EXPLORING THE NATURE OF AND COMMITMENT TO EXERCISE RELATIONSHIPS

By

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PUBLIC ABSTRACT

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The United States population suffers from poor health, largely as a consequence of physical inactivity. Only a small minority of Americans meet or exceed the daily physical activity guidelines prescribed by the American College of Sports Medicine. One of the most frequently reported barriers to engaging in physical activity is lack of an exercise partner, and the performance-enhancing benefits of social factors in exercise have been well-documented. Despite the widely-recognized value of an exercise partner among health scientists and the lay public, there has been no research to date examining the nature of exercise relationships (i.e., the relationships between exercise partners). This dissertation presents two studies exploring the nature of exercise relationships — the first characterizes exercise relationships on a variety of relationship and exercise factors and second the examines factors that predict psychological commitment and whether psychological commitment translates into behavior. Both studies employed an anonymous web survey.

The first study was the first inquiry into exercise relationships. Based on theories of communication between people and how relationships develop, the first study examined the exercise relationships of undergraduates at a large Midwest university and focused on relationship quality (i.e., closeness & communication). Exercise relationships were characterized by a high degree of closeness and a communication on many different topics, and the study revealed that most exercise relationships formed from existing relationships rather than forming in the exercise context.

The second study examined predictors and consequences of commitment to an exercise relationship. Support was found for a model of commitment in exercise relationships, where commitment was predicted by satisfaction with the exercise relationship, attractiveness of alternatives to the exercise relationship, and investment in the exercise relationship. Psychological commitment predicted behavioral commitment to the exercise relationship, which in turn predicted total individual physical activity.

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The United States population suffers from poor health, largely as a consequence of physical inactivity. Only a small minority of Americans meet or exceed the daily physical activity guidelines prescribed by the American College of Sports Medicine. One of the most frequently cited barriers to engaging in physical activity is lack of an exercise partner, and the ergogenic benefits of social factors in exercise have been well-documented. Despite the widely-recognized value of an exercise partner among health scientists and the lay public, there has been no research to date examining the nature of exercise relationships (i.e., the relationships between exercise partners). This dissertation presents two studies exploring the nature of exercise relationships – the first characterizes exercise relationships on a variety of relationship and exercise factors and the second examines antecedents and consequences of psychological commitment to an exercise relationship. Both studies employed an anonymous web survey.

The first study was the first inquiry into exercise relationships. Based on theories of interpersonal communication and relationship development, the first study examined the exercise relationships of undergraduates at a large Midwest university and focused on relationship quality (i.e., interpersonal closeness & communication). Exercise relationships typically began outside of an exercise context, emerging from pre-existing relationships (77.0%). Exercise relationships were characterized by a high degree of interpersonal closeness, reporting closeness values significantly higher than the scale midpoint, (M = 5.07, SD = 1.56), t(381) = 13.44, p < .001. Participants reported talking about a greater number of topics outside workouts (M = 6.53, SD = 0.001

2.50) than in typical workouts (M = 4.21, SD = 2.69), t(382) = 14.82, p < .001. In addition to conversation, participants reported agreement higher than scale midpoint for reciprocal exercise encouragement (M = 4.04, SD = 0.81), t(382) = 25.10, p < .001, in typical workouts. Lastly, participants reported values higher than scale midpoint on *mutual goal facilitation* (M = 3.76, SD = 0.79), t(382) = 18.83, p < .001, suggesting that exercise relationships are characterized by closeness, high communication breadth, and cooperation rather than competition.

The second study examined antecedents and consequences of psychological commitment to an exercise relationship. Support was found for a model of commitment in exercise relationships, where psychological commitment was predicted by satisfaction with the exercise relationship, attractiveness of alternatives to the exercise relationship, and investment in the exercise relationship, and the predictors accounted for nearly half of the variance in psychological commitment, F(3, 518) = 146.80, p < .001, $R^2 = .46$. Path analyses revealed that psychological commitment predicted behavioral commitment to the exercise relationship, which in turn predicted total individual physical activity.

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CHAPTER 1

INTRODUCTION

The population of the United States is overwhelmingly overweight or obese, and the mostoverweight individuals report the lowest levels of activity (Hedley et al., 2004; Tucker, Welk, & Beyler, 2011). The top three causes of death in the United States (heart disease, cancer, stroke) are largely predicted by lifestyle behaviors including physical inactivity, which significantly increases risk of disease and mortality. The Department of Health and Human Services (DHHS) prescribes 150 minutes of moderate to vigorous physical activity per week to maintain good health (Garber et al., 2011; USDHHS, 2008). However, less than 5% of Americans meet the DHHS guidelines (Troiano, 2008). The most frequently self-reported barriers to exercise are "no time," "laziness," "other priorities," "no motivation," and "no energy," (Ebben & Brudzynski, 2008). Physical inactivity is *fundamentally a motivation issue* (Dishman, 2001).

Motivation is defined as the direction and intensity of effort (Gill, 1986). Motivation can be derived from many sources, one of which may be an exercise partner; another frequently reported barrier to exercise is "no exercise partner," highlighting the potential importance of the "other" in exercise (Ebben & Brudzynski, 2008; Louw, Biljon, & Mugandani, 2012). Social factors can have a powerful motivating role in exercise behavior (Courneya, Plotnikoff, Hotz, & Birkett, 2000). Social support is defined as "the social resources that persons perceive to be available or that are actually provided to them by nonprofessionals in the context of both formal support groups and informal helping relationships" (Cohen, Gottlieb, & Underwood, p. 4). Social support, especially from a workout "buddy," positively predicts physical activity, and can facilitate exercise initiation and maintenance (Darlow & Xu, 2011; Gellert, Ziegelmann, Warner, & Schwarzer, 2011; Jago et al., 2011; Rackow, Scholz, & Hornung, 2014).

Review of Concepts and Theory

This section provides a description of concepts and theoretical approaches relevant to the two studies in this dissertation. The section begins with dominant theories of exercise motivation that include a social component, namely self-determination theory and achievement goal theory. Next, theory pertaining to relationship development and maintenance are discussed, including uncertainty reduction theory, social penetration theory, and the relationship investment model.

Theories of Exercise Motivation

Self-determination theory is a theory of motivation that posits that intrinsic drive is maximized when three conditions are met: the individual feels competent in the domain in which the motivated behavior will occur, feels autonomous and that performing the behavior is entirely their own doing, and feels support or approval from others to engage in the behavior (Deci & Ryan, 2000).

Basic psychological needs theory, which falls under the umbrella of self-determination theory, asserts that these three conditions are fundamental psychological human needs: competence, relatedness, and autonomy (Deci & Ryan, 2000). When these needs are met, humans achieve optimal levels of intrinsic motivation.

Humans need to feel that they can effectively interact with their environment (i.e., they need to feel competent and capable). The desire to demonstrate competence is a recurring theme in sport and exercise psychology (Harter, 1978; Horn, 1985; Klint & Weiss, 1987; White, 1959; Whitehead & Corbin, 1991). Feeling capable is one of the highest reported sources of enjoyment for engaging in physical activity along with social opportunities and social recognition (Scanlan, Stein & Ravizza, 1989). People can be motivated to demonstrate competence in either

performance domains or social domains in a sporting context; the drive to participate in physical activity for performance or for social reasons is largely driven by domains in which domain an individual feels most competent (Klint & Weiss, 1987).

Relatedness, or the positive interpersonal connections perceived by an athlete or exerciser, can be achieved by coaches who express genuine interest and empathy and is fostered through team-building exercises (Martin, Carron, & Burke, 2009). Athletes or exercisers who feel connected to others in the performance environment and who perceive social support may be more motivated to perform (Dishman & Buckworth, 1996; Martin, Carron, & Burke, 2009).

Cognitive evaluation theory is another sub-theory under the self-determination theory umbrella. It focuses on how perceptions of competence and autonomy can improve intrinsic motivation, and therefore shares some supporting research with the basic psychological needs theory. Cognitive evaluation theory is different in that it recognizes that perceptions of competence and autonomy can be influenced by social interactions (Deci & Ryan, 1985). Cognitive evaluation theory posits that when verbal performance feedback is perceived as informational and intended to convey information pertaining specifically to the performance, it can affect motivation *positively or negatively* (Deci, Koestner, & Ryan, 1999). Most research on cognitive evaluation theory has focused on feedback given to a mentee from a mentor, and although the hierarchical dynamic of those relationships is not necessarily applicable to exercise relationships (where there is likely parity), the theory highlights the potentially powerful role that verbal messages can have in a performance context.

Achievement goal theory (AGT) is similar to the previous two theories listed in that its underlying tenet is that humans have an innate desire to demonstrate competence. AGT organizes achievement goals into two categories: mastery goals, which focus on demonstrating

competence in self-referential terms (i.e., improving), and outcome goals, which focus on demonstrating competence in other-referential terms (i.e., being superior to others). Nicholls (1984) originally suggested that these different achievement goal orientations were the result of different definitions of success. AGT states that goal involvement (situation-specific) begins with an interaction between conception of ability, one's goal orientation, and the motivation climate one is in (Smith, Balaguer, & Duda, 2006). That goal involvement interacts with perceived ability to produce a resultant motivated behavior (i.e., outcome), (Nicholls, 1984).

A mastery goal involvement, regardless of perceived ability, results in high motivation and challenging task choices. High motivation and challenging task choices are also demonstrated by individuals with outcome goal involvement, but only when perceived ability is high. If perceived ability is low, the individual tends to avoid challenge (or approach challenges that are too great) due to a fear of failure. Achievement goals focused on mastery are considered adaptive and lead to enhanced intrinsic motivation (Elliot & Harackiewicz, 1994). Outcome goals rooted in fear of failure significantly undermine intrinsic motivation.

According to the model, goal involvement is influenced by two factors that can be socially influenced. The first is conception of ability. Cognitive Evaluation Theory, discussed above, highlights how influential others can affect perceived competence. The second factor is motivational climate, which is shaped by significant others and authority figures (Ames, 1992). According to AGT, relationships between peers and authority figures can influence the nature of the motivational climate which can in turn affect an individual's achievement goal involvement.

Theories of Relationship Development

Humans evolved to live and thrive in groups (Hamilton, 1971; Hamilton & Axelrod, 1981). A group is any number of people larger than one, the smallest example being a dyad (Williams,

2010). Within any group, social relationships play an integral role, serving as a cohesive force keeping the group from disintegrating. The feeling of belonging to a group and having social connections has even been described as a basic human need (Baumeister & Leary, 1995). Any and all ways in which social relationships can confer psychological, emotional, and instrumental benefits have been termed social support (Cohen, Underwood, & Gottlieb, 2000). When conceptualized in this way, social support is an integral component of many of exercise psychology's most prominent theories of motivation, and reasonably so; it is reliably associated with and predictive of motivated exercise behaviors (Carron, Hausenblas, Mack, 1996; Courneya et al., 2000; Darlow & Xu, 2011; Dunlop & Beauchamp, 2013; Huffmeier et al., 2014; Resnick, Orwig, Magaziner, & Wynne, 2002; Ryan & Deci, 2000; Yang, Ha, & Jung, 2015).

The focus of this research is the smallest form of human group. A preponderance of evidence suggests that the human tendency to gather and connect is no coincidence; groups confer many benefits to individuals that comprise them. However, forming the relationships that hold groups together is an effortful process.

Communication. Central to relationships and their development is communication and interaction (Kelley et al., 1983; Miller & Steinberg, 1975). Communication has been described as principally a prediction-making activity, where individuals gather data (e.g., information communicated to them, past interactions, situational context of an interaction, etc.) and make predictions "about the effects, or outcomes, of their communication behaviors," (Miller & Steinberg, 1975, p. 12). Communication allows people to learn about one another, become closer, and reduce friction in their interpersonal interactions. One of the driving forces behind initial message exchange is uncertainty and the discomfort associated with it (Berger & Calabrese, 1975).

Uncertainty reduction theory. Uncertainty reduction theory postulates that uncertainty serves as a motivator to gather data and learn more about other individuals. Two acquaintances, wishing to better predict one another's messages, message interpretation, and behavior, are likely to feel a high degree of uncertainty due to the absence of data acquired from previous interactions. Uncertainty is more than merely not knowing; it can be conceptualized as the discrepancy between the amount of predictive information one possesses about another individual and the amount of predictive information that one desires or needs to meet the predictive demands of interactions. So, while one may not have information about a stranger walking in the opposite direction down a shared sidewalk, uncertainty is not low (i.e., there is low motivation to exchange messages) because the information each party possesses is sufficient to navigate the superficial interaction. In situations where there are frequent interactions or there is a desire to have predictive information, uncertainty is lowest (and predictions are optimal) when people share a *psychological level of understanding* of each other - that is, when two people know one another's deepest thoughts, feelings, beliefs, and opinions (Altman & Taylor, 1973; Vangelisti, 2002).

Social penetration theory. Social penetration, or a deep psychological level of understanding between people, is reached through reciprocal, repeated self-disclosure (Altman & Taylor, 1973). When one individual self-discloses and makes themselves vulnerable, it tends to be reciprocated by the recipient of the information - humans have an innate tendency toward reciprocity (Gouldner, 1960). Reciprocal self-disclosure leads to increasingly deeper psychological penetration, or intimate knowledge of one another. Communication depth is accompanied by communication breadth. As people share personal increasingly detailed information, they also discuss increasingly more topics.

Satisfaction and dependence. Interaction between relationship partners is an essential component of relationship development because interactions yield outcomes (both positive and negative), which can be viewed as rewards or costs (Rusbult & Buunk, 1993). Interactions are motivated by profit, reciprocity, and perceived fairness – we are constantly analyzing the costs and benefits in relationships and that will affect our relationship commitment (Rusbult, 1969). A relationship for which benefits exceed costs is profitable and perceived to be *rewarding*, which elicits satisfaction. Whether a relationship is maintained or initiated at all is determined in part by an ongoing evaluation of net worth of the relationship (as calculated by a ratio of costs and benefits). Early research on relationships examined this ratio through the lens of perceived equity (i.e., equal contribution of both in a relationship) and postulated that it was the primary predictor of relationship success (Walster et al., 1978). However, reward (and equity) have since been consumed by the broader construct of satisfaction as defined in interdependence theory, which posits that psychological commitment to a relationship (and relationship behavior) is determined in part by an individual's perception of *satisfaction* in the relationship (i.e., reward, fulfillment of needs and expectations) and their perceived dependence on the relationship (availability of other opportunities) (Thibaut & Kelley, 1959). Relationship commitment, or the degree of dedication or allegiance to one's relationship with another person, is a key predictor of committed behavior (Impett, Beals & Peplau, 2001). In the interdependence model, relationships that are high in satisfaction and high in dependence are considered ideal and sustainable (if dependence is voluntary), while relationships that are low in satisfaction and low in dependence will end.

Investment. Unaccounted for in the interdependence model is *investment*, or a relationship's sunk (i.e., irretrievable) costs. Accordingly, a revised interdependence model was

proposed that included investment as a predictor of psychological commitment (Rusbult, 1980). Investment can be dichotomized into direct and indirect forms of investment. The former, direct investment, is investment that arises from pouring resources directly into a relationship such as time, energy, money, and self-disclosure. The latter, indirect investment, is the secondhand outcome of direct investment (e.g., having shared mutual friends, sharing ownership of a home, sharing an identity and feeling close). Direct investment is most immediately relevant to behaviors (because they are an active, agentic form of investment rather than passive consequence of it). Investment serves as a motivator to remain committed to a relationship and engage in maintenance behaviors. This is especially true when the relationship is highly valued and there are few attractive alternatives: relationship commitment is a function of investment, satisfaction, and quality of alternatives (Rusbult, Martz, & Agnew, 1998).

Overview of Current Research

The aim of the current research is to a) initiate and build a strong descriptive base for research on exercise relationships and b) design and test a conceptual model of psychological commitment to exercise relationships. To date, there has been no formal inquiry into the nature of relationships between exercise partners. The study of interpersonal relationships and communication can be organized into levels of inquiry ranging from basic descriptive work to testing complex interactions among people and the systems they live in (Cappella, 1987). The line of inquiry investigated by the current research begins with the broadest level and asks research questions that are exploratory. Exercise relationships were examined in an interdisciplinary fashion, incorporating several prominent theoretical perspectives from communication, exercise psychology, and social psychology. The second study in this dissertation builds upon the first, designing and testing a model of psychological commitment to

an exercise relationship that includes antecedents to and consequences of psychological commitment.

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CHAPTER 2

STUDY 1: CHARACTERIZING EXERCISE RELATIONSHIPS: COMMUNICATION, CLOSENESS, AND PERFORMANCE

Preface

The abstract from this manuscript was published in the *Journal of Sport and Exercise Psychology* in 2016. Complete citation: Max, E. J., Wittenbaum, G. W., & Feltz, D. L. (2016). Characterizing Exercise Relationships: Communication, Closeness, Performance. *Journal of Sport and Exercise Psychology, 38*, S228. This manuscript was submitted to *Psychology of Sport and Exercise* in 2017.

This study began as a research practicum for the completion of the degree of Doctor of Philosophy at Michigan State University. It was the logical outgrowth of the first author's thesis for a Master of Science, which examined the effect of encouragement (and specifically pronoun inclusivity) with a virtually-present exercise partner in an active video game and conducted under the guidance of the third author (Feltz). The second author (Wittenbaum) assisted in the design of the study and editing of the manuscript.

Abstract

Objective: Group dynamics research in exercise has highlighted the motivation-boosting potential of working out with an exercise partner or group, but to the authors' knowledge there has been no research to date characterizing the typical exercise relationship, which is an interpersonal relationships that include regular co-exercise. This purpose of this study was to characterize exercise relationships.

Method: A sample of 555 undergraduates were administered an 82-item survey, 383 of whom met inclusion criteria and reported having or having had an exercise partner.

Results and Conclusions: Participants (77%) reported that their exercise relationships typically emerged out of previously existing relationships. Participants reported (on a 1-7 Inclusion of Other in Self Scale) that they were very close with their exercise partners ($M = 5.07 \pm 1.56$) and that (out of 10 discussion topic categories) they talked about a number of topics outside of exercise ($M = 6.53 \pm 2.50$) and during typical workouts ($M = 4.21 \pm 2.69$). Exercise relationships were characterized by mutual goal facilitation, and participants whose exercise relationships had dissolved or failed reported significantly lower interpersonal closeness, lower communication breadth, and more performance-based goals than participants who reported an ongoing exercise relationship (ps < .05). Participants exercised more often the more an exercise relationship was defined by exercise (p < .05), suggesting that exercise relationships that did not prioritize exercise.

Introduction

The population of the United States is becoming increasingly inactive and the resultant decreases in health are marked (Barnett, Cerin, & Baranowski, 2011; Daley, 2009). Physical inactivity is hypothesized to account for more than 5 million deaths per year, placing it amongst the top killers on the globe (Wen & Wu, 2012). In other western countries, such as England, only about two thirds of the adult population meets the 2011 United Kingdom physical activity guidelines (Bhatnagar, Wickramasinghe, Williams, Rayner, & Townsend, 2015).

One of the most promising solutions to the issue of exercise adherence and effort is the utilization of group dynamics (Burke, Carron, Ntoumanis, & Estabrooks, 2006; Dishman & Buckworth, 1996; Feltz, Kerr & Irwin, 2011). Social influence has been cited as a predictor of exercise participation and has been shown to be associated with reduced attrition from exercise

programs (Courneya & McAuley 1995; Courneya et al., 2000; Darlow & Xu, 2011). Coexercise has also been found to have stress-management benefits when compared to exercising alone (Plante, Coscarelli, & Ford, 2001). The role of valued others has been emphasized in many of exercise psychology's most ubiquitous theories (e.g., verbal persuasion and vicarious experience in self-efficacy theory, subjective norms and social support in the theory of planned behavior, relatedness in self-determination theory). The inclusion of and focus on the importance of the "other" in exercise and physical activity engagement has made the leap from science to practice, as many popular fitness and health magazines are rife with recommendations and offers such as "grab a partner for a better workout," "7 ways to find a workout partner," or "5 reasons why having a workout partner can help you achieve your goals" (Cortese, n.d.; FitDay, n.d.; Lebowitz, 2012). However, the qualities of an ideal (or even typical) workout partner relationship have not been empirically investigated, and practical recommendations are speculative, at best.

The dearth of research on exercise relationships has been problematic in other domains as well. For example, game developers and researchers have responded to the trending decline in fitness with the creation of active video games (AVGs), offering the potential for convenient and private exercise at home. Despite growing popularity, few AVGs on the market have incorporated group dynamics principles (e.g., social comparison, social indispensability) into their games, forgoing a promising opportunity to increase game effectiveness. Fewer yet have examined partner communication, and early findings suggest that partner encouragement could be problematic (Irwin, Feltz & Kerr, 2012; Max, Feltz, Kerr, & Wittenbaum, 2016), leading some to the conclusion that verbal communication should be excluded from such games entirely. However, this solution seems inelegant and shortsighted because of the integral nature of

communication in all human relationships. Indeed, one AVG study has shown that communication regarding a fatiguing partner enhanced subsequent exercise effort for men but not for women (Max et al., 2016). Instead, communication between exercise partners needs to be reexamined as well as the qualities involved in exercise relationships.

In this paper we examined the nature of exercise relationships through an online survey. An exercise relationship is an interpersonal relationship that is rooted, in some degree, in the exercise context and includes regular co-exercise. Exercise partners are people who exercise with one another and rely on each other in their chosen exercise context (e.g., in the gym, on the track, on the trails, or on the road). Exercise relationships may take on a variety of characteristics, but the key defining trait is *regular co-exercise*. Exercise relationships can be stand-alone relationships (e.g., a relationship formed and maintained within the exercise context or purely *for* exercise-related goals) or they may be nested within a larger relationship (e.g., a lifelong friend, family member, or romantic partner with whom someone has chosen to exercise). The success of the relationship will be defined, in this study, by the relationship viability (i.e., the degree to which the relationship is socially/emotionally nurturing) and the degree to which the relationship is ergogenic.

There are a number of theories examining relationships outside of the exercise context that may be relevant, but have yet to be examined through a kinesiological lens. Accordingly, a review of relationship theory and research is warranted. To begin, we review interpersonal communication theories that may be relevant to the formation and maintenance of a successful exercise relationship.

Exercise Relationship Development

Relationship quality. Relationship quality comprises three components: interpersonal communication, interpersonal closeness, and viability. Interpersonal communication refers to the depth and breadth of communication, interpersonal closeness is the degree to which individuals in a relationship share an identity, and viability is the time spent together (both acutely and long-term). See Figure 1 for a conceptual framework and summary of research questions.



Figure 1. Conceptual framework and summary of research questions.

Communication. Interpersonal information is shared and learned through selfdisclosure, a key component of relationship formation. Self-disclosure, or the process of making oneself vulnerable and revealing privileged information, is the basis for intimacy and closeness. In exercise relationships, disclosure may be seen as a form of investment (vulnerability associated with high risk information, time, and energy) thereby strengthening the relational bond and increasing interpersonal obligation, a potential motivator (i.e., social constraint) to persist in an exercise program.

Initiating this process may be a challenge, however, as the risks associated with making oneself psychologically vulnerable are potentially high. The human tendency to reciprocate is considered universal (Gouldner, 1960), likely evolved as a tit-for-tat strategy (Axelrod & Hamilton, 1981), and that may incentivize self-disclosure initiation. Self-disclosure begets self-disclosure, so an exercise relationship may be able to be strengthened through the initiation of self-disclosure by one party. As self-disclosure (and, therefore, investment) increases, so will commitment, a key predictor of relationship stability and longevity. Exercise partners for whom fitness is the primary priority (as opposed to, for example, companionship) may have issues with self-disclosure. Exercise relationships which begin with a specific goal in mind where the exercise partner is seen as instrumental to that goal may be rooted in social comparison, as the other may be seen as an exemplar of fitness or health (or alternatively, the self may be viewed in such a way, and the partner as a novice), and that comparison may be associated with a competitive nature in the relationship. Competition in friendships may hinder self-disclosure processes (Abell, Lyons, & Brewer, 2014).

Though competition between exercise partners may hinder the relationship development through alteration of self-disclosure, cooperation between exercise partners *in competition against another group* may actually facilitate the process, potentially allowing for a competitive goal orientation to benefit the relationship. Intergroup competition facilitates cooperation within human groups, a tendency that would have been evolutionarily advantageous in early human development (Burton-Chellew, Gillespie, & West, 2010). The existence of a perceived "outgroup" could reduce perceived differences between exercise partners, increasing perceptions

of similarity, cohesion, and comfort with disclosure (Turner, Oakes, Haslam, & McGarty, 1994). In summary, a highly competitive exercise relationship is not, then, destined to fail, and may actually be promoted if competition is directed outward. The desired outcome, relationship commitment, may be unaffected.

Interpersonal closeness. A relationship's depth can be characterized by the closeness between the individuals in it and the degree to which their relationship is unifocal or multifaceted. True interpersonal communication occurs only when intimate details and privileged information are shared between both relational partners, and as more private information is shared on the psychological level, the people in the relationship will become closer (Altman & Taylor, 1973). The depth of the knowledge may change in the context of the relationship, however. For example, intimacy in a romantic partnership may look qualitatively different from intimacy in an exercise partnership. The nature of personal information (e.g., personal goals, aspirations, fears) in an exercise relationship may be more context specific.

Regardless, depth of communication will likely facilitate interpersonal closeness in exercise relationships just as it does with platonic and romantic relationships, which could in turn facilitate relationship longevity (i.e., viability) and, consequently, exercise adherence. In order for this communication to occur, there needs to be a catalyst to initiate information-sharing, because information at the psychological level cannot be obtained through mere exposure and observation. In addition to the importance of interpersonal communication (i.e., mutual divulgence of psychological information), relationship formation and interpersonal connection also are important to the exercise relationship.

Another perspective on depth is the degree to which an exercise relationship is unifocal (i.e., existing entirely within the exercise domain) or multifaceted (i.e., broad and larger than

exercise) may also contribute to a relationship's depth. Broad communication on topics beyond exercise may facilitate relational depth, as it does with interpersonal closeness.

Relationship viability. Of critical importance is whether an exercise relationship is sustained or terminated. Relationship viability comprises total relationship length, exercise relationship length, and how often exercise partners hang out with one another. Each of these variables is a measure of time in the relationship – either acutely (as with hangout time per week) or chronically (as with duration of the relationship). These factors, along with self-disclosure and interpersonal closeness, are likely to covary because all are forms of investment in the relationship, which can improve an individual's likelihood of staying in a relationship (Rusbult, Martz & Agnew, 1998). Another factor that can contribute to an individual's likelihood of staying in a relationship is their perceived value of the relationship.

Relationship Utility. Value can be derived from either the pleasure inherent in the relationship (i.e., positive affect associated with having another person to exercise with) or an auxiliary source such as goal attainment. People are likely to value and seek others who have the ability to facilitate their goals (Slotter, 2011). Physical fitness is seen as a key factor when assessing a hypothetical exercise partner's appeal, and similar fitness abilities and goals are what many prioritize (Cholewa, Law, & Carron, 2008; Tucker & Irwin, 2006). Though exercise partners who initiate their relationship with a goal in mind may value their relationship at the onset, value may decline once goals are achieved (Fitzsimons & Fishbach, 2010). Indeed, relationships involving persons who most easily see relationships in the context of rewards and costs, who are more prone to leave a relationship that is not immediately beneficial to them, tend to have poorer quality relationships (Lyons & Aitken, 2010). This behavioral style may lead to

premature relationship dissolution and, consequently, issues with exercise adherence. See the right side of Figure 1 for variables relevant to utility.

Present Study and Research Questions

The purpose of this study was to explore the nature of exercise partner relationships by characterizing them on several key features. Most importantly, we sought to examine the exercise relationships from two perspectives: (a) relationship quality, as inferred through communication, and relational depth, and relationship viability, and (b) relationship utility (i.e., the relationship's ergogenic potential), as inferred through reported exercise goals and behaviors as well as the perceived benefits of working with an exercise partner.

We examined the following research questions (see Figure 1 for a summary):

- 1. What is the relational background (status, meeting context) of exercise relationships?
- 2. What are the individual exercise goals and behaviors of those who have/had an exercise relationship?
- 3. What are the exercise goals and behaviors during exercise with a partner?
- 4. How do individual exercise goals and behaviors relate to exercise goals and behaviors during exercise with a partner?
- 5. What is the relational quality (depth, viability, communication) of exercise relationships?
- 6. How do depth, viability, and communication relate to one another in exercise relationships?
- 7. Does relational background predict (a) exercise goals and behaviors during exercise alone and with a partner and (b) the relational quality of exercise relationships?

Method

Participants

After obtaining institutional approval from the Human Research Protection Program, an anonymous web survey hosted by Qualtrics was conducted on undergraduate students enrolled in communication courses at a large Midwestern university. Participants were recruited and enrolled in the study through the website Experimetrix, which allowed them to obtain course credit while keeping their responses anonymous. Participants who did not have an exercise partner or who did not exercise at all were automatically forwarded to the end of the survey to receive their participation credit.

Demographics. No power analysis was performed because a) exercise relationships had never been examined before and their prevalence was unknown and b) the purpose of the inquiry was primarily descriptive. A total number of 555 students enrolled and consented, though 153 did not meet criteria for inclusion (83 = non-exercisers, 70 = never had an exercise partner) and 21 were excluded (17 = non-completion of survey, 4 = bogus responses). The final remaining sample (N = 383; 199 = females, 182 = males, 2 = unreported) was included for subsequent analyses. The mean age of the sample was 20.09 years (SD = 2.58), with a mean height of 67.88 inches (SD = 4.90), weight of 156.51bs (SD = 34.80), and BMI of 24.16 (SD = 4.10). The sample was primarily Caucasian (n = 295, 77.0%) and non-Hispanic (n = 317, 82.7%).

