CHARACTERIZING MOVEMENT HABITS AND PARTNER SUPPORT DYNAMICS IN OLDER COUPLES

by

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(Under the Direction of Ellen M. Evans and Janet Buckworth)

ABSTRACT

Close social relationships, especially within couples, influence health habits, including physical activity and exercise (PA/EX) behaviors, in both positive and negative ways depending on the quality of the relationship and partner support. Among older adult couples, the influence of PA/EX support on PA/EX habits has been incompletely characterized and could benefit from research that a) intentionally includes both halves of dyads, b) is anchored by an interpersonal health behavior theoretical framework, and c) utilizes a mixed-methods research MMR approach. The overarching objective of this two-phase dissertation project was to 1) capture dyadic patterns of PA/EX behaviors and support, and 2) assess the effects of support behaviors on PA/EX habits in older adult couples. Phase One (8 older adult couples) utilized a MMR approach and measured objective PA via accelerometers and social support and relationship quality outcomes via validated questionnaires. Semi-structured interviews allowed themes to be detected. Phase Two utilized an online survey battery to assess similar outcomes in 47 older adult couples. Primary results from Phase One indicated that the qualitative analysis further advanced understanding of dyadic PA/EX participation and PA/EX partner support with the themes of tangible supportive inaction and non-tangible supportive perceptions and provided

further support for use of the Positive and Negative Social Control Scales. In Phase Two, our most notable finding was that within this sample of older couples, a partner's PA/EX support perceptions influenced their partners' PA/EX participation, and, a partner's PA/EX influenced their partners' perceptions of PA/EX support. This finding aligns with PA/EX support dynamics noted in Phase One. That is, for some partners, they felt PA/EX support from their partners when their partners were engaging in PA/EX with them. This concept supports the potential bidirectional influence in our findings by introducing the possibility of shared PA/EX as a mediator of the dyadic bidirectional influence of PA/EX partner support and PA/EX participation. More research is needed in this emergent area. Application of this data may inform the design of effective PA/EX programs that leverage social support to enhance adherence to PA/EX guidelines for older adults, a key health behavior for successful aging.

INDEX WORDS: Older adults, dyadic influence, Physical Activity, Partner Support, Mixed-Methods Research, Actor-Partner Interdependence Model

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DEDICATION

This [dissertation] is dedicated

To every kid who ever got picked last in gym class,

To every kid who never had a date to no school dance,

To everyone who's ever been called a freak.

This is for you.

(Madden & Madden, 2000)

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CHAPTER 1

INTRODUCTION

1.1 Significance

Older adults are the fastest growing segment of the U.S. population and, due to the rising number of chronic conditions, they pose a great burden to the healthcare system (Federal Interagency Forum on Aging-Related Statistics, 2016). Ample clinical research documents the effectiveness of habitual movement in the form of physical activity (PA) and intentional exercise (EX) as a means of reducing chronic disease risk and maintaining quality of life, yet 80+% of older adults fail to meet the aerobic PA and muscle strengthening PA guidelines (Bennie et al., 2019; Keadle et al., 2016; Piercy et al., 2018).

Previous studies have established a clear link between social context and health habits, including PA/EX, in older adults (Smith et al., 2017). To date, research in social support has mostly focused on significant others, friends, and family (Smith et al., 2017). When considering the context of social relationships, close intimate partnerships can influence daily activities and patterns, including PA/EX, in both positive and negative ways (Craddock et al., 2015). Within this dyadic context, more positive PA/EX influence is generally likened to positive social control or partner support, while more negative PA/EX influence is likened to negative social control or partner control (Cotter, 2012). Both members of the dyad experience PA/EX support and control by both receiving and providing it, which can contribute to perceptions of relationship quality (Craddock et al., 2015; Maisel & Gable, 2009).

Despite the interpersonal context of dyadic PA/EX support, the vast majority of PA/EX social support research has only focused on one half of older dyads (Smith et al., 2017). That is, one partner participates in the study while the other does not—half the dyad is involved while the other half is only examined from a support standpoint (Craddock et al., 2015). Furthermore, the majority of research exploring older couple's PA/EX and support behaviors, has been predominately quantitative, with minimal qualitative studies (Ayotte et al., 2013; Barnett et al., 2013; Griesemer et al., 2020; Khan et al., 2013; Winters-Stone et al., 2016). Because the concept of PA/EX support arises in an interpersonal context, there is a need to more critically examine and qualitatively characterize the concept of partner PA/EX support. To effectively highlight lived experiences when examining dyadic influence in older couples PA/EX and support behaviors, an interpersonal theoretical framework must be coupled with a mixed-methods research (MMR) examination.

Transactive Goal Dynamics (TGD) theory takes a systems-based approach to examining the interactions among dyadic health behaviors (vanDellen, 2019). Because an individual's health behaviors do not occur in isolation, in order to understand these behaviors, the system of dyadic influence must be examined (vanDellen, 2019). Despite TGD theory's applicability to this line of inquiry exploring couple's health behaviors, application of an interpersonal theoretical framework remains scarce in the context of older couples' PA/EX habits and support behaviors (Craddock et al., 2015; Barnett et al., 2013; Richards et al., 2017). Furthermore, to effectively capture the depth of both partner's perspectives on PA/EX habits and support behaviors, it is imperative to incorporate qualitative methodology. To balance theoretical and empirical, individual and interpersonal, qualitative and quantitative, integration of MMR is necessary.

1.2 Specific Aims

Among older adult couples, dyadic patterns of PA/EX habits and the concept of PA/EX support has been incompletely characterized. The present study enhanced the line of inquiry into older couples' PA/EX habits and support through a) intentional inclusion of both halves of dyads, b) a theoretical framework informed by interpersonal health behavior theory, and c) integration of a MMR approach, toward the end of expanding the understanding of dyadic influence, PA/EX behaviors, and PA/EX support in older couples. The MMR approach taken for this dissertation project was characterized by two phases: 1) (Phase One) a convergent MMR phase with sequential quantitative (QUANT) and qualitative (QUAL) strands to critically examine and comprehensively characterize older couples' PA/EX habits and support behaviors; and 2) (Phase Two) a QUANT phase to examine the dyadic patterns and associations among older couples' PA/EX habits and support behaviors. The two-phased, sequential MMR approach of the current study had the overarching project objective of 1) capturing dyadic patterns of PA/EX lived experience to 2) better operationalize and assess the effects of support behaviors on PA/EX habits in older adult couples. This overarching project objective was accomplished by addressing the following aims:

Specific Aim 1 (Phase One; QUANT+QUAL): To examine how older adults participate in PA/EX behaviors and experience PA/EX support within their partnerships. The results of Phase One directly informed the nature and scope of research questions and subsequent analyses of Phase Two.

Specific Aim 2 (Phase Two; QUANT): To examine the actor and partner effects of support perceptions and control perceptions in the prediction of PA/EX behaviors in older adult couples.

Overarching Hypothesis: It was expected that more partner support and less partner control would be associated with greater engagement in PA/EX behaviors in older adult couples.

1.3 Scientific and Public Health Related Significance

Sustainable PA/EX habits and social connections are crucial for successful aging. Among older adults the concept of PA/EX related social support, specifically in the context of romantic partnerships has been incompletely characterized and may be untapped to enhance adherence to PA/EX guidelines. This proposed project will use MMR to enhance the understanding of older adult couples' experiences with PA/EX in the context of their relationship subsequently informing strategies to leverage social support to enhance adherence to PA/EX interventions and programs for older adults.

1.4 Definitions of Terms (in alphabetical order)

Cisgender

This term refers to an individual whose gender identity matches their sex assigned at birth. For example, someone who identifies as a woman and was assigned female at birth or someone who identifies as a man and was assigned male at birth.

Dyad

The term dyad refers to a partnership between two individuals. Dyad is interchangeable with the term couple in the context of this project.

Mixed-Methods Research

This term refers to research that mixes the methods and methodologies of quantitative and qualitative research. MMR approaches combine elements from quantitative and qualitative research in an effort to maximize the strengths and minimize the weaknesses of each strand of research.

Partner Control

Partner control is the negative PA/EX control an individual receives from their significant other. In this project, partner control is quantitatively captured via the Negative Social Control Scale (Cotter, 2012). Some items from this questionnaire include: "Nagged you about exercise" and "Demanded that you discuss exercise."

Partner Support

Partner support is the positive PA/EX support an individual receives from their significant other. This can be thought of as social support for PA/EX within the interpersonal context. In this project, partner support is quantitatively captured via the Positive Social Control Scale and qualitatively expanded upon with reflexive thematic analysis (Braun & Clarke, 2006; Cotter, 2012). Some items from the Positive Control Scale include: "Offered to exercise with you" and "Gave you helpful reminders to exercise."

Physical Activity/Exercise Behaviors

PA/EX behaviors are the different types and amounts of habitual physical movement. PA/EX behaviors are captured quantitatively via accelerometry (objectively measured) and the CHAMPS questionnaire (self-report), producing estimates of the volume of PA/EX in the form of moderate-to-vigorous PA (MVPA) (Stewart et al., 2001). Additionally, the CHAMPS

questionnaire assesses types of PA/EX. PA/EX behaviors are expanded upon through qualitative interviews, as well.

Qualitative Research

Qualitative research, in a general sense, is "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990, p. 17). This research examines social phenomena and lived experiences to arrive at a contextually-situated truth. Typically, qualitative research aims for “illumination, understanding, and extrapolation to similar situations” (Golafshani, 2003, p. 600).

Quantitative Research

This term refers to research that operates within a positivist epistemology with the intent of discovering an attainable, objective truth through use of methods aimed at statistical quantification. Typically, quantitative research is characterized by “seek[ing] causal determination, prediction, and generalization of findings” (Golafshani, 2003, p. 600).

Relationship Quality

Relationship quality is a central construct for studying and understanding relationships. In this project, relationship quality is captured via the Couples Satisfaction Index-32 (CS1-32) and the CSI-4 (Funk & Rogge, 2007). Some items from this questionnaire include: “Please indicate the degree of happiness, all things considered, of your relationship” and “In general, how satisfied are you with your relationship?”

Social Control

Within the context of dyadic relationships, this term refers to “any attempt to influence a close other” (Craddock et al., 2015, p. 119). Positive social control can be likened to the concept of social support. Within the context of this project, negative social control is likened to control.

Social Support

This term broadly refers to social relationships that offer reciprocity, accessibility, and reliability, and provide any combination of supportive resources (Smith et al., 2017; Williams et al., 2004). PA/EX support, or perceived social support specific to PA/EX behaviors, has been predominately quantitatively assessed using the Social Support and Exercise Survey (SSES) (Sallis, 1987). Some items from this questionnaire include: "Offered to exercise with you" and "Gave you helpful reminders to exercise." These items, while notably similar to those contained on the Positive Social Control Scale, are asked within the broader context of "family" and "friends." (Cotter, 2012; Sallis et al, 1987). Family being "anyone living in your household" and friends being "friends, acquaintances, or coworkers." Cotter adapted her Positive Social Control Scale from Sallis' SSES to study social control in the context of friends, family, and partners (Cotter, 2012).

Theme

In the context of qualitative inquiry, this term refers to "something important about the data in relation to the research question, and represents some level of *patterned* response or meaning within the dataset" (Braun & Clarke, 2006, p. 81)

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CHAPTER 2

LITERATURE REVIEW

2.1 Aging and Physical Inactivity in the United States

Older adults are the fastest growing segment of the U.S. population and due to the growing number of chronic conditions, they pose a great burden to the healthcare system (Federal Interagency Forum on Aging-Related Statistics, 2016). Ample clinical research documents the effectiveness of habitual PA/EX as a means to reduce risk of falling and physical disability and maintain quality of life (Piercy et al., 2018). Furthermore, several professional and governmental guidelines reflect the importance of habitual PA/EX for healthy aging (Piercy et al.,, 2018; American College of Sports et al., 2009). Despite this body of knowledge and these evidence-based recommendations, 80+% of older adults fail to meet the aerobic PA and muscle strengthening PA guidelines (Keadle et al., 2016). Even though the importance of habitual PA/EX for successful aging is well established, effective interventions have yet to be developed that sustain PA/EX behaviors in older adults (Garmendia et al., 2013; Keadle et al., 2016). To prevent the public health crisis caused by the interaction of aging demographics and sedentary lifestyles, acceptable, effective, and sustainable PA/EX interventions that are embedded within individuals' daily social lives are needed to 1) prevent an epidemic of physical disability and 2) maintain quality of life.

2.2 The Social Context of Physical Activity and Exercise Behaviors

Although many factors influence the poor PA/EX adherence and poor health outcomes in older adults, previous studies have established a clear link between social context and health habits, including PA/EX (Smith et al., 2017). The research documenting social influence on PA/EX behaviors is further bolstered by a theoretical basis, especially Social Cognitive Theory (SCT). SCT posits that learning is influenced on three levels: cognitive, behavioral, and environmental (Bandura, 1989). One of the central tenets of this theory is reciprocal determinism, which suggests that personal, behavioral, and environmental factors interact, both directly and indirectly, to influence behavior (Bandura, 1989). Specifically, Bandura elaborated on key psychosocial constructs and their applicability to health behavior: self-efficacy, outcome expectations, goals, and facilitators and impediments (Bandura, 1998). Bandura's SCT has been adapted and applied to health behaviors by himself and others (Anderson et al., 2007; Bandura, 1998) and has also been frequently applied to the older adult population in the context of PA/EX interventions (McAuley & Blissmer, 2000; White et al., 2012).

Above and beyond the presence of others influence on PA/EX, a recent systematic review highlights one specific aspect of social context—social support—that is associated with higher levels of PA/EX in older adults (Smith et al., 2017). Social support has historically been defined as "support accessible to an individual through social ties to other individuals, groups, and the larger community," and has been identified by the World Health Organization as a key determinant of Active Aging (World Health Organization, 2002). Even though the importance of social support is evident, the definition and measurement of social support remains poor and inconsistent (Hupcey, 1998; Williams et al., 2004). Williams et al. (2004) critically examined the multifaceted concept of social support in the literature and identified categories of social support definitions which included social relationships that offer reciprocity, accessibility, and reliability,

and provide any combination of supportive resources (Smith et al., 2017; Williams et al., 2004). Furthermore, Williams et al. (2004) point to a variety of definitions for social support, advocating for "a qualitative and contextual approach to the definition of social support" as a means to develop more context-specific definitions (Williams et al., 2004, p. 958).

To date, research efforts targeting social support have mostly focused on significant others, friends, and family (Smith et al., 2017), and focused on one half of the couple dyad or friendship. That is, one partner participates in the study while the other does not—half the dyad is involved while the other half is only examined from a support standpoint (Craddock et al., 2015). This approach produces an incongruence in study aims and study outcomes—assessing one individual in the context of a social relationship without accounting for the other individual(s) present in the social relationship reduces the causality of conclusions. Thus, in this context, research is needed to explore social support and PA/EX in older adults, specifically regarding couple dynamics relative to the potential bidirectional influence that has largely been overlooked in the literature to date.

2.3 Romantic Relationship Dynamics Influence Health Behaviors

To enhance understanding of the interactive dynamics of social influences on PA/EX behaviors in older adults, an interpersonal theoretical basis is needed. Transactive Goal Dynamics (TGD) theory takes a systems-based approach to examining the interactions among individuals and their health behaviors (vanDellen, 2019). In essence, an individual's health behaviors do not occur in isolation; therefore, to understand these behaviors the system of social influence should be examined (vanDellen, 2019). While SCT elucidates the social influences on health behaviors at the individual level, TGD theory captures the social context of health

behaviors at the interpersonal level. TGD theory, essentially, takes a systems-level approach to explaining the interactions among SCT constructs. TGD theory frames the interdependence of couple's health behaviors relative to goals, efficacy, and support (vanDellen, 2019). When considering the context of social relationships, close intimate partnerships can influence daily activities and patterns, including PA/EX, in both positive and negative ways (Craddock et al., 2015). The highest levels of effective support are seen when partners or family members communicate confidence in an individual's abilities and are responsive to their desires (Maisel, 2009). In contrast, negative and controlling support (e.g., doubt, criticism) is inversely related to health behavior change as well as relationship quality (Craddock et al., 2015). Therefore, support can be an asset or a liability for PA/EX behaviors depending on the relationship quality, partner support, and recursive influences of behavior (Craddock et al., 2015; vanDellen, 2019). Furthermore, the construct of relationship quality is closely associated with perceived support with more nurturing, action-facilitating support being linked to a more positive assessment of relationship quality (Overall et al., 2010). It is imperative to assess relationship quality relative to couples' health behaviors to gain a deeper understanding of support behaviors as they relate to individual and dyadic PA/EX behaviors and habits. Furthermore, because the focus of research to date has primarily been on resolving discrepancies in social support definition and assessment to understand the link between social ties and health, relationship dynamics and processes have been overshadowed (Craddock et al., 2015). Therefore, when examining the social context of older dyads' PA/EX behaviors, intentional inclusion of both halves of partnerships is necessary to comprehensively characterize the influence of support behaviors and relationship quality on partner PA/EX participation.

2.4 Mixed-Methods Research

Quantitative and qualitative research paradigms are the principal approaches utilized in the social and behavioral sciences (Johnson & Onwuegbuzie, 2004). These two paradigms differ with respect to their underlying assumptions for capturing and conceptualizing truth. The quantitative paradigm applies a positivist lens arguing that through empirical examination, truth is attainable through objective, reliable methodological approaches (Sale et al., 2002). Thus, within the quantitative paradigm, "there is only one truth, an objective reality that exists independent of human perception" (Sale et al., 2002, p. 2). Conversely, the qualitative research paradigm utilizes a interpretivist lens arguing that reality is socially constructed and thus truth is contextually situated and as a result constantly changing (Sale et al., 2002). These foundational, philosophical assumptions of quantitative and qualitative paradigms produce differences in methodological approaches, conceptions of quality, and implications for findings.

Despite this dichotomous framework that has long divided these research paradigms and fueled the "quantitative-qualitative debate," a third paradigm has emerged, offering a middle-ground along the "qualitative-quantitative continuum." (Johnson et al., 2007, p. 123; Sale et al., 2002, p. 2). Mixed-Methods Research (MMR) is "an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced, and useful research results" (Johnson et al., 2007, p. 129). Essentially, MMR approaches combine elements from quantitative and qualitative research methodologies in an effort to maximize the strengths and minimize the

weaknesses of each research paradigm in pursuit of a deeper understanding of human experiences and social phenomena.

2.4a Resolving Quantitative and Qualitative Tension Through Paradigmatic Perspective and Mixing Purpose

To effectively implement MMR, the differences in foundational, philosophical assumptions of quantitative and qualitative paradigms must first be reconciled. Shannon-Baker (2016) outlines specific paradigmatic perspectives within MMR that successfully find middle ground between the epistemological extremes of quantitative and qualitative paradigms (Shannon-Baker, 2016). One such paradigmatic perspective that effectively offers epistemological and ontological reconciliation is critical realism (CR). Realism emerged as a critique of positivism—Karl Popper contended that "The kind of verificationism posited by positivists could not lead to genuine knowledge" (Brinkmann, 2018, p. 55). A CR paradigmatic perspective "believes in a world that is constructed through our individual standpoints and perceptions" (Shannon-Baker, 2016, p. 329). This paradigm helps bridge the gap between empiricism and description, and, as Fletcher points out, "…becomes particularly useful for change-oriented research in which participants offer competing explanations of a phenomenon" (Fletcher, 2016, p. 188). Thus, CR distilled down, allows previous human experience to inform present interpretation without restricting it, while also acknowledging social influence. CR is not only able to contextualize data relative to theory and real-world experience, but also contextualizes findings as a means of creating change to both.

By employing CR, this allows empirical findings to be framed relative to theoretical and real world contexts, which ultimately enables data "to modify, support, or reject existing theories

to provide the most accurate explanation of reality" (Fletcher, 2016, pp. 189-190). CR allows for theoretical growth, which creates space for our understanding of human experience to evolve. Within the context of MMR, CR "…emphasizes diversity and the relationships among people, events, and ideas...allows for process-based causal inferences, [and] emphasizes perspective-taking and empowering the voices of others while still recognizing that these can only be partial representations of reality" (Maxwell & Mittapalli, 2010; Shannon-Baker, 2016, p. 330).

Once the epistemological tension between quantitative and qualitative paradigms is reconciled, the purpose for mixing guides methodological implementation of MMR. Essentially, to utilize an MMR approach, conceptual differences in qualitative and quantitative paradigms, as well as practical differences in methodological purposes must be resolved. The overarching purpose of utilizing a MMR approach is to achieve "a *better understanding* of the phenomena being studied" (Greene, 2007, p. 98). As outlined by Greene (2007), to effectively reach this better understanding, methods are mixed for five distinct purposes: triangulation, complementarity, development, initiation, and expansion. Specifically, the purpose of complementarity aligns with the paradigmatic perspective of phenomenological CR. As detailed by Greene (2008), this purpose "seeks broader, deeper, more comprehensive social understandings by using methods that tap into different facets or dimensions of the *same complex phenomenon*" (Greene, 2007, p. 101). Thus, through application of a CR paradigmatic perspective and a mixing purpose of complementarity, tension between quantitative and qualitative paradigms are resolved and a deeper understanding of socially contextualized human experience is achieved.

2.4b Utility of Mixed-Methods Research at the Social Intersection of Aging, Health, and Human Movement

In order to comprehensively understand aging, health, and human movement within the context of social relationships, an MMR approach is necessary. By applying a paradigmatic perspective of CR and mixing methods to achieve the purpose of complementarity, this 1) allows a "broader, deeper, and more comprehensive social understanding" of PA/EX and support behaviors to be reached, 2) creates space for converging and/or diverging perspectives from each partner, 3) enables "investigation of context-based causality" among dyadic PA/EX support behaviors, and 4) expands upon existing TGD theory to offer tentative, context-based explanations for dyadic PA/EX support behaviors in older dyads (Greene, 2007, p. 101; Shannon-Baker, 2016, p. 329). Within dyadic relationships, each partners' PA/EX habits and support behaviors can be more comprehensively characterized. By quantitatively and qualitatively capturing each partners' perspective of: 1) their own PA/EX behaviors, 2) their partner's PA/EX behaviors, and 3) the PA/EX support they offer each other, this both deepens and widens the scope of understanding dyadic PA/EX support and its implications for PA/EX participation.

Understanding is a constantly evolving process in which humans are actively participating in, and as Brinkmann asserts, "...nothing of philosophical interest is hidden, but that significant phenomena can be so obvious to us—so implicit in our sayings, doings, and experiences—that we fail to notice them" (Brinkmann, 2018, p. 75). Therefore, PA/EX habits and support behaviors in older couples need to be explored through application of an MMR approach that utilizes a CR paradigmatic perspective and a complementarity mixing purpose. By using a TGD theoretical framework and an MMR approach, these complimentary systems-level approaches

effectively examine and contextually characterize older couples' PA/EX habits and support behaviors to offer a deeper understanding of the social intersection of aging, health, and human movement.

2.5 Summary

To prevent the public health crisis caused by the interaction of aging demographics and sedentary lifestyles, acceptable, effective, and sustainable PA/EX interventions that are embedded within individuals' daily social lives are needed to 1) prevent an epidemic of physical disability and 2) maintain quality of life. Thus, in this context, research is needed to explore social support and PA/EX in older adults, specifically regarding interpersonal dynamics relative to PA/EX support in older couples. When examining the social context of older dyads' PA/EX behaviors, intentional inclusion of both halves of partnerships is necessary to comprehensively characterize the influence of support behaviors and relationship quality on partner PA/EX participation. To address these concerns, future research should seek to implement research approaches that combine elements from quantitative and qualitative research methodologies in an effort to capture a deeper understanding of older couples' PA/EX and support experiences. Furthermore, MMR approaches to this line of inquiry need: 1) an interpersonal theoretical framework, 2) a paradigmatic stance that grounds quantitative and qualitative methodological application, and 3) a clearly defined mixing purpose, to effectively examine and contextually characterize older couples' PA/EX habits and support behaviors. Through mixed-methods exploration, we will be able to achieve a deeper understanding of the social intersection of aging, health, and human movement.

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CHAPTER 3

EXAMINING PHYSICAL ACTIVITY AND EXERCISE SUPPORT DYNAMICS IN OLDER COUPLES: A MIXED METHODS UNDERSTANDING[1]

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3.1 Abstract

Introduction: Social support is associated with higher levels of PA/EX in older adults. Because the concept of PA/EX support arises in an interpersonal context, there is a need to more critically examine and comprehensively characterize the concept of partner PA/EX support and the potential influence on individual PA/EX behaviors. The aim of this study was to utilize a mixed-methods research (MMR) approach to examine PA/EX participation and identify PA/EX support patterns within and between older physically active dyads using a mixed-methods analysis. Methods: Eight community-dwelling, heterosexual couples 59-77 years (69.8±4.6 years) participated in this MMR study of PA/EX and PA/EX support behaviors. Through use of a convergent design and analysis, dyadic behavioral patterns were assessed quantitatively and qualitatively. Actigraph GT3X+ accelerometers captured PA/EX, the Couples Satisfaction Index assessed relationship satisfaction, the Positive and Negative Social Control Scales measured partner support and control, and qualitative semi-structured interviews captured individuals PA/EX and support experiences. Results: Quantitative data were analyzed descriptively, dyadic associations were explored, and qualitative interview transcripts were analyzed using reflexive thematic analysis. While associations between male and female partners' MVPA and steps did not pass significance, medium strength positive associations were present ($r=0.31$ and 0.40, respectively $p>0.10$). Partners' support perceptions displayed a small negative albeit nonsignificant association ($r=-0.16$, $p>0.10$). Though non-significant, gender-specific associations in partner support and PA/EX levels indicated that: 1) males felt more supported when their female partners were more active ($r=0.56$, $p>0.10$), and 2) females felt more supported when their male partners were less active ($r=-0.43$, $p>0.10$). Qualitative findings expanded upon quantitative findings to: 1) provide context to couples' PA/EX concordance by

highlighting couples' PA/EX patterns - they are physically active together and separately and 2) offer a possible explanation for couple's discordant PA/EX support by constructing the notion that PA/EX support is present in ways that cannot fully be captured with questionnaire items - tangible supportive inaction and non-tangible supportive perceptions may be present. Conclusions: Qualitative analysis further advanced understanding of dyadic PA/EX participation patterns and the concept of PA/EX partner support with the themes of tangible supportive inaction and non-tangible supportive perceptions, and provided further support for use of the Positive and Negative Social Control Scales for assessment of tangible supportive action in the context of older adult dyads PA/EX. Through integration of findings, we see the utility of implementing qualitative methodology to expand upon the quantitative data, particularly when quantitative analyses are underpowered. Future studies should seek to incorporate mixed-methods approaches when examining PA/EX support in dyads.

3.2 Introduction

Although many factors influence poor adherence to health behaviors and poor health outcomes in older adults, research supports a clear link between social context and health habits, including physical activity (PA) and exercise (EX) behaviors (Smith et al., 2017). One specific aspect of social context—social support—is associated with higher levels of PA/EX in older adults (Smith et al., 2017). Williams et al. (2004) critically examined the multifaceted concept of social support in the literature and identified categories of social support definitions, which included social relationships that offer reciprocity, accessibility, and reliability, and provide any combination of supportive resources (Smith et al., 2017; Williams et al., 2004). Furthermore, Williams et al. (2004) point to a variety of definitions for social support, advocating for "a

qualitative and contextual approach to the definition of social support" as a means to develop more context-specific definitions (Williams et al., 2004, p. 958).

Within the context of older adults' PA/EX, social support has predominately been quantitatively assessed using the Social Support and Exercise Survey (SSES) (Sallis et al., 1987). This 13-item measure was developed to assess perceived social support specific to EX behaviors, separating social support into two categories: family and friends (Sallis, et al., 1987). In the years since it was developed, the SSES has been administered in numerous studies to assess PA/EX social support in older adults (Smith et. al, 2017). In 2012, Cotter adapted the measure to more specifically examine PA/EX social support (social control) received from a partner/spouse (Cotter, 2012). Cotter (2012) created two scales: the Positive and Negative Social Control Scales, to assess individuals' perceptions of their partners' supportive and controlling behaviors related to PA/EX (Cotter, 2012).

Close social relationships have been shown to impact PA/EX, in both positive and negative ways (Craddock et al., 2015). Furthermore, while research in social support has mostly focused on significant others, friends, and family, the vast majority of this research has only focused on one half of the relationship (Smith et al., 2017). That is, one partner participates in the study while the other does not—half the dyad is involved while the other half is only examined from a support standpoint (Craddock et al., 2015). This approach produces an incongruence in study aims and study outcomes—assessing one individual in the context of a social relationship without accounting for the other individual(s) present in the social relationship reduces the causality of conclusions. Furthermore, the majority of research exploring older couple's PA/EX and support behaviors, has been predominately quantitative, with minimal qualitative studies (Ayotte et al., 2013; Barnett et al., 2013; Griesemer et al., 2020; Khan et al.,

2013; Winters-Stone et al., 2016). Because the concept of PA/EX support arises in an interpersonal context, there is a need to more critically examine and comprehensively characterize the concept of partner PA/EX support. Notably, later in life, social network size shrinks, invariably increasing the time older adults spend with their spouses or partners; thus, partner support theoretically is even more important in this stage of life (Cartensen, 1992). Therefore, the overarching objective of this study was to explore older couples PA/EX support behaviors specifically 1) examining older couples who are physically active, 2) intentionally including both members of the partnership, and 3) utilizing a mixed-methods research (MMR) approach with a convergent design and analysis. To address this objective, the following mixed-methods research (MMR) question and aim guided our study:

Research Question: How do older adults participate in PA/EX behaviors and experience PA/EX support within their partnerships?

Aim: The aim of this study was to examine how older adults participate in PA/EX behaviors and experience PA/EX support within their partnerships.

3.3 Methods

Study Design. This study applied a critical realist paradigmatic perspective to address the study question and aim. Critical realism embodies a constructivist epistemology and a realist ontology to "'facilitate dialogue' and compatibility between quantitative and qualitative approaches" (Shannon-Baker, 2016, p. 323). This convergent MMR approach was utilized to comprehensively characterize active older couples' PA/EX support behaviors and expand the understanding of dyadic influence. With this approach, quantitative and qualitative data are concurrently collected, each dataset is analyzed separately, and quantitative and qualitative

findings are then integrated by means of comparison (Creswell, 2018). The study design is outlined in Figure 3.0.

Recruitment and Participant Characteristics. To complete the proposed study design, we recruited eight older adult couples (dyads) from the local community. To be eligible, dyads met the following inclusion criteria: 1) community-dwelling, 2) currently romantically involved for at least 6 months and living together, 3) self-identified as physically active based upon the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire (Stewart et al., 2001) estimates of weekly moderate PA/EX participation, 4) 60 years of age or older, 5) able to ambulate, and 6) both halves of the partnership were willing to participate. Participant demographics were collected via a standardized questionnaire. To ensure adequate cognitive function, the mini-Mental State Examination was administered (Folstein, 1975) and participants with a score below 25 were considered ineligible for study participation. This measure was performed to ensure that there was no cognitive impairment present (e.g., dementia) that could affect participants' ability to consent themselves for participation in the study. Due to novelty of the exploratory research design, a convenience sample was selected through use of probability, purposive, and snowball sampling techniques. Specific recruitment strategies included community and university listservs, recruitment flyers, newspaper advertisements, and word of mouth. Participant's written informed consent was obtained prior to participation and all procedures were approved by the Institutional Review Board at the University of Georgia. Couples provided consent separately to decrease influence from the partner on the decision to participate.

3.3a Quantitative Assessment Methods

Demographics, Weight Status, Comorbidities, and Medication. Participant demographics were collected via a standardized questionnaire. Weight status was assessed, and body mass index (BMI) was calculated, via conventional clinical methodology. Barefoot standing height was measured to the nearest 0.1 cm with a stadiometer. Body weight was measured on a digital scale. The total number of comorbidities, or pre-existing health conditions, and the total number of prescription medications were collected via a standard health history questionnaire.

PA/EX Behaviors. An objective measure of PA/EX behavior (steps, minutes, intensity) was captured using Actigraph GT3X+ accelerometers (ActiGraph LLC, Fort Walton Beach, FL). Participants wore devices for 7 days during all waking hours with usable data defined as at least 4 days and ≥10 hours/day of wear time. Participants were also instructed to keep a log of when the device was put on, taken off, and any activity that occurred without the device being worn (e.g., showering). Raw data from the accelerometers were processed using ActiLife software for examining wear time and quantifying minutes/day of Moderate to Vigorous PA (MVPA) and steps/day. Wear time estimates were compared from ActiLife data with the log for consistency to determine validity of data for inclusion in the analysis; all participants provided usable data. MVPA was quantified based on a Freedson specific cut-point of ≥1,952 counts/minute (Freedson, 1998).

Relationship Satisfaction, Partner Support, and Partner Control. Relationship satisfaction was assessed via the Couples Satisfaction Index (CSI-32) (Funk & Rogge, 2007). A higher score on the CSI-32 is indicative of greater relationship satisfaction. Partner support and control was assessed via the Positive and Negative Social Control Scales (Cotter, 2012). The

Positive Social Control Scale measured partner support, while the Negative Social Control Scale measured partner control.

3.3b Qualitative Assessment Methods

Semi-structured Individual Interviews. For the interview portion of the data collection, protocol development was guided by application of the Social Cognitive Theory in the context of a phenomenological framework (Bandura, 1989; Johnson, 2015). These semi-structured, phenomenological interviews (Roulston, 2010) took place during November and December 2019 in a university research space. The interviews were conducted separately in a one-on-one set up allowing each half of the dyad to feel comfortable disclosing their individual perspectives without their partner present. Because there was a laboratory visit prior to the interview, the interviewees and the interviewer (the first author; RES) were already acquainted with one another. This development of rapport prior to interviews was important to enable participants to feel comfortable disclosing details of their lives, which were important for capturing a holistic representation of their PA/EX and support behaviors in the context of their relationship. Interviews were conducted, audio recorded, and immediately transcribed. During the transcription process, all participants were given pseudonyms.

3.3c Analytic Strategy

Overview of Approach. The analytic strategy used for the present study emphasized a critical realist, convergent MMR analysis approach in that the intent of analysis integration was to "develop results and interpretations that expand understanding [and] are comprehensive" (Creswell, 2018, p. 221). In accordance with Creswell and Plano Clark's "primary data analysis

and integration procedures," quantitative data were analyzed first, followed by qualitative analysis, and then findings were integrated (Creswell, 2018, p. 224).

Quantitative Data Analysis. Using SPSS version 27 quantitative data were analyzed descriptively (means, standard deviations, frequencies) at the individual level and then bivariate correlational analyses were used to explore dyadic associations among weight status, PA/EX behavior, relationship satisfaction, partner support, and partner control.

Qualitative Data Analysis. Qualitative interview transcripts were analyzed, specifically focusing on participants' responses to the following interview questions: 1) tell me about the PA/EX you've engaged in within the last week, 2) tell me about the kinds of activities you and your partner like to do together, and 3) what does your partner do that helps you be physically active? The transcripts were analyzed with an inductive thematic analysis approach assisted by narrative mapping. By adapting Braun and Clarke's guidelines for reflexive thematic analysis and adapting Lapum's "questions of the text" for crafting narrative maps, this accommodated dyadic transcripts by creating space for both partner's perspectives (Braun & Clarke, 2006; Braun & Clarke, 2020; Lapum, 2010, p. 756). This approach, using qualitative dyadic data analysis, also aligns with the critical realist notion that these individuals make meaning of their PA/EX experience while the social context of their relationships impacts that meaning (Braun & Clarke, 2006) As such, each individual's response to the three key interview questions was extracted before then intertwining significant statements from each partner into a single narrative map of PA/EX behaviors and support within each dyad (Lapum, 2010). Transcript excerpts about PA/EX support were then analyzed to generate themes between dyads by first using descriptive coding (Linneberg & Korsgaard, 2019). These descriptive codes were then organized into tentative themes and thematic maps were synthesized (Braun & Clarke, 2006). These

thematic maps enabled exploration of tentative themes connections, allowing review and revision prior to defining and naming finalized major themes (Braun & Clarke, 2006). Quantitative and qualitative findings were then integrated to more comprehensively characterize older couples' PA/EX support behaviors.

3.4 Results

In accordance with the separation of the quantitative and qualitative strands of the study during analysis, the results are presented sequentially before mixing the strands within the discussion to enable the reader to experience the mixing purpose of expansion.

3.4a Quantitative Findings

Socio-Demographics. Participant characteristics described below are presented by sex in Table 3.0. A total of 8 community-dwelling, heterosexual couples 59-77 years (69.8±4.6 years) completed questionnaires and qualitative interviews. The entire sample was non-Hispanic White, and seven out of eight couples were married (37.0±19.4 years; range = 2-53 years). Of the six couples who chose to disclose their income, five couples reported $90,000+ annual household income. All 16 participants reported being retired with four individuals indicating participation in part-time work.

Weight Status, Comorbidities, and Medication. Weight status differed by sex with females having a lower BMI compared to their male counterparts (24.7±4.3 vs. 28.0±4.8 kg/m^2, respectively). Despite this difference, partners' BMIs were concordant ($r=0.67$, $p<0.10$). Females and males were not significantly different with respect to their presence of comorbidities and prescription medication use (see Table 3.0).

PA/EX Behaviors. At screening, participants indicated that they were meeting the Physical Activity Guidelines according to the CHAMPS questionnaire (Stewart et al., 2001) estimates of weekly moderate PA/EX participation. On average, male partners engaged in more weekly MVPA (475.8± 76.0 vs. 316.1±192.9, respectively) and daily steps (8637.3±2505.9 vs. 8373.0±2509.7, respectively) (see Table 3.0). Bivariate correlations revealed dyadic associations relative to PA/EX behaviors (see Tables 3.0 and 3.1). While associations between male and female partners' MVPA and steps did not pass significance, medium strength positive associations were still present (r=0.31 and 0.40, respectively p>0.10). These associations indicate that the more active one partner is, the higher the activity level of their partner.

Relationship Satisfaction, Partner Support, and Partner Control. On average, both female and male partners were satisfied in their relationship with average scores exceeding 104.5 (143.3±13.4 and 139.4±19.6, respectively). Females reported higher relationship satisfaction and partner support compared to their male counterparts. Both males and females reported similar partner control. Bivariate correlations also revealed dyadic associations between relationship variables. Partners were significantly concordant for relationship satisfaction, meaning that both partner's relationship satisfaction scores strongly agreed (r=0.66, p<0.10). However, medium strength associations between relationship satisfaction and partner control were discrepant between partners. For females, relationship satisfaction was positively associated with males' partner control, while males' relationship satisfaction was negatively associated with females' Partner Control (r=0.41 and -0.35, p>0.10). Essentially, female partners had more relationship satisfaction when male partners perceived more partner control, while male partners had more relationship satisfaction when female partners perceived less partner control. Females' and males' perceptions of partner support and partner control showed almost no associations. For

females, perceived partner control showed negligible association with males' perceived partner support (r=0.01, p>0.10). Additionally, males' partner control did not demonstrate association with females' partner support (r=0.02, p>0.10). This suggests that female and male perceptions of control are not connected with their counterpart's support perceptions. However, while associations between female and male partners' control perceptions did not pass significance, a moderate negative association was still present (r=-0.29, p>0.10). That is, when one partner perceives more control, the other perceives less. Additionally, partners' support perceptions displayed a small negative, but still nonsignificant association (r=-0.16, p>0.10). Again, this indicates a discrepancy in partners' perceptions—when one partner perceives more support, the other perceives less. Essentially, while nonsignificant, these negative associations suggest that partners' perceptions of both partner control and partner support differ—when one partner perceives more control or support, the other perceives less control or support. It is important to note that despite these differences in PA/EX support and control perceptions, partners indicated that they are still mutually satisfied in their relationship.

Associations Between PA/EX and Relationship Variables. Additionally, for females, perceptions of both partner support and partner control were inversely associated with their partners' steps and MVPA (r range=-0.22 to -0.62; all $p \geq 0.1$). The large, inverse association between females' partner control and males' steps was the only correlation approaching significance (r=-0.62, p=0.1). Collectively, these inverse associations indicate that females' perceptions of PA/EX control and support are in opposition to males' steps and MVPA. Conversely, within males, partner support showed large, positive associations with females steps and MVPA (r=0.56 and 0.36, respectively), with partner control indicating almost no association at all (r=-0.04 and -0.05, respectively). Collectively, these associations within males indicate

that, the more partner support males perceive, the more females engage in PA/EX. In other words, males experience more PA/EX support when their female partners are more physically active. By connecting these gender-specific patterns in partner support and PA/EX levels, these findings indicate that: 1) males feel more supported when their female partners are more active, and 2) females may feel more supported when their male partners are less active. Partner support demonstrated clear associations with PA/EX for both male and female partners, with partner control only demonstrating associations with PA/EX for female partners. This suggests that while individual perceptions of partner support are connected to partners' PA/EX across genders, only females' perceptions of partner control are associated with their male partner's PA/EX. Furthermore, while partners were concordantly satisfied in their relationship, males' relationship satisfaction showed small associations with females MVPA, steps, and partner support ($r=0.18$, 0.09, -0.14; $p>0.10$) and females relationship satisfaction demonstrated small to moderate associations with males' MVPA, steps, and partner support ($r=0.18$, 0.33, 0.01; $p>0.10$). Therefore, while couples' relationship satisfaction strongly agrees, these findings suggest that this agreement is not as strongly associated with PA/EX or PA/EX support.

3.4b Qualitative Findings

One-on-one semi-structured interviews with couples allowed us to address the question of: How do older adults participate in PA/EX behaviors and experience PA/EX support within their partnerships? Information about PA/EX and support experiences were collected via the following lead-off interview questions: 1) tell me about the PA/EX activities you've engaged in within the last week, 2) tell me about the kinds of activities you and your partner like to do together, 3) what types of things does your partner do to help you stay physically active? The

responses to questions 1 and 2, were used to craft the within-dyad PA/EX behavior synopses below. These synopses provide both an overview and contextualize the PA/EX dynamics within each dyad. Then, the responses to question 3 were analyzed to generate PA/EX support themes between dyads.

Within-Dyad PA/EX Behavior Synopses.

Dyad 1: Marie, 67 years old, and Jack, 68 years old, have been married for 42 years. They attend a group exercise class together three times per week. Separately, he goes for walks around their neighborhood, and she does various tasks and chores around the house.

Dyad 2: Alice, 73 years old, and Marty, 77 years old, have been married for 17.5 years. They walk in their neighborhood together and do chores around their house and farm together. He also goes for walks in their neighborhood without her to make sure he hits his daily goal of 10,000 steps.

Dyad 3: Lori, 63 years old, and Dave, 71 years old, have been married for two and a half years. They exercise separately, taking individual trips to the recreational center—she attends a water aerobics class in the evening, while he uses the treadmill and lifts weights early in the morning. She also likes to spend most of her time outside gardening and working in the yard. They are also active together and spend most of that time walking or hiking outside, especially when traveling or with their grandkids.

Dyad 4: Kathryn and Max, both 68 years old, have been married for 46 years. They are active together by going for walks. She also walks separately, and lifts weights and occasionally does other activities with friends like tubing or skiing. He also lifts weights and does body weight exercises on his own as he is able to, but sometimes his spinal stenosis limits him.

Dyad 5: Marsha and Gerry, both 73 years old, have been married for 51 years. They are highly active, exercising together and separately. She walks with friends, lifts weights, and attends yoga classes weekly. He lifts weights with a personal trainer, attends yoga classes, and does aerobic exercise (rowing machine, elliptical, bike) weekly. Throughout the week they are also active together—walking, hiking, attending spin classes, and cycling outside as weather permits. They also intentionally take biking and hiking vacations.

Dyad 6: Claire, 66 years old, and Drake, 59 years old, have been together for seven years. They are physically active together and separately. She participates in pickleball and boxing classes weekly and also walks daily. He occasionally does a boxing class, but more regularly lifts weights at the gym, bikes outside as the weather permits, and also works on bikes, motorcycles, and woodworking projects. They walk together daily, as his knee permits, and also bike together as the weather permits. With her more recent Parkinson's diagnosis, they both expressed a need to prioritize exercise.

Dyad 7: Lynn, 72 years old, and John, 73 years old, have been married for 47 years. She attends a Pilates class, while he goes for runs to train for 5K and 10K races he participates in throughout the year. They have no interest in each other's preferred activity, but they do still walk together daily.

Dyad 8: Connie, 72 years old, and Gary 74 years old, have been married for 53 years. They attend a group exercise class together two times per week and also walk together daily. He also walks separately, especially to take their dog out. They schedule active vacations that will allow them to walk more and challenge them to climb.

Between-Dyad PA/EX Support Themes.

Note: Between-dyads themes and subthemes are presented in Figure 3.1

Between-dyads PA/EX support from interview transