses of daily interactions: Effects of perceived social support and social control on physical activity behavior

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Effects of perceived social support and social control on physical activity behavior

by

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The student author and the program of study committee are solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

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ABSTRACT

The purpose of this study was to examine the effects of daily perceived social support and social control receipt, as well as the effects of partner reports of provided social support and control, on daily physical activity. Couples completed 14 daily diary surveys measuring social support and social control provided to the romantic partner and received from the romantic partner, as well as a self-report measure of daily exercise minutes. During this 14-day period, participants were also asked to wear a Fitbit Zip to track their daily physical activity. Men and women demonstrated different patterns of effects for social support and social control for the three outcome variables: daily steps, daily active minutes, and daily exercise minutes. For women, support received from a partner was a significant predictor of more exercise for all outcomes, while for men it only significantly predicted self-reported exercise. Partner-reported provided support only significantly predicted more daily exercise minutes for men. There were no significant effects of received social control, but partner-reported social control provision predicted more daily steps and active minutes for men. This study provides a better understanding of how daily social support and social control might influence health-promoting behaviors, such as physical activity.

CHAPTER 1: INTRODUCTION

The pursuit of exercise is not a modern phenomenon. Hippocrates, the Greek physician who is widely considered the father of western medicine, recommended physical activity as a treatment for various diseases as far back as the 4th century, B.C. (Berryman, 2010), stating that "Walking is man's best medicine" (Bergland, 2015). In U.S. history, President Eisenhower established the President's Council on Youth Fitness in 1953, including a national fitness testing that still exists today in the form of the President's Challenge (President's Council on Fitness, Sports & Nutrition, 2016). In the last decade, former First Lady Michelle Obama emphasized the importance of physical activity in her "Let's Move!" initiative, intended to address the childhood obesity epidemic faced by the United States (Let's Move!, 2016). Fitness is on the minds of average citizens as well. Fitness tracker sales more than doubled from 2014 to 2015 and are expected to continue increasing through 2016 and 2017 (The NPD Group, Inc., 2016).

A great deal of time, effort, and money has been invested in increasing people's physical activity levels. The focus of most of these physical activity interventions has been on the individual who requires a behavior change, rarely taking into account the influence of one of the most significant influences on behavior: the romantic partner. This is likely due to the common theoretical understanding of motivation from self-determination theory, which suggests that influence from outside sources is always detrimental to motivation (SDT; Ryan & Deci, 2000). Given the mixed findings of research on social support and control, the relationship between spousal influence and motivation is likely not as clear cut as originally theorized.

Overview

This study will examine the effects of social support and control from an individual's romantic partner on his or her physical activity. The first section of this paper will review self-determination theory as a backdrop for the proposed study. The literature review will explore the effects of autonomy support, social control and social support on physical activity. It will be followed by an integration of the various perspectives into a single study to examine the influence of the romantic partner on physical activity level, including research questions, methods, and planned statistical analyses.

Self-Determination Theory

The theoretical framework for the proposed research begins with self-determination theory (SDT). SDT states that motivation for behavior comes from internal and external sources, and postulates that the satisfaction of three basic needs (competence, autonomy, and relatedness) promotes self-directed motivation (Ryan & Deci, 2000). Research within this theory examines the source and type of motivation as predictors of behavioral outcomes, including academics (Deci, Vallerand, Pelletier, & Ryan, 1991; Guay, Ratelle, Roy, & Litalien, 2010; Miserandino, 1996; Ratelle, Guay, Vallerand, Larose, & Senécal, 2007; Vansteenkiste, Lens, & Deci, 2006, happiness (Nix, Ryan, Manly, & Deci, 1999), workplace performance and enjoyment (Fernet, Austin, & Vallerand, 2012; Gagné et al., 2014; Van den Broeck, Lens, De Witte, & Van Coillie, 2013), videogame enjoyment (Lyons, 2015; Ryan, Rigby, & Przybylski, 2006), environmentally conscious behavior (Osbaldiston & Sheldon, 2003; Seguin, Pelletier, & Hunsley, 1999), and health outcomes (Stanley, Cumming, Standage, & Duda, 2012,

Williams, Frankel, Campbell, and Deci, 2000; Williams, Gagné, Mushlin, & Deci, 2005; Williams, Rodin, Ryan, Grolnick, & Deci, 1998), just to name a few. The terminology used to identify these types of motivation varies widely by author, including terms such as internal and external, intrinsic and extrinsic, autonomous and controlled, all of which reflect similar constructs. Before examining the effects of these different types of motivation, this paper will first explore the different terminology used to describe motivation.

Intrinsic and Extrinsic

The motivation terminology most familiar to psychologists uses the broad categories of intrinsic and extrinsic motivation. Intrinsic motivation is the performance of an activity for the purpose of enjoyment or perceptions of the activity's inherent value (Ryan & Deci, 2000). An individual engages in an intrinsically motivating activity due to some enjoyable aspect that is inherent to the activity. This is contrasted with extrinsic motivation, in which an activity is performed to gain some desirable outcome as a result of performing the activity. For example, an individual who runs because they enjoy running is intrinsically motivated to run, while a person who runs because they desire some positive outcome that is caused by running (better health, weight loss, getting somewhere faster) is extrinsically motivated.

The self-determination literature considers intrinsic motivation ideal, as it is self-determined. Research in this area has examined how to promote and undermine intrinsic motivation. An early summary of findings in self-determination theory reported that intrinsic motivation is encouraged by promoting choice over control, and is undermined by rewards, punishments, evaluations, deadlines, imposed goals, and competition (Deci,

Vallerand Pelletier, & Ryan, 1991). More specifically, a meta-analysis of these findings indicated that rewards that were contingent on engagement, completion, and performance in a task undermined intrinsic motivation and interest in that task (Deci, Koestner, & Ryan, 1999).

According to SDT, intrinsic and extrinsic motivation, are on the same continuum of motivation, ranging from amotivation (the total lack of intention) to intrinsic motivation (self-directed intention) (Ryan & Deci, 2000). Along this continuum there are six classifications of motivation, sometimes referred to as regulatory style. At one end is amotivation, which is characterized by a lack of intention to engage in a particular activity and generally arises from an individual not finding value or enjoyment in an activity (Ryan, 1995). Amotivation is not categorized as intrinsic or extrinsic motivation, but as the total absence of motivation.

Moving along the continuum toward intrinsic motivation, are the four regulatory classifications of extrinsic motivation: external, introjected, identified, and integrated (Ryan & Deci, 2000). External regulation refers to the performance of activities for the sake of some external reward or punishment, demonstrated in the work of B. F. Skinner (1953). A child who cleans his or her room for allowance money or to avoid being grounded is under the influence of external regulation.

The next classification within extrinsic motivation is introjected regulation, which involves the performance of an activity to maintain or promote self-worth (Ryan & Deci, 2000). For example, calling one's grandmother on her birthday out of a desire to avoid feeling guilty rather than any desire to actually speak to her is an introjected behavior.

The desire to perform the activity arises from within the self, but is not due to the enjoyable nature of the activity.

Identified regulation is the next classification of extrinsic motivation, and it involves valuing an action or behavior because it leads to a personally-valued outcome (Ryan & Deci, 2000). For example, a graduate student writing a thesis or dissertation is likely motivated by identified regulation. The student does not particularly enjoy the activity, but realizes that it is important for some future career goal.

The final classification of extrinsic motivation is integrated regulation, where the individual has adopted the behaviors performed for extrinsic reasons and integrated them within himself or herself (Ryan & Deci, 2000). Individuals motivated by integrated regulation perform activities because they believe that those activities are consistent with their self-concept or belief system. For example, an individual who attends religious services regularly because it fits with his or her personal beliefs, rather than due to any enjoyment gained from attendance, is motivated by integrated regulation.

At the far end of the continuum we find intrinsic motivation or intrinsic regulation, which is categorized by interest, enjoyment, and satisfaction garnered from the performance of the activity or behavior in question (Ryan & Deci, 2000). As previously stated, people are intrinsically motivated when engaging in an activity that they truly enjoy, rather than due to any external forces. For example, an individual who reads for pure enjoyment, rather than for a reward program, because they feel they must to avoid guilt or because it is something that they feel they should do as an intelligent person, is intrinsically motivated.

Autonomous and Controlled

The five classifications of motivated behavior (external, introjected, identified, integrated, and intrinsic) are also frequently categorized as autonomous or controlled. Ryan and Deci (2000) state that the five types of motivated behavior vary in their relative autonomy and are frequently divided into two groups: autonomous (intrinsic, identified, and integrated) and controlled (external and introjected) (Williams, Grow, Freedman, Ryan & Deci, 1996). Factor analysis of these subscales has supported the creation of these two motivational categories (Cid, Moutão, Leitã, & Alves, 2012; Vansteenkiste, Lens, DeWitte, DeWitte, & Deci, 2004). A cross-sectional study of motivation among high school students found unique effects for autonomous and controlled motivation on behavior and emotional responses to activities (Patrick, Skinner, & Connell, 1993).

Previous research in this area has combined autonomous and controlled motivation into a single, complex difference score known as the Relative Autonomy Index (RAI). The RAI is a single score calculated using the scores of the external, introjected, identified, and intrinsic regulation subscales (Grolnick & Ryan, 1987). The scores of the four subscales are weighted as follows, according to their relative self-determination: external regulation (-2), introjected regulation (-1), identified regulation (+1), and intrinsic regulation (+2). These weights provide an overall formula for the RAI of "2(intrinsic) + 1(identified) – 1(introjected) – 2(external)." This gives an overall score that is in essence a weighted difference score. This is potentially problematic for several reasons, including increased likelihood of Type I and Type II errors (Phillips, 2013), lower reliability and reduced power (Edwards, 2001), and loss of information (Phillips & Johnson, in review). Recent examinations of the RAI have recommended avoiding its use

due to these issues (Chemolli & Gagné, 2014) and developers of self-determined motivation scales like the BREQ (Behavioral Regulation in Exercise Questionnaire) have stopped recommending its use (Markland & Tobin, 2004; Wilson, Rodgers, Loitz, & Scime, 2006). For these reasons, the following section will explore the independent effects of autonomous and controlled motivation, rather than those indicated by the RAI.

Effects of Autonomy and Control

A large number of studies have explored these effects. Most of the early literature on autonomous and controlled motivation was conducted with grade school and high school students and explored the effects of different types of motivation on learning and enjoyment. Deci et al., (1991) provided a brief summary of findings for motivation in educational studies. They report that students generally reported less interest in an activity and less willingness to work when experiencing controlled motivation in the form of rewards for good performance or avoidance of punishment for poor performance.

As an example, in an experimental study with fifth graders, Grolnick and Ryan (1987) manipulated instructions for a reading comprehension task to examine the effects of different types of motivation. Students were assigned to one of three conditions: noncontrolling/directed, controlling/directed, and nondirected. In each condition, students were asked to read a passage from a social studies text book and answer a series of questions about the reading. Following this initial task, the students were told that they would be asked to complete a second reading. In the noncontrolling condition, students were told that they would be asked questions about the reading following its completion, but that they would not be graded so they should handle the reading in their own preferred method. In the controlling condition, students were told that they would be

asked questions about the material in the reading and that they should work hard because their responses would be graded. In the nondirected condition, students were told that they would just be asked questions about the second reading that were similar in style to those asked after the first reading. All participants were asked to rate their enjoyment of the reading, report feelings of pressure and anxiety, and complete recall tasks for the material. Approximately 8 days later, the participants were asked to recall information from the second reading.

Grolnick and Ryan (1987) found that students in the noncontrolled and nondirected tasks reported greater interest in the second reading and greater conceptual recall of the material, while students in the controlled condition reported greater feelings of pressure and anxiety and demonstrated a larger decrease in recall for the material over time. One interpretation of these results is that the students in the controlled condition experienced negative side effects of controlled motivation, while those in the noncontrolled and nondirected conditions experienced the benefits of self-determined motivation.

In recent years, self-determination theory and the exploration of autonomous and controlled motivation has been expanded to include various life domains beyond the classroom (Deci & Ryan, 2008). A vast literature has emerged on health behaviors, where most findings demonstrate the benefits of autonomous motivation. For example, participants who were autonomously motivated to lose weight attended a weight loss program more frequently, lost more weight on average, and demonstrated better maintenance of weight loss at follow up (Williams, et al., 1996). In a study of patients who were taking long-term medications, autonomous motivation was strongly correlated

with medication adherence (Williams, et al., 1998). Additionally, participants in a dental hygiene intervention who reported higher levels of autonomous motivation were more likely to engage in healthy dental behaviors such as flossing and regular brushing (Münster Halvari & Halvari, 2006).

One of the largest segments of the SDT literature on health behaviors uses physical activity and exercise as the behavioral outcome for motivation. A systematic review of this literature found that autonomous motivation consistently positively predicts physical activity outcomes, while the results for controlled motivation were less clear cut, indicating both negative and null effects on physical activity (Teixeira, Carraça, Markland, Silva, & Ryan, 2012). These effects ranged across types of studies, including cross-sectional, prospective, and experimental designs. In intervention studies, framing exercise goals in terms of their intrinsic benefits (general health and well-being) leads to more autonomous motivation, more frequent performance of exercise, and greater persistence (Vansteenkiste, Simons, Soens, & Lens, 2004). Alternatively, framing goals in terms of their extrinsic benefits (weight loss and attractiveness) leads to less autonomous motivation, exercise behavior, and persistence, even when compared to a control group that was not asked to form an exercise goal.

The consistent effects of autonomous motivation on behavior have led to a large number of studies examining the promotion of autonomous motivation. The next section will explore the development of interventions to facilitate autonomous motivation for a variety of behaviors, with particular emphasis on health behaviors and physical activity.

Autonomy Support

The positive effects of autonomous motivation are well-documented, and as a result, researchers have invested many resources into understanding how to develop autonomous motivation for desirable behaviors. Early research in this area centered on the effect of parenting behaviors and teaching styles on children (Grolnick & Ryan, 1989; Deci, Eghrari, Patrick, & Leone, 1994). These early studies coined the term *autonomy support*, to describe the type of parenting and teaching style that promoted autonomous motivation in children. In its original definition, a*utonomy support* is the act of one individual (parent, teacher, etc.) valuing and using techniques to promote problem solving, choice, and participation in decision making (Grolnick & Ryan, 1989). This can be contrasted to a more controlling style where the individual uses techniques to assert power, pressuring the other person to comply with a demand (Deci et al., 1994). More recent research has expanded upon this definition, stating that autonomy support is the act of one individual taking perspective, encouraging action, supporting choice, and demonstrating responsiveness for another individual (Deci & Ryan, 2008). The difference between an autonomy-supportive style and a controlling style can be easily summed up as the difference between "you can" and "you must." One allows for a degree of choice in actions and decision making (autonomy-supportive), while the other indicates a lack of choice and forced compliance (controlling).

Autonomy support appears frequently in parenting and educational research. An early study by Grolnick and Ryan (1989) found that an autonomy-supportive parenting style predicted autonomous self-regulation in school. Studies of high school students have found that students who report lower rates of autonomy support from parents and

teachers experience fewer feelings of autonomy and competence, which predicts less autonomous motivation for school performance and greater intentions to drop out of school (Vallerand, Fortier, & Guay, 1997). Likewise, students who reported that their teachers were autonomy-supportive were more likely to experience autonomous motivation and feelings of competence for school performance, which predicted intentions to persist in school through graduation (Hardre & Reeve, 2003). Given the important role of parents and teachers in the lives of children, it is not surprising that the behavior of these influential individuals affects the motivation and behavior of their charges.

Additional studies have explored the effect of autonomy support from other less influential sources, such as researchers in a lab. Osbaldiston and Sheldon (2003) found that participants who perceived the experimenter in a cross-sectional study of environmental goals and behavior to be more autonomy-supportive also demonstrated more internalized motivation for self-selected environmental goals. In essence, participants who felt as if the experimenter allowed them to have choices about the degree of their involvement in environmental goals were more likely to experience autonomous motivation for those goals. This led to a greater likelihood to engage in the self-selected pro-environmental goals over the course of the next week.

Autonomy Support and Health

The study of autonomy support has also made frequent appearances in the health psychology literature as a method for encouraging health promoting behaviors, including dental care, medication adherence, diabetes self-management and glycemic control, and physical activity. The majority of these studies examine the effect of autonomy support

provided by a physician or other healthcare providers. This section will examine a subset of the studies within the literature regarding the relationship between autonomy support and health-promoting behaviors, which were selected to demonstrate the range of outcomes in the literature.

Dental patients who perceived the dental professionals (dentists, hygienists, etc.) at their dental clinic to be more autonomy supportive reported greater need satisfaction (autonomy, competence, relatedness), which predicted greater feelings of competence and autonomy, and fewer feelings of anxiety regarding their dental care (Münster Halvari, Halvari, Bjørnbeck, & Deci, 2010). This, in turn, predicted better dental clinic attendance, reduced likelihood of putting off making dental appointments, and overall better dental behavior (flossing, brushing, etc.).

The study of autonomy support has also been applied to predict medication adherence. In a study of adults who had been taking at least one prescription medication, autonomy support from the primary care physician predicted autonomous motivation for medication adherence, which in turn, predicted self-reported medication adherence (Williams, et al., 1998)

Healthcare provider autonomy support also plays a role in the management of chronic diseases which require a great deal of effort and involvement from the patient, such as type-2 diabetes. A cross-sectional study of adult members of a diabetes patient association who had been diagnosed with type-2 diabetes found that patients' autonomy-supportiveness ratings of their primary physician were related to self-reported disease self-management skills (Raaijmakers, Martens, Hesselink, de Weerdt, de Vries, &

Kremers, 2014). Both the ratings of physician autonomy support and self-reported self-management skills were correlated with health-related quality of life.

Patients with poorly controlled type-2 diabetes from a diabetes care center in the U.S. were enrolled in a 12-month longitudinal study (Williams, McGregor, Zeldman, Freedman & Deci, 2004). During the study, patients completed measures of autonomous motivation and perceived competence four times over a six-month period. They were also asked to rate practitioner-provided autonomy support and to complete a measure of diabetes self-management. Patients also participated in blood draws to measure HbA1c, an indicator of their average level of blood glucose over the past several months. Williams et al., found that autonomy support at t2 predicted autonomous motivation and perceived competence at t3, controlling for initial levels. Furthermore, perceived competence at t3 predicted lower levels of HbA1c at t4.

One of the most frequently explored outcomes in the autonomy support literature is physical activity. In the last 20 years, multiple studies have examined how autonomy support from a variety of providers influences autonomous motivation for physical activity and actual physical activity. A common source of autonomy support in these physical activity studies is a physical education (PE) or fitness class instructor. A cross-sectional study of students, ages 12-14, asked participants to rate the autonomy-supportiveness of a physical education instructor, as well as their own perceived relatedness, autonomy, and competence, autonomous motivation for physical activity, and intention to engage in leisure time physical activity (Standage, Duda, and Ntoumanis, 2003). Students who reported more autonomy support from their PE instructor, rated themselves as more autonomous. Higher ratings of perceived autonomy predicted more

autonomous motivation for physical activity, which in turn predicted greater intentions to engage in physical activity during leisure time.

Longitudinal studies of autonomy support provided by activity leaders have also been performed. In a 16-week lunchtime walking intervention, which included 10 weeks of group walks led by a walk leader and 6 weeks of independent walking, walk leaders were trained in SDT and basic psychological needs (competence, autonomy, relatedness) to promote autonomous participation (Kinnafick, Thøgersen-Ntoumani, Duda, & Taylor, 2014). During the 10-week group phase of the intervention, participants were asked to attend the group lunchtime walks, as well as walk independently during the weekend. Additionally, each participant received two weekly autonomy-supportive text messages, designed around the principles of SDT which were intended to minimize pressure and control and promote choice about participating in the walking intervention of one's own volition. Participants were asked to rate the autonomy supportiveness of the walk leader and their level of autonomy need satisfaction. Additionally, participants completed a self-report measure of physical activity. Kinnafick et al., found that participants who rated their walk leader as more autonomy-supportive experienced more autonomy need satisfaction, which predicted higher levels of physical activity, controlling for initial levels.

The effects of autonomy support on physical activity have also been explored in quasi-experimental studies. Edmunds, Ntoumanis, and Duda (2008) designed a quasi-experimental study of exercise class leadership styles. Women at a university in the UK signed up for one of two exercise classes at the university wellness center. One class was randomly assigned to be the SDT experimental group, while the other was used as a

control condition. The instructor in the SDT experimental group provided autonomy support by taking the perspective of the participants and providing them with opportunities for choice. The participants in the SDT were given choices about the exercises they would perform during each class period, and those exercises would be repeated with the control group. All participants were asked to rate the autonomy-supportiveness of the exercise instructor, as well as complete measures of SDT need satisfaction, and intention to continue participation in the class. Exercise behavior was measured using class attendance as a proxy for physical activity. Initial ratings of autonomy-supportiveness of the instructor were not significantly different between the SDT and control groups. However, ratings of autonomy support in the control group decreased over time, while ratings of autonomy support in the SDT group increased over time. Participants in the SDT experimental group attended significantly more classes than those in the control group, indicating greater participation in the physical activity outcome.

Another common method of exploring the effects of autonomy support from activity leaders is through randomized controlled trials of SDT interventions. Silva et al. (2010) conducted a 1-year behavior intervention with overweight and obese women in Portugal. The intervention was intended to promote weight-loss and exercise participation and adherence. Participants were randomly assigned to either an experimental or control group. The women assigned to the experimental groups participated in 30 2-hour sessions over the course of the year. These sessions were designed to be autonomy-supportive, and intended to help participants engage in decision making and choice about weight loss and physical activity. Those assigned to the control

group received 29 2-hour sessions over the course of a year on various topics not directly related to weight control, including communication skills, preventative nutrition, and stress management. The women in both groups rated the autonomy-supportiveness of their group leaders, their own need satisfaction, motivations for physical activity, and a self-report measure of physical activity. Women in the intervention condition reported that their group leaders were more autonomy supportive. This predicted increased perceived autonomy, which predicted greater intrinsic motivation for physical activity. Higher levels of intrinsic motivation for physical activity predicted a higher number of total minutes spent engaging in moderate to vigorous physical activity.

Duda et al., (2014) also reported on a randomized controlled trial comparing an exercise intervention grounded in Self-Determination Theory to a standard exercise intervention. Participants were assigned to either a standard exercise intervention control group or an experimental intervention group, in which the health and fitness advisor was trained to provide autonomy support to patients. In this trial, autonomy support provided by the health and fitness advisor did not vary by condition, which the authors indicated was likely due to ceiling effects in the autonomy support measure. However, autonomy support provided by the health and fitness advisor predicted need satisfaction, which in turn, predicted physical activity intentions at a 3-month follow-up. Intentions to engage in physical activity at the 3-month follow-up predicted self-reported physical activity at the 6-month follow-up.

Other studies have examined the effect of autonomy support provided by a healthcare provider on physical activity. A study of severely obese participants enrolled in a weight loss program at a community hospital examined the effect of autonomy

support provided by the staff on autonomous motivation for participation in the program, attendance in the program, and final BMI controlling for initial BMI (Williams, et al., 1996). Results indicated that autonomy support from the clinic staff predicted patient autonomous motivation for participation in the program. More autonomous motivation for participation predicted better attendance in the program, which predicted a lower BMI controlling for initial BMI.

In another physical activity intervention in Canada, participants were randomly assigned to either a standard care control condition or a SDT-based intervention condition with a physical activity counselor trained in SDT (Fortier, Sweet, O'Sullivan, & Williams, 2007). During this 13-week intervention, participants were asked to rate the autonomy supportiveness of the physical activity counselor and complete a self-report measure of their physical activity. Participants in the SDT intervention reported slightly higher levels of physical activity during the final measurement at week 13 compared to the control group, after controlling for baseline activity levels. However, autonomy support did not predict autonomous motivation. For the control group, ratings of autonomy support from the healthcare provider predicted greater autonomous motivation at the 6-week follow-up, but this did not predict changes in physical activity at the 13-week follow-up.

Summary of Autonomy Support Findings

According to SDT theory, autonomy support promotes autonomous motivation through the mechanism of increased feelings of autonomy and competence, as well as through increasing behavioral intentions. The increased feelings of autonomy and competence lead to greater autonomous motivation for physical activity and greater

behavioral intentions to engage in physical activity, which leads to increased physical activity. This pattern is less consistent in interventions where an exercise leader, instructor, or healthcare provider has been trained specifically to provide autonomy support. Researchers involved in these interventions speculate that the inconsistency of this effect could be due to issues within the intervention site. It is possible that some trained individuals continue to utilize traditional strategies to promote physical activity. However, correlational results consistently indicate the presence of an effect of autonomy support from instructors and healthcare providers on health outcomes such as physical activity.

The perception that a healthcare provider supports the ability to make choices about health decisions promotes both the perception that an individual is able to make and implement good choices (perceived competence) and the desire to act on those choices (autonomous motivation). Increased desire to act upon a choice or behavior increases the intention for a behavior, which increases the likelihood of actually engaging in the behavior. The effect of autonomy support from a healthcare provider or advisor is present despite what is likely minimal contact between this provider and the individual. In the next section, we will explore the role of a potentially more influential supportive individual, the romantic partner.

Autonomy Support in Close Relationships

Autonomy support provided by a close other, such as a romantic partner, has the potential to be extremely influential. According to interdependence theory, interdependence occurs in relationships when one's emotions, cognitions, and behaviors influence the emotions, cognitions and behaviors of one's partner (Kelley & Thibaut,

1978; Kelley, Holmes, Kerr, Reis, Rusbult, & Van Lange, 2003). This interdependence would likely lead to greater effects of autonomy support on behavior.

It is intuitive that one's health behaviors, good and bad, would have an effect on a partner's behaviors. Multiple studies have found correspondence between the health behaviors for both members of a couple (Kolonel & Lee, 1981; Wilson, 2002; Manne, Coups, & Kashy, 2016; Martire, Stephens, Mogle, Schulz, Brach, & Keefe, 2013). A simple illustration of a potential mechanism driving this correspondence may be found in a small qualitative study of newly cohabitating young adult couples (Anderson, Marschall, & Lea, 2004). Both members of the couples in this study demonstrated increased body weight within the first three months of a new living arrangement, which they attributed to shared meals and partner support for unhealthy dietary habits including alcohol and junk food consumption. The behaviors and attitudes of each member of the couple influenced the behavior of the other, leading to behavioral similarities within the couple.

Despite the clear influence partners have on one another's behaviors, very few studies have explored the effect of partner-provided autonomy support on health behaviors. A search of the literature found only three studies related to the effect of important other-provided autonomy support on physical activity. In one of these three studies, participants were asked to identify an important other, such as a friend, family member or romantic partner to be included in the study. During a 12-month weight loss intervention with adults, participants in the experimental group were asked to identify an intervention partner (Gorin, Powers, Koestner, Wing, & Rayner, 2014). This partner attended one weight loss session and was not trained in successful support provision.

Autonomy support provided by the partner, measured at 6-months, predicted greater weight loss at 6 and 18 months. By comparison, partner use of punishment and rewards for healthy behavior was unrelated to weight loss, and encouragement of healthy eating behaviors predicted less weight loss. This study emphasizes the importance of a partner who limits pressure and control and allows for choice in healthy behaviors. Additionally, it is likely that the effects of autonomy support would be stronger if all intervention partners were also romantic partners, who would have greater influence on behavior than friends or family in this population.

In the second of the three studies, a cross-sectional sample of college-aged students completed measures of autonomy support from close others, behavioral intentions, and physical activity (Chatzisarantis, Hagger, & Brickell, 2008). This study found that autonomy support from close others for engaging in physical activity predicted greater intentions to engage in physical activity. Behavioral intentions, in turn, predicted self-reported physical activity. This matches the pattern of effects of the previously discussed healthcare provider autonomy support studies.

The third important-other autonomy support study examined the role of autonomy support in couples where one member has been diagnosed with osteoarthritis (Martire, et al., 2013). In this daily diary study, participants were asked to rate the extent to which their romantic partner provided autonomy support, pressure, and persuasion for physical activity behaviors. During the 22-day study, participants wore activity monitors to track number of daily steps and minutes of moderate to vigorous physical activity. Martire and colleagues found that daily autonomy support predicted more daily minutes of physical activity and a higher number of daily steps. Interestingly, the male osteoarthritis patients

in this study demonstrated less physical activity on days when they reported their partners had attempted to implement pressure or persuasion tactics to encourage physical activity. This adverse reaction to attempts at behavior change resembles some of the support backfire effects demonstrated in the social support and social control literatures, which will be discussed below.

Summary of Autonomy Support from Important-Other Findings

The findings of these three studies are consistent with the tenets of self-determination theory. The provision of autonomy support encourages a sense of choice in activities, and this sense of choice promotes autonomous motivation. Individuals who are autonomously motivated for a given behavior are more likely to engage in that behavior. Likewise, pressure and persuasion strategies for behavior change operate as an attempt to control another person's behavior. This effort to exert control can reduce autonomous motivation, leading to lower intent to engage in the desired behavior.

The previous summary of the general autonomy support literature emphasized the role of autonomy support in increasing autonomy and competence, which leads to increased physical activity through increased autonomous motivation and behavioral intentions. There is very little research on the role of autonomy support provided by a romantic partner, but we may hypothesize that autonomy support from a close other may also have previously unexplored effects on relatedness. When receiving autonomy support from a romantic partner, one may experience increases in autonomy, competence, *and* relatedness, which would increase physical activity through increased autonomous motivation and behavioral intentions. See Figure 1 for this theoretical model.

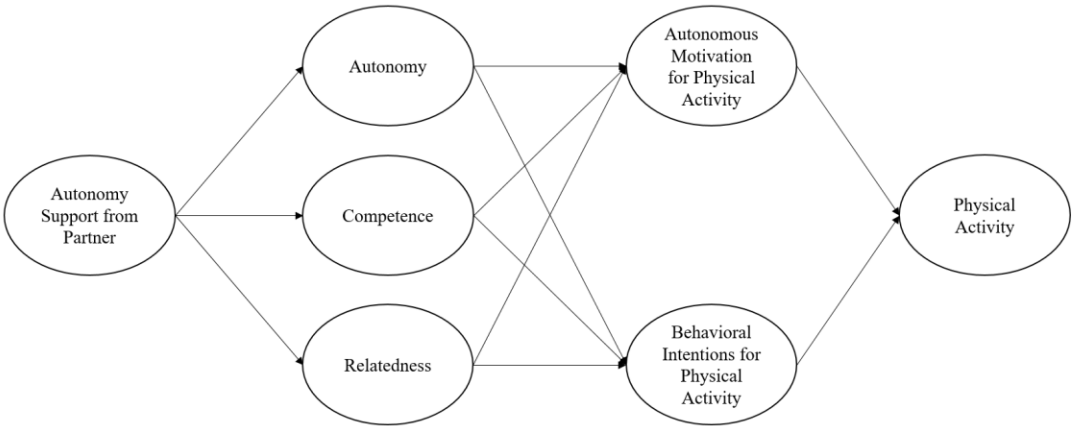

Figure 1. *Self-Determined Motivation for Physical Activity Theoretical Model*

These findings fall in line with hypotheses of self-determination theory, however, more research is needed to explore the effect of partner-provided autonomy support on physical activity. The Martire et al., (2013) sample included only individuals who had been diagnosed with a chronic illness. The effect of autonomy support in healthy couples may be different than in those where one partner has a debilitating physical illness and autonomy is of greater importance.

A significant gap in the autonomy support literature is that it does not address the position of autonomy support in the overall framework of social support theory and research. The next section will explore the social support literature with regards to health behaviors and physical activity.

Social Control and Health

Not all attempts at encouraging health-promoting behaviors have the desired effect. The literature on social control has explored the complexities of promoting health behavior changes. Social control is defined as interactions between social network contacts intended to regulate, influence, or constrain behavior (Lewis & Rook, 1999), and health-related social control involves regulation and influence attempts on health-specific behaviors (Lewis & Butterfield, 2007). These interactions may be categorized as positive, negative, direct, indirect, bilateral, and unilateral (Butterfield & Lewis, 2002; Lewis Butterfield, Darbes, & Johnston-Brooks, 2004). Positive social control includes persuasion, logic, modeling, and positive reinforcement. Negative social control includes expressions or elicitations of negative emotions including disappointment and guilt. Direct social control involves open discussion of the desired behavior change, while indirect social control is implemented by dropping hints and indirectly suggesting behavior change. Bilateral social control involves give and take from both partners and can include behaviors like bargaining and joint discussions. Unilateral social control is a more one-sided approach and may include behaviors, such as withdrawing affection or taking other actions that do not involve the target. Some behaviors may be categorized in multiple ways. For example, pointing out others who have successfully changed would be categorized as positive, indirect, and unilateral, while offering to make the change with the target would be positive, direct and bilateral.

Social control can be exerted by multiple individuals in a person's social network at the same time. Self-reported overall social control from one's social network has deleterious effects (Lewis & Rook, 1999). Overall attempts by the network to encourage

healthy behaviors leads to reduced rates of those health-promoting behaviors, while encouraging the reduction of unhealthy behaviors leads to an increase in those health-compromising behaviors. A recent meta-analysis of social control found that different types of social control have different effects on behavior change (Craddock, vanDellen, Novak, & Ranby, 2015). Positive social control is moderately associated with increases in health-promoting behaviors, while negative social control had a weak association with decreases in health-promoting behaviors.

Many studies have explored the effect of social control on health-promoting and health-compromising behaviors. The majority of this literature has focused on the effects of positive and negative social control. In a self-report survey about social control and health behaviors, Lewis and Rook (1999) found that positive social control from a specific provider led to an increase in the desired health-promoting behaviors and higher levels of negative emotions like sadness and guilt. Comparatively, negative social control had no effect on the desired behavior and also led to higher levels of sadness and guilt, as well as hostility and irritation.

Interdependence theory would suggest that partner's behaviors have a strong influence on the behaviors of the other (Kelley & Thibaut, 1978; Kelley, et al., 2003). This is apparent in studies of social control among couples, where married individuals report that their partner is their greatest source of social control (August & Horkin, 2010). It should be noted that married men are more likely to report experiencing social control than unmarried men. This is unsurprising, given that women are more likely than men to exert social control over a partner's health in heterosexual relationships (Umberson, 1992).

It is important to explore the effects of different kinds of social control to understand the true effects of these behaviors. In the previously discussed autonomy support study by Martire and colleagues (2013), the effects of positive and negative social control were combined into a single variable referred to as "pressure and persuasion." This pressure and persuasion variable predicted null effects for physical activity among women and a decrease in physical activity for men.

This evidence of backfire is less apparent when social control is separated into positive and negative control attempts. Tucker and Anders (2001) found that perceptions of positive social control attempts from one's partner predicted greater health promoting behaviors. In contrast, negative social control attempts predicted more health compromising behaviors. Another study of positive and negative social control found that individuals receiving positive social control were less likely to ignore those control attempts and do nothing, while receiving negative social control was associated with more attempts to hide unhealthy behavior from one's partner (Tucker, Orlando, Elliott, & Klein, 2006). Lewis and Butterfield (2007) found that positive, bilateral, and direct social control predicted an increase in health-promoting behavior. Negative, unilateral, and indirect social control attempts had no significant effects on behavior. Interestingly, wives' direct attempts to control their husbands' health behaviors was associated with an increase in their own health-promoting behaviors.

Though positive social control may lead to increases in health-promoting behaviors, there are concerns that it may have negative long-term effects because it may undermine autonomy (Helgson, Novak, Lepore, & Eton, 2004). Exerting control over an individual's behavior would likely only be helpful to a point and would not lead to

autonomous motivation for the health-promoting activity. In a study of diabetes management among couples where one member had been diagnosed with type 2 diabetes, attempts to exert control, compared to the provision of social support, led to null effects or decreases in physical activity (Khan, Stephens, Franks, Rook, & Salem, 2013). The effects of social support on health behaviors, with emphasis on physical activity will be explored below.

Social Support and Physical Activity

Social support is broadly defined as various types of help and assistance that one receives from others. This help and assistance can come in many forms, including informational, tangible, emotional, esteem, and social network support (Cutrona & Suhr, 1992). This paper will focus primarily on emotional, esteem, and informational support, as these are likely to be the most relevant types of support for physical activity. Emotional support includes statements of caring, concern, empathy, and sympathy. Esteem support is characterized by expressions of regard for another's skills, abilities and intrinsic value. Informational support includes advice, factual input, and feedback on actions. According to some research, different types of social support are more appropriate for specific kinds of situations than others (Cutrona & Russell, 1990). In a qualitative study, new parents reported that informational (advice), instrumental (taking over chores), emotional (encouragement), reciprocal (giving and receiving of support), and autonomy support (respect for choice) were considered the most important for physical activity behavior (Hamilton & White, 2010). According to the optimal matching model, social support that matched these desires would be most effective. (Cutrona & Russell, 1990). An observational study of social support found that the match between

the type of support desired and the type provided affects the recipient's response (Cutrona, Shaffer, Wesner, & Gardner, 2007). When a participant disclosed an emotion and his or her partner responded with emotional support, the partner was rated as more sensitive, while a support mismatch predicted lower perceptions of partner sensitivity and lower relationship satisfaction. Alternatively, following a request for information, a provision of informational support had no identifiable effect on perceptions of partner sensitivity and negative responses to that request led to lower perceptions of partner sensitivity. This study indicates that the type of support provided in a given context is important and different types of support may not have the same effects in similar contexts.

A large body of literature has explored the relationship between social support and health. Multiple recent studies have found a relationship between social support and physical activity in healthy and chronically ill individuals. Though social support can come in many forms, most studies have focused on the effect of general perceived social support from friends, family, and close others. A few of these studies will be described below.

A cross-sectional study of young adult women in Australia found that the most commonly reported barrier to physical activity was a lack of social support (Andajani-Sutjahjo, Ball, Warren, Inglis, & Crawford, 2004). In an observational study of university students in the UK, perceived social support was related to concurrent physical activity and physical activity at a 7-week follow-up (Molloy, Dixon, Hamer, & Sniehotta, 2010). There is also evidence for this relationship in older adults. The Wellbeing, Eating and Exercise for a Long Life (WELL) study in Australia also found a relationship between

social support and physical activity (Van Dyck, Teychenne, McNaughton, De Bourdeaudhuij, & Salmon, 2015). A cross-sectional study of cancer survivors and their caregivers found a relationship between social support from others and self-reported physical activity (Barber, 2013). Some studies have gathered objective measures of physical activity to assess the relationship between social support and exercise. For example, a study of adolescents in England found that social support from peers predicted objective measures of physical activity, obtained via actigraphy (Edwardson, Gorely, Pearson, & Atkin, 2013).

Mechanisms Underlying Social Support's Effects

Lakey and Cohen (2000) detailed three perspectives on the relationship between social support and health, including the stress and coping perspective, the social constructionist perspective, and the relationship perspective. The stress and coping perspective conceptualizes support as a protective factor that shields the recipient from the adverse effects of stress. The social constructionist perspective theorizes that perceived social support leads to greater self-esteem and self-regulation, which in turn leads to improved health. Finally, the relationship perspective posits that the health effects associated with social support are inextricably tied to relationship processes, such as companionship, intimacy, and a lack of conflict.

The proposed mechanism for the role of social support in the case of physical activity is best captured by the social constructionist perspective. Individuals who perceive high levels of support from close others have greater self-esteem and self-regulation, which in turn would predict more regular physical activity. This combination of self-regulation and self-efficacy is something Bandura (1997) referred to as self-

regulatory self-efficacy for physical activity, or an individual's faith that he or she is able to persevere in attempts to engage in physical activity in the face of challenges, barriers, and setbacks. In this social-cognitive model of social support, the perception of available social support increases the individual's confidence that they are able to complete a goal despite difficulties.

Multiple cross-sectional studies have found evidence for this social-cognitive relationship in which support predicts self-efficacy and self-regulation, which in turn, predict physical activity. These findings come from diverse samples, including Latino young adults (Marquez & McAuley, 2006), university students in the United States (Rovniak, Anderson, Winett, & Stephens, 2002; Petosa, Suminski, & Hortz, 2003), married middle-aged adults (Ayotte, Margrett, & Hicks-Patrick, 2010), and African American churchgoers (Li, Seo, Torabi, Peng, Kay, & Kolbe, 2012).

Longitudinal studies have also found evidence for the link between social support, self-efficacy, self-regulation, and physical activity. In a church-organized, physical activity intervention, individuals who reported higher levels of social support had greater self-efficacy and self-regulation, which in turn predicted more frequent physical activity (Anderson, Wojcik, Winett, & Williams, 2006). In another physical activity intervention with working mothers, higher levels of perceived social support from friends and family were associated with higher self-efficacy and self-regulation, which predicted more frequent physical activity (Mailey & McAuley, 2014).

The pattern of social support predicting self-efficacy, which leads to greater autonomous motivation and physical activity resembles the findings of the previously discussed autonomy support studies. It would appear that self-efficacy and perceived

competence are very similar, if not identical, concepts that can be promoted by strategic support provision and can lead to greater intentions to engage in specific behaviors.

Despite the strong evidence that social support is a boon to those attempting to engage in health-promoting behaviors, there is also evidence that social support does not always provide this benefit. The next section will explore what happens when social support does not have the intended effect.

Support Backfire

There is strong evidence that social support is related to mental and physical health benefits. Many studies report positive effects of social support (i.e., reducing stress, increasing health-promoting behaviors, etc.), but there are also studies that do not find this effect of social support (Bolger, Zuckermann, & Kessler, 2000; Bolger & Amarel, 2007; Shrout, Herman, & Bolger, 2006). This may, in part, be due to the interpretation placed on the support provision by the support receiver. For example, a qualitative study of new parents found that these parents said they would appreciate receiving certain types of social support from romantic partners, but that they may also feel guilty for getting or needing help to engage in health-promoting behaviors such as physical activity (Hamilton, 2010). This has also been explored in cross-sectional and experimental quantitative studies, described below.

Some researchers suggest that support is most effective when it is provided but not recognized, referred to as "invisible support" (Bolger, Zuckerman, & Kessler, 2000). Invisible support is characterized by supportive acts that are outside of a recipient's awareness or are subtle enough that the recipient does not recognize them as supportive acts (Bolger & Amarel, 2007). These invisible support studies are generally conducted as

the recipient faces a large stressor, such as taking the bar exam (Bolger et al., 2000; Shrout, Herman, & Bolger, 2006), preparing to give a public speech (Bolger & Amarel, 2007), or quitting smoking (Lüscher, Stadler, Oschner, Rackow, Knoll, Hornung, & Scholz, 2015). Other studies examine video recordings of couples' interactions (Girme, Overall, & Simpson, 2013; Howland & Simpson, 2010). In daily diary studies an instance of invisible support occurs when one individual reports providing his or her partner with support, but the recipient does not report receiving support. Experimental studies involve manipulating the method in which support is provided (visible/invisible) and examining the effects of those manipulations.

The earliest study of invisible support in the literature examined the effect of social support provided by a romantic partner in the lead-up to a stressful event: taking the bar exam (Bolger et al., 2000). In this first study, participants (studying for the exam) and their romantic partners completed a 35-day daily diary in the days leading up to and immediately following the exam. Participants and their partners reported on support provided and received, as well as their emotional state for the day. This first study found that on days when the examinee's partner reported providing emotional support but the examinee did not report receiving support, the examinee experienced less anxiety and depression. Conversely, when the person taking the exam reported receiving support, he or she experienced higher levels of anxiety and depression. Bolger and colleagues suggest that this indicates that there is an emotional cost to receiving emotional support. This emotional cost was mitigated when the examinee also reported providing support to his or her partner. One possible explanation for this pattern of effects is that when an

individual reports receiving, but not providing support, it leads to feelings of inefficacy or inadequacy that are resolved by providing reciprocal support to the partner.

In the years since the initial study, other researchers have added to our knowledge of invisible support. In a daily diary study of couple interactions, Maisel and Gable (2009) found that both invisible and visible general support reduced feelings of anxiety and sadness and increased relationship quality when that support was rated as responsive. Given the nature of the responsiveness items for this study, which included "my partner understood me," "my partner made me feel as if he/she valued my abilities and opinions," and "my partner made me feel cared for," it is possible that support-related feelings of inadequacy are alleviated when the support provider addresses this concern through empathy and esteem support. Biehle and Mickelson (2012) also conducted a daily diary study of social support provision and receipt in couples and found that receiving support, visible or invisible, reduced feelings of anxiety. However, providing support to one's partner also predicted less anxiety and depression, unless the support was unacknowledged.

Invisible support has also been investigated experimentally. Bolger and Amarel (2007) manipulated the visibility of emotional and practical social support provided by a confederate in a series of experiments with university students who believed they were preparing for a public speaking stressor. In these experiments, they found that individuals in the invisible practical and emotional support conditions experienced less emotional reactivity than those in the no support or visible support conditions, further emphasizing the effects of invisible support.

Observational studies of invisible support have also been conducted. A study of couples in the Midwest used video-recorded conversations between couples discussing a self-improvement goal (Howland & Simpson, 2010). One member of the couple was randomly assigned to be either the recipient or provider, and couples were instructed to discuss the self-improvement goal of the recipient for 7 minutes. Immediately preceding and following the discussion, all participants rated their current mood and self-efficacy. Those assigned to be the recipient of support completed a measure of support received, and the support providers completed a measure of support provided. The recordings of couples' interactions were then coded for visibility and type (emotional and practical) of support. In this coding system, invisible support occurred when one of the following happened during the couple's discussion: the provider deemphasized the role of recipient and supporter by making the discussion more like a regular conversation, the provider referenced themselves or a third-party to draw focus from the problem, the support was subtle or indirect, or the provider drew focus from the recipient's limitations or negative feelings about the situation. Coded visible support behaviors included emphasizing the role of support recipient and provider, focusing on the problem or the recipient's limitations and negative feelings, direct and easily recognizable support. Emotional support occurred when the support provider attempted to assuage negative emotions via reassurance, positive feedback, or through expressions of concern. Practical support included attempts to fix the problem through advice, information provision, suggestions for courses of action, and direct offers to help. Invisible practical and emotional support predicted decreased experiences of anger and anxiety between the two reports of mood. Interactions rated highly for invisible practical support, combined with low awareness of

support provision on the part of the recipient, predicted increases in self-efficacy between the two assessments.

These findings indicate that different kinds of support may confer more or less benefit from their visibility, and these benefits may vary based on the situation. Just as practical support may be more helpful than emotional support in certain situations, its receipt may also come at a higher emotional cost. The higher emotional cost of receiving specific types of support may lead to greater benefits to invisibility. For example, receiving practical support, such as advice or assistance, may lead to reduced feelings of competence and corresponding increases in anxiety and general negative mood. In this case, practical support may be useful when provided but not perceived. Furthermore, invisible support may have an effect on self-efficacy, which is an important variable of interest in the social cognitive model of social support.

A study of heterosexual couples in New Zealand asked couples to have a discussion about an important self-improvement goal while being video recorded (Girme, Overall, & Simpson, 2013). Following this discussion, both members of the couple rated the extent to which they felt supported by their partner, the extent to which they felt they supported their partner, distress, and the success of the discussion. These discussions were then coded for visibility and type of support using a procedure similar to the one used in the previous study (Howland & Simpson, 2010). Invisible support occurred when one member of the couple did any of the following: subtly or indirectly provided support, de-emphasized the roles of support provider and recipient, or reframed the problem locus away from the recipient. Visible support occurred when any of the following occurred: support was provided directly or overtly, roles of support provider and recipient were

emphasized, or focus was placed on receiver and the problem to narrow focus and increase distress. Girme et al. (2013), found that visible support predicted higher ratings of discussion success but only for distressed participants, while non-distressed participants rated the discussion less successful in the presence of visible support. Additionally, invisible support predicted greater goal advancement at multiple follow-ups over the next year.

These results suggest that both visible and invisible support have an important role to play in couple interactions. Visible support is important in maintaining a sense of progress and success in discussions with one's partner during times of distress, which may lead to increased feelings of emotional closeness or intimacy. Invisible support is important to increased feelings of self-efficacy (Howland & Simpson, 2010), which may lead to more goal advancement over time (Girme et al., 2013).

A few of the invisible support studies have found evidence for mixed effects that vary based on the type of support provided. In a study of couples where one member was studying for the bar exam, Shrout, Herman, and Bolger (2006) found that invisible practical support led to reduced daily fatigue and increased daily vigor, while recognizing that a partner had provided emotional support predicted increased daily anger, depression and anxiety. Lüscher et al., (2015) studied couples where one member was attempting to quit smoking. In this study receiving invisible instrumental and emotional support led to reduced negative mood but also predicted increases in smoking. These findings suggest that there is still more to be explored about the effects of invisible support, specifically in behavior change contexts, as the effects are less well-established.

The general social support literature has explored the effects of different types of support. Cutrona and Suhr (1992) videotaped couples discussing stressors in the lab and coded the controllability of the stressors and types of support provided. They also asked participants to rate their satisfaction with the support provided. Participants experiencing a controllable stressor were less satisfied with informational support than participants with an uncontrollable stressor, while participants reported being more satisfied when receiving emotional support, regardless of stressor controllability. This suggests that different types of social support may be perceived differently within the same context. Additionally, some types of support may be more likely to backfire.

Present Study

The present study explores the effects of daily social support and social control provided by a romantic partner on daily physical activity. Based on the tenets of self-determination theory, social support should lead to greater daily physical activity due to increased perceptions of autonomy, competence, and relatedness. Conversely, social control should not show evidence of increasing physical activity. Additionally, the data were explored for evidence of support backfire. The central hypotheses for this study are: (1) informational and emotional support will show evidence of support backfire; (2) autonomy and esteem support will predict greater daily physical activity and not show evidence of support backfire; (3) social control will show evidence of backfire, leading to reduced levels of daily physical activity. To test these hypotheses, I collected data from couples during a 14-day diary study, which included self-report and objective measures of physical activity, as well as measures of daily autonomy and social support, social pressure, and relationship satisfaction.

CHAPTER 2: METHOD

Participants

Participants were recruited from the Iowa State University psychology subject pool. Requirements for participation included: being at least 18 years of age, and being currently involved in a romantic relationship for a minimum of 3 months. In total, 50 couples were recruited for this study (96% heterosexual, *N* = 48). The mean relationship length of these couples was 16.46 months (*SD* = 19.29). In 78% of couples (*N* = 39) both members reported a relationship status of "dating," 2% reported being married (*N* =1), 12% reported cohabitation as a relationship status (*N* = 6), and 8% of couples (*N* = 4) reported different relationship statuses. In the cases where couples reported different relationship statuses, one member reported a relationship status of "dating" while the other reported "cohabitating." At least one couple mentioned this was due to not knowing the definition of cohabitating.

The sample was comprised of 50 men and 50 women, and the mean age was 19.89 (*SD* = 2.26). The ethnicity breakdown of participants was 76% white, 12% Asian, 7% Hispanic, 2% Black or African American, and 3% Other.

Compensation

Participants received either course research credit from the SONA system or monetary compensation for their participation in this study. Participants enrolled in a course that utilizes the SONA system received research credit for their participation, and non-students and students not registered in the SONA system received monetary compensation.

Participants that received SONA credit received credit based on their participation. Credits were assigned based on the number of daily diary surveys the participant completed, up to a maximum of six credits. One credit was earned for participating in the initial survey, which required more time and effort on the part of the participant, as participants were required to come into the lab to fill out questionnaires and receive instructions on the remaining diary assessments. An additional research credit was assigned for completing 4 of the 14 daily diary surveys. A third research credit was assigned for completing 7 of the 14 daily diary surveys. Participants received a fourth credit for completing 10 of 14, a fifth for completing 13 of 14, and a sixth credit was assigned for completing the follow-up questionnaire in the lab and returning the research equipment assigned to the participant. This assignment of credits was based on the assumption that initial questionnaire and instructions would take approximately 30 minutes to complete and the daily diary assessment would require roughly 10 minutes each to complete at a rate of 1 credit for 30 minutes of participation. Credits were awarded once the participant had returned the study equipment to the lab and completed the follow-up questionnaire.

Participants who were not enrolled in a SONA-registered course or who were non-students received a maximum of $20 compensation for participation and were compensated according to the number of assessments completed. Participants who completed only the initial questionnaire received $4. Participants received $1 for each completed daily diary survey. Participants received $2 for completing the follow-up survey and returning study equipment. Monetary compensation was awarded after the return of the study equipment, following the completion of the follow-up assessment.

Participants who wore the activity tracker for all 14 days of the study were entered to win 1 of 2 $50 Target gift cards. All participants, including those who received research credit and those who received monetary compensation, were eligible to be entered in the drawing for these gift cards.

Procedure

Participants on SONA were instructed to schedule an appointment time when both they and their partner were available to come to the lab to complete the consent process, the initial questionnaire, and receive instructions and their fitness trackers. At this time, they also scheduled an appointment to complete the follow-up questionnaire approximately 2-weeks later. Once in the lab, individual members of the couple completed the initial questionnaire independently. The initial questionnaire included basic demographic information about the individual (age, sex, ethnicity), and characteristics of the couple, including relationship duration and relationship type (married, dating, cohabitating). After completing the demographic information, participants were asked to complete a series of individual difference measures, including a measure of behavioral intentions for physical activity, social support, and relationship satisfaction. After completing this series of questionnaires, each participant was asked for his or her email address so that they could receive the daily diary surveys. Additional measures were administered, but were not used in the present analyses. Once both members of the couple had completed the initial questionnaire, they were assigned a Fitbit Zip and given instructions on how to wear and care for the device. They were also given instructions on completing daily surveys and reminded of their appointment time for the follow-up survey in two weeks.

The first diary survey was sent to participants the day after they completed the initial questionnaire. Participants were sent an individual link to the email address they provided during the initial questionnaire. The daily diary survey included measures of self-reported physical activity, a report of physical activity in which the partner participated, a 1-item measure of shared physical activity, perceived supportiveness of the partner, a report of supportive and controlling partner behaviors, support and control provided to the partner, perceived barriers to physical activity, and relationship quality. Participants were asked to complete 1 survey per day for 14 days. The link for each survey was sent at 7 PM and participants had 5 hours to complete the daily diary survey before the link deactivated at midnight. This was done to encourage participants to complete the survey at the end of the day in question. If participants missed a day of the survey they were not allowed to go back and complete it later, but were encouraged to continue with future surveys.

In addition to completing daily diary measures, participants were asked to wear an activity monitor during the 14-day period. The measures of interest from the activity monitor were number of steps per day and number of active minutes per day. Participants were provided with this device in the lab and instructed to attach it to their clothing after waking up in the morning and remove it before going to bed at night. When these devices were returned to the lab, the data was collected and linked to the participants' survey data through a 4-digit participant ID number.

At the end of the 14-day period, couples returned to the lab to complete the follow-up questionnaire and return the activity tracker. The follow-up questionnaire included measures of habit strength, behavioral intentions, self-determined motivation for

physical activity (BREQ2), perceived barriers to physical activity, and need satisfaction. At this time, the participants were debriefed on the project and compensated for their participation.

Measures

Participants completed multiple questionnaires during the initial survey, daily diary, and follow-up portions of the study. This section will include information on measures utilized in the missing data analyses and results sections. Detailed information on measures collected but not used in the present analyses may be found in Appendix A. Complete lists of all items from all portions of the study may be found in Appendices B-D. A summary of reliability information for the multi-item scales used in the present analyses may be found in Table 1.

Table 1
Reliability for Multi-Item Measures

Measure	Citation	Cronbach's Alpha
Physical Activity Intentions	Orbell & Verplanken, 2010	.94
Partner-Specific Support	Cutrona & Russell, 1987	.75
Relationship Quality	Rusbult et al., 1998	.83
Daily Received Support	Present study	.90
Daily Provided Support	Present study	.91
Daily Received Control	Present study	.51
Daily Provided Control	Present study	.59

Initial Questionnaire.

Demographics. Participants completed a variety of individual and relationship demographic measures including age, sex, whether or not they are a student athlete, length of romantic relationship with the partner they came into the lab with, and relationship type (i.e., dating, cohabiting, married, etc.)

Physical activity intentions. The participant's intention to engage in physical activity on a regular basis over the 14 days of the study was measured using a modified

version of the 3-item behavioral intention measure used by Orbell and Verplanken (2010). Items included, "I intend to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks", "I will try to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks," and "I plan to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks." Each item was assessed on a 7-point Likert scale (strongly disagree to strongly agree). The present data indicate excellent reliability for this scale ($\alpha = .94$).

Social support. Social support from the romantic partner was measured using a partner-specific version of the Social Provisions Scale (Cutrona & Russell, 1987; SPS). Participants completed the 12-item measure, which asks them to indicate their degree of agreement with a series of statements about the availability of support from their romantic partner on the 6 dimensions of social support. Possible responses range from 1 (strongly disagree) to 4 (strongly agree). Items on this measure include, "I feel that I do not have a close relationship with my romantic partner" and "My romantic partner does not really rely on me for his/her well-being." The partner-specific social support scale was slightly less internally consistent than the general social support measure ($\alpha = .75$).

Relationship quality. Relationship quality of the participant's current romantic relationship was measured with the 6-item Satisfaction Level subscale of the Investment Model Scale (Rusbult, Martz, & Agnew, 1998). Participants rated a series of statements about their current satisfaction with their romantic partner on a scale of 1 (strongly disagree) to (strongly agree). A sample item from this scale is, "Our relationship makes me very happy." Cronbach's alpha indicated the scale was internally consistent ($\alpha = .83$).

Daily Diary Questionnaire.

Physical activity (self-report). Because all physical activity types could not be captured by the activity trackers, participants were also asked to self-report all physical activity during the day. Each day, participants were asked if they exercised that day. If the participant reported that they did perform some kind of physical activity during the day, they were asked to report the intensity of the activity (light, moderate, vigorous) and how long they performed the given activity in minutes. When asked to report the intensity of physical activity, participants were provided with examples of each type. Guidelines for mild, moderate, and vigorous physical activity among adults are described by the U.S. Department of Health and Human Services (U.S. Department of Health and Human Safety, 2008). Intensity of exercise and physical activity is measured using Metabolic Equivalents (METs), which indicate the amount of energy expended doing an activity compared to the amount of energy expended while at rest, which makes these totals comparable across individuals. For example, while performing an activity that requires 3 METs a person would expend 3 times the energy they would while at rest. These guidelines indicate that light physical activity is defined as activities that require 1.1 to 2.9 METs, moderate physical activity expends 3.0-5.9 METs, and vigorous activity expends 6.0 METs. The guidelines also provide examples of each type of exercise, which was provided to the participants. Full lists of these examples may be found in Appendix B. Examples of mild physical activity included walking slowly, dancing slowly, light stretching, and bicycling less than 5mph. Examples of moderate physical activity included brisk walking (3-4.5mph), weight training, light aerobics, hiking, and yoga. Examples of vigorous physical activity included jogging/running, high impact aerobics,

swimming laps, most aerobic machines such as elliptical, stair climbers, stationary bicycles, etc., and bicycling more than 10mph.

Perceived partner supportiveness. Participants were asked to respond to a 1-item measure of perceived partner supportiveness for that day. The item stated, "In general, how supportive of your physical activity was your partner today?" The participant was asked to indicate partner supportiveness on a scale of 1 (not at all supportive) to 7 (very supportive).

Perceived partner supportive and controlling behaviors. Participants were asked to respond to a series of 6 items about ways their partner was involved in their physical activity during each day. These items included a series of supporting and controlling behaviors that the romantic partner may have performed during the day in question. Items included statements about autonomy support, esteem support, informational support, emotional support, persuasion, and pressure.

Autonomy support. Autonomy support is defined as "actions that are characterized by empathy and understanding for an individual's situation and the provisions of choices for making health behavior changes" (Martire, et al., 2013, p. 214). Participants were asked to indicate the extent to which their partner provided autonomy support with one item: "showed understanding for how physically active you wanted to be" (Martire, et al., 2013). Participants indicated whether their partner did this action "not at all," "somewhat," or "very much."

Esteem support. Esteem support is defined as attempts to positively evaluate or affirm another person's skills, abilities, or intrinsic value (Cutrona & Suhr, 1992). Participants responded to one statement (expressed confidence in your ability to engage in physical

activity) and rate to what extent their partner provided esteem support "not at all," "somewhat," or "very much."

Informational support. Informational support includes presenting knowledge or facts, advice, or feedback (Cutrona & Suhr, 1992). Participants were asked to respond to a single statement about the extent to which their partner provided them with informational support during the current day (not at all, somewhat, and very much). The statement measuring informational support was, "offered guidance or advice on your physical activity or exercise."

Emotional support. Emotional support includes expressions of caring and concern, as well as empathy and sympathy (Cutrona & Suhr, 1992). Participants were asked to respond to one statement about the extent to which their partner provided them with emotional support for their physical activity habit that day (not at all, somewhat, very much). The item measuring emotional support was, "expressed caring or understanding about your participation in physical activity."

Persuasion. Persuasion involves attempts to convince another person to engage in a specific activity, and in this case, it includes attempts to persuade the participant to engage in physical activity or exercise. Participants were asked to respond to one item about persuasion attempts made by their partner to engage in physical activity within the current day. Response options include, "not at all," "somewhat," and "very much." The item measuring persuasion stated, "Tried to persuade you to be more physically active."

Pressure. Activity-related pressure involves attempts to force or coerce a person, in this case the participant, to engage in physical activity. Participants were asked to respond to one item about their partner's attempts to pressure them into engaging in physical activity

or exercise, with response options of "not at all," "somewhat," and "very much." The item measuring pressure was, "expressed irritation with or criticized your choices about your physical activity or exercise."

Support provided to partner. Participants were asked to respond to one question about their general supportiveness of their partner's physical activity habit that day. This item stated, "In general, how supportive of your partner's physical activity were you today?" The participant was asked to indicate their supportiveness on a scale of 1 (not at all supportive) to 7 (very supportive).

Supportive and controlling behaviors toward partner. Participants were asked to indicate the extent to which they engaged in specific supportive and controlling behaviors toward their partner during the current day. These items were matched to those presented in the received supportive behaviors measures, and were simply rephrased to measure behaviors directed toward the romantic partner. For example, the item measuring esteem support was rephrased from "expressed confidence in your ability to engage in physical activity" to "Expressed confidence in your partner's ability to engage in physical activity. Please see appendix with full list of daily diary measures for exact wording.

Activity Tracker

The activity tracker allows for an objective measure of physical activity for both participants. The participants were asked to wear the activity tracker during their waking hours, with the exception of during showering, bathing, or any other activity that would involve the device being submerged in water. Participants were asked to wear the activity tracker for the 14-days of the daily diary study. The primary sources of activity data for each participant will be total number of steps per day and number of active minutes.

Approximately 9% of participants lost at least one activity tracker over the course of the study, some of which were eventually returned. See Appendix D for detailed information on lost and recovered Fitbits.

Number of steps per day. The activity trackers tracked total number of steps taken per day. This number was used to measure the individual participant's activity level each day and a combined total of couple steps per day.

Number of active minutes. The activity monitors also tracked number of active minutes. An active minute is defined as an activity that has a MET of at least 3 (moderate-vigorous physical activity). In accordance with the Physical Activity Guidelines (2008), which state that an individual should be active for at least 10 minutes at a time, the activity monitors only begin to keep track of active minutes after the 10 consecutive minutes of moderate-vigorous physical activity.

CHAPTER 3: DATA ANALYSIS

The goal of this study was to examine the effects of providing and receiving different types of support and social control on physical activity behavior. Prior to any hypothesis testing, primary axis factoring was used to determine the most appropriate way to combine the daily social support and social control predictor variables.

Factor Analysis

Factor analysis was conducted with the social support and social control daily diary items to determine if items could be combined to form more general and reliable measures. Correlations among these items may be found in Table 2. The "Received" measures are those where participants reported support or control efforts they received from their partner, while the "Provided" measures are the items where participants reported the support they provided to their romantic partner. It is important to note that almost all correlations in this table are significant due to the highly-powered nature of repeated measures designs, so it is important to consider the strength of the relationships, rather than their significance. Items measuring social support were highly correlated with coefficients ranging from .51 to .81, and the two items measuring social control correlated at .40 for the "from partner" measures and .46 for the "to partner" measures. Conversely, the correlations between the social support and social control items were generally lower. This would indicate that there were two separate components within these items. Principal Axis Factoring was conducted in SPSS separately for the received and provided measures. Each factor analysis used all five social support items (i.e., general, autonomy, esteem, informational, and emotional support) and two social control

Table 2

Correlations between Unstandardized Social Support and Social Control Daily Diary Items and Outcome Measures

Measure	Mean	*SD*	1.	2.	3.	4.	5.	6.	7.
Received									
1. General Support	5.40	1.76							
2. Autonomy Support	2.41	.69	.72**						
3. Esteem Support	2.38	.72	.68**	.77**					
4. Informational Support	1.92	.85	.51**	.52**	.59**				
5. Emotional Support	2.30	.76	.61**	.69**	.74**	.63**			
6. Persuasion	1.52	.74	.25**	.26**	.33**	.47**	.37**		
7. Pressure	1.19	.50	.01	.03	.09**	.19**	.06*	.40**	
Provided									
8. General Support	5.42	1.74	.83**	.65**	.62**	.50**	.57**	.24**	.01
9. Autonomy Support	2.41	.69	.65**	.79**	.73**	.55**	.64**	.29**	.04
10. Esteem Support	2.40	.72	.59**	.69**	.80**	.55**	.67**	.32**	.08**
11. Informational Support	1.93	.85	.46**	.48**	.53**	.78**	.56**	.42**	.23**
12. Emotional Support	2.29	.76	.56**	.62**	.71**	.60**	.78**	.34**	.09**
13. Persuasion	1.52	.73	.21**	.21**	.27**	.38**	.31**	.72**	.39**
14. Pressure	1.18	.49	.04	.03	.07*	.18**	.08**	.38**	.75**
Outcomes									
15. Steps	7380.23	4410.25	.04	.02	.04	-.01	.04	.01	.07*
16. Active Minutes	40.06	33.36	.05	.03	.02	.05	.06	.06	.09*
17. Exercise Minutes	43.72	59.99	.18**	.10**	.09**	.02	.10**	-.04	-.01

Note. ** $p < .01$, * $p < .05$, Correlations are calculated using data from all participants across all days, Table continues to the right on next page

Table 2

Correlations between Unstandardized Social Support and Social Control Daily Diary Items and Outcome Measures (cont)

	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
9. Autonomy Support	.72**									
10. Esteem Support	.67**	.81**								
11. Informational Support	.50**	.55**	.54**							
12. Emotional Support	.64**	.71**	.75**	.62**						
13. Persuasion	.21**	.26**	.29**	.44**	.34**					
14. Pressure	.02	.04	.01	.24**	.08**	.46**				
Outcomes										
15. Steps	-.00	-.00	.03	.04	.03	.04	.05			
16. Active Minutes	.03	.02	.02	.08*	.06	.09*	.06	.85**		
17. Exercise Minutes	.11**	.03	.04	.05	.08**	-.02	.03	.37**	.33**	

Note. ** $p < .01$, * $p < .05$, Correlations are calculated using data from all participants across all days, Table continued from left

items (i.e., pressure and persuasion). Additionally, factor analyses were conducted on just the social support items to see if there were unique factors within the five items. The number of factors was determined using Eigenvalues greater than one. Factor analyses were also conducted using aggregated data to account for non-independence of observation within individuals. The pattern of results reported below was the same in the aggregated analyses.

For the received support daily diary items, Principal Axis Factoring was conducted using data for all five social support and two social control items. Factor analysis (Table 3) revealed two factors within the items: a social support factor and a social control factor, indicating that the two sets of items should be analyzed independently. The factor analysis for just the social support items (Table 4) found that all five items loaded onto a single social support factor.

Principal Axis Factoring was also conducted for the provided social support and social control items. Results for this factor analysis may be found in Table 5 and indicated two separate factors: social support and social control. Table 6 contains the results of the PAF for just the provided social support items, which all loaded onto a single social support factor.

Table 3
Received Social Support and Social Control Principal Axis Factoring Results

Item	Factor 1	Factor 2
General Support	.76	-.20
Autonomy Support	.87	-.22
Esteem Support	.86	-.16
Informational Support	.70	.20
Emotional Support	.84	-.07
Persuasion	.45	.66
Pressure	.18	.57

Note. Unrotated matrix

Table 4
Received Social Support Principal Axis Factoring Results

Item	Factor 1
General Support	.78
Autonomy Support	.85
Esteem Support	.89
Informational Support	.67
Emotional Support	.83

Note. Unrotated matrix

Table 5
Provided Social Support and Social Control Principal Axis Factoring Results

Item	Factor 1	Factor 2
General Support	.76	-.20
Autonomy Support	.84	-.25
Esteem Support	.87	-.14
Informational Support	.72	.19
Emotional Support	.82	-.06
Persuasion	.50	.67
Pressure	.15	.47

Note. Unrotated matrix

Table 6
Provided Social Support Principal Axis Factoring Results

Item	Factor 1
General Support	.78
Autonomy Support	.89
Esteem Support	.88
Informational Support	.66
Emotional Support	.85

Note. Unrotated matrix

Statistical Models

Based on the results of the factor analyses, the social support items were combined into a single social support measure. Given the correlation between the social control items was .40 and .46 in the received and provided measures respectively, the items were combined into a single social control item. The individual items for the social support and social control measures were standardized and combined to create composite scores due to high correlations between items. Daily support provided and daily control

provided were created with the items that measured how much social support or control a participant gave to his or her partner on that day. Daily support received and daily control received is the amount of social support of control a participant reported receiving from his or her partner each day. Daily support from partner and daily control from partner were daily partner reports of how much social support or control he or she provided that day.

Three outcome variables were created from the daily physical activity data. Daily physical activity is the number of self-reported minutes the participant reported engaging in each day in the daily diary survey. Daily steps are the number of daily steps recorded by the Fitbits worn by participants. Daily active minutes is the number of minutes spent engaging in vigorous and moderate intensity physical activity recorded by the Fitbits worn by participants.

Data were analyzed using PROC MIXED in the statistical software SAS. Within these analyses, the relationship between the predictors and outcome variables was computed for each couple. Furthermore, the relationship between the predictor and outcome variables was computed for each individual within the couple. To accomplish this, dummy-coded male and female variables were created to establish an intercept for a given outcome, as well as a slope to indicate linear change over time. Each prediction equation included a coefficient for male and female intercepts, male and female change over time, male and female received support or control, and male and female support or control provided by partner.

Missing Data

Repeated measures studies often have missing data issues because not every participant completes the included measures at every time point. Issues of missingness in this study were complicated further by the use of multiple sources of data. Some participants may have complete survey data, but have missing activity tracker data due to forgetting to wear the device, device failure, or device loss. Conversely, some individuals may have complete activity tracker data but be missing one or more daily surveys. The dyadic nature of the analyses conducted also lead to issues with missingness where one individual completed all materials for a given day, while his or her partner is missing one or more parts of that day's measures.

Restricted maximum likelihood (REML) was utilized in SAS as a solution to missing data. Additionally, potential predictors of missingness for each of the predictor and outcome variables were examined to better understand any missing data mechanisms at work. Variables that routinely predicted missingness in the outcome and predictor variables were used as auxiliary variables in the FIML estimation to account for missingness.

Within these data there were 1400 daily observations for 100 individuals over 14 days. Approximately 33% of the participants completed all 14 daily dairy surveys and 96% completed at least 50% of the daily surveys. Additionally, 55% of participants had complete Fitbit data from all 14 days of their participation and approximately 6% of participants lost at least one Fitbit during the course of the study. Examination of the predictor and outcome variables found that 81% of daily observations had complete data, meaning for a given day the participant completed all diary measures and wore the

assigned activity tracker. The two most common patterns of missing data included missing only daily steps from the Fitbit or missing all survey data, with present Fitbit data.

The final dataset was created using data from the 48 heterosexual couples in the sample. One of these couples was eliminated from the dataset due to a lack of overlapping daily diary reports, for a final sample of 47 heterosexual couples.

Logistic regression to predict missingness on the predictor and outcome variables revealed interesting effects. For the predictor variables, missingness on participant reports of support receipt was predicted by age and gender. Missingness on partner report of support and control provided, as well as participant report of control received, was predicted by age. In general, older individuals and women were less likely to have missing data on the predictor variables.

Self-reported exercise minutes demonstrated a similar pattern to that of the predictor variables. Missingness was significantly predicted by gender and age, such that older participants and women were less likely to have missing data. The two Fitbit-generated outcome variables demonstrated a different pattern. Missingness on daily steps and active minutes, recorded with the activity tracker, was significantly predicted by age, gender, day of survey completion, physical activity intentions, and relationship satisfaction. For the Fitbit-generated outcome variables, older individuals and men were less likely to have missing data. This is likely due to the fact that women were much more likely to lose their assigned Fitbits. Additionally, Fitbit data was more likely to be complete during the early days of the study. Individuals who reported higher relationship satisfaction were more likely to have missing Fitbit data, and those with greater intent to

engage in physical activity were less likely to have missing Fitbit data. Tables for all logistic regressions to predict missingness may be found in Appendix F.

Additionally, a variable indicating complete or missing data was created to determine if any changes in overall effects by adding a missingness predictor. This variable was scored as '0' if data was complete and '1' if a given day had any missing data for predictor or outcome variables. Analyses were conducted using this missingness variable to look for differences in effects. Results from these analyses may be found in Appendix E. There were no obvious changes in the pattern of effects for any models.

CHAPTER 4: RESULTS

Descriptive statistics and correlations for the daily predictor and outcome measures may be found in Table 7. These correlations are based on data from participants in the 47 couples included in the analyses across all 14 days of the study. The individual items for the social support and social control measures were standardized to account for different response scales and assure equal weighting of items. Once standardized, the items were combined to create composite scores due to high correlations between items. Additional results for models using the individual social support and social control items may be found in Appendix F. It is important to note that some of the correlations between the predictors (variables 1-6) and the outcomes (variables 7-9) are small, though significant, due to the high-powered nature of repeated measures studies. The correlations are also stronger between the predictor variables and the daily self-report physical activity outcome than the daily steps and daily-active minutes outcomes, which were generated using data collected from the Fitbits. These higher correlations could be the result of a method effect; both the predictors and outcomes come from the same self-report questionnaire. It is also possible that the self-reported physical activity measure more accurately represents intentional exercise behavior than the objective Fitbit numbers, which capture general movement rather than intentional exercise.

Though originally hypothesized to have unique effects, self-reported support provided to one's partner and support received from one's partner correlated .88 and social control provided to one's partner and received from one's partner were correlated .75. This caused severe multicollinearity issues, so the measures of support and control

Table 7

Descriptive and Correlations of Predictor and Outcome Variables for All Participants

Measure	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Daily Support Provided	-0.09	4.26									
2. Daily Support Received	-0.09	4.25	.88**								
3. Daily Support from Partner	-0.09	4.26	.52**	.49**							
4. Daily Control Provided	-0.07	1.59	.24**	.21**	.18**						
5. Daily Control Received	-0.07	1.55	.27**	.26**	.15**	.75**					
6. Daily Control from Partner	-0.07	1.59	.18**	.16**	.24**	.31**	.34**				
7. Daily Physical Activity (Self-Report)	43.53	60.18	.06*	.10**	.05+	-.02	-.06*	-.05			
8. Daily Steps (Fitbit)	7478.59	4339.92	.00	.01	.00	.07*	.04	.02	.37**		
9. Daily Active Minutes (Fitbit)	28.02	32.94	.04	.05	.03	.10**	.07*	.03	.36**	.85**	

Note. ** $p < .01$, * $p < .05$, + $< .10$

provided to one's partner were dropped from the final analyses. Final analyses included measures of support and control received from one's partner and partner reports of support and control provided to examine effects of invisible social support and control.

Before testing any models, each of the three outcome variables was tested for significant variance within couples and within couples across time to establish that the following analyses were appropriate. Results for the effect of social support on all three outcome variables will be presented first, followed by the effect of social control on the outcomes, and finally the combined effects of social support and social control on the physical activity outcomes. Additionally, models for Fitbit outcomes were tested using all available data for the 47 couples included and using only those days where participants demonstrated evidence of wearing the device for a minimum of 10 hours. The pattern of results for the two sets of analyses did not differ significantly, and the results presented below are those using all available data.

The data were visualized to examine patterns of the outcome variables using SGPANELS in SAS. This allows us to view the general variability in the outcome variables while looking for any linear trends. In Figures 2-4, each graph in the panel represents an individual couple, labeled by their couple ID number. The gray lines represent the men and the black lines are the women. It is important to notice that not all graphs in the daily steps and daily-active minutes panels have two lines. This occurs when one member of the couple lost his or her Fitbit and no objective activity data was recorded.

Figure 2 shows the values for the 47 couples included in the dataset for the daily steps outcome variable across the 14-day diary period. Visual inspection finds variability

between couples and over time. There are no easily visible linear trends within the data. Figure 3 shows the values for all couples on the daily-active minutes outcome variable for the 14-day diary period. There are no easily visible linear trends. Figure 4 shows the daily self-reported exercise minutes for all couples in the sample. There are no clearly visible linear trends in the data.

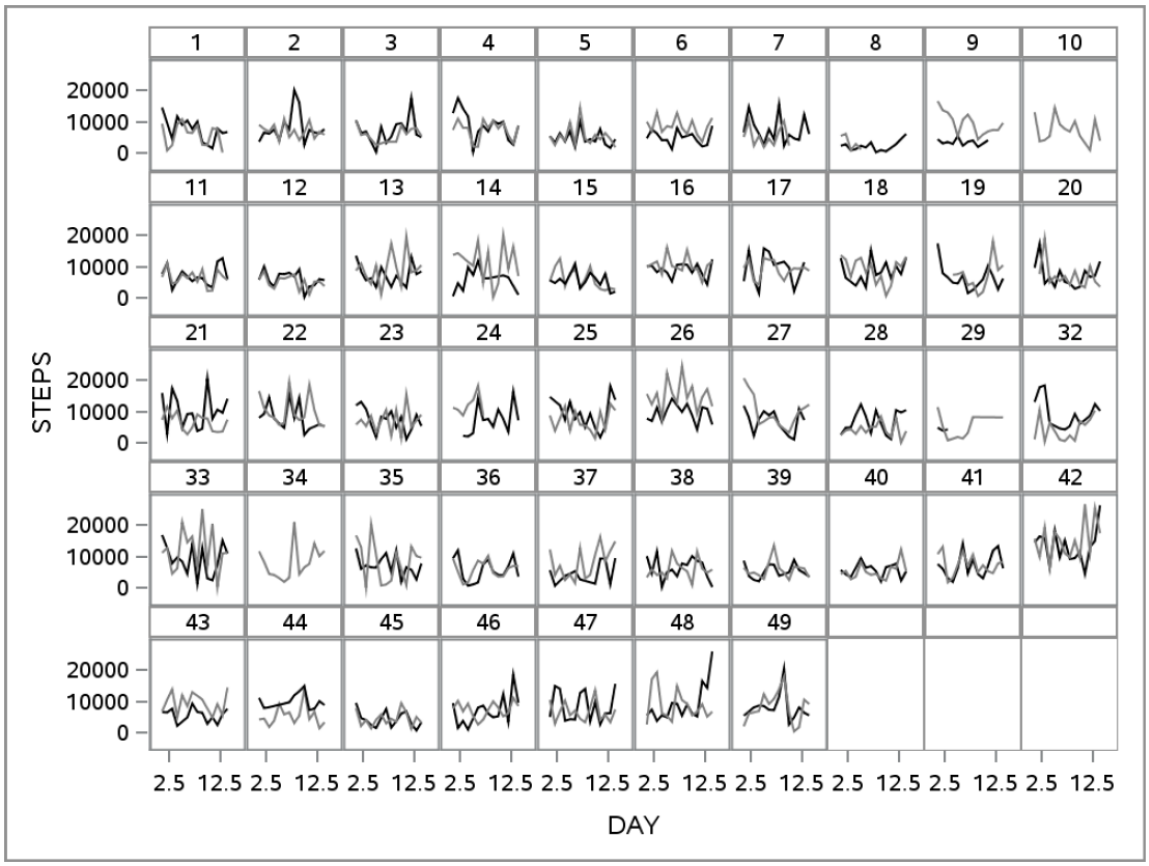

Figure 2. *Daily Steps for All Couples*

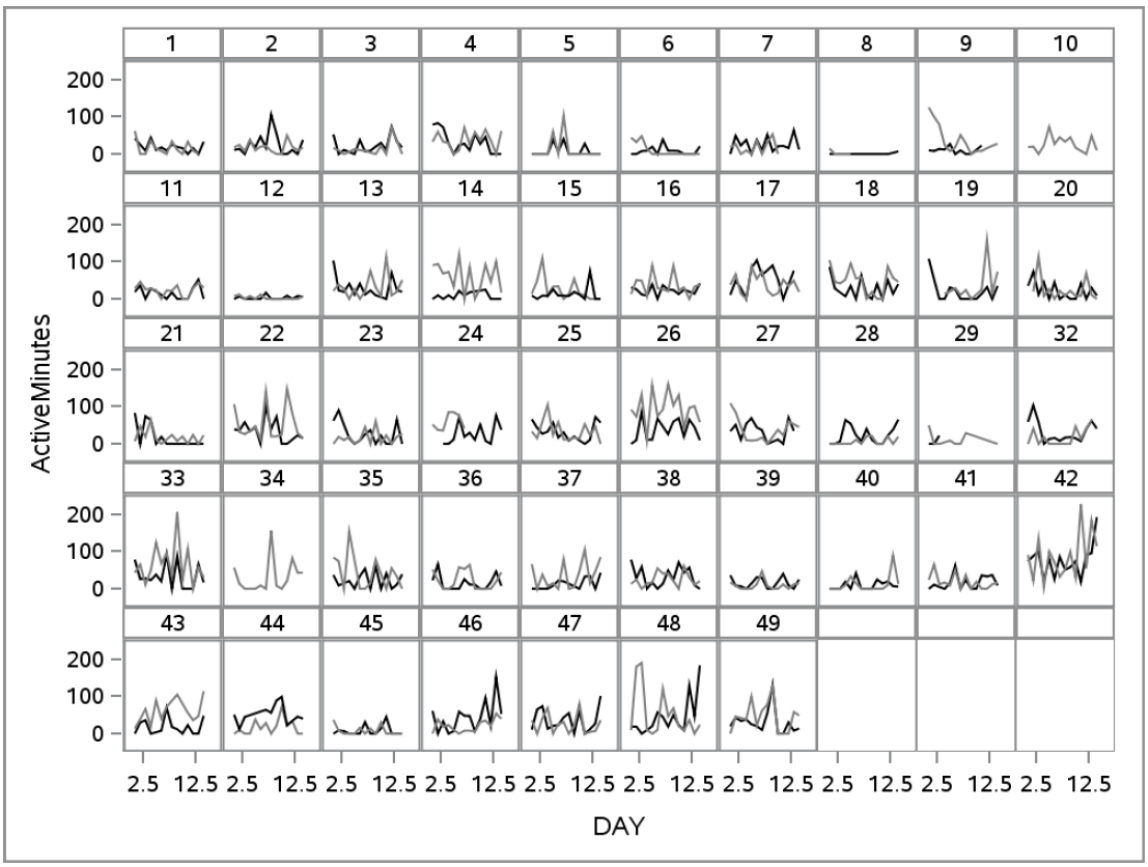

Figure 3. *Daily Active Minutes for All Couples*

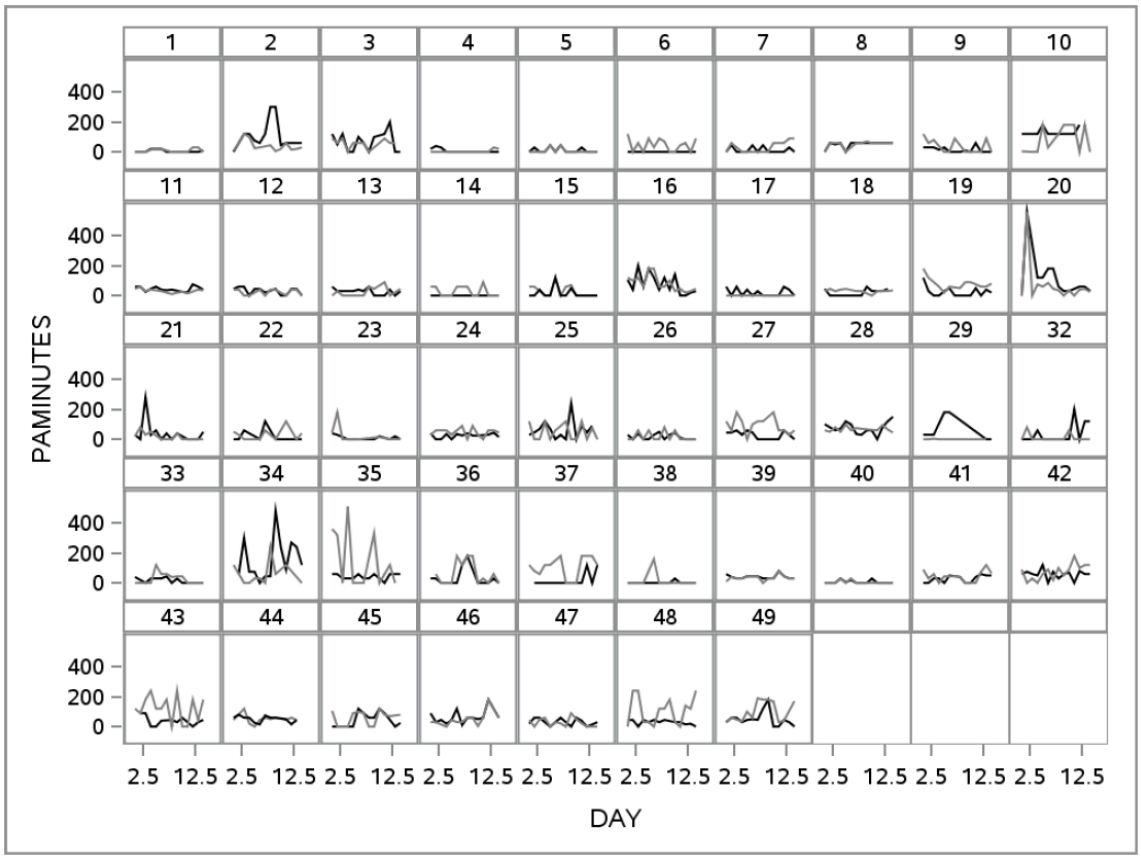

Figure 4. *Daily Exercise Minutes for All Couples*

Social Support

The first three models predicted individual differences in daily step totals from the Fitbits, daily active minutes from the Fitbits, and daily self-reported physical activity, respectively. Results for these three models may be found in Table 8. Descriptions of results for each model may be found below.

Table 8
Daily Social Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8195.92	513.80***	33.35	3.90***	55.02	7.09***
Female: Intercept	7516.58	450.46***	26.12	3.18***	44.14	6.23***
M: Slope	-62.31	43.19	-0.24	0.38	-0.88	0.56
F: Slope	-34.78	42.32	-0.07	0.35	-0.66	0.54
M: Support Receipt	80.23	63.17	0.85	0.49+	2.35	0.84**
F: Support Receipt	171.42	57.95**	1.43	0.44**	2.29	0.76**
M: Support from Partner	89.53	62.35	0.92	0.49+	2.27	0.82**
F: Support from Partner	-12.30	62.88	-0.19	0.47	0.53	0.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Daily Steps

The mean number of daily steps for men was 8195.82, with a linear change of -62.31 steps per day. This linear change was not significantly different from zero. There were no significant effects of self-report or partner report of social support for men.

The mean number of daily steps for women was 7516.58, with a linear change of -34.78 steps per day. This linear change was also not significantly different from zero. Women's report of social support received from the partner predicted a significant increase in daily steps, $b = 171.42, p < .01$. This means a one-point increase in a female participant's report of how much support she received from her male partner predicted an increase of approximately 171 steps for that day. There were no significant effects of partner report of support provided for women. The model explained 3% of variance in daily steps at the couple level.

Daily Active Minutes

The mean number of active minutes per day for men was 33.35, and the linear change over time was -0.24 per day. This linear change was not significantly different

from zero. The model explained 5% of variance in couple-level active minutes. There were no significant predictors of men's active minutes, but both men's report of received support and reports of support provided by the female partner were marginally significant. These results indicate small increases in daily active minutes that are equivalent to less than one minute of change per day as a function of a 1-point change in support from the female partner.

The mean number of daily active minutes for women was 26.12. The linear change for women was -0.07, which was not significantly different from zero. Once again, women's report of support received from their male partner was a significant predictor of change in daily active minutes, $b = 1.43, p < .01$. This indicates that a one-point increase in the amount of social support women reported receiving from their male partners corresponded with a 1.43 minute increase in active minutes for that day. Male reports of support provided to their female partners was not a significant predictor of daily active minutes.

Daily Exercise Minutes

Men reported engaging in a mean of 55.02 daily exercise minutes, with a linear change of -0.88 minutes, which was not significantly different from zero. The model explained approximately 5% of variance in couples' exercise minutes. Male reports of support received from their female partner predicted an increase of 2.35 daily exercise minutes for men, and female reports of providing social support to their male partner predicted an increase of 2.27 minutes for men.

The mean number of daily exercise minutes for women was 44.14, with a linear change over time of -0.66 minutes. The linear change for women was not significantly

different from zero. Women's reports of receiving social support from their male partner significantly predicted an increase in daily exercise minutes of 2.29. Male reports of support provided to their female partner had no significant effect on women's daily reported exercise minutes.

Social Control

The results for the next three models predicted daily steps, active minutes, and exercise minutes from daily social control received and provided. Results for these models may be found in Table 9.

Table 9
Daily Social Control Predicting All Outcomes

	Steps (Fitbit)		Active Minutes (Fitbit)		Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8083.05	493.53***	32.55	3.71***	55.32	6.64***
Female: Intercept	7579.92	439.30***	27.68	3.10***	44.86	6.33***
M: Slope	-45.45	45.60	-0.05	0.39	-0.89	0.59
F: Slope	-55.88	44.59	-0.29	0.37	-0.81	0.57
M: Control Receipt	251.72	132.31+	1.61	1.03	-1.19	1.78
F: Control Receipt	-193.05	160.58	0.14	1.21	-1.25	2.20
M: Control from Partner	312.52	148.65*	3.97	1.14**	0.88	2.02
F: Control from Partner	67.37	134.88	-0.88	1.01	0.43	1.83

Note. *** $p < .0001$, ** $p < .001$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Daily Steps

The mean number of daily steps reported by men was 8083.05 with a linear change of -45.45. The linear change was not significantly different from zero. The model explained approximately 2% of variance in couple-level daily steps. The effect of men's report of social control from their female partner was marginally significant, $b = 251.72, p = .06$. Women's reports of social control provided to their male partner after

controlling for men's reports of support received significantly predicted more daily steps for men, $b = 312.52, p < .05$.

The mean number of daily steps for women was 7579.92. Linear change over time for women was not significantly different from zero, $b = -55.88, p = .21$. There were no significant effects of either women's reports of control received from their partner or male reports of control provided on daily steps for women.

Daily Active Minutes

The mean number of active minutes for men was 32.55. The linear change over time for men was not significantly different from zero, $b = -.05,\ p = .90$. The model explained approximately 5% of variance in couple-level daily active minutes. Men's report of social control received from their female partner was not a significant predictor of daily active minutes for men. Women's reports of social control provided to their male partner, after controlling for men's reports of control received, significantly predicted more daily active minutes for men, $b = 3.97, p < .001$.

Women engaged in a mean of 27.68 minutes of moderate to vigorous physical activity as recorded by the Fitbits. The linear change over time in active minutes for women was -0.29, which was not significantly different from zero. There were not significant effects of social control on daily active minutes for women.

Daily Exercise Minutes

The mean number of daily active minutes for men and women were 55.32 and 44.86, respectively. The linear change for men ($b = -.89$) and women ($b = -.81$) were not significantly different from zero. The model explained approximately 2% of variance

in couple-level daily exercise minutes.There were no significant effects of social control on self-reported exercise minutes for men or women.

Combined Models

The effects of social support and social control were also examined in a series of three combined models. The results for these models may be found in Table 10.

Table 10
Combined Model of Daily Social Support and Control Predicting All Outcomes

	Steps (Fitbit)		Active Minutes (Fitbit)		Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8091.34	508.22***	32.77	3.83***	56.59	7.19***
Female: Intercept	7577.67	457.60***	27.51	3.22***	44.69	6.59***
M: Slope	-46.79	45.69	-0.08	0.40	-1.07	0.58
F: Slope	-52.11	43.28	-0.26	0.36	-0.80	0.56
M: Received Control	224.40	139.43	1.23	1.08	-2.82	1.86
F: Received Control	-301.42	165.42+	-0.70	1.24	-2.99	2.22
M: Control from Partner	226.70	153.43+	3.56	1.18**	-0.75	2.06
F: Control from Partner	51.93	140.62	-1.09	1.05	-0.26	1.88
M: Received Support	39.10	66.65	0.57	0.52	2.76	0.89**
F: Received Support	188.80	59.84*	1.44	0.46**	2.50	0.78**
M: Support from Partner	62.03	64.48	0.55	0.50	2.31	0.85**
F: Support from Partner	-18.88	64.97	-0.09	0.49	0.57	0.87

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Daily Steps

The mean number of daily steps for men was 8091.34, with a non-significant linear change of -46.79 over time. There were no significant effects of men's reported social control or support received from their female partners on men's daily step counts. The effect of women's report of social control provided to their male partner was marginally significant, $b = 226.70, p = .08$. On days when women reported providing more social control to their male partner, the male partner took approximately 226 more steps.

Women took an average of 7577.67 steps per day. The slope for women's steps over time was not significantly different from zero, $b = -52.11, p = .23$. The effect of women's reports of received social support was marginally significant, $b = -301.42, p = .07$. On days when women reported receiving more social control from their partner they took approximately 301 fewer steps. Women's report of receiving social support from their partner significantly predicted a higher daily step count, $b = 188.80, p < .05$. On days when women reported receiving social support from their romantic partner they took approximately 188 more steps. There were no significant effects for men's reports of providing social control or social support on women's daily steps.

Daily Active Minutes

Men engaged in an average of 32.77 minutes of moderate to vigorous physical activity per day, with a nonsignificant linear change over time of -0.08. Women's reports of support provided to their partner significantly predicted more daily active minutes for men, $b = 3.56, p < .01$. There were no significant effects for men's reports of received social support or social control or women's reports of provided social support on men's daily active minutes.

Women engaged in an average of 27.51 minutes of moderate to vigorous physical activity during the 14-day diary period. Women's slope for change in active minutes over time did not differ significantly from zero, $b = -.25, p = .49$. There was a significant, positive effect for women's reports of received social support on daily active minutes, $b = 1.44, p < .01$. On days when women reported receiving more social support they engaged in approximately 1.45 more minutes of daily moderate to vigorous physical

activity. There were no significant effects of women's receipt of social control or men's reports of providing social support or social control to their romantic partner.

Daily Exercise Minutes

Men reported engaging in an average of 56.59 minutes of exercise per day over the 14-day dairy period. There was a marginally significant downward trend of exercise minutes over the course of the 14-day diary period, $b = -1.07, p = .06$. Men's reports of social support receipt significantly predicted more daily exercise minutes, $b = 2.76, p < .01$. There was also a significant effect of women's report of providing support on men's exercise minutes after controlling for men's reported support receipt, $b = 2.31, p < .01$. There were no significant effects of men's received or women's reported social control on men's daily exercise minutes.

The mean for women's exercise minutes over the 14-day diary period was 44.69, with a nonsignificant slope of -0.80, $p = .15$. Women's reports of receiving social support from their romantic partner significantly predicted more daily exercise minutes, $b = 2.50, p < .01$. There were no significant effects for men's reports of provided support or social control or women's reports of social control receipt on women's daily exercise minutes.

CHAPTER 5: DISCUSSION

The primary purpose of this study was to determine if there are differential effects for four types of social support and two types of social control on daily exercise behavior. Participants' reports of daily social support and social control behaviors received from one's partner, as well as partner reports of support and control behaviors enacted on behalf of the participant, were used to predict daily physical activity recorded as daily steps, daily active minutes, and self-reported daily exercise minutes. We hypothesized that informational and emotional support would show evidence of support backfire, while autonomy and esteem support would not show evidence of support backfire.

Correlations between the items measuring social support and social control were calculated, and factor analyses were conducted to determine if there were unique concepts measured within the items. High correlations and the results of the factor analyses indicted that there were two unique factors within the items. The seven items were split into two distinct measures: social support and social control. As a result, the hypotheses for differential effects for different types of support could not be tested for this study. Instead, the data were examined for evidence of overall social support backfire and backfire from control attempts.

A series of nine models were tested, three for each outcome variable. The first set of models tested the effects of received and partner-provided social support on the three outcome variables. The second set of models examined the effects of received and partner-provided reports of social control attempts on the three outcomes. The third set of models included both received social support and control and partner-reported support provision and control attempts. In the next section the significant effects for these nine

models will be broken down into received and partner-provided social support effects and received and partner-provided social control effects.

Explanation of Effects

There were several significant effects of participant-reported received support in both the support-only and combined models, and these effects were slightly different for men and women. For women, there was a significant, positive effect of received support on all three physical activity outcomes in both the support only and combined models. On days when women reported receiving support from their male partner, they reported engaging in more intentional exercise in their physical activity diary and their assigned Fitbits recorded more daily steps and more minutes engaged in moderate to vigorous physical activity. Among male participants, received support predicted significantly more self-reported physical activity in both the support only and combined models, but there were no significant effects on the objective physical activity measures recorded by the Fitbits. On days when men reported receiving more social support from their female partner they also reported engaging in longer sessions in their physical activity diary. The general positive effect of received social support on daily social support indicates a lack of support for hypotheses regarding support backfire.

Effects of partner-reported support provision were less evident in the data. Once again, there were different patterns of effects for men and women. Among women, there were no significant effects of partner-reported support provision on daily physical activity outcomes. Partner-reported support provision significantly predicted daily self-reported exercise minutes for men in both the support-only model and the combined model. On days when women reported providing more support, their male partner self-

reported more minutes of exercise. This provides some evidence for the effect of invisible social support on physical activity behavior for men.

There were no significant effects of social control receipt in either the control-only or combined models. The lack of effect was consistent for men and women.

Partner-reported social control attempts had no significant effect for women in either the control-control only or combined models. Among men, partner-reported social control attempts significantly predicted more self-reported daily exercise minutes. On days when women attempted to engage in social control attempts, their male partner reported more minutes of exercise.

Implications

In this section, I will explore the implications of the pattern of effects for self-reported support receipt, partner-reported support provision, self-reported control receipt, and partner-reported social control attempts. Each effect will be discussed separately, with an exploration of the possible interpretations for the pattern of effects for men and women across the three outcome variables.

In general, there was no evidence of support backfire, as self-reports of receiving support from one's partner did not result in a reduction of physical activity for either men or women. The majority of research in the support backfire domain has explored the presence of support backfire on emotional states rather than behavior. It appears that support backfire may not apply to behavioral outcomes. Similar to the daily autonomy support findings from Martire et al., (2013), daily social support resulted in more self-reported and objectively measured physical activity for women and more self-reported physical activity for men. A possible interpretation for the different patterns of effects for

men and women is that men were engaging in physical activity, such as weight lifting, that would not be recorded by the Fitbit but could be reported in the daily physical activity diary. However, the correlations between self-report and Fitbit data were slightly higher for men than women (Table 11), which suggests that the Fitbit measures were slightly more aligned with self-report measures for men than for women.

Table 11
Correlations between Outcome Variables for Men and Women

Variable	1.	2.	3.
1.Steps			
2.Active Minutes	.86** (.82**)		
3.Exercise Minutes	.41** (.35**)	.38** (.30**)	

Note. ** $p < .01$; Correlation for women in parentheses

Partner-reported support provision was only a significant predictor of self-reported physical activity for men. This pattern of effects has multiple explanations. It is possible that men were less likely to notice the extent of the support provided by their female partners or that the female participants were providing more subtle types of social support that were less likely to be noticed by their male partners. Conversely, it is possible that women were more likely to notice the support their partner provided, or that the male participants provided more observable types of support. However, the data indicate that men and women demonstrated similar accuracy in detecting social support and social control (Table 12). This may indicate differences in interpretation of these types of support.

Table 12
Correlations between Self-Reported Received and Partner-Reported Support and Control

	1.	2.	3.	4.
1. Received Social Support				
2. Support from Partner	.48** (.50**)			
3. Received Social Control	.25** (.17**)	.17** (.21**)		
4. Control from Partner	.18** (16**)	.21** (.27**)	.34** (.33**)	

Note. ** $p < .01$; Correlations for women in parentheses

There were no significant effects of self-reported social control on physical activity behavior for men or women. This aligns with previous mixed findings for the effects of social control on health behaviors. A meta-analysis of social control effects showed that positive social control had moderately strong, positive effects on health promoting behaviors, while negative social control had null effects on the same behaviors (Craddock et al., 2015). The pressure and persuasion items in this study were originally intended to examine the effects of different kinds of social control. Due to high correlations between the items for both self-report and partner-report scales, they were combined into a single social control measure. The combination of the high correlation between these items and the results indicate that these items functioned together as a measure of positive social control. It is possible with more extensive social control measures it would be possible to examine unique effects of different kinds of social control, but additional study complexity would cause a subsequent increase in participant burden.

In direct contrast to the results of Martire et al., (2013), who found that men engaged in less physical activity when their partner reported engaging in control behaviors, this study found that partner-reported attempts to engage in social control resulted in more daily steps and active minutes for men. It is possible that this effect is due to how the data were analyzed. This study controlled for self-reported social control receipt, unlike the Martire et al., study, which allowed us to examine the effects of social control attempts beyond what the participant noticed. It is possible that these control attempts, which went unnoticed by the participant, were effective increasing daily physical activity for men. An alternative explanation for this effect is that the younger

men of this sample experienced less threat to their autonomy resulting from control attempts from their partner than did the older male participants studied by Martire and colleagues.

Theoretical Implications

From a theoretical perspective, there are multiple gains to our understanding of self-determination theory and social support. This study was one of the first to examine autonomy support as part of the overall concept of social support. The high correlations between autonomy support and the other measured types of social support would suggest that autonomy support falls within the overall construct of social support, much like esteem or emotional support. Previous research has demonstrated that autonomy support leads to increases in autonomy and competence, which in turn, predicts more health-promoting behaviors (Duda et al., 2014; Silva et al., 2010). Given the position of autonomy support under the social support umbrella, it appears that social support effects health-promoting behaviors through a similar mechanism. We can see these benefits of social support from the daily physical activity results in these analyses. More social support from one's partner, whether perceived or not, leads to longer periods of physical activity.

The daily effects of social control also tell an interesting theoretical story. It is generally well-accepted within the self-determination theory literature that controlled motivation acts as a hindrance to performing health-promoting behaviors. However, in this study there were no significant negative effects of daily social control. In fact, when women reported engaging in social control behaviors on behalf of their male partner, beyond what the male partner reported perceiving, the men engaged in more objective

physical activity, as measured by the Fitbits. This would suggest that social control can be beneficial to health behaviors if it goes unnoticed, which prevents subsequent detriments to feelings of autonomy and competence.

Summary of Implications

There was no evidence for support backfire in these data. Social support receipt did not appear to have a negative effect on health behaviors. General social support, including autonomy, informational, esteem, and emotional support, had a generally positive effect on daily physical activity behavior. There were no effects of self-reported social control for men or women. In contrast to previous research, men engaged in more physical activity on days when their female partner reported engaging in social control attempts.

Limitations

While this study was complex in design and implementation, there are still issues that it does not address. Creating single summary scores for social support and social control did not facilitate tests for differences between types of social support and social control. There are also additional concerns about the effectiveness of the individual items in measuring the intended concepts. This is particularly true for autonomy support, as the daily diary item had a small, marginally significant correlation (r = .20, p = .07) with the full autonomy support measure administered during the initial survey of the study. In a similar vein, the activity monitors used were relatively basic in design and only captured certain types of physical activity. With additional funding and more complex activity monitors, more extensive physical activity data could be captured.

The sample within this study was relatively small and WEIRD (western, educated, industrialized, rich, and democratic) as described by Henrich, Heine, and

Norenzayan (2010). Additionally, Ames, Iowa, the city where the data for this study was collected is considered a very healthy city and was named the healthiest city in the United States by USA Today in 2015 (Sauter, Frohlich, & Stebbins, 2015). It is possible that effects would be stronger or weaker within a different sample in a different setting. Additionally, student athletes were included in the sample; these individuals would likely not show the same degree of change in physical activity behaviors, as their exercise habits are strictly regulated by coaches and practice schedules. A wider range of participants is needed to apply findings to wider populations.

Another important consideration for this study is that the high-powered nature of repeated measures methodology allows us to find statistical significance in the absence of meaningful significance. The significant effects for this study result in a few hundred more steps or few minutes of physical activity per day. These small increases in physical activity resulting from social support and control may not result in meaningful improvements in health. However, this study only assessed the effects of partner-provided social support. For most people, particularly young adults, one's romantic partner is far from the only source of social support. It is possible and likely that support from multiple sources could have compounding effects on health-promoting behaviors.

The utilization of activity monitors may have resulted in a change in daily physical activity behavior for participants. This effect may have been exacerbated by the fact that participants were able to see their total step count on the Fitbit screen. Multiple individuals reported competing with their romantic partner during the course of the study.

Finally, this study was correlational and examined the relationships between daily support and control behaviors and physical activity outcomes. Based on psychological

theory, we would anticipate that social support and control efforts to promote exercise would cause changes in physical activity behaviors, rather than the reverse. However, the nature of the study does not allow us to definitively determine causality for changes in exercise behaviors.

Future Directions

Future studies in this domain should examine the effect of social support and control on a wider and more diverse range of participants. There are differences in the patterns of effects for this young, dating sample and older, married samples in which one member of the couple has been diagnosed with a chronic illness. It is possible that differences are due to the relationship status of the couples, the age of participants, or the overall health of the sample.

The effects found here could also be studied with additional health behaviors, both among individuals attempting to engage in a health promoting behavior or discontinue an unhealthy behavior. Possible relevant behaviors to study among a college sample similar to this one could include healthy eating, smoking cessation, or moderating drinking.

Additionally, future studies should attempt to implement social support interventions with couples to increase physical activity. This would allow us to determine conclusively the causal nature of relationships between social support and control and physical activity. Given the results of this study, concerns about support backfire and training couples to support one another in ways that could result in decreasing physical activity behavior are generally unfounded.

Conclusions

In general, social support has a positive effect on daily physical activity for men and women. The effects for social control are less consistent and require further exploration. Concerns about social support backfire for behaviors, rather than emotional states, are not supported by this research.

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APPENDIX A: DESCRIPTIONS OF MEASURES NOT USED IN ANALYSES

Table 13

Reliability for Multi-Item Measures Not Used in Analyses

Measure	Citation	Cronbach's Alpha
Physical Activity Habit Strength	Gardner et al., 2012	.91
Self-determined Motivation: Amotivation	BREQ-2; Markland & Tobin, 2010	.71
Self-determined Motivation: External Regulation	BREQ-2; Markland & Tobin, 2010	.81
Self-determined Motivation: Introjected Regulation	BREQ-2; Markland & Tobin, 2010	.89
Self-determined Motivation: Identified Regulation	BREQ-2; Markland & Tobin, 2010	.82
Self-determined Motivation: Integrated Regulation	BREQ-2; Markland & Tobin, 2010	.92
Self-determined Motivation: Intrinsic Regulation	BREQ-2; Markland & Tobin, 2010	.94
Need Satisfaction: Perceived Competence	McAuley et al., 1989 & Standage et al., 2003	.83
Need Satisfaction: Autonomy	Van den Broeck et al., 2010	.74
Need Satisfaction: Relatedness	Van den Broeck et al., 2010	.83
General Social Support	SPS; Cutrona & Russell, 1987	.86
Autonomy Support	Williams et al., 2006	.87

Initial Questionnaire

Physical activity frequency. Frequency of physical activity was measured using two separate scales. The first of these scales was the 7-item short form of the International Physical Activity Questionnaire (Craig et al., 2003). Participants were asked about their vigorous and moderate physical activity, walking behavior, and time sitting in the last seven days. Participants indicated the number of days they engaged in each type of activity and then the number of hours and minutes they engaged in each activity during an average day in the previous week. Example items include, "Think about all the vigorous activities you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breath much harder than normal. Think only of those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like lifting, digging, aerobics, or fast bicycling?"

Frequency of physical activity was also assessed using three items about the participant's recent participation in physical activity and two items about the couple's recent participation in physical activity. The items for the individual included, "How many days in total have you participated in physical activity for at least 30 minutes in the last week?" (0-7), "How often do you typically engage in physical activity for at least 30 minutes?" (never to daily), and "Please tell us which option most closely fits you, currently." Response options for this final question included, "I do not currently exercise and I don't intend to start," "I currently do not exercise, but I am thinking about starting," "I currently exercise some, but not regularly," "I currently exercise regularly, but have only begun doing so within the last 6 months," and "I currently exercise regularly, and I

have been doing so for longer than 6 months." The items about joint physical activity participation by both members of the couple were assessed with the items, "How many days in total have you participated in physical activity with your romantic partner for at least 30 minutes in the last week?" (0-7) and "How often do you and your romantic partner typically engage in physical activity for at least 30 minutes?" (never to daily).

Physical activity habit strength. Habit strength will be measured using a 4-item automaticity-specific version (Gardner, Abraham, Lally, and de Bruijn, 2012) of the Self-Report Habit Index (SRHI; Verplanken & Orbell, 2002). Participants will respond to 4 items following the header, "Engaging in physical activity for at least 30 minutes per day is something… I do automatically," "I start doing before I realize I'm doing it," "I do without having to consciously remember," and "I do without thinking." All items will be assessed on a 5-point Likert scale (strongly disagree to strongly agree). The scale has good internal consistency ($\alpha = .91$).

Self-determined motivation. Self-determined motivation for physical activity was assessed with the 24-item Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2010). This scale measures amotivation, as well as external, introjected, identified, integrated, and intrinsic regulation of exercise behavior. Responses range from 0 (not true for me) to 4 (very true for me). Each of the six subscales has four items. The amotivation subscale includes items such as, "I don't see why I should have to exercise." An example of an item from the external motivation subscale is, "I exercise because other people say that I should." The introjected motivation subscale includes items such as, "I feel guilty when I don't exercise." A sample item from the identified subscale is, "It's important to me to exercise regularly." The integrated regulation

subscale includes items such as, “I exercise because it is consistent with my life goals.” Items from the intrinsic motivation scale include, “I exercise because it’s fun.” Cronbach’s alpha for the coefficients for the six subscales were as follows: amotivation .71, external regulation .81, introjected regulation .89, identified regulation .82, integrated regulation .92, and intrinsic regulation .94.

Need satisfaction. Participants completed measures of need satisfaction for perceived competence, autonomy and relatedness. Descriptions of the three needs satisfaction scales for competence, relatedness, and autonomy may be found below.

Perceived competence. Need satisfaction for perceived competence was measured using a 5-item measure adapted from McAuley, Duncan, & Tammen, 1989 and Standage, Duda, & Ntoumanis, 2003. Sample items include “I am satisfied with my exercise performance” and “After engaging in physical activity for a while I feel pretty competent.” Responses ranged from 1 (totally disagree) to 7 (totally agree). Chronbach’s alpha indicated acceptable internal consistency ($\alpha = .83$).

Autonomy. Need satisfaction for autonomy was measured using an adapted version of the autonomy subscale from the Work-Related Basic Need Satisfaction scale (Van den Broeck, Vansteenkiste, De Witte, Soenens, and Lens, 2010). Responses ranged from 1 (totally disagree) to 7 (totally agree), and sample items include, “When I exercise I feel forced to do things I don’t want to do” and “I feel I have some choice in when or how I exercise.” Cronbach’s alpha was slightly below acceptable levels for internal consistency ($\alpha = .74$).

Relatedness. Need satisfaction for relatedness was measured using an adapted version of the relatedness subscale from the Work-related Basic Need Satisfaction scale (Van den

Broeck, Vansteenkiste, De Witte, Soenens, and Lens, 2010). Responses ranged from 1 (totally disagree) to 7 (totally agree), and sample items include, "When my partner and I exercise I feel like part of a team" and "I can talk to my partner about my thoughts and feelings about exercise." Cronbach's alpha indicated acceptable levels of internal consistency ($\alpha = .83$).

Perceived barriers. Participants completed the Perceived Barriers to Exercise Scale (Salmon, Owen, Crawford, Bauman, & Sallis, 2003), which included 12 environmental and personal barriers to physical activity. Each item asked the participant to rate each potential barrier on a 5-point Likert scale ranging from 1 (not a barrier) to 5 (very much a barrier). The environmental barriers include "the weather," "cost," "air or noise pollution," "safety," "no sidewalk," and "no access to facilities." The physical barriers to exercise include "other priorities," "disability or injury," "work commitments," "feeling tired," "family commitments," and "lack of time." The item, "age" from the original measure was removed from the questionnaire due to its irrelevance for a student population.

Social support. General perceived social support from all sources was measured using the Social Provisions Scale (Cutrona & Russell, 1987; SPS). Participants completed the 24-item measure, which asks them to indicate their agreement with a series of statements about the availability of support in general on six dimensions of social support. Possible responses ranged from 1 (strongly disagree) to 4 (strongly agree). The complete measure had acceptable internal consistency ($\alpha = .86$).

Autonomy support. Autonomy support from the romantic partner for exercise behavior was measured using a 6-item version of the Important Others Climate

Questionnaire (Williams, Lynch, McGregor, Ryan, Sharp, & Deci, 2006) adapted for physical activity. Items measured the participant's perceptions of autonomy support provided by his or her romantic partner with regards to physical activity for health improvement. Participants were asked to respond to a series of 6 statements on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A sample item from this scale is, "I feel that my significant other/romantic partner has provided me with choices and options about exercise/physical activity in terms of improving my health (including not engaging in physical activity)." The measure was internally consistent (α = .87).

Daily Diary Questionnaire

Shared physical activity. Participants were asked to report if they participated in physical activity with their romantic partner during that day.

Perceived barriers to physical activity. Each day, participants were asked to complete a checklist of the 13 barriers listed in the in the perceived barriers measure, administered in the pre-diary assessment (Salmon, Owen, Crawford, Bauman, & Sallis, 2003) and one additional item indicating that something the romantic partner did during the current day prevented the participant from engaging in physical activity.

Relationship Quality. Participants rated daily relationship quality by responding to the questions "How satisfied did you feel with your relationship with your romantic partner today?" and "How emotionally close did you feel to your romantic partner today?" Responses range from 1 (not at all satisfied or not at all close) to 10 (very satisfied or very close).

Follow-up Questionnaire

In the follow-up questionnaire, participants completed the scales for physical activity intentions, habit strength, perceived barriers to exercise, self-determined motivation for exercise, and need satisfaction detailed in the measure descriptions for the initial questionnaire. Table 1 includes reliability information for all multi-item measures used in this study.

APPENDIX B: INITIAL QUESTIONNAIRE

Physical Activity Frequency

We are interested in finding out about the kinds of physical activities that people do as a part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heaving lifting, digging, aerobics, or fast bicycling?
   ___ **days per week** (if answer 0 will skip to question #3)
2. How much time did you usually spend doing vigorous physical activities on one of those days?
   ___ **hours per day**
   ___ **minutes per day**

Think about all the **moderate** activities that you did in the **last 7 days. Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days,** on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
   ___**days per week** (if answer 0 will skip to question #5)
4. How much time did you usually spend doing **moderate** physical activities on one of those days?
   ___ **hours per day**
   ___ **minutes per day**

Think about all the time you spent **walking** in the **last 7 days.** This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days,** on how many days did you walk for at least 10 minutes at a time?
   ___**days per week** (if answer 0 will skip to question #7)
6. How much time did you usually spend walking on one of those days?
   ___ **hours per day**
   ___ **minutes per day**

The last question is about the time you spent sitting on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days,** how much time did you spend **sitting** on a **week day**?
   ___ **hours per day**
   ___ **minutes per day**

8. How many days in total have you participated in physical activity for at least 30 minutes in the last week?" (Responses 0-7)
9. How often do you typically engage in physical activity for at least 30 minutes? (Responses "Never" to "Daily")
10. Please tell us which option most closely fits you, currently."
    a. I do not currently exercise and I don't intend to start.
    b. I currently do not exercise, but I am thinking about starting.
    c. I currently exercise some, but not regularly.
    d. I currently exercise regularly, but have only begun doing so within the last 6 months
    e. I currently exercise regularly, and I have been doing so for longer than 6 months.

Please respond to the following questions about physical activity **with your romantic partner/spouse.**

1. How many days in total have you participated in physical activity with your romantic partner in the last week? (Responses 0-7)
2. How often do you and your romantic partner typically engage in physical activity together for at least 30 minutes?

Physical activity intentions

Please respond to the following items about your intentions to engage in physical activity over the next 21 days of the study on the following scale.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. I intend to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks.
2. I will try to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks.
3. I plan to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 3 weeks.

Physical Activity Habit Strength

Please respond to the following statements about your CURRENT physical activity habits on the following scale.

Strongly disagree				Strongly Agree
1	2	3	4	5

Engaging in physical activity for at least 30 minutes per day is something…

1. …I do automatically.
2. …I start doing before I realize I'm doing it
3. …I do without having to consciously remember
4. …I do without thinking.

Self-determined motivation for physical activity

We are interested in the reasons underlying people's decisions to engage or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

Not true for me		Sometimes true for me		Very true for me
0	1	2	3	4

1. It's important to me to exercise regularly
2. I don't see why I should have to exercise
3. I exercise because it's fun
4. I feel guilty when I don't exercise
5. I exercise because it is consistent with my life goals.
6. Exercise because other people say I should
7. I value the benefits of exercise
8. I can't see why I should bother exercising
9. I enjoy my exercise sessions
10. I feel ashamed when I miss an exercise session
11. I consider exercise part of my identity
12. I take part in exercise because my friends/family/partner say I should
13. I think it is important to make the effort to exercise regularly
14. I don't see the point in exercising
15. I find exercise a pleasurable activity
16. I feel like a failure when I haven't in a while
17. I consider exercise a fundamental part of who I am
18. I exercise because others will not be pleased with me if I don't
19. I get restless if I don't exercise regularly
20. I think exercising is a waste of time.
21. I get pleasure and satisfaction from participating in exercising
22. I would feel bad about myself if I was not making time to exercise
23. I consider exercise consistent with my values
24. I feel under pressure from my friends/family to exercise

Need satisfaction

Please respond to the following questions about how you feel about physical activity and exercise on the following scale.

Totally disagree						Totally agree
1	2	3	4	5	6	7

1. I think I am pretty good at physical activity in general
2. I am satisfied with my exercise
3. After engaging in physical activity for a while I feel pretty competent.
4. I am not very skilled at physical activity.
5. My performance in physical activities is generally poor.
6. I don't really feel connected with my partner during exercise.
7. When my partner and I exercise I feel like part of a team.
8. My partner and I don't really interact when we exercise.
9. I can talk to my partner about my thoughts and feelings about exercise
10. I feel close to my partner when we exercise.
11. When I exercise I feel like I have to follow someone's commands.
12. The exercises I do are my choice.
13. I feel free to exercise the way I want.
14. When I exercise I feel forced to do things I don't want to do.
15. I feel I have some choice in how or when I exercise.

Perceived barriers to physical activity (Salmon, Owen, Crawford, Bauman, & Sallis, 2003)

Please rate the extent to which you GENERALLY experience the following barriers to performing regular physical activity or exercise on the following scale:

Not a barrier				Very much a barrier
1	2	3	4	5

1. Cost (unable to afford equipment/clothing/shoes/gym membership)
2. Weather (too hot, too cold, rainy, etc.)
3. Safety (neighborhood is not safe to exercise in)
4. Pollution (air quality is poor, too noisy)
5. No access (no access to fitness equipment/facilities for exercise)
6. No sidewalk
7. Disability or injury
8. Tired
9. Lack of time
10. Work/school commitments
11. Family commitments
12. Other priorities

Social support (Cutrona & Russell, 1987; SPS)

In answering the following questions, think about your current relationships with friends, family members, co-workers, community members, and so on. Please indicate to what extent each statement describes your current relationships with other people. Use the following scale to indicate your opinion.

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

So, so for example, if you feel a statement is very true of your current relationships, you would respond with a 4 (strongly agree). If you feel a statement clearly does not describe your relationships, you would respond with a 1 (strongly disagree.)

1. There are people I can depend on to help me if I really need it.
2. I feel that I do not have close personal relationships with other people.
3. There is no one I can turn to for guidance in times of stress.
4. There are people who depend on me for help.
5. There are people who enjoy the same social activities I do.
6. Other people do not view me as competent.
7. I feel personally responsible for the well-being of another person
8. I feel part of a group of people who share my attitudes and beliefs.
9. I do not think other people respect my skills and abilities.
10. If something went wrong, no one would come to my assistance.
11. I have close relationships that provide me with a sense of emotional security and well-being.
12. There is someone I could talk to about important decisions in my life.
13. I have relationships where my competence and skill are recognized.
14. There is no one who shares my interest and concerns.
15. There is no one who really relies on me for their well-being.
16. There is a trustworthy person I could turn to for advice if I were having problems.
17. I feel a strong emotional bond with at least one other person.
18. There is no one I can depend on for aid if I really need it.
19. There is no one I feel comfortable talking about problems with.
20. There are people who admire my talents and abilities.
21. I lack a feeling of intimacy with another person.
22. There is no one who likes to do the things I do.
23. There are people who I can count on in an emergency.
24. No one needs me to care for them.

Romantic Partner-Specific Social Support

In answering the next set of questions, I want you to think about your current relationship with your romantic partner. Please rate the extent you agree that each statement describes your current relationship with your partner. For example, if you feel a statement is very true of your current relationship, you would rate it 4. If you feel a statement clearly does not describe your relationship, you would rate it 1.

Strongly disagree	Disagree	Agree	Strongly agree
1	2	3	4

1. I feel that I do not have a close relationship with my romantic partner.
2. I cannot turn to my romantic partner for guidance in times of stress.
3. My romantic partner does not view me as competent.
4. I do not think my romantic partner respects my skills and abilities.
5. If something went wrong, my partner would not come to my assistance.
6. My partner does not share my interests and concerns.
7. My partner does not really rely on me for his/her well-being.
8. My partner is a trustworthy person I can turn to for advice, if I were having problems.
9. I cannot depend on my partner for aid, when I really need it.
10. I lack a feeling of intimacy with my partner.
11. My partner does not like to do things I do.
12. My partner does not need me to care for him/her.

Autonomy support for exercise behavior
Important other climate questionnaire for exercise behavior (Williams, Lynch, McGregor et al., 2006)

Please respond to the following statements about your relationship with your romantic partner with regards to your physical activity and exercise behavior, on the following scale:

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

1. I feel that my significant other/romantic partner has provided me with choices and options about exercise/physical activity in terms of improving my health (including not engaging in physical activity).
2. I feel my significant other/romantic partner understands how I see things with respect to my exercise/physical activity in terms of improving my health.
3. My significant other conveys confidence in my ability to make changes regarding my exercise/physical activity behavior in terms of improving my health.
4. My significant other/romantic partner listens to how I would like to do things regarding my exercise/physical activity in terms of improving my health
5. My significant other/romantic partner encourages me to ask questions about my exercise/physical activity in terms of improving my health.
6. My significant other/romantic partner tries to understand how I see my exercise/physical activity in terms of improving my health before suggesting any changes.

Relationship Satisfaction

The following statements are about how you feel about your relationship with your romantic partner. Please rate each one on the following scale:

Strongly disagree						Strongly agree
1	2	3	4	5	6	7

1. I feel satisfied with our relationship
2. My relationship is much better than others' relationships
3. My relationship is close to ideal
4. Our relationship makes me very happy.
5. Our relationship does a good job of fulfilling my needs.
6. I love my partner

Demographics

Please complete the following information about yourself

1. Age
2. Sex
    a. Male
    b. Female
3. Ethnicity
    a. American Indian/Alaska Native
    b. Asian
    c. Black or African American
    d. Native Hawaiian or Other Pacific Islander
    e. White
    f. Hispanic
    g. Other
4. Are you a student athlete?
5. How long IN MONTHS have you been involved with your current romantic partner?
6. Relationship status with current romantic partner
    a. Dating
    b. Cohabitating
    c. Married

Please input your email address. This information will be used to send you reminder emails to fill out the short surveys about your daily activities. You will only receive 1 email per day and the link in each email will expire at midnight. The reminder emails will cease once the 14 days of the study have passed and you have returned all study equipment to the researcher.

_____

APPENDIX C: DAILY DIARY QUESTIONNAIRE

Physical Activity

1. Did you engage in physical activity today?
    a. Yes
    b. No
2. How intense was the physical activity you engaged in? Please see examples below.
    a. Mild
    b. Moderate
    c. Vigorous

Mild intensity	**Moderate Intensity**	**Vigorous Intensity**
Walking slowly	Brisk walking (3-4.5 mph)	Jogging/running
Dancing slowly	Weight training	High impact aerobics
Light stretching	Light aerobics	Swimming laps
Bicycling less than 5mph	Hiking	Elliptical, stairclimbers, stationary bicycle
	Yoga	Bicycling more than 10mph

3. How long (in minutes) did you engage in [fill intensity chosen] activity?
4. Did your partner engage in this physical activity with you?
    a. Yes
    b. No

Perceived Partner Supportiveness

5. In general, how supportive of your physical activity was your partner today?

Not at all supportive						Very supportive
1	2	3	4	5	6	7

Supportive and Controlling Behaviors

Now we would like to ask you about ways your partner might have been involved with your physical activity and exercise choices today. Exercise choices can include when, where, and how you engage in physical activity or exercise. Please respond to these statements on the following scale.

Not at all	Somewhat	Very much
0	1	2

Regarding your physical activity and exercise TODAY, your partner…

Autonomy support

6. Showed understanding for how physically active you wanted to be.

Esteem Support

7. Expressed confidence in your ability to engage in physical activity

Informational support

8. Offered guidance or advice on your physical activity or exercise

Emotional support

9. Expressed caring or understanding about your participation in physical activity

Persuasion

10. Tried to persuade you to be more physically active

Pressure

11. Expressed irritation with or criticized your choices about your physical activity or exercise

Now we would like to ask you about how you interacted with your partner regarding his or her physical activity and exercise choices.

Support provision

12. In general, how supportive were you of YOUR PARTNER's physical activity today? Please respond on the following scale:

Not at all supportive						Very supportive
1	2	3	4	5	6	7

Please respond to the questions below using the provided scale to indicate the extent to which you engaged in the following behaviors.

Not at all	Somewhat	Very much
0	1	2

Regarding your partner's physical activity and exercise TODAY, you…

Autonomy support

13. Showed understanding for how physically active your partner wanted to be

Esteem Support

14. Expressed confidence in your partner's ability to engage in physical activity

Informational support

15. Offered guidance or advice on your partner's physical activity or exercise

Emotional support

16. Expressed caring or understanding about your partner's participation in physical activity

Persuasion

17. Tried to persuade your partner to be more physically active

Pressure

18. Expressed irritation with or criticized your partner's choices about his or her physical activity or exercise

Perceived barriers to physical activity

Please indicate which of the following barriers to physical activity you encountered TODAY. Select all that apply.

19. Cost
20. Weather
21. Safety
22. Pollution
23. No access
24. No sidewalk
25. Disability or injury
26. Tired
27. Lack of time
28. Work/school commitments
29. Family commitments
30. Other priorities
31. Something my partner did

Relationship quality

32. How satisfied did you feel with your relationship with your romantic partner today?
33. How emotionally close did you feel to your romantic partner today?

APPENDIX D: FOLLOW-UP QUESTIONNAIRE

Physical Activity Frequency

We are interested in finding out about the kinds of physical activities that people do as a part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think *only* about those physical activities that you did for at least 10 minutes at a time.

11. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heaving lifting, digging, aerobics, or fast bicycling?
    ___ **days per week** (if answer 0 will skip to question #3)
12. How much time did you usually spend doing vigorous physical activities on one of those days?
    ___ **hours per day**
    ___ **minutes per day**

Think about all the **moderate** activities that you did in the **last 7 days. Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

13. During the **last 7 days,** on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.
    ___**days per week** (if answer 0 will skip to question #5)
14. How much time did you usually spend doing **moderate** physical activities on one of those days?
    ___ **hours per day**
    ___ **minutes per day**

Think about all the time you spent **walking** in the **last 7 days.** This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

15. During the **last 7 days,** on how many days did you walk for at least 10 minutes at a time?
    ___days per week (if answer 0 will skip to question #7)
16. How much time did you usually spend walking on one of those days?
    ___ hours per day
    ___ minutes per day

The last question is about the time you spent sitting on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

17. During the **last 7 days,** how much time did you spend **sitting** on a **week day**?
    ___ hours per day
    ___ minutes per day

18. How many days in total have you participated in physical activity for at least 30 minutes in the last week?" (Responses 0-7)
19. How often do you typically engage in physical activity for at least 30 minutes? (Responses "Never" to "Daily")
20. Please tell us which option most closely fits you, currently."
    a. I do not currently exercise and I don't intend to start.
    b. I currently do not exercise, but I am thinking about starting.
    c. I currently exercise some, but not regularly.
    d. I currently exercise regularly, but have only begun doing so within the last 6 months
    e. I currently exercise regularly, and I have been doing so for longer than 6 months.

Please respond to the following questions about physical activity **with your romantic partner/spouse.**

3. How many days in total have you participated in physical activity with your romantic partner in the last week? (Responses 0-7)
4. How often do you and your romantic partner typically engage in physical activity together for at least 30 minutes?

Physical activity intentions

Please respond to the following items about your intentions to engage in physical activity over the next 14 days on the following scale.

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

4. I intend to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 2 weeks.
5. I will try to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 2 weeks.
6. I plan to engage in physical activity at least 5 times per week (at least 30 minutes per day) over the next 2 weeks.

Physical Activity Habit Strength

Please respond to the following statements about your CURRENT physical activity habits on the following scale.

Strongly disagree				Strongly Agree
1	2	3	4	5

Engaging in physical activity for at least 30 minutes per day is something…

5. …I do automatically.
6. …I start doing before I realize I'm doing it
7. …I do without having to consciously remember
8. …I do without thinking.

Self-determined motivation for physical activity

We are interested in the reasons underlying people's decisions to engage or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

Not true for me		Sometimes true for me		Very true for me
0	1	2	3	4

25. It's important to me to exercise regularly
26. I don't see why I should have to exercise
27. I exercise because it's fun
28. I feel guilty when I don't exercise
29. I exercise because it is consistent with my life goals.
30. Exercise because other people say I should
31. I value the benefits of exercise
32. I can't see why I should bother exercising
33. I enjoy my exercise sessions
34. I feel ashamed when I miss an exercise session
35. I consider exercise part of my identity
36. I take part in exercise because my friends/family/partner say I should
37. I think it is important to make the effort to exercise regularly
38. I don't see the point in exercising
39. I find exercise a pleasurable activity
40. I feel like a failure when I haven't in a while
41. I consider exercise a fundamental part of who I am
42. I exercise because others will not be pleased with me if I don't
43. I get restless if I don't exercise regularly
44. I think exercising is a waste of time.
45. I get pleasure and satisfaction from participating in exercising
46. I would feel bad about myself if I was not making time to exercise
47. I consider exercise consistent with my values
48. I feel under pressure from my friends/family to exercise.

Need satisfaction
Perceived competence (adapted from McAuley, Duncan, & Tammen, 1989) and (Standage, Duda, & Ntoumani, 2003)
Relatedness (Van den Broeck et al., 2010)
Autonomy (Van den Broeck, et al., 2010)

Please respond to the following questions about how you feel about physical activity and exercise on the following scale.

Totally disagree						Totally agree
1	2	3	4	5	6	7

16. I think I am pretty good at physical activity in general
17. I am satisfied with my exercise
18. After engaging in physical activity for a while I feel pretty competent.
19. I am not very skilled at physical activity.
20. My performance in physical activities is generally poor.
21. I don't really feel connected with my partner during exercise.
22. When my partner and I exercise I feel like part of a team.
23. My partner and I don't really interact when we exercise.
24. I can talk to my partner about my thoughts and feelings about exercise
25. I feel close to my partner when we exercise.
26. When I exercise I feel like I have to follow someone's commands.
27. The exercises I do are my choice.
28. I feel free to exercise the way I want.
29. When I exercise I feel forced to do things I don't want to do.
30. I feel I have some choice in how or when I exercise.

Perceived barriers to physical activity (Salmon, Owen, Crawford, Bauman, & Sallis, 2003)

Please rate the extent to which you GENERALLY experience the following barriers to performing regular physical activity or exercise on the following scale:

Not a barrier				Very much a barrier
1	2	3	4	5

13. Cost (unable to afford equipment/clothing/shoes/gym membership)
14. Weather (too hot, too cold, rainy, etc.)
15. Safety (neighborhood is not safe to exercise in)
16. Pollution (air quality is poor, too noisy)
17. No access (no access to fitness equipment/facilities for exercise)
18. No sidewalk
19. Disability or injury
20. Tired
21. Lack of time
22. Work/school commitments
23. Family commitments
24. Other priorities

APPENDIX E: LOST, DAMAGED, AND RECOVERED FITBITS

1. Fitbit #3 lost within first 24-hours of data collection
2. Fitbit #17 “lost” for two weeks in participant’s pocket. Returned after completion of study with partial data intact.
3. Fitbit #10 lost at sorority date party on day 2 of participation; eventually returned at end of study. Replacement Fitbit #23 assigned on day 4 of participation lost on day of follow-up appointment; eventually returned one week after study completion.
4. Fitbit #20 lost in back of participant’s mom’s car and was driven out-of-state. Participant promised to return the device and was unresponsive to all contact after leaving the follow-up appointment.
5. Fitbit #26 lost by participant who stated it was “very unlike me” to do so.
6. Fitbit #35 dropped in a porta-potty over Spring Break. Device was not recovered.
7. Fitbit #44 likely stepped on during a Spring Break party in Mexico. Device was cracked but still functional. Data was recovered.
8. Fitbit #45 lost “after practice” and not recovered.
9. Fitbit #33 lost in participant’s pocket for 2 days. Later recovered and returned.
10. Fitbit #21 returned to lab after participant had connected it to his or her personal Fitbit account. Device intact, but data not present. Participant was contacted and data recovered.

APPENDIX F: MISSING DATA ANALYSES

Table 14

Logistic Regression Predicting Missingness on Support Receipt

Predictor	*b*	*se*	*p*
Age	-.19	.07	< .01
Gender	-.37	.19	< .05
Day of Survey	.03	.02	.22
Physical Activity Intentions	-.00	.02	.94
Partner Specific Social Support	.01	.03	.79
Relationship Satisfaction	.01	.03	.68

Note. Missing=1, Complete=0; Male=1, Female=2

Table 15

Logistic Regression Predicting Missingness on Support from Partner

Predictor	*b*	*se*	*p*
Age	-.14	.07	< .05
Gender	.15	.19	.13
Day of Survey	.02	.02	.36
Physical Activity Intentions	-.03	.02	.17
Partner Specific Social Support	-.04	.03	.19
Relationship Satisfaction	.02	.03	.47

Note. Missing=1, Complete=0; Male=1, Female=2

Table 16

Logistic Regression Predicting Missingness on Control Receipt

Predictor	*b*	*se*	*p*
Age	-.16	.06	< .05
Gender	-.33	.19	.07
Day of Survey	.03	.02	.22
Physical Activity Intentions	-.01	.02	.81
Partner Specific Social Support	.01	.03	.71
Relationship Satisfaction	.01	.03	.85

Note. Missing=1, Complete=0; Male=1, Female=2

Table 17

Logistic Regression Predicting Missingness on Control from Partner

Predictor	*b*	*se*	*p*
Age	-.15	.07	< .05
Gender	.16	.19	.39
Day of Survey	.03	.02	.26
Physical Activity Intentions	-.02	.02	.27
Partner Specific Social Support	-.03	.03	.23
Relationship Satisfaction	.03	.03	.42

Note. Missing=1, Complete=0; Male=1, Female=2

Table 18
Logistic Regression Predicting Missingness on Daily Steps

Predictor	*b*	*se*	*p*
Age	-.19	.08	< .05
Gender	.42	.21	< .05
Day of Survey	.08	.03	< .01
Physical Activity Intentions	-.05	.02	< .05
Partner Specific Social Support	.05	.03	.08
Relationship Satisfaction	.16	.05	< .01

Note. Missing=1, Complete=0; Male=1, Female=2

Table 19
Logistic Regression Predicting Missingness on Daily Active Minutes

Predictor	*b*	*se*	*p*
Age	-.19	.08	< .05
Gender	.42	.21	< .05
Day of Survey	.08	.03	< .01
Physical Activity Intentions	-.05	.02	< .05
Partner Specific Social Support	.05	.03	.08
Relationship Satisfaction	.16	.05	< .01

Note. Missing=1, Complete=0; Male=1, Female=2

Table 20
Logistic Regression Predicting Missingness on Daily Exercise Minutes

Predictor	*b*	*se*	*p*
Age	-.16	.06	< .05
Gender	-.43	.18	< .05
Day of Survey	.03	.02	.26
Physical Activity Intentions	.01	.02	.73
Partner Specific Social Support	.01	.03	.62
Relationship Satisfaction	.02	.03	.57

Note. Missing=1, Complete=0; Male=1, Female=2

Table 21
Missing Data Analyses for Social Support Models

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8172.87	516.75***	33.18	3.91***	55.13	7.19***
Female: Intercept	7514.38	451.48***	26.15	3.19***	44.44	6.62***
M: Slope	-62.67	42.99	-0.25	0.38	-0.73	0.58
F: Slope	-34.68	42.34	-0.07	0.35	-0.65	0.54
M: Missingness	2162.38	1662.17	17.06	12.75	-18.61	11.22+
F: Missingness	146.24	1828.12	-2.00	13.80	-3.89	9.96
M: Support Receipt	76.76	63.27	0.81	0.49	2.36	0.85**
F: Support Receipt	171.58	57.97**	1.43	0.44**	2.30	0.76**
M: Support from Partner	94.32	62.43	0.96	0.49+	2.30	0.83**
F: Support from Partner	-12.10	62.91	-0.19	0.47	0.54	0.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$

Table 22
Missing Data Analyses for Social Control Models

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8072.40	495.34***	32.40	3.72***	55.56	6.71***
Female: Intercept	7578.29	441.09***	27.54	3.11***	44.76	6.37***
M: Slope	-45.35	45.52	-0.05	0.38	-0.76	0.61
F: Slope	-55.74	44.69	-0.28	0.37	-0.81	0.57
M: Missingness	1072.54	1831.28	15.65	13.98	-19.92	11.76+
F: Missingness	131.72	2914.78	12.21	21.75	1.33	10.63
M: Control Receipt	246.17	132.77+	1.53	1.03	-1.31	1.79
F: Control Receipt	-193	160.73	0.13	1.21	-1.23	2.20
M: Control from Partner	312.43	148.80*	3.97	1.14**	0.84	2.02
F: Control from Partner	67.57	135.04	-0.88	1.01	0.43	1.82

Note. *** $p < .0001$, ** $p < .001$, * $p < .05$, + $p < .10$

Table 23

Missing Data Analyses for Social Support Models: Gender x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8172.87	516.75***	33.18	3.90***	55.13	7.19***
Female: Intercept	7514.38	451.48***	26.45	3.19***	44.44	6.32***
M: Slope	-62.38	42.99	-0.25	0.38	-0.73	0.58
F: Slope	-34.68	42.34	-0.07	0.35	-0.65	0.54
Male*Missingness	2162.38	1662.17	17.06	12.75	-18.61	11.22^{+}
Female*Missingness	146.24	1828.12	-2.00	13.80	-3.89	9.96
M: Support Receipt	76.76	63.27	0.81	0.49	2.36	0.84**
F: Support Receipt	171.58	57.97**	1.43	0.44**	2.30	0.76**
M: Support from Partner	94.32	62.43	0.96	0.49^{+}	2.30	0.83**
F: Support from Partner	-12.10	62.92	-0.19	0.47	0.54	0.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 24

Missing Data Analyses for Social Support Models: Slope x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8189.68	515.01***	33.33	3.90***	54.72	7.13***
Female: Intercept	7515.11	450.33***	26.11	3.18***	44.14	6.25***
M: Slope	-64.69	43.21	-0.25	0.38	-0.77	0.58
F: Slope	-36.90	42.33	-0.08	0.35	-0.63	0.55
M: Day*Missingness	242.88	191.53	1.02	1.48	-0.85	1.10
F: Day*Missingness	268.80	229.10	2.15	1.77	-0.27	1.08
M: Support Receipt	77.45	63.24	0.83	0.49^{+}	2.34	0.84**
F: Support Receipt	171.36	57.91**	1.44	0.44**	2.30	0.76**
M: Support from Partner	96.79	62.60	0.86	0.49^{+}	2.28	0.83**
F: Support from Partner	-12.78	62.85	-0.19	0.47	0.54	0.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 25

Missing Data Analyses for Social Support Models: Support Receipt x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8174.23	515.55***	33.10	3.91***	54.87	7.19***
Female: Intercept	7544.71	451.05***	26.39	3.18***	43.63	6.03***
M: Slope	-60.10	43.02	-0.22	0.38	-0.83	0.57
F: Slope	-34.66	42.41	-0.10	0.35	-0.68	0.54
M: Support Receipt	78.74	63.16	0.83	0.49^{+}	2.17	0.86*
F: Support Receipt	162.85	58.49**	1.35	0.45**	1.88	0.78*
M: Support Receipt*Missingness	562.07	521.67	6.37	3.97	3.65	2.37
F: Support Receipt*Missingness	330.43	313.35	3.25	2.36	4.27	2.09*
M: Support from Partner	86.13	62.41	0.88	0.49^{+}	2.23	0.83**
F: Support from Partner	-7.49	63.03	-0.14	0.47	0.53	0.81

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 26

Missing Data Analyses for Social Support Models: Support from Partner x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8196.27	513.74***	32.24	3.89***	54.51	7.23***
Female: Intercept	7582.54	450.50***	26.73	3.19***	44.10	6.22***
M: Slope	-62.39	43.26	-0.22	0.38	-0.80	0.58
F: Slope	-42.06	42.46	-0.13	0.35	-0.65	0.54
M: Support Receipt	80.36	63.15	0.85	0.49^{+}	2.18	0.85*
F: Support Receipt	170.09	57.86**	4.43	0.44*	2.29	0.76**
M: Support from Partner	89.78	62.85	0.85	0.49^{+}	1.71	0.85*
F: Support from Partner	-20.45	62.88	-0.25	0.47	0.58	0.85
M: Support from Partner*Missingness	-9.41	347.38	3.07	2.66	8.85	2.58**
F: Support from Partner*Missingness	1021.86	538.07^{+}	9.46	4.14*	-0.29	2.18

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 27

Missing Data Analyses for Social Control Models: Gender x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8072.40	495.34***	32.40	3.72***	55.56	6.71***
Female: Intercept	7578.29	441.09***	27.54	3.11***	44.76	6.37***
M: Slope	-45.35	45.52	-0.05	0.39	-0.76	0.61
F: Slope	-55.74	44.69	-0.28	0.37	-0.81	0.57
Male*Missingness	1072.54	1831.28	15.65	13.98	-19.92	11.76+
Female*Missingness	131.72	2914.78	12.21	21.75	1.33	10.63
M: Control Receipt	246.12	132.77+	1.53	1.03	-1.31	1.79
F: Control Receipt	-193.00	160.73	0.13	1.21	-1.23	2.20
M: Control from Partner	312.43	148.80*	3.96	1.14**	0.84	2.02
F: Control from Partner	67.57	135.04	-0.88	1.01	0.43	1.82

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 28

Missing Data Analyses for Social Control Models: Slope x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8080.69	494.36***	32.52	3.71***	55.02	6.67***
Female: Intercept	7579.00	440.60***	27.64	3.11***	44.86	6.33***
M: Slope	-45.62	45.61	-0.05	0.39	-0.76	0.62
F: Slope	-55.80	44.65	-0.29	0.37	-0.81	0.57
M: Day*Missingness	58.87	257.17	0.72	1.97	-1.11	1.19
F: Day*Missingness	21.37	641.96	0.96	4.82	0.05	1.16
M: Control Receipt	249.75	132.71+	1.59	1.03	-1.27	1.79
F: Control Receipt	-193.06	160.77	0.13	1.21	-1.24	2.20
M: Control from Partner	313.25	148.86*	3.98	1.14**	0.90	2.02
F: Control from Partner	67.53	135.15	-0.88	1.01	0.43	1.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 29

Missing Data Analyses for Social Control Models: Support Receipt x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8084.70	493.13***	32.56	3.70***	55.38	6.68***
Female: Intercept	7578.27	441.05***	27.54	3.11***	44.47	6.31***
M: Slope	-44.94	45.70	-0.04	0.39	-0.91	0.60
F: Slope	-55.73	44.68	-0.28	0.37	-0.79	0.57
M: Control Receipt	264.76	133.44*	1.77	1.03+	-1.07	1.80
F: Control Receipt	-193.00	160.72	0.13	1.21	-1.13	2.21
M: Control Receipt*Missingness	-615.17	782.52	-7.56	5.95	-5.18	8.90
F: Control Receipt*Missingness	478.81	10597.00	44.39	79.08	-5.59	8.30
M: Control from Partner	313.14	148.74*	3.98	1.14**	0.87	2.02
F: Control from Partner	67.60	135.03	-0.88	0.01	0.56	1.84

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

Table 30

Missing Data Analyses for Social Control Models: Support from Partner x Missingness Interaction

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8081.96	493.89***	32.55	3.71***	55.58	6.73***
Female: Intercept	7578.66	440.75***	27.50	3.10***	44.75	6.32***
M: Slope	-45.00	45.64	-0.05	0.39	-0.83	0.60
F: Slope	-55.75	44.70	-0.27	0.37	-0.79	0.56
M: Control Receipt	251.68	132.42^{+}	1.61	1.03	-1.29	1.79
F: Control Receipt	-192.99	160.74	0.14	1.21	-1.22	2.19
M: Control from Partner	309.62	149.12*	3.98	1.14**	0.87	2.02
F: Control from Partner	67.20	135.01	-0.92	1.01	0.70	1.87
M: Control from Partner*Missingness	508.31	1937.37	-2.35	14.80	22.66	10.18*
F: Control from Partner*Missingness	73.77	1691.95	10.69	12.82	-2.91	4.77

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$; ICC Steps=.36, Active Minutes=.37, Exercise Minutes=.42

APPENDIX G: ADDITIONAL RESULTS FOR SEPARATE SUPPORT AND CONTROL ITEMS

Table 31

Daily General Social Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8356.61	515.12****	34.91	3.92****	59.02	7.02****
Female: Intercept	7701.28	451.91****	27.64	3.20****	47.20	6.08****
M: Slope	-86.75	44.09*	-0.47	0.38	-1.45	0.56**
F: Slope	-51.73	42.58	-0.21	0.36	-0.99	0.55^{+}
M: General Support Receipt	428.34	246.90^{+}	5.07	1.91**	13.93	3.23****
F: General Support Receipt	754.26	234.87**	6.40	1.80***	11.49	3.06***
M: General Support from Partner	371.01	249.11	2.62	1.93	7.80	3.26*
F: General Support from Partner	144.10	255.17	0.15	1.94	4.12	3.31

Note. **** $p < .0001$, *** $p < .001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$

Table 32

Daily Autonomy Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8134.58	512.81***	32.77	3.87***	54.75	7.04***
Female: Intercept	7503.12	441.98***	26.30	3.12***	44.24	6.24***
M: Slope	-58.13	43.75	-0.18	0.38	-0.88	0.55
F: Slope	-33.71	42.27	-0.10	0.35	-0.66	0.54
M: Autonomy Support Receipt	263.74	238.28	3.15	1.86^{+}	10.17	3.11**
F: Autonomy Support Receipt	632.30	230.67**	4.34	1.77*	6.52	3.05*
M: Autonomy Support from Partner	612.70	249.11*	4.98	1.88**	10.53	3.18**
F: Autonomy Support from Partner	12.99	240.08	-0.30	1.83	2.36	3.17

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$

Table 33

Daily Esteem Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8170.96	514.58***	32.90	3.88***	53.20	6.85***
Female: Intercept	7496.24	444.84***	26.24	3.15***	43.77	6.25***
M: Slope	-64.71	44.59	-0.22	0.39	-0.70	0.58
F: Slope	-32.66	42.59	-0.09	0.36	-0.59	0.55
M: Esteem Support Receipt	480.31	250.52^{+}	4.07	1.94*	4.75	3.33
F: Esteem Support Receipt	547.46	221.93*	4.36	1.71*	9.06	2.94**
M: Esteem Support from Partner	208.20	240.37	2.14	1.89	6.54	3.14*
F: Esteem Support from Partner	-107.21	248.15	-0.38	1.88	1.18	3.32

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, $^{+}$ $p < .10$

Table 34

Daily Informational Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8235.76	499.74***	33.80	3.80***	55.91	6.68***
Female: Intercept	7562.17	440.30***	26.80	3.14***	44.80	6.30***
M: Slope	-65.66	43.76	-0.25	0.37	-0.87	0.57
F: Slope	-43.28	43.46	-0.16	0.36	-0.74	0.55
M: Informational Support Receipt	-71.52	256.60	-0.43	2.02	-0.31	3.41
F: Informational Support Receipt	77.26	236.39	1.79	1.80	3.05	3.18
M: Informational Support from Partner	286.38	258.42	4.19	2.01*	8.44	3.41*
F: Informational Support from Partner	-26.74	244.30	-0.24	1.86	1.51	3.28

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$

Table 35

Daily Emotional Support Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8158.97	502.56***	33.19	3.81***	5320	6.87***
Female: Intercept	7474.35	452.14***	26.09	3.21***	43.38	5.22***
M: Slope	-61.55	44.26	-0.25	0.38	-0.69	0.57
F: Slope	-31.18	42.80	-0.09	0.36	-0.61	0.55
M: Emotional Support Receipt	160.11	245.06	1.61	1.92	6340	3.23*
F: Emotional Support Receipt	554.96	226.28*	4.59	1.74**	6.38	2.99*
M: Emotional Support from Partner	86.86	251.92	1.37	1.98	5.19	3.30
F: Emotional Support from Partner	73.21	237.90	0.17	1.81	0.80	3.13

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$

Table 36

Daily Persuasion (Social Control) Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8183.89	494.43***	33.18	3.67***	54.84	6.61***
Female: Intercept	7539.68	437.11***	26.73	3.10***	44.55	6.25***
M: Slope	-53.35	45.27	-0.10	0.39	-0.86	0.59
F: Slope	-45.46	43.87	-0.17	0.37	-0.78	0.56
M: Persuasion Receipt	35.24	236.58	-0.35	1.83	-0.79	3.16
F: Persuasion Receipt	-270.72	237.49	0.21	1.79	-3.07	3.23
M: Persuasion from Partner	643.25	245.85**	7.58	1.88***	1.08	3.28
F: Persuasion from Partner	140.87	229.39	-0.53	1.73	1.47	3.11

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$

Table 37

Daily Pressure (Social Control) Predicting All Outcomes

	Daily Steps (Fitbit)		Daily Active Minutes (Fitbit)		Daily Exercise Minutes (Self-Report)	
Predictor	*b*	*se*	*b*	*se*	*b*	*se*
Male: Intercept	8083.75	490.66***	32.49	3.70***	55.69	6.60***
Female: Intercept	7552.55	441.13***	27.33	3.08***	44.99	6.36***
M: Slope	-47.77	45.52	-0.10	0.39	-0.94	0.59
F: Slope	-43.09	44.46	-0.21	0.37	-0.76	0.56
M: Pressure Receipt	513.56	201.19*	3.84	1.56*	-2.41	2.71
F: Pressure Receipt	-160.75	272.34	-0.16	2.06	0.24	3.72
M: Pressure from Partner	497.99	266.57+	5.17	2.06*	1.81	3.60
F: Pressure from Partner	0.45	209.19	-1.53	1.57	-0.05	2.83

Note. *** $p < .0001$, ** $p < .01$, * $p < .05$, + $p < .10$

APPENDIX H: IRB APPROVAL LETTER

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 12/7/2016

To: Melissa A Johnson
W112 Lagomarcino Hall

CC: Dr. Carolyn Cutrona
W112 Lagomarcino

From: Office for Responsible Research

Title: Couples and Exercise Habits

IRB ID: 16-518

Approval Date: 12/5/2016 **Date for Continuing Review:** 12/4/2018

Submission Type: New **Review Type:** Expedited

The project referenced above has received approval from the Institutional Review Board (IRB) at Iowa State University according to the dates shown above. Please refer to the IRB ID number shown above in all correspondence regarding this study.

To ensure compliance with federal regulations (45 CFR 46 & 21 CFR 56), please be sure to:

- **Use only the approved study materials** in your research, **including the recruitment materials and informed consent documents that have the IRB approval stamp**.
- **Retain signed informed consent documents for 3 years after the close of the study**, when documented consent is required.
- **Obtain IRB approval prior to implementing any changes** to the study by submitting a Modification Form for Non-Exempt Research or Amendment for Personnel Changes form, as necessary.
- **Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences** involving risks to subjects or others; and (2) **any other unanticipated problems involving risks** to subjects or others.
- **Stop all research activity if IRB approval lapses**, unless continuation is necessary to prevent harm to research participants. Research activity can resume once IRB approval is reestablished.
- **Complete a new continuing review form** at least three to four weeks prior to the **date for continuing review** as noted above to provide sufficient time for the IRB to review and approve continuation of the study. We will send a courtesy reminder as this date approaches.

Please be aware that IRB approval means that you have met the requirements of federal regulations and ISU policies governing human subjects research. **Approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **IRB approval in no way implies or guarantees that permission from these other entities will be granted.**

Upon completion of the project, please submit a Project Closure Form to the Office for Responsible Research, 202 Kingland, to officially close the project.

Please don't hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.