Survey Instrument

The 82-item survey consisted of relational background and quality, participant exercise goals and behaviors (both individual and during exercise with the partner), and basic demographic information and took approximately 30 minutes to complete. Participants responded individually, not with their exercise partner. A summary of the main variables is shown in Figure 2.

Relational Variables

<u>Relational Background</u> Relationship status Meeting context

Relational Quality

<u>Depth</u> Closeness Exercise in the relationship

<u>Viability</u>

Relationship length Exercise relationship length Hangout frequency

Communication

Amount of talk Relative talk Communication breadth Exercise Encouragement

Exercise Variables

Individual Exercise Goals & Behavior Exercise frequency Exercise modality Fitness level Motivation level Exercise goals (including mastery goals)

Exercise Goals & Behavior with Partner Exercise frequency with partner Exercise engagement Comparative exercise behavior Performance goals Goal facilitation

Figure 2. Summary of main survey variables.

Relationship background. Exercise partner was defined for participants as "a person with whom you exercise or train consistently." The *status* question was, "Do you have an exercise partner/s?" Response items were (a) "I have never had an exercise partner," (b) "I used to have an exercise partner but I don't anymore," (c) "I have an exercise partner but we haven't exercised together in some time/are taking a break," and (d) "I have an exercise partner." Participants who reporting having or having had an exercise partner (b, c, or d) were instructed to "focus on one exercise partner (current or past). If you have multiple exercise partners, choose

your primary exercise partner (the one with whom you exercise the most frequently)" for subsequent questions.

To determine *meeting context*, we asked "Did you meet your exercise partner in an exercise context or elsewhere?"

Individual exercise goals and behaviors. We assessed individual exercise goals and behaviors in five ways: exercise frequency, exercise modality, and exercise goals (including mastery goals). *Frequency of exercise* was assessed with a single item, "how many days per week do you exercise total?" *Exercise modality* was assessed with a single item, "What type of exercise? [Check all that apply]." Participants who selected "other" from the list were directed to an open-answer follow-up item to elaborate.

Two additional items to measure mastery goals (i.e., goals that are focused on selfimprovement and task mastery) were modeled after those used by Elliot and McGregor (2001). Participants indicated their agreement on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale with two questions: "When I exercise, my goal is to perform better than I did during my last workout," and "When I exercise, my goal is to not perform worse than I did during my last workout." The mean of those two items was calculated to produce an overall mastery goal score ($\alpha = .54$). Reliability was low for this measure due to the omission of consideration for approach vs. avoidance valences in achievement goals. Despite low reliability, the measure was strongly associated with other variables in the study so it was included in the paper.

Exercise goals and behaviors with partner. We assessed exercise goals and behaviors with partner in five ways: exercise frequency with partner, exercise engagement, comparative exercise behavior, performance goals, and goal facilitation. *Exercise frequency with partner* was measured by asking the number of days that participants exercised with their partner, assessed

with the item, "How many days per week, on average, do you and your exercise partner exercise together?"

Exercise engagement was measured with three items that assessed looking forward to partnered workouts, exercise persistence with the partner, and likelihood of the exercise partner to reduce exercise attrition. These were assessed with three Likert-type agreement items on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale: "I look forward to workouts with my exercise partner," "I exercise harder/longer when I'm with my exercise partner," and "I am likely to skip a workout if my exercise partner is unavailable." These items were not combined due to low internal reliability ($\alpha = .46$).

Seven items asked participants to evaluate themselves relative to their partner on a 1 (*much less*) to 5 (*much more*) scale. These *comparative exercise behavior* questions led with, "Compared to my exercise partner, I am..." and the seven items were: "physically fit," "motivated in exercise," "likely to lead a workout," "satisfied after a workout," "likely to push or encourage the other during a workout," "likely to suggest ending a workout/reducing the intensity," and "likely to suggest prolonging a workout/increasing the intensity."

Two items to measure *performance goals* (i.e., goals that are focused on comparison of the self with another) were modeled after those used by Elliot and McGregor (2001). Participants indicated their agreement on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale with two questions: "When I exercise, my goal is to outperform my partner," "When I exercise, my goal is to not do worse than my partner." The mean of those two items was calculated to produce an overall performance goal score ($\alpha = .68$).

To measure *goal facilitation*, we created two items for this study that tapped prioritization of partner goals and perception of partner prioritization of personal goals with ratings made on a

1 (*strongly disagree*) to 5 (*strongly agree*) scale: "When I exercise, my goal is for my exercise partner to achieve her/his goals," and "My exercise partner helps me to achieve my exercise goals."–The mean of those two items was calculated to produce an overall *mutual goal facilitation* score ($\alpha = .71$).

Relational quality. Relational quality contained three dimensions: communication, depth, and viability. These dimensions were measured with nine different scales.

Communication. Communication in two contexts (typical workout and most-enjoyable workout) included amount of talk, relative talk, communication breadth, and exercise encouragement. Communication breadth also was assessed in a third context: outside of workout.

The *amount of talk* during typical workouts and most-enjoyable workouts was assessed with a single item soliciting the percentage of workout time spent "talking to each other." Participants used a sliding scale that allowed the selection of options between 0% and 100% in 10% increments. To assess whether participants or their partners tended to dominate the conversation, the respondent's *relative talk* contribution to intra-workout conversation was assessed with a single 5-point Likert-style item ranging from 1 (*mostly you*) to 5 (*mostly exercise partner*).

The content of conversation with the exercise partner outside of workouts, in typical workouts, and in most-enjoyable workouts was assessed with a single check-all, 10-option item listing various discussion topics: exercise, work, family, friends, romantic relationships, hobbies, current events/news, small talk, philosophy, other. *Communication breadth* was calculated by summing the number topics checked. A follow-up, open-ended item prompted participants to elaborate on what they talked about within the topic areas they selected.
To measure *exercise encouragement*, we asked two questions about typical workouts and most-enjoyable workouts: "My exercise partner encourages me when I am struggling," and "I encourage my exercise partner when she/he is struggling." Each was measured on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale. The mean of these two items was calculated to create a single measure of reciprocal exercise encouragement ($\alpha = .91$).

Depth. Relational depth was measured as closeness and exercise in the relationship. *Closeness* was assessed with the 7-point Inclusion of Other in Self (IOS) Scale (Aron, Aron & Smollan, 1992). This scale has shown acceptable reliability ($\alpha = .93$). The amount of *exercise in the relationship* was assessed with a single item scale created for this study (hereafter referred to as the Exercise in the Relationship Scale – ERScale), which displayed seven nested circles depicting exercise represented as a progressively greater proportion of the entire relationship (see Figure 3). The image was accompanied by the following prompt: "Please choose the picture that best describes the extent to which your relationship with your exercise partner is rooted in exercise." Scores on both the IOS scale and ERScale ranged from 1 to 7.



Figure 3. Exercise in the relationship scale (ERScale).

Viability. Viability was measured as relationship length, exercise relationship length, and hangout frequency. *Relationship length* was measured as the total amount of time the exercise partners had known each other. This single item, "How long have you known your exercise partner?," was followed by open-ended response options soliciting number of months and years. *Exercise relationship length* was assessed with a single item, "How long have you and your exercise partner been working out together?," followed with open-ended response options soliciting number of months and years. *Hangout frequency* was measured as the number of days participants saw each other outside of exercise, assessed with a single item, "How many days do you and your exercise partner see each other outside of exercise?"

Results

Preliminary Analyses

A summary of bivariate correlations, means, and standard deviations of key study variables is available in Table 1 (next page). Research questions posed in the introduction are examined below.

Relationship Background

For RQ1, we asked, what is the relational background (status, meeting context) of exercise relationships? In terms of relationship *status*, most participants reported having a current exercise partner (42.6%), followed by a former exercise partner (34.5%) or an exercise partner who was "on a break" (23.0%). Comparisons between exercisers with different relationship statuses are addressed under RQ7. Regarding *meeting context*, the overwhelming majority of exercise partner relationships began outside of an exercise context (77.0%). When participants were asked to elaborate on how they met their exercise partner, they commonly referred to the role of their partner as being a family member, significant other, or roommate. In

sum, most participants had an exercise partner, and this was someone with whom they had a close relationship outside of exercise.

Table 1.

Summary of bivariate correlations, means, and standard deviations of key study variables

Measure	1	2	3	4	5	6	7	8
 Relationship length (months) Exercise relationship length (months) Communication breadth outside exercise Communication breadth in typical exercise Communication breadth in best exercise 	-							
	.48**	-						
	.21**	.14*	-					
	.18**	.14*	.30**	-				
	.17**	.10	.27**	.78**	-			
6. IOSScale	.21**	.16**	.49**	.21**	.19**	-		
7. ERScale	16**	09	31**	23**	16**	33**	-	
8. Exercise frequency with partner	.07	.02	.03	07	10	02	.26**	-
M	60.28	20.46	6.53	4.21	4.01	5.07	3.02	2.80
SD	65.77	32.25	2.50	2.69	2.82	1.56	1.81	1.43

Note: * p < .05, ** p < .01.

Individual Exercise Goals and Behaviors

For RQ2, we asked, what are the individual exercise goals and behaviors of those who have/had an exercise relationship? Regarding *exercise frequency* and *exercise modality*, participants reported exercising often (M = 4.75 days/week, SD = 1.59) and engaged primarily in running, weightlifting, and walking as exercise (a full report of exercise modalities is shown in Table 2). In terms of physical *fitness level*, participants reported that they were moderately fit (M = 3.79, SD = 1.01), and their primary *individual exercise goals* (with the highest means) were

exercising to improve fitness (M = 4.21, SD = 0.90), feel good (M = 3.95, SD = 1.01), and manage stress (M = 3.93, SD = 1.00).

Table 2.

	<i>v v</i> 1	1	0 7	1
	<u>Percentage</u>			
Running	65%			
Weights	58%			
Walking	56%			
Other	27%			
Elliptical	26%			
Cycling	24%			
Yoga	18%			
Stairclimbing	17%			
Dance	9%			
Rowing	8%			
Swimming	7%			
Pilates	4%			
Hiking	4%			
Racquet	3%			

Exercise modality frequencies as a percentage of the total sample

Mastery goals, which focus on self-improvement were reported significantly higher than the scale midpoint, (M = 4.01, SD = .72), t(382) = 26.95, p < .001. Mastery goals were associated with exercising for the purpose of enhancing fitness, r(382) = .44, p < .001, relieving stress, r(382) = .39, p < .001, to feel good, r(382) = .39, p < .001, and to have fun, r(382) = .31, p < .001. Exercising for fun, in turn, was the reason for exercise most strongly related to exercise frequency, r(382) = .31, p < .001.

Exercise Goals and Behaviors with Partner

For RQ3, we asked, what are the exercise goals and behaviors during exercise with a partner? Regarding *exercise frequency with partner*, participants reported exercising with their partner during most of their workouts (M = 2.8 days/week, SD = 1.43).

Mean responses to the three *exercise engagement* items were above the scale midpoints. For the question, "I look forward to exercising with my workout partner," participants reported agreement significantly higher than the scale midpoint (M = 3.90, SD = 0.87), t(382) = 20.26, p < .001. They also reported values significantly higher than the scale midpoint in response to statements that they were likely to skip a workout if their partner was absent (M = 3.19, SD = 1.26), t(381) = 2.88, p = .005, and their partner helped them to exercise longer and harder (M = 4.01, SD = 1.00), t(382) = 17.78, p < .001.

Regarding *comparative exercise behavior*, participants reported being equally fit and motivated when compared to their exercise partners, as well as equally likely to lead a workout and quit a workout first (ps > .06). Participants reported values higher than scale midpoint on being more likely than their partner to feel satisfied after a workout (M = 3.25, SD = .67), t(381) = 7.14, p < .001. Participants also reported values higher than scale midpoint on *mutual goal facilitation* (M = 3.76, SD = 0.79)), t(382) = 18.83, p < .001.

Relationship between Individual and Partnered Exercise Goals and Behaviors

For RQ4, we asked, how do individual exercise goals and behaviors relate to exercise goals and behaviors during exercise with a partner? Frequency of exercising with one's partner was associated with individual exercise frequency, r(383) = .55, p < .001. Frequency of exercising with one's partner was also associated, albeit weakly, with mutual goal facilitation, r(383) = 0.13, p = .009.

Participants who found their partner helpful to maximize intensity and duration were more likely to look forward to workouts with their partner, r(383) = .53, p < .001. They were also more likely to espouse mastery goals, r(382) = .30, p < .001. Performance goals that hinge on comparison and competition (M = 3.17, SD = .96) were rated as lower than mastery goals,

which focus on self improvement (M = 4.01, SD = .72), t(382) = 15.57, p < .001. Mastery goals were associated with mutual goal facilitation, r(381) = .50, p < .001, suggesting that mastery goals are related to cooperative behavior.

Relational Quality

Descriptive results. For RQ5, we asked, what is the relational quality of exercise relationships? This question was assessed in terms of three dimensions: depth, viability, and communication.

In terms of depth, participants rated their *closeness* to their exercise partner higher than the midpoint on the IOS scale (M = 5.07, SD = 1.56), t(381) = 13.44, p < .001, and lower than the midpoint on the ERScale (M = 3.02, SD = 1.81), t(381) = -10.58, p < .001, suggesting that participants were very close and exercise was only one component of a greater relationship. In terms of viability, the median value for *exercise relationship length* was 12 months – one third of the median total *relationship length* (36 months). Participants reported seeing their partner outside of exercise frequently (M = 4.87 days/week, SD = 2.11). Regarding *amount of talk*, participants reported spending half of their workout time talking with their partner whether in typical workouts (M = 49%, SD = 22.56) or most-enjoyable workouts (M = 50%, SD = 24.23). Regarding *relative talk*, participants reported a value significantly higher than the midpoint for communication in typical workouts (i.e., their partner tended to talk more than they did) (M =3.92, SD = 0.63), t(365) = 27.84, p < .001. In most-enjoyable workouts, talk was more equal but still primarily from the participants' partners (M = 3.06 SD = 0.54), t(365) = 2.21, p = .027.

A complete list of communication topic frequencies is reported in Table 3. The most frequently reported conversation topics varied only slightly between outside workout and withinworkout contexts. Talking about friends was the most frequently reported conversation topic

outside workouts and the second most popular topic in typical workouts and most-enjoyable workouts. Talking about exercise was the most popular in workouts and the second most popular topic outside workouts. *Communication breadth* was collected for outside workouts, in typical workouts, and in most-enjoyable workouts by summing all communication topics. Participants reported talking about a greater number of topics outside workouts (M = 6.53, SD = 2.50) than in typical workouts (M = 4.21, SD = 2.69), t(382) = 14.82, p < .001, or most-enjoyable workouts (M = 4.01, SD = 2.82), t(382) = 15.33, p < .001. In addition to conversation, participants reported agreement higher than scale midpoint to for reciprocal exercise encouragement (M = 4.04, SD = 0.81), t(382) = 25.10, p < .001, in typical workouts.

Table 3.

	Outside of Workouts		Typical	Workouts	Best Workouts		
<u>Rank</u>	Topic	Percentage	Topic	Percentage	Topic	Percentage	
1	Friends	91%	Exercise	84%	Exercise	81%	
2	Exercise	79%	Friends	63%	Friends	58%	
3	Hobbies	78%	Small Talk	53%	Small Talk	49%	
4	Small Talk	78%	Family	43%	Family	44%	
5	Family	77%	Romance	41%	Romance	39%	
6	Romance	69%	Events	39%	Work	36%	
7	Events	66%	Hobbies	38%	Hobbies	35%	
8	Work	65%	Work	38%	Events	34%	
9	Philosophy	31%	Other	12%	Other	13%	
10	Other	20%	Philosophy	11%	Philosophy	12%	

Communication topic frequencies and communication breadth.

Relationships between components of relational quality. For RQ6, we asked, how do aspects of relational quality (depth, viability, and communication) relate to one another in exercise relationships? Partner closeness was moderately related to communication breadth outside workouts, r(382) = .49, p < .001, and weakly related to communication breadth in typical

workouts, r(382) = .21, p < .001. A Steiger *t*-test indicated that the correlation was stronger for outside workouts than typical workouts (z = 4.39, p < .001). A similar pattern was seen with ERScale and communication breadth outside workouts, r(382) = -.31, p < .001, typical workouts, r(382) = -.23, p < .001, and most-enjoyable workouts, r(382) = -.16, p = .002, suggesting that closer exercise partners tend to narrow their communication in exercise. Exercise relationship length, a proxy for long-term exercise adherence, was significantly (albeit weakly) associated with relational closeness, r(298) = .16, p < .001, communication breadth outside workouts, r(299) = .14, p = .018, and in typical workouts, r(299) = .14, p = .016.

Relationship Background Associations with Exercise Goals and Relationship Quality

For RQ7, we asked, is relationship background (status, meeting context) associated with (a) exercise goals and behaviors during exercise alone and with a partner and (b) the relationship quality of exercise relationships? Multiple t-tests compared variables according to to *relationship status* and *meeting context* (means in Table 4).

Table 4.

	Meetin	ig Context	Relationsl	Relationship Status		
	In exercise	Out of exercise	Partner	Broken Up		
	M(SD)	M (SD)	M (SD)	M (SD)		
Hangout frequency						
	3.99 (2.29)	5.13 (1.99)*	5.18 (2.08)*	4.27 (2.06)		
Exercise frequency with						
partner	2.72 (1.37)	3.08 (1.59)*	3.00 (1.47)*	2.43 (1.27)		
Communication breadth outside of exercise	5 31 (2 56)	6 90 (2 37)*	6 78 (2 40)*	6.08 (2.63)		
IOSScale	0.01 (2.00)	0.90 (2.57)	0.70 (2.10)	0.00 (2.05)		
10.00	4.64 (1.66)	5.20 (1.51)*	5.26 (1.46)*	4.71 (1.68)		
ERScale						
	4.08 (1.80)*	2.71 (1.69)	3.11 (1.83)	2.85 (1.76)		
Mastery goals						
	4.01 (0.82)	4.01 (0.71)	4.07 (0.75)*	3.91 (0.70)		
	3.92 (1.08)	4.03 (0.97)	4.12 (0.93)*	3.80 (1.08)		

Means and standard deviations of variables by meeting context and relationship status.

Table 4 (cont'd) Perceived ergogenic benefit of partner

Note. * = mean is significantly higher than other group in category.

Status. Multiple *t*-tests comparing variables according to *relationship status* (currently has a partner vs. no longer has a partner) revealed some patterns that corroborated earlier analyses. When compared to their counterparts who still had an exercise partner, exercisers who had split up with their exercise partner spent less time together outside of exercise (i.e., *hangout frequency*), t(380) = 4.10, p < .001, and had exercised with their partner less frequently, t(381) = 2.29, p = .023. Exercise relationships that had ended were also not as close as those that were ongoing, t(380) = 3.33, p = .001, and reported a smaller communication breadth outside of exercise, t(381) = 2.63, p = .009.

Participants who no longer had an exercise partner reported that their exercise partner did not help them persist harder or longer during exercise when compared to participants who had a current exercise partner, t(381) = 3.03, p = .003. Those whose exercise relationship had ended also were less likely to hold mastery goals than those who had a current exercise relationship, t(380) = 2.07, p = .039. These differences suggest that spending time together, communicating more and developing a closer relationship may be protective against exercise relationship dissolution. In the exercise context, espousing mastery goals and pushing one's partner may also enhance the relationship.

Meeting context. Multiple *t*-tests comparing variables according to partner *meeting context* (met in or out of exercise context) revealed several notable differences. When compared to exercise partners who met outside of exercise, those who met in an exercise context spent less time together outside of exercise, t(380) = 4.52, p < .001, but exercised together more frequently,

t(381) = 2.10, p = .037. Participants who met their exercise partner in an exercise context also viewed exercise as a greater component in their relationship, t(380) = 6.60, p < .001, and reported being less close with their partner, t(380) = 3.03, p = .003, when compared to participants who met their exercise partner outside of exercise. Participants who met their exercise partner outside of exercise. Participants who met their their exercise context also reported significantly lower communication breadth than those who met their partner outside of exercise, t(381) = 5.45, p < .001.

Discussion

Despite the abundance of purported benefits of having an exercise partner on physical activity, there is a dearth of research directly examining exercise relationships. The purpose of this study was to explore the nature of exercise partner relationships by characterizing them on several key features. Most importantly, we sought to examine the exercise relationships from two perspectives: (a) relationship quality, as inferred through communication pattern and interpersonal closeness, and (b) relationship utility (i.e., the relationship's ergogenic potential), as inferred through reported exercise goals and behaviors as well as the perceived benefits of working with an exercise partner.

Relationship Quality

Exercise relationships were characterized by their long length, high interpersonal closeness, robust communication both in and outside of exercise, and their existence within a greater relationship. Unsurprisingly, given the nature of self-disclosure in relationship formation and maintenance, participants with thriving exercise relationships tended to report being closer to and discussing more topics with their exercise partner than participants whose exercise relationships had ended. Participants whose exercise relationships had dissolved reported being

significantly less close with their exercise partners and had spent less time together outside of exercise when compared to participants reporting that their exercise relationships persisted.

Talk between exercise partners covers a wide range of topics but becomes more focused during exercise, especially for closer partners. This may be the case because closer partners are more efficient at communicating and, when task-oriented, do not need to say as much to communicate the same message: they are likely better at predicting one another's behaviors and understanding each other's messages than partners who are not as close. Interactions between closer exercise partners are more fluid, allowing them to focus when necessary.

Exercise partners, at least for this sample of college students, typically emerge from preexisting relationships rather than beginning in an exercise context. Exercise relationships tend to be enduring, close relationships that comprise only a portion of a broader interpersonal relationship. More often than not, exercise is the consequence of an existing connection rather the cause of a connection initially (i.e., exercise partners are less "workout buddies," and more "buddies who workout"). Exercise partners who met in an exercise context spent less time together outside of exercise but exercised together more frequently and viewed exercise as more important in their relationship when compared to exercise partners who met outside of exercise. Exercise-specific advantages associated with meeting one's exercise partner outside of exercise were offset by relational disadvantages: meeting in an exercise context was associated with more superficial relationships and lower communication breadth, which could hinder long-term viability. These findings might be specific to a college-campus population where students live in relatively close quarters and meet each other in classes and resident halls to develop friendships first. They also are a transient population, and while their friendships might endure past their

graduation, their ability to exercise together may not be possible. Exercisers who have settled in to work and family life may show a different pattern of how exercise partners emerge.

Communication breadth was positively related to how strongly participants felt about self-improvement and helping their partners, supporting the notion that competition may be a hindrance to self-disclosure and closeness (Brewer, Abell & Lyons, 2014). The most viable exercise partner relationships were cooperative, not competitive, and were seen not as a means to an end but rather an end in themselves.

Relationship Utility

Though participants occasionally sought an exercise partner to help facilitate their goals, most exercise relationships were less Machiavellian in nature. Exercise partners prioritized selfimprovement and wanted to help their partners improve, and did not view their partners as competition or a performance benchmark. Despite not obviously seeking out their exercise partners for strategic exercise benefits, participants did report that they found utility in their exercise partner for exercise quality and adherence. Participants whose exercise relationships had dissolved reported being significantly less likely to report having mastery (i.e., selfimprovement) goals and reported that their partner had not helped them have more productive exercise sessions when compared to participants with an ongoing exercise partner relationship.

Participants reported that they were well-matched with their exercise partners on fitness and motivation, though they reported that they were more likely than their partners to offer encouragement, push their exercise partner, and feel satisfied after a workout. In any exercise relationship, for all relative superiorities there is a corresponding relative inferiority in the other partner, so these differences are unlikely to reflect reality. Instead, these reported differences

may merely be an example of the "Lake Wobegon" effect, where people tend to believe that their skills and abilities are above average (Kruger, 1999).

Implications

Exercisers seeking an exercise partner may find that their best option is to turn to a close friend, coworker, romantic partner or family member to begin an exercise regimen. Exercise partners who are close, comfortable, and open with one another, and can mutually benefit from the relationship are more likely to see fruitful health outcomes than those just looking for someone to motivate them. For individuals merely seeking a "push," a personal trainer or fitness coach may be a better option: investment may occur through similar transactional processes, albeit monetary instead of emotional/informational.

Exercise partners should focus on getting to know each other, building the relationship outside of exercise as well as in, and viewing exercise time as task to complete rather than a pure social outlet. Approaching workouts with awareness of not only personal goals but also a focus on and prioritization of one's partner's goals may improve relationship quality over time.

Researchers seeking to closely examine exercise partner relationships or manufacture them through software generated partners face a real obstacle. Because exercise partner relationships consist of so much more than exercise, laboratory settings where interactions are restricted or contrived may influence interactions and outcomes. Researchers should be wary of removing existing relationships from their natural environment and understand that forming adhoc exercise relationships in a lab will likely not reflect true workout buddy social dynamics. For those seeking to develop software generated workout partners, a focus on the relational component may make virtual partners more realistic.

Limitations

As with any research, this study has potential limitations. Firstly, this was a survey design, eliminating the possibility of causal inference and precluding practical recommendations for where to look for an exercise relationship or what qualities the ideal exercise relationship may have.

Secondly, relying only on participant feedback may also threaten assumptions of accuracy (e.g., can participants accurately predict an average number of workout days per week?) and truthfulness (e.g., will participants be honest about how much they look forward to workouts with their partner?). Additionally, we used a convenience sample of undergraduate students whose relationships may not reflect those of the broader population. Notably, the sample we surveyed (college students) reported a high level of exercise and most indicated that they had an exercise partner, which seems to conflict with knowledge of exercise habits of the United States.

Thirdly, we only assessed two domains of exercise (i.e., frequency and type). A more comprehensive and validated assessment of physical activity behaviors would have provided richer data on exercise behaviors.

Finally, scale reliability values for the mastery and performance exercise goals were poor. While significant associations were obtained, and this work is exploratory, reliance on adapted or shortened scales may limit the utility of the findings from this study.

Future directions

Firstly, surveying a broader demographic may be useful in forming a general knowledge of exercise partner relationships. Comparing these findings to exercise partner relationships in undergraduate students in different majors or colleges, middle-age and older people, active

exercisers, and more sedentary individuals can help to illuminate the nature of relationships in exercise. Any additional surveys should include questions on exercise intensity and duration instead of only frequency.

Secondly, though most participants in our survey reported having an exercise partner at some point in time, some either no longer had an exercise partner or have never had one. An inquiry into the personal characteristics (e.g., personality dimensions) that may predispose one to seek or benefit from an exercise partner may be worthwhile.

Thirdly, a comprehensive understanding the nature of *commitment* to the relationship and the factors predicting it may inform researchers and practitioners interested in maximizing physical activity. Understanding commitment to a relationship for which exercise is a critical component is important because such a relationship necessitates exercise participation. Factors associated with or predictive of commitment, especially performance aspects (factors comprising relationship utility) and interpersonal aspects (factors comprising relationship quality) of the exercise relationship, are of special interest.

To overcome the limitations imposed by survey research, direct observation of exercise partners (e.g., mic'd workouts, video to capture nonverbals) could provide more information on the nature of interactions. Longitudinal relationship tracking may help see relationships change over time to inform causal patterns in exercise partner relationship success or dissolution.

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Author Disclosure Statement

No competing financial interests exist.

APPENDIX

APPENDIX

MICHIGAN STATE

October 30, 2014

- To: Gwen Wittenbaum 559 Communication Arts Building MSU
- IRB# x14-1122e Category: Exempt 2 Re: Approval Date: October 30, 2014

Exercise Partner Relationship and Communication Survey Title:

The Institutional Review Board has completed their review of your project. I am pleased to advise you that your project has been deemed as exempt in accordance with federal regulations.

The IRB has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. Under our exempt policy the Principal Investigator assumes the responsibilities for the protection of human subjects in this project as outlined in the assurance letter and exempt educational material. The IRB office has received your signed assurance for exempt research. A copy of this signed agreement is appended for your information and records.

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Revisions: Exempt protocols do not require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a new initial application will be required.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to the human subjects and change the category of review, notify the IRB office promptly. Any complaints from participants regarding the risk and benefits of the project must be reported to the IRB.



Follow-up: If your exempt project is not completed and closed after three years, the IRB office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with the IRB office.

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Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at IRB@msu.edu. Thank you for your cooperation.

Sincerely,

A. Miller

Harry McGee, MPH SIRB Chair

c: Emery Max, Deborah L. Feltz

Initial IRB Application Determination *Exempt*

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CHAPTER 3

STUDY 2: EXERCISE RELATIONSHIP COMMITMENT

Preface

This study is the second installment in the series on exercise relationships. It builds upon the first by designing and testing a conceptual model of commitment in exercise relationships. This study serves to further explore exercise relationships, commitment within them, and exercise behaviors associated with that commitment.

This study was justified by the findings of the previous study, that exercise relationships are characterized by closeness and individuals in exercise relationships may be much more than *just* workout buddies. Study conception was a collaborative process involving input from all authors (Max, Feltz, Wittenbaum, Smith, & Pfeiffer). The first author prepared the study instrument, collected and analyzed the data, and prepared the manuscript. The second author (Feltz) assisted in the editing of the manuscript. Data collection for the student sample was facilitated by the third author (Wittenbaum). All authors had input on the hypothesized model. This manuscript will be submitted to the journal *Psychology of Sport and Exercise*.

Abstract

The United States population suffers from poor health, largely as a consequence of physical inactivity. One of the most frequently cited barriers to engaging in physical activity is lack of an exercise partner, and the ergogenic benefits of social factors in exercise have been well-documented. Despite the widely-recognized value of an exercise partner among health scientists and the lay public, there has been only one study to date examining the nature of exercise relationships (i.e., the relationships between exercise partners; Max, Feltz, & Wittenbaum. 2016). High interpersonal closeness and communication breadth observed in

exercise relationships justify further examination of relational factors in those relationships. This study examined exercise relationship commitment through the lens of Rusbult's (1980) investment model of interpersonal relationships with participants (N = 522), aged 18-65 years, who have (or have had) an exercise relationship. Participants completed an 82-item web survey that consisted of assessments of relational background, closeness, commitment, satisfaction, investment, attractiveness of alternatives, participant exercise behaviors (both individual and during exercise with the partner), and basic demographic information. Using multiple regression and path analyses to test relationships in the investment, results showed that psychological commitment to an exercise relationship was positively predicted by satisfaction with and investment in the relationship, and negatively predicted by the attractiveness of alternatives to the relationship. Psychological commitment mediated the relationship between satisfaction, attractiveness of alternatives, and investment, and behavioral commitment to the relationship. Behavioral commitment mediated the relationship between psychological commitment to the relationship and individual exercise behaviors. These results show support for a satisfaction and investment model of exercise relationship commitment.

Introduction

Despite paying over \$3 trillion per year on healthcare, the United States has one of the poorest health records in the world (Keehan et al., 2015). Nearly two-thirds of Americans are overweight or obese, and the most overweight report the lowest levels of physical activity (Hedley et al., 2004; Tucker, Welk, & Beyler, 2011). Increasing physical activity has been demonstrated to greatly reduce health risk, and the United States Department of Health and Human Services recommendation of 150 min of moderate to vigorous physical activity per week can be met in a number of ways (Garber et al., 2011; USDHHS, 2008). However, common

interventions such as health education, access to fitness facilities and equipment, training, and diet are not reliably successful, and though obesity and activity levels are no longer trending negatively, they remain poor (Dwyer-Lindgren et al., 2013; Ogden, Carroll, Kit, & Flegal, 2014).

Although the health benefits of physical activity and exercise are well-known, physical inactivity in leisure time persists. Low motivation to initiate and persist in an exercise program has been identified as a key factor contributing to low levels of physical activity (Dishman & Buckworth, 1996; Teixeira, Carraça, Markland, Silva, & Ryan, 2012). Physical inactivity is fundamentally a motivation issue as the most frequently self-reported barriers to exercise are all motivational: "no time," "laziness," "other priorities," "no motivation," and "no energy" (Ebben & Brudzynski, 2008). These reported barriers are reflective of priorities; they are an indication that the behavior is undesirable, not prioritized, and not valued.

Social factors have potent motivating potential. The association between social forces and physical activity has been demonstrated repeatedly; family, friends, co-exercisers, exercise instructors, and valued others can affect exercise involvement (Carron, Hausenblas, & Mack, 1996; Darlow & Xu, 2011; Jago et al., 2011). This is especially true for friends and non-familial valued-others, who have the greatest influence over exercise behaviors (Carron et al., 1996). In light of this research, it is unsurprising that one of the most frequently reported reasons for not exercising is lack of a workout partner (Ebben & Brudzynski, 2008; Louw, Biljon, & Mugandani, 2012). Despite the importance of social factors in physical activity (namely, friends and valued others), there has been only one study to date on exercise relationships (i.e., interpersonal relationships that include regular co-exercise) (Max, Wittenbaum, & Feltz, 2016). Max et al.'s work found that exercise relationships tend to be quite close, frequently arise from preexisting relationships, tend to be cooperative rather than competitive, and tend to include discussion of many non-exercise topics. Furthermore, factors associated with exercise relationship continuance or dissolution fall under both performance *and* relational factors. These findings suggest that exercise relationships are interpersonal in nature and, aside from exercise, may share many characteristics with other interpersonal relationships (e.g., friendships, romantic relationships). Given the importance of exercise relationships and the unexpected findings from Max et al., further examination of the *relational* aspects of exercise relationships is warranted, especially as they pertain to relationship viability.

A comprehensive understanding of the behaviors associated with enduring exercise relationships that remain intact and encourage exercise participation may inform researchers and practitioners interested in maximizing physical activity. Understanding factors that may predict persistence in exercise relationships is important because *an exercise relationship necessitates exercise*. While behavioral outcomes (i.e., exercise behaviors) are paramount when considering implications for public health, understanding the psychological mechanisms that may ultimately influence behavior is also critically important. Accordingly, the focus of this research was to develop an understanding of commitment in exercise relationships.

Commitment, conceptualized as a motivation to maintain a connection to an individual, behavior, or organization, is largely a function of an individual's perception and assessment of (a) satisfaction (e.g., "am I happy with this relationship"), (b) attractiveness of alternative options, and (c) investments (i.e., sunk costs) (Rusbult, 1980). Researchers have examined commitment to friends (Branje, Frijns, Finkenauer, Engels, & Meeus, 2007), romantic partners (Impett, Beals, & Peplau, 2001; Rusbult, 1980), occupations (Rusbult & Farrell, 1983), mentors (Allen & Eby, 2008), and sport (Scanlan et al., 1993; Weiss, Weiss, & Amorose, 2010). However, commitment has yet to be examined in the context of exercise relationships. This

study outlines and tests an application of the traditional investment model of relationship commitment, as explained below, to *exercise* relationships, which may have antecedents to commitment that are unique.

The Investment Model

The investment model was developed by Rusbult (1980) to predict an individual's commitment to (and satisfaction with) a romantic interpersonal relationship. Though the model was developed for and has most frequently been applied to romantic relationships, it was intended to conceptualize commitment in a variety of ongoing interpersonal relationship types (e.g., friendship), and thus may be well-suited to enhance understanding of commitment in exercise relationships. The original relationship commitment model by Rusbult (1980) included three components: satisfaction with the relationship, attractiveness of alternatives, and investment in the relationship as predictors of psychological commitment to the relationship. See the "Core Model" in Figure 4 for Rusbult's investment model (next page).

Relationship commitment is fundamentally a psychological variable, and can be defined as the *intent* or *desire* for the relationship to persist. In the first iteration of the model, no attempt was made to predict behavior. Rather, the focus was on commitment as a purely psychological construct. Research has shown, however, that psychological commitment reliably and positively predicts behavioral commitment (i.e., persistence in the relationship), and is predicted by satisfaction with the relationship, the perceived attractiveness of relationship alternatives, and size of investment in the relationship (Rusbult, Martz, & Agnew, 1998).

Satisfaction. The first antecedent of commitment is satisfaction which is derived from the degree to which a relationship is perceived to be rewarding (i.e., when benefits exceed costs; mutual goal facilitation, proxy efficacy) and useful (i.e., needs are fulfilled). Individuals persist

in relationships that they perceive to be rewarding and useful (Sabatelli, 1984). In the context of an exercise relationship, satisfaction may be determined by not only fulfillment of companionship needs, as with other types of interpersonal relationships (e.g., friendship), but also exercise-related needs (e.g., motivation, instruction, accountability).



Figure 4. Analysis summary and conceptual model of exercise relationship commitment.

In addition to being inherently social, humans are goal-driven organisms: goals are a driving force for human behavior and permeate much of our social space (Fitzsimons & Shah, 2008). Because of this, individuals seek out and engage in relationships that may be useful to them by facilitating their goals, and may draw closer to one another when they perceive each other as instrumental (Fitzsimons & Fishbach, 2010; Slotter & Gardner, 2011). Mutual goal facilitation has even been described as the primary function of relationships (Berscheid &

Ammazzalorso, 2001), an idea that is bolstered by evidence of the cooperative evolutionary history of the species (Alexander, 1974; Hamilton, 1971; Hamilton & Axelrod, 1981).

Individuals may pursue multiple goals simultaneously within relationships. In the exercise context, physical performance goals may be the most salient. Exercisers who perceive that their exercise relationship yields dividends in the exercise domain (i.e., exercise benefits) are likely to deem those relationships rewarding and equitable - and therefore satisfying. Perceived ergogenic benefits of an exercise partner (e.g., facilitative of enhanced exercise, more frequent exercise, or more regular exercise) may, consequently, contribute to exercise relationship satisfaction.

Proxy efficacy, or one's belief in the ability of an expert or authority figure to facilitate one's own goals or behaviors, may also influence satisfaction with an exercise relationship by increasing perceived reward and fulfilling exercise-related needs. At its core, proxy efficacy for an exercise partner is an individual's perception of partner utility in a goal-oriented relationship (i.e., benefits). Although the construct was developed to examine interpersonal relationships with social hierarchy (e.g., exerciser/personal trainer, athlete/coach, student/mentor, child/parent), application to an exercise relationship, where individuals may rely on one another to meet individual goals, is justified. Proxy efficacy has been found to predict exercise behaviors with other types of relationships in the physical activity context (Bray, Gyurcsik, Culos-Reed, Dawson, & Martin, 2001).

Satisfaction may also be affected by relationship maintenance behaviors, which are efforts to improve relationship satisfaction and serve to fulfill social needs. Relationship maintenance behaviors are intended to boost relationship satisfaction by increasing the benefit:cost ratio, with the end goal to improve behavioral relationship commitment (Fehr,

1996). Although most research on relationship maintenance behaviors has focused on romantic relationships, support for the construct has also been found with friendships (Oswald, Clark, & Kelly, 2004).

Attractiveness of alternatives. The second predictor of psychological commitment is the attractiveness of viable alternatives (e.g., appeal of a different relationship or no relationship at all). In previous research, attractiveness of alternatives has been conceptualized as the potential for satisfaction in other relationships (i.e., the attractiveness of other relationships – the degree to which alternative options are perceived to have the capacity to fulfill needs) (Rusbult, 1980). Attractiveness of alternatives in an exercise relationship may be determined by the appeal of exercising with another specific exercise partner (i.e., forming a different exercise relationship with a known other), any exerciser (i.e., finding a new exercise partner), exercising alone (i.e., all of my needs can be met elsewhere), or not exercising at all.

Investment. The third antecedent of commitment is *investment*. Rusbult et al. (1998) define investment as the "magnitude and importance of the resources that are attached to (or poured into) the relationship," (p. 359). Investments can be either direct (i.e., intentional and intrinsic) or indirect (i.e., unintentional and extrinsic) (Rusbult, 1980).

Direct investments occur when resources are allocated in the effort to enhance the relationship with examples being self-disclosed personal/private information, time spent, and effort expended on the relationship. In human interactions, individuals have an interest to learn more about one another (Berger & Calabrese, 1975). To satisfy this desire, people engage in repeated, reciprocal self-disclosure (i.e., the exchange of vulnerable, privileged information among individuals in a relationship) until they have a deep, broad understanding of one another (Altman & Taylor, 1973). Reciprocal self-disclosure, in addition to functioning as an

information-sharing tool, also serves as the basis for closeness in relationships (consequently serving as a form in investment). Max et al. (2016) found that individuals in exercise relationships exhibited high communication breadth and frequency (i.e., mutual self-disclosure with deep and numerous communication topics).

In addition to communication, time spent on the relationship and the total duration of the relationship are forms of direct investment. Not only is time itself a resource, but it affords more opportunities for self-disclosure (thereby further contributing to investment).

Direct investment may also contribute to indirect forms of investment (e.g., shared identity). One outcome of repeated reciprocal self-disclosure is *closeness* (i.e., the degree of influence over one another, diversity of interactions, and frequency of those interactions) (Kelley et al., 1983). Closeness is a measure of inclusion of the other in self (Aron, Aron, & Smollan, 1992), and may serve as a proxy for identity-investment with one's exercise partner. Max et al. (2016) found that individuals in exercise relationships exhibited high levels of interpersonal closeness, which may serve as an indirect investment that could increase relationship commitment.

In addition to interpersonal closeness and shared identity, more tangible examples of indirect investments may come in the form of shared space, resources, and relationships. In romantic relationships, indirect investments may include having a home together, shared assets, and children. For peers, it may be friends-in-common, and shared hobbies. In exercise relationships, this may be belonging to the same gym, sharing a gym membership, or belonging to the same running club.

Commitment. Commitment can be examined either as a psychological or behavioral factor, whether one wishes to assess motivation subjectively (i.e., self-report) or instead wishes

to infer it from behavior. The focus of this project will be on psychological commitment and its antecedents because there are myriad factors that may moderate the relationship between motivation (i.e., psychological commitment) and motivated behavior (i.e., behavioral commitment). However, the consequences of psychological commitment - behavioral commitment (i.e., maintaining the exercise relationship – given that it necessitates exercise) – is also critically important to physical activity maintenance.

Aim

To date, there has been only one formal inquiry into the nature of relationships between exercise partners. Extant literature and theory in the field of interpersonal communication provides a foundation for a conceptual framework that allows for prediction and hypothesistesting justified by the descriptive work of Max et al. (2016). This study had two aims. The first aim was to test the adaptation of Rusbult's (1980) core model to exercise relationships. The second aim was to expand and test a conceptual model of commitment in exercise relationships to include behavioral commitment to the exercise relationship and individual physical activity, as well as examining the predictors of the core model. See Figure 4 for the conceptual model with behavioral consequences of commitment and exploratory predictors of satisfaction and investment.

Hypotheses

The hypotheses were tested with participants who have (or have had) an exercise relationship. We examined only one member of the dyad because the conceptual model includes primarily intrapersonal cognitive variables. Because of sample size and complexity of model, the hypotheses are organized and tested in sections to employ both multiple regression and path analyses where appropriate: a) predicting psychological commitment: a test of the core model, b)

predicting behavioral commitment and individual activity behaviors, and lastly c) testing the antecedents of the core model.

A Test of the Core Model: Predicting Psychological Commitment

H1: Psychological commitment to exercise relationship will be directly and positively predicted by satisfaction level and investment size and negatively predicted by attractiveness of alternatives.

Behavior Expansion: Predicting Behavioral Commitment and Individual Physical Activity

H2: Building on the core of the model, psychological commitment will be a significant mediator of satisfaction, attractiveness of alternatives, and investment as predictors of behavioral commitment.

H3: Adding to the model, behavioral commitment will significantly mediate psychological commitment to the exercise relationship as a predictor of individual physical activity.

Exploratory Predictors: Testing the Antecedents of the Core Model

H4: Satisfaction level will be directly and positively predicted by friendship maintenance, the ergogenic benefits of the exercise relationship, and proxy efficacy.

H5: Investment size will be directly and positively predicted by communication breadth, interpersonal closeness, and relationship length.

Method

Participants

After obtaining institutional approval from the Human Research Protection Program, an anonymous web survey hosted by Qualtrics was conducted on community members age 18-65 years who were subscribed to the email list of a web-based fitness company, and undergraduate students enrolled in communication courses at a large Midwestern university. Community participants were recruited through email, and undergraduate participants were recruited and enrolled in the study through a university endorsed website, which allowed them to obtain course credit while keeping their responses anonymous. Participants who did not have an exercise partner were solicited questions about their personal exercise habits, and those who did not exercise at all were automatically forwarded to the end of the survey to receive their participation credit. The sample was delimited to include only participants who reported that their primary mode of exercise with a partner was running, resistance training, or walking.

Demographics. A total number of 435 undergraduate students enrolled and consented, though 133 did not meet criteria for inclusion in primary analyses (102 never had an exercise partner, 29 reported their primary exercise modality was outside the scope of the study, 2 did not complete the survey). A total number of 308 community members enrolled and consented, though 84 did not meet criteria for inclusion in primary analyses (75 never had an exercise partner, 9 reported their primary exercise modality was outside the scope of the study). The final combined sample (N = 522; 217 females, 217 males, 3 unreported; 298 students, 224 community) was included for subsequent analyses.

Survey Instrument

The 82-item survey consisted of measures assessing relational background, closeness, commitment, satisfaction, investment, attractiveness of alternatives, participant exercise behaviors (both individual and during exercise with the partner), and basic demographic information and took approximately 20 min to complete. Participants responded individually, not with their exercise partner.

Satisfaction. Satisfaction with the exercise relationship, assessed with a 5-item measure, was adapted from Rusbult et al. (1998) to apply to exercise relationships ($\alpha = .87$). Participants indicated their agreement on a 1 (*completely disagree*) to 9 (*completely agree*) scale to prompts such as "Our exercise relationship does a good job fulfilling my exercise needs," and "I feel satisfied with our exercise relationship."

Ergogenic benefits. Perceived performance-boosting benefits of the exercise relationship were assessed by soliciting agreement on a 5-item measure created for this study ($\alpha = .83$). Responses ranged from 1 to 9 (1=completely disagree, 9=completely agree). Example ergogenic benefits included "I am likely to skip a workout if my exercise partner is unavailable," and "My exercise partner and I help each other meet our goals."

Proxy efficacy. Proxy efficacy was assessed with a 7-item measure adapted from Brawley and Shields (2007) to apply to exercise relationships ($\alpha = .92$). Participants reported their confidence in their exercise partner's ability to help them perform each of a list of exerciserelated skills, with responses ranging from 1 (not at all confident) to 10 (completely confident). Responses for behaviors that did not apply (NA = I do not rely on my exercise partner for this behavior) were not included in calculation of mean score. Example behaviors included "use safe, effective exercise techniques," and "motivated me to exercise harder or longer."

Relationship maintenance behaviors. Relationship maintenance behaviors were assessed with a 20-item measure from Oswald, Clark, and Kelly (2004; $\alpha = .94$). Participants responded with their behavioral frequency of a list of behaviors preceded by the stem "How often do you and your exercise partner," with responses ranging from 1 (*never*) to 11 (*frequently*). Example behaviors included "Express thanks when the other person does something nice for you," and "Try to make each other laugh."

Attractiveness of alternatives. Attractiveness of alternatives to the exercise relationship was assessed with a 5-item measure, adapted from Rusbult et al. (1998), to apply to exercise relationships ($\alpha = .70$). Participants indicated their agreement on a 1 (*completely disagree*) to 9 (*completely agree*) scale to prompts such as "My needs for a workout motivation boost could easily be fulfilled elsewhere (e.g., by exercising with another exercise partner, alone, with a trainer, with a fitness class, or with an exercise game or app)," and "There are other possible exercise partners I may prefer to workout with."

Investment. Perceived investment of the exercise relationship was assessed with a 5item measure, adapted from Rusbult et al. (1998), to apply to exercise relationships ($\alpha = .75$). Participants indicated their agreement on a 1 (*completely disagree*) to 9 (*completely agree*) scale to prompts such as "I have put a great deal into my exercise relationship that I would lose if we were to stop exercising together," and "Many aspects of my life besides exercise have become linked to my exercise partner, and I would lose all of this if we were to stop working out together."

Exercise relationship length. Exercise relationship length was assessed with a single item, "How long have you and your exercise partner been working out together?," followed with open-ended response options soliciting number of months and years.

Communication breadth. The content of conversation with the exercise partner outside of workouts and in typical workouts was assessed with a single check-all, 10-option item listing various discussion topics: exercise, work, family, friends, romantic relationships, hobbies, current events/news, small talk, philosophy, other. Communication breadth was calculated by summing the number topics checked. A follow-up, open-ended item prompted participants to elaborate on what they talked about within the topic areas they selected.
Closeness. Closeness was assessed with the 7-point Inclusion of Other in Self (IOS) Scale (Aron, Aron & Smollan, 1992). This scale has shown acceptable reliability in Aron, Aron & Smollan's (1993) paper ($\alpha = .93$)

Psychological commitment. Perceived commitment to the exercise relationship was assessed with a 5-item measure, adapted from Rusbult et al. (1998), to apply to exercise relationships ($\alpha = 87$). Participants indicated their agreement on a 1 (*completely disagree*) to 9 (*completely agree*) scale to prompts such as "I'm determined to keep working out with my exercise partner," and "I am committed to maintaining my exercise relationship."

Behavioral commitment. Behavioral commitment to the exercise relationship was assessed with the proxy of workout frequency. Exercise frequency with partner was measured by asking the number of days that participants exercised with their partner, assessed with the item, "How many days per week, on average, do you and your exercise partner exercise together?"

Physical activity. Physical activity was assessed with the International Physical Activity Questionnaire (IPAQ; Hagströmer, Oja, & Sjöström, 2006). We used the 7-day recall short form that solicited information about participants' duration of physical activity over the previous week at all physical activity intensities. Total physical activity was measured after data collection by summing metabolic equivalents (METs) for walking, moderate, and vigorous physical activity to the units MET-min/week. The IPAQ has demonstrated good reliability ($\rho = .8$) and criterion validity consistent with other self-report measures with ρ values of approximately .3 (Craig et al., 2003).

Results

Demographics

A breakdown of physical characteristics by sample and sex is reported in Table 5. The mean age of the sample was 22.47 years (SD = 6.12), with a mean height of 173.56 cm (SD =11.58), weight of 73.98 kg (SD = 15.10), and BMI was 24.59 (SD = 4.24). The sample was primarily Caucasian (n = 345, 66.0%). The total sample exceeded the HEPA (health-enhancing) physical activity) minimum cutoff of 3 days/wk of vigorous physical activity (M = 4.24, SD =1.82; t(517) = 15.26; p < .001, d = .68) and 1500 MET-min/wk (M = 10376.16 MET-min/wk, SD = 11419.03; t(422)= 21.87; p < .001, d = 1.04). Approximately half of participants reported that they had an exercise partner previously but were no longer working out together (n = 235, 45%). Unlike in Max et al. (2016), which found that approximately 77% of exercise relationships came from preexisting relationships or friendships, in this sample closer to about one-half of participants met their exercise partner outside of an exercise context (n = 290, 55.6%). A Chisquare test of independence to examine the relation between exercise partner meeting context and recruitment source (i.e., student vs. community) revealed no significant relationship, X^2 (1, N = 522 = .94, p = .33, suggesting that this difference was not attributable to the inclusion of a new, broader demographic. See Table 6 for breakdown of means and standard deviations of key variables overall and by sex and sample and Table 7 for a breakdown by activity modality.

Table 5.

Demographic in	joi mailon by	sumple	ини зел.							
		Comm	nunity		Students					
	Men	<u>SD</u>	Women	<u>SD</u>	Men	<u>SD</u>	Women	<u>SD</u>		
N	126	-	97	-	176	-	120	-		
Age (years)	25.98	8.24	26.38	7.20	19.78	1.61	19.64	1.62		
Height (cm)	177.09	9.22	163.50	9.98	181.56	8.13	165.76	8.48		

Demographic information by sample and sex.

Table 5 (cont'd)								
Weight (kg)	83.03	11.86	62.40	8.44	81.18	13.96	62.80	9.92
BMI	26.59	3.96	23.77	4.19	24.75	4.02	23.05	4.10

Table 6.

Means and standard deviations of key variables overall and by sex.

	Men				Women			Overall	<u>Reliability</u>	
	\underline{N}	Mean	<u>SD</u>	\underline{N}	Mean	<u>SD</u>	\underline{N}	Mean	<u>SD</u>	α
Total Physical Activity										
(MET-min/wk)	265	10363.35	12757.84	177	10308.87	9060.21	444	10376.16	11419.03	-
Behavioral Commitment								• • • •		
(days/wk)	294	3.24	1.61	211	2.87	1.58	508	3.08	1.60	-
Commitment	302	5.98	1.72	217	6.37	1.89	522	6.13	1.81	.87
Satisfaction	302	6.97	1.53	217	7.31	1.54	522	7.10	1.55	.87
Attractiveness of										
Alternatives	302	5.38	1.48	217	5.08	1.51	522	5.25	1.50	.70
Investment	302	4.42	1.66	217	4.56	1.77	522	4.47	1.71	.75
Proxy Efficacy	299	7.77	1.79	216	7.79	1.81	516	7.78	1.80	.92
Ergogenic Benefits	298	7.48	1.46	215	7.83	1.46	514	6.85	1.30	.83
Relationship Maintenance										
Behaviors	296	7.26	1.84	214	8.36	1.75	511	7.72	1.88	.94
Communication Breadth										
(Outside)	302	6.37	2.60	217	7.11	2.35	522	6.64	2.56	-
Closeness	299	4.58	1.64	216	5.36	1.43	516	4.90	1.60	-
Exercise Relationship										
Length (months)	300	17.65	21.66	216	17.05	18.74	517	17.40	20.45	-

Table 7.

Means and standard deviations of key variables by activity modality.

	Weights				Runnii	<u>1g</u>	Walking		
	\underline{N}	Mean	<u>SD</u>	\underline{N}	Mean	<u>SD</u>	\underline{N}	Mean	<u>SD</u>
Total Physical Activity (MET-min/wk)	328	10071.65	8096.83	83	10897.38	19764.62	16	11710.15	13565.00
Behavioral Commitment (days/wk)	328	3.19	1.54	83	2.47	1.46	16	1.81	1.28
Commitment	328	6.30	1.78	83	5.79	1.97	16	5.34	1.41
Satisfaction	328	7.29	1.43	83	7.00	1.40	16	5.49	1.79
Attractiveness of Alternatives	328	5.27	1.51	83	5.42	1.41	16	4.99	1.69
Investment	328	4.47	1.72	83	4.27	1.62	16	4.18	1.90
Proxy Efficacy	328	7.98	1.69	83	7.16	1.76	16	6.19	2.19
Ergogenic Benefits	328	7.61	1.41	83	7.15	1.46	16	6.49	1.85
Relationship Maintenance Behaviors	328	7.82	1.81	83	7.53	2.00	16	7.37	2.24
Communication Breadth (Outside)	328	6.85	2.48	83	6.42	2.37	16	6.19	2.93
Closeness		4.96	1.59	83	4.82	1.65	16	4.88	1.86
Exercise Relationship Length (months)		17.16	17.26	83	13.66	21.25	16	10.94	13.43

Thirty-eight participants were excluded from all data analyses because they reported that their primary exercise modality with their workout partner was something other than resistance training, running, or walking and we chose to delimit participant selection for a more homogenous sample who engaged in types of exercise that are not inherently competitive. Of the 522 who were included, participants overwhelmingly reported resistance training as their primary mode of exercise with a workout partner (n = 403, 77%), followed by running (n = 100, 19.16%) and then walking (n = 19, 3.64%) – the trend did not differ by sex.

A Test of the Core Model: Predicting Psychological Commitment

In the first iteration of Rusbult's (1980) model, no attempt was made to predict behavior. Rather, the focus was on commitment as a purely psychological construct. The same approach was taken by Scanlan et al. (1993) when developing a model of commitment for sport. Accordingly, we first sought to establish the relationship among these four cognitive variables in the exercise context absent any behavioral factors.

Before scale means were calculated, scale reliability was assessed for each measure. The 5-item measure for exercise relationship satisfaction was determined to have an acceptable reliability ($\alpha = .87$). The 5-item measure for attractiveness of alternatives was low ($\alpha = .68$). One item, "I would be fine if I didn't have an exercise partner," correlated poorly with other items in the scale, perhaps due to issues with comprehension of the question. After the omission of one item, an acceptable reliability of $\alpha = .70$ was obtained. The mean of the revised 4-item measure was used for subsequent analyses. The 5-item measure for perceived investment in the exercise relationship was determined to have an acceptable reliability ($\alpha = .75$). Finally, the 5-item measure for psychological commitment to the exercise relationship was determined to have an acceptable reliability ($\alpha = .87$).

A multiple regression analysis was performed to examine if satisfaction with the exercise relationship, attractiveness of alternatives, and investment in the exercise relationship significantly predicted psychological commitment to the exercise relationship. The model had good fit, accounting for nearly half of the variance in psychological commitment, $F(3, 518) = 146.80, p < .001, R^2 = .46$. As expected, psychological commitment was positively predicted by both satisfaction ($\beta_{standardized} = .46, p < .001$) and investments ($\beta_{standardized} = .36, p < .001$), and negatively predicted by attractiveness of alternatives ($\beta_{standardized} = -.07, p = .032$). This suggests that psychological commitment to the exercise relationship was highest with exercisers for whom satisfaction was higher, perceived investment was greater, and alternatives were deemed relatively unattractive (although this was a weak predictor). This is evidence in support of Hypothesis 1, that psychological commitment to exercise relationship is directly and positively predicted by satisfaction level and investment size and weakly negatively predicted by attractiveness of alternatives.

Behavior Expansion: Predicting Behavioral Commitment and Individual Physical Activity

Although the psychological construct of commitment is at the core of this study as the first examination of commitment in exercise relationships, health and real-world implications are the ultimate goals of this line of inquiry. We sought to assess the utility of this model in predicting behavioral commitment (i.e., partnered exercise frequency) and total individual physical activity.

Predicting behavioral commitment. A path analysis was conducted to determine the associations among the variables of relationship satisfaction, attractiveness of alternatives, relationship investments, psychological commitment to the exercise relationship, and behavioral commitment to the exercise relationship (i.e., partnered workout days per week).

The proposed model was just-identified and thus the correlations were reproduced exactly, precluding tests of model fit. To test the mediation hypothesis, we used a bootstrapping approach (Preacher and Hayes, 2008) because when compared to the traditional Baron and Kenny (1986) approach, it is less prone to Type I error and has greater power in detecting indirect effects. The analysis utilized 500 bootstrap samples and 95% confidence intervals to evaluate the significance and magnitude of the indirect effects. The results showed that behavioral commitment was directly (albeit weakly) associated with relationship satisfaction ($\beta_{standardized} =$.078, p = .19) and attractiveness of alternatives ($\beta_{\text{standardized}} = -.167$, p = .004), but not perceived investment in the relationship ($\beta_{\text{standardized}} = .048, p = .41$). A significant, positive direct effect was observed between psychological commitment and behavioral commitment ($\beta_{\text{standardized}} = .164, p =$.011). We observed significant indirect effects for satisfaction ($\beta_{\text{standardized}} = .073, p = .011$) and perceived investment ($\beta_{\text{standardized}} = .059, p = .011$), but not for attractiveness of alternatives $(\beta_{\text{standardized}} = -.013, p = .055)$. These findings provide moderate support for the mediational hypothesis (i.e., the relationships between two of the three predictor variables and behavioral commitment were mediated by psychological commitment). The total effects (i.e., combined direct and indirect effects) of satisfaction ($\beta_{\text{standardized}} = .151$, p = .004) and attractiveness of alternatives ($\beta_{\text{standardized}} = -.181$, p = .004), and perceived investment ($\beta_{\text{standardized}} = .107$, p = .048) on behavioral commitment were all weak but significant.

Predicting individual physical activity behaviors. We next sought to test the association between psychological commitment, behavioral commitment, and total physical activity, absent the predictors present in the previous analysis. The proposed model was just-identified and thus the correlations were reproduced exactly, precluding tests of model fit. To test the mediation hypothesis, we used the same bootstrapping and confidence interval approach

as in the previous section. The results showed that, as expected, total individual physical activity was not directly associated with psychological commitment to the exercise relationship ($\beta_{standardized} = -.008, p = .97$). However, a significant positive direct effect was observed between psychological commitment and behavioral commitment ($\beta_{standardized} = .266, p < .001$), and between behavioral commitment and total individual physical activity ($\beta_{standardized} = .148, p =$.003). The indirect (i.e., mediated) relationship between psychological commitment and total individual physical activity was weak but significant ($\beta_{standardized} = .024, p = .012$), providing support for the mediational hypothesis: the relationship between psychological commitment to an exercise relationship and total individual physical activity was entirely mediated by behavioral commitment to the exercise relationship.

Overall model fit. With the bootstrapped sample, we next sought to examine the fit of the model including the behavior expansion. A path analysis was conducted to determine the causal effects among the variables of relationship satisfaction, attractiveness of alternatives, relationship investments, psychological commitment to the exercise relationship, behavioral commitment to the exercise relationship, and total individual exercise. A Chi-Square Goodness of Fit test based on predicted vs. observed covariances was non-significant (p = .36), suggesting good model fit. We performed follow-up fit evaluations using the Comparative Fit Index (CFI) and Normed Fit Index (NFI). Cutoff values of NFI or CFI that are .95 or larger are considered good fitting models (Hu & Bentler, 1999). Goodness of Fit tests comparing the proposed model with an alternative perfect-fit-null also demonstrated good fit for the proposed model (NFI = .991, CFI = .999). The expanded model, presented in Figure 5 (next page) with standardized path coefficients, was consistent with the empirical data and accounted for 779.7 METmin/wk of

individual physical activity (i.e., behavioral commitment) per 1 SD change in behavioral commitment to the exercise relationship (d = .15).

Exploratory Predictors: Testing the Antecedents of the Core Model

Satisfaction. Before scale means were calculated, scale reliability was assessed for each measure. The 5-item measure for perceived ergogenic benefits was low ($\alpha = .64$). One item, "I am likely to skip a workout if my partner is unavailable," correlated poorly with other items in the scale, perhaps due to issues with comprehension of the question. After the omission of that item, an acceptable reliability of $\alpha = .83$ was obtained. The mean of the revised 4-item measure was used for subsequent analyses. The 20-item measure for relationships maintenance behaviors was determined to have an acceptable reliability ($\alpha = .94$). The 9-item measure for proxy efficacy was determined to have an acceptable reliability ($\alpha = .92$).



Figure 5. Exercise relationship commitment model - behavioral commitment and individual physical activity expansion with standardized path coefficients.

A multiple regression analysis was performed to explore if perceived ergogenic benefits, proxy efficacy, and relationship maintenance behaviors predicted satisfaction to the relationship. The multiple regression accounted for 39.3% of the variance in satisfaction, F(3, 505) = 108.87, p < .001, $R^2 = .389$. Satisfaction was positively predicted by perceived ergogenic benefits ($\beta_{standardized} = .42, p < .001$), proxy efficacy ($\beta_{standardized} = .13, p = .004$), and relationship maintenance behaviors ($\beta_{standardized} = .18, p < .001$) in support of Hypothesis 4. These findings suggest that satisfaction with the exercise relationship was highest with exercisers for whom perceived ergogenic benefits were greater, perceived proxy efficacy was higher, and relationship maintenance behaviors were more frequent.

Investment. A second multiple regression analysis was performed to explore if interpersonal closeness, communication breadth, and exercise relationship length predicted perceived investment in the relationship. All variables were first placed into the model to directly test Hypothesis 5. Although the hypothesized model was significant, F(4, 510) = 7.56, p< .001, $R^2 = .056$, communication breadth measures, inside and outside of workouts, were not significant contributors to investment (ps > .5). The statistical software was then cued to produce alternative models using the process of backwards elimination. The method procured a more parsimonious model, which excluded communication breadth (both in and out of workouts) as a predictor at no expense to predictive utility, and accounted for 5.4% of variance in perceived investment, F(2, 512) = 14.65, p < .001, $R^2 = .054$. Investment was positively predicted by interpersonal closeness ($\beta_{standardized} = .20$, p < .001) and exercise relationship duration ($\beta_{standardized}$ = .09, p < .001), showing moderate partial support of Hypothesis 5. These findings suggest that perceived investment in the exercise relationship was highest for exercise relationships characterized by higher interpersonal closeness and longer duration.

Discussion

This was the first study to examine and expand the investment model in exercise relationships. Only one other study to date has examined the nature of relationships between exercise partners (Max, Feltz, & Wittenbaum, 2016). This study had two aims. The first aim was to test the adaptation of Rusbult's (1980) core model to exercise relationships. The second aim was to expand and test a conceptual model of commitment in exercise relationships to include behavioral commitment to the exercise relationship and individual physical activity, as well as examining antecedents of the core model.

A Test of the Core Model: Predicting Psychological Commitment

Hypothesis 1 was supported. We found that psychological commitment to one's exercise relationship was directly and positively predicted by satisfaction level and investment size and negatively predicted by attractiveness of alternatives. Psychological commitment, satisfaction with the exercise relationship, attractiveness of alternatives, and investment in the relationship were adequately captured with our adapted measures and the sample chosen, as indicated by the retention of acceptable reliability with the measures when adapted from romance to the exercise context. These findings are congruent with Rusbult's (1980) original investment model that predicted psychological commitment in romantic relationships, and provide support for Rusbult's general conceptual model of commitment in another domain beyond those in which it has already been examined (i.e., romantic relationships, business, friendship, and sport). In this study nearly half of the variance in psychological commitment to the exercise relationship was accounted for by these three predictors alone, suggesting that the model is conceptually robust and applicable to exercise relationships.

Of the three antecedents of psychological commitment, satisfaction with the relationship was the strongest predictor of commitment. This suggests that to a great extent, satisfaction and the factors that it comprises may play the most powerful role in determining whether an individual becomes and remains psychologically committed to an exercise relationship. Investment in the relationship was also a powerful positive predictor, but did not weigh as heavily in calculation of an individual's commitment to their exercise relationship when compared to satisfaction. Attractiveness of alternatives was a negative predictor, and although it was statistically significant it was weak, suggesting that how appealing one's alternatives are plays only a small role in whether an individual is committed to their exercise relationship. This differs from Rusbult's (1980) investment model, which showed that attractiveness to alternatives played a more substantial role in an individual's commitment to their romantic relationship. It is possible that perceived attractiveness of alternatives plays a smaller role in this context because, unlike friendships or romantic relationships, exercise relationships are not as necessary a part of life. That is, there may be more variability among individuals in the degree of dependence on an exercise relationship because the desirability and reliance upon an exercise partner vs. exercising alone, a larger group, or not at all may vary highly among individuals (i.e., for some it is essential, for others not at all), whereas desiring friends and a romantic partner of some kind is universal. Interestingly, Scanlan et al. (1993) reported that the construct of "involvement alternatives," a version of attractiveness of alternatives adapted to youth sport may not be applicable to the sport context, although they did not speculate as to why. In conclusion, individuals most strongly committed to their exercise relationship are likely to be a) more satisfied with their exercise partner's ability to fulfill their needs in the relationship and

contribute equitably, b) more invested in their exercise partner relationship, and to a smaller degree c) have fewer attractive alternative options.

Behavior Expansion: Predicting Behavioral Commitment and Individual Physical Activity

Despite the conceptual strength of the model and utility for predicting psychological commitment, of special interest to this study is bridging the gap between thought and action to predict actual behavior. Because psychological constructs regarding behavior do not always account for behavior at a ratio of 1:1 (e.g., Armitage & Conner, 2001), we examined behavioral prediction tentatively and incrementally, first by examining psychological commitment as a mediator between satisfaction, attractiveness of alternatives, and investment as predictors of behavioral commitment (i.e., partnered exercise frequency) and then finally by adding total individual activity to the model.

At the first stage, building on the core of the model to predict behavioral commitment, we found partial support for Hypothesis 2 - psychological commitment mediated the relationship between satisfaction and perceived investment as predictors of behavioral commitment. The relationship between attractiveness of alternatives and behavioral commitment was not mediated by psychological commitment, but a direct relationship was observed. Behavioral commitment was positively predicted by psychological commitment, satisfaction, and negatively predicted by attractiveness of alternatives. How frequently individuals exercised with their exercise partner is dependent, in part, on their level of commitment to that relationship, their satisfaction with relationship, and the attractiveness of alternative options.

Further building on the model, we found support for Hypothesis 3, that behavioral commitment significantly mediated psychological commitment to the exercise relationship as a predictor of individual physical activity. This finding has meaningful implications for public

health because it suggests that committed exercise relationships are a potential means for increasing individual physical activity.

Although the model was deemed to have Good Fit, and the predictors were statistically significant, we note that a relatively small portion of variance in total physical activity was accounted for. Although not trivial, the practical utility of this model for predicting an individual's total physical activity is not strong. The loss of predictive utility of the model with the addition of total physical activity may be due to the nature of behavioral commitment as relying on the "other" in the exercise relationship (i.e., the "other" that one is psychologically committed to), directly linking the two, while total individual physical activity encompasses partnered activity but is also potentially largely independent of it.

Exploratory Predictors: Testing the Antecedents of the Core Model

Rusbult described the antecedents of psychological commitment to a relationship but did not offer suggestions as to what influences them (i.e., the antecedents of the commitment's antecedents). Max et al. (2016) found that exercisers who found their exercise partner helpful to maximize intensity and duration of exercise were more likely to look forward to workouts with their partner, and that exercise relationships of lower relational quality or performance-enhancing potential were less likely to persist. These findings guided our hypothesis that reward and fulfillment (i.e., satisfaction) would be calculated by individuals at least in part based on their perception of their exercise partner's effort and ability to enhance their exercise and relationship quality (through exercise facilitation and relationship maintenance behaviors).

Results showed that satisfaction level was directly and positively predicted by friendship maintenance, the ergogenic benefits of the exercise relationship, and proxy efficacy, providing support for Hypothesis 4. Each of the antecedents contributed comparably to predicting

satisfaction, suggesting that individuals feel most satisfied with their exercise relationship when they perceive that the exercise relationship confers ergogenic benefits, that they are confident that their exercise partner is able to facilitate exercise-relevant skills, and that the exercise partners engage in frequent relationship-maintenance behaviors like expressing gratitude and making one another laugh. Notably, satisfaction was derived from *both* performance-related factors (i.e., ergogenic benefits and facilitation of exercise-relevant skills) and relational factors (i.e., supportive and affiliative behavior). These findings provide a greater understanding of the components that underlie satisfaction with one's exercise relationship, which can be useful in improving and/or maintaining the relationship. For instance, these include being facilitative to one's partner, ensuring that their exercise partner is aware of and facilitative of their needs (or finding a partner who is), ensuring that both parties "get out what they put in," and working on engaging in friendly behaviors to sustain the relationship. Exercise partners who are useful, contribute their fair share, and are friendly are likely to improve satisfaction with their relationship, commitment, partnered workouts and ultimately their own physical activity outcomes.

Lastly, only weak and partial support was found for Hypothesis 5, that investment size was directly and positively predicted by communication breadth, interpersonal closeness, and relationship length. Interpersonal closeness and relationship length both weakly (but significantly) predicted perceived investment, accounting for 5.4% of the variance in perceived investment. Contrary to our hypothesis, communication breadth (both in and out of workouts) failed to contribute to variance in perceived investment, suggesting that although Max et al. (2016) found that communication breadth, as a proxy for self-disclosure, was a factor in exercise relationships, it does not contribute to perceptions of investment in exercise relationships. Other

research has found inconsistent associations between self-disclosure and other relational constructs. Sprecher & Hendrick (2004) found that self-disclosure predicts commitment over time but does "not generally predict relational quality or stability," (p. 873), because it changes little over time in stable relationships and therefore has low variability and weak correlations. Although only a small fraction of the variance in investment was explained by these variables, investment was still a potent predictor of psychological commitment, and other possible antecedents (e.g., communication *depth*, belonging to the same gym, number or quality of relationships in common, the degree to which one adjusted their own daily or exercise routine to accommodate the exercise relationship) should be revisited in future work.

Limitations

As with all studies, this study had some limitations. First, this study examined a crosssectional convenience sample of university students and willing community participants. The study was non-experimental and, due to the absence of a prospective temporal design, the prerequisites for suggesting causality were not met (Thiese, 2014). Researchers interested in examining this topic who wish to better understand causality may consider longitudinal work to establish the temporality of events or phenomena associated with the exercise relationship commitment process.

Second, we only examined one side of an exercise relationship. The possibility of dyads in the data set (i.e., both members of exercise relationships) was ignored. Relationships comprise more than one individual, and the congruence or dissonance in perceptions between exercise partners may influence the discrepancy between psychological commitment and behavioral commitment. Employing a dyadic approach to data collection in future research may reveal whether congruence in relationship perceptions plays a role in behavioral prediction.

Third, we only included participants who reported that their primary exercise modality with their workout partner was strength training, running, or walking. This group comprised the majority of our sample, and Max et al. (2016) also found that these were the most common modalities. However, future research may include other types of exercise because the commitment process for individuals using other types of exercise (especially more game-oriented ones or ones which preclude conversation during activity) may differ from what was observed in this sample.

Fourth, all data from this study were self-reported. Although self-report has been demonstrated to have acceptable validity as a method for estimating physical activity, the inclusion of a direct assessment of physical activity (e.g., Actigraph monitor or Caltrac accelerometer) could provide a more comprehensive understanding of physical activity (Ainsworth, Jacobs, Leon, Richardson, & Montoye, 1993).

Fifth, although our sample was large enough to reach statistically significant findings on our hypothesized relationships, it was still too small to test the entire conceptual model in a path analysis. Future research could collect data from a larger sample to test a complete model.

Last, although we sampled a large number of community participants, the mean age was only a few years older than the college sample. What exercisers value in an exercise relationship may change with age, which could influence the weighting of factors contributing to psychological commitment. Future studies may examine older participants, whose exercise motivations and behaviors may differ from individuals in their 20 and 30's (Brunet & Sabiston, 2011).

Acknowledgments

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APPENDIX A

IRB Approval Letter Study 2

MICHIGAN STATE

September 13, 2016

- To: Gwen Wittenbaum 559 Communication Arts Building MSU
- Re: IRB# x16-1150e Category: Exempt 2 Approval Date: September 13, 2016

Title: Exercise Relationships at MSU

The Institutional Review Board has completed their review of your project. I am pleased to advise you that **your project has been deemed as exempt** in accordance with federal regulations.

The IRB has found that your research project meets the criteria for exempt status and the criteria for the protection of human subjects in exempt research. Under our exempt policy the Principal **Investigator assumes the responsibilities for the protection of human subjects** in this project as outlined in the assurance letter and exempt educational material. The IRB office has received your signed assurance for exempt research. A copy of this signed agreement is appended for your information and records.

Renewals: Exempt protocols do <u>not</u> need to be renewed. If the project is completed, please submit an *Application for Permanent Closure*.

Revisions: Exempt protocols do <u>not</u> require revisions. However, if changes are made to a protocol that may no longer meet the exempt criteria, a new initial application will be required.

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to the human subjects and change the category of review, notify the IRB office promptly. Any complaints from participants regarding the risk and benefits of the project must be reported to the IRB.



Office of Regulatory Affairs Human Research Protection Programs

Biomedical & Health Institutional Review Board (BIRB)

Community Research Institutional Review Board (CRIRB)

Social Science Behavioral/Education Institutional Review Board (SIRB)

Olds Hall 408 West Circle Drive, #207 East Lansing, MI 48824 (517) 355-2180 Fax: (517) 432-4503 Email: irb@msu.edu www.hrpp.msu.edu

MSU is an affirmative-action equal-opportunity employer.

Follow-up: If your exempt project is not completed and closed after <u>three years</u>, the IRB office will contact you regarding the status of the project and to verify that no changes have occurred that may affect exempt status.

Please use the IRB number listed above on any forms submitted which relate to this project, or on any correspondence with the IRB office.

Good luck in your research. If we can be of further assistance, please contact us at 517-355-2180 or via email at IRB@msu.edu. Thank you for your cooperation.

Sincerely,

A. Meller

Harry McGee, MPH SIRB Chair

c: Emery Max

Initial IRB Application Determination *Exempt*

APPENDIX B

Study 2 Survey Measures

Individual Exercise (IPAQ 7-day Recall) INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as 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 heavy lifting, digging, aerobics, or fast bicycling?

____ days per week



No vigorous physical activities — *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
Don't know/Not sure

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.



No moderate physical activities — *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
Don't know/Not sure

Think about 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?



6. How much time did you usually spend **walking** on one of those days?



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
Don't know/Not sure

Behavioral Commitment to Exercise Relationship

In a typical week, how many days do you exercise or train with your exercise partner? (1-7)

Psychological Commitment to Exercise Relationship

Please indicate the degree to which you agree with each statement about your exercise relationship (1 = completely disagree, 9 = completely agree)

- 1. I'm determined to keep working out with my exercise partner.
- 2. I want my exercise relationship to last for a very long time.
- 3. I am committed to maintaining my exercise relationship.
- 4. It is unlikely that I will stop working out with my exercise partner.
- 5. I would be bothered if I was unable to exercise with my exercise partner.

Satisfaction Level

Please indicate the degree to which you agree with each statement about your exercise relationship (1 = completely disagree, 9 = completely agree)

- 1. Our exercise relationship does a good job fulfilling my companionship needs.
- 2. Our exercise relationship does a good job fulfilling my exercise needs.
- 3. My exercise relationship makes my workouts enjoyable.
- 4. I feel satisfied with our exercise relationship.
- 5. My exercise relationship is better than others I've seen.

Involvement Alternatives

Please indicate the degree to which you agree with each statement regarding the fulfillment of each need in alternative relationships (e.g., with a different exercise partner, friend, family, fitness trainer, fitness class, etc.). (1 = completely disagree, 9 = completely agree)

- 1. My needs for companionship could easily be fulfilled by another exercise partner.
- 2. My needs for a workout motivation boost could easily be fulfilled elsewhere (e.g., by exercising with another exercise partner, alone, with a trainer, with a fitness class, or with an exercise game or app).
- 3. Alternatives to my exercise relationship are appealing to me (e.g., by exercising with another exercise partner, alone, with a trainer, with a fitness class, or with an exercise game or app).
- 4. There are other possible exercise partners I may prefer to workout with.
- 5. I would be fine if I didn't have an exercise partner.

Investment Size

Please indicate the degree to which you agree with each statement about your exercise relationship (1 = completely disagree, 9 = completely agree)

- 1. I have put a great deal into my exercise relationship that I would lose if we were to stop exercising together.
- 2. Many aspects of my life besides exercise have become linked to my exercise partner, and I would lose all of this if we were to stop working out together.
- 3. I feel very involved in my exercise relationship like I have put a great deal into it.

- 4. My other relationships (e.g., friends and family members) would be complicated if my exercise partner and I were to stop working out together (e.g., exercise partner is friends with people I care about).
- 5. My exercise partner and I are closer than people in most exercise relationships.

Friendship Maintenance Behaviors (Oswald, Clark, & Kelly, 2004)

How often do you and your exercise partner:

1 = never, 11 = frequently

Positivity subscale

- 1. Express thanks when the other person does something nice for you?
- 2. Try to make each other laugh?
- 3. Not return each other's messages?*
- 4. Try to be upbeat and cheerful when together?
- 5. Reminisce about things you did together in the past?

Supportiveness subscale

- 6. Try to make the other person "feel good" about who they are?
- 7. Let each other know you accept them for why they are?
- 8. Support each other when one of you is going through a difficult time?
- 9. Let each other know you want the relationship to last in the future?
- 10. Provide each other with emotional support?

Openness

- 11. Share your private thoughts with each other?
- 12. Repair misunderstandings?
- 13. Give advice to each other?
- 14. Show signs of affection toward each other?
- 15. Have intellectually stimulating conversations?

Interaction

16. Do favors for each other?

17. Visit each other's homes?

- 18. Make an effort to spend time together even when you are busy?
- 19. Celebrate special occasions together?

20. Work together on jobs or tasks?

*reverse scored

Each subscale is averaged for an overall score.

Ergogenic Benefits

Please indicate the degree to which you agree with each statement about your exercise relationship (1 = completely disagree, 9 = completely agree)

- 1. I look forward to workouts with my exercise partner.
- 2. I exercise longer/harder when I'm with my exercise partner.
- 3. I am likely to skip a workout if my exercise partner is unavailable.
- 4. My exercise partner and I encourage each other when we're struggling during a workout.
- 5. My exercise partner and I help each other meet our goals.

Proxy Efficacy (adapted from Brawley & Shields, 2007)

How confident are you in your exercise partner's ability to help you perform each of the following skills or behaviors? (1=not at all confident, 10=completely confident, NA = I do not rely on my exercise partner for this behavior)

- 1. use safe, effective exercise techniques
- 2. meet my exercise goals
- 3. help me stay on a regular exercise schedule
- 4. motivate me to exercise harder or longer
- 5. challenge myself in exercise
- 6. avoid missing a workout
- 7. return to exercise after missing a workout

Communication Breadth

- 1. Please list what topics you and your exercise partner talk about OUTSIDE workouts (check all that apply) *exercise, work, family, friends, romantic relationships, hobbies, current news/events, small talk (e.g., weather, weekend activities), philosophy, other*
- 2. Please list what topics you and your exercise partner talk about IN TYPICAL WORKOUTS (check all that apply) *exercise, work, family, friends, romantic relationships, hobbies, current news/events, small talk (e.g., weather, weekend activities), philosophy, other*

Closeness (IOS Scale)



Exercise Relationship Length

- 1. How long have you known your exercise partner? (years/months)
- 2. How long have you and your exercise partner been working out together? (years/months)

Exercise Relationship Status

An exercise partner is a person with whom you exercise or train consistently. Do you have an exercise partner?

- Yes, I have an exercise partner.
- No, I used to have an exercise partner but I don't anymore.
- No, I have never had an exercise partner.

Exercise Partner Meeting

Did you meet your exercise partner in an exercise context or elsewhere? *Choose one:* Exercise context/elsewhere

Exercise Type Filter

Please select the type of exercise you engage in most frequently with your exercise partner. *Options:* strength training/weights, running, walking, other

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CHAPTER FOUR

GENERAL DISCUSSION

Two Studies Exploring the Nature of Exercise Relationships

The two manuscripts presented in this dissertation established a foundation for exercise relationship research by first describing them and exploring associations among variables and then by designing and testing a conceptual model of exercise relationship commitment. Exercise relationships are interpersonal relationships that include regular co-exercise, and they are important because a) one of the most frequently reported reasons for not exercising is lack of a workout partner and b) social factors play an important role in physical activity (Carron, Hausenblas, & Mack, 1996; Darlow & Xu, 2011; Ebben & Brudzynski, 2008; Louw, Biljon, & Mugandani, 2012).

The first study characterized exercise relationships on interpersonal and performance factors. A sample of undergraduates were administered a web survey, and reported that they were very close with their exercise partners and that they talked about a number of topics both in and out of the exercise context. Exercise relationships were characterized by mutual goal facilitation, and participants whose exercise relationships had dissolved or failed reported significantly lower interpersonal closeness, lower communication breadth, and more performance-based goals than participants who reported an ongoing exercise relationship. Participants exercised more often the more an exercise relationship was defined by exercise, suggesting that exercise relationships that revolved around exercise were more immediately productive than exercise relationships that did not prioritize exercise. Future research should examine the development of exercise relationships over time, in a broader demographic, and the nature of commitment in exercise relationships.

The second study examined exercise relationship commitment through the lens of Rusbult's (1980) investment model of interpersonal relationships with exercisers who have (or have had) an exercise partner. Participants were college students and community participants, and volunteered to complete a web survey that solicited information on their exercise relationship and their exercise behaviors. Using multiple regression and path analyses, I found that psychological commitment to an exercise relationship was positively predicted by satisfaction with and investment in the relationship, and negatively predicted by the attractiveness of alternatives to the relationship. Psychological commitment mediated the relationship between satisfaction, attractiveness of alternatives, and investment, and behavioral commitment to the relationship. Behavioral commitment mediated the relationship between psychological commitment to the relationship and individual exercise behaviors. These results show support for a satisfaction and investment model of exercise relationship commitment. However, this model is preliminary and probably contains fewer antecedents than actually exist; but it provides a starting point for future research to extend or tighten the model.

These two studies suggest that exercise relationships are indeed *relational*, that they are close, that the dynamics of the relationship are intertwined with performance related goals and objectives in the exercise context, and that the nature of commitment in exercise relationships is similar to commitment in amorous relationships and friendships. Together, these works provide a strong foundation for future work on exercise relationships.

Theoretical Implications

In the introduction of this dissertation, several topics and theories were introduced. The findings of the two manuscripts presented herein have implications for some of those theories.

Two motivation theories referenced in the introduction for which there are implications from this line of research are self-determination theory and achievement goal theory. The findings from the two manuscripts presented in this dissertation align with the general framework of both of these theories as they pertain to the desire to feel and demonstrate competence.

In the first study, exercise relationships were characterized by mutual goal facilitation. In the second study, relationship satisfaction was derived in part by ergogenic benefits attributed to the exercise relationship. Individuals were more committed to their exercise relationship (and the relationship was more likely to be actively sustained) if the relationship facilitated their exercise. Goal achievement informs self-perceptions of competence because a realized goal is an affirmation of the ability of the performer. Individuals in the first study engaged in relationships with those who helped to facilitate their goals, and goal facilitation has been identified as critical (if not the sole purpose) of relationships in other contexts (Berscheid & Ammazzalorso, 2001). The phenomenon of drawing nearer to facilitative others may be explained in part by the innate human drive to demonstrate competence; humans seek to be competent and therefore seek relationships with people who will facilitate that feeling, especially through opportunities to demonstrate competence.

Of the communication and relationship development factors that were highlighted in the introduction section, the two theoretical perspectives that most strongly relate to the findings in Studies 1 and 2 are uncertainty reduction theory and interdependence theory. Uncertainty is more than merely not knowing; it can be conceptualized as the discrepancy between the amount of predictive information one possesses about another individual and the amount of predictive information that one desires or needs to meet the predictive demands of interactions. In Study 1

we observed that communication breadth was lower in the exercise context than outside of exercise, and in Study 2 we observed that physical performance-related factors contributed to satisfaction and ultimately commitment to an exercise relationship. In a performance context, there may be less motivation to reduce uncertainty when compared to traditional interpersonal relationships based more on relational factors because perhaps less predictive information is necessary for fluid interaction in an exercise context when compared to traditional interpersonal relationships.

Interdependence theory postulates that individuals evaluate relationships based on their perception of the ratio of rewards to costs, and they seek to maximize profit in relationships by increasing that ratio (Thibaut & Kelley, 1959). The studies presented in this dissertation support the notion that one way to improve that ratio is to facilitate goals, because goal facilitation is a primary purpose of all interpersonal relationships (Berscheid & Ammazzalorso, 2001). Exercise relationships are no exception to those phenomena observed in other interpersonal relationships, and may even be archetypal in this regard given their more explicit goal-orientation when compared to other interpersonal relationships. Exercise relationships tend to be mutually goal facilitative, and exercisers derive satisfaction based on how social needs are met and whether goals are facilitated (i.e., satisfaction comes from social rewards and performance rewards). Satisfaction, as determined by the ratio of rewards to costs, then informs an individual's commitment to an exercise relationship.

Practical Application

Exercisers seeking an exercise partner may consider reaching out to a close friend, coworker, romantic partner or family member. Exercise relationships are characterized by closeness and mutual benefit – individuals in an exercise relationship may work to improve their
relationship by becoming closer and also by helping to facilitate their exercise partner's goals (as well as encourage their exercise partner to reciprocate).

For individuals in exercise relationships, there are potential health ramifications for the quality of the relationship. Psychological commitment to an exercise relationship (and the antecedents of commitment) may impact partnered exercise behaviors and individual physical activity outcomes. One of the most critical factors is satisfaction, which is derived from perceptions of reward, fulfillment of needs and expectations.

Because exercise partner relationships consist of so much more than exercise, laboratory settings where interactions are restricted or contrived may influence interactions and outcomes. Researchers should be cognizant of this when simulating exercise relationships in a lab for experimental research.

Overall Limitations and Future Work

These studies examined cross-sectional convenience samples of either a) university students or b) students and willing community participants. Researchers interested in examining exercise relationships who wish to better understand causality may consider longitudinal work to establish the temporality of events or phenomena associated with the exercise relationship commitment process.

In addition, both of these studies only examined one side of an exercise relationship, which only captures half of the data encompassed by a relationship between dyads. Although perceptions of a relationship may be congruent between two individuals, incongruence may explain discrepancies between psychological commitment and behavioral commitment to an exercise relationship.

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Last, all data from these studies were self-reported and retrospective. Although selfreport has been demonstrated to have acceptable validity as a method for estimating physical activity, future research may instead use a direct assessment of physical activity to provide more accurate data. For the psychological variables, self-report is the strongest method we have, but utilizing other methods that mitigate the issues associated with retrospective self-report (e.g., journaling) may improve accuracy of the data.

Conclusions

This dissertation provides a groundwork for research on exercise relationships. By first examining and describing exercise relationships, Study 1 initiated this line of research and provided justification and direction for Study 2. Exercise relationships are characterized by their relational qualities (i.e., exercise partners are close and communicative) but also by their performance objectives. This is further supported by the factors that exercisers value in their exercise relationships, which ultimately account for the psychological commitment they have to their exercise relationship. These two studies established a foundation for future work on exercise relationships, perhaps some of the most important yet under-examined social relationships in the exercise context. REFERENCES

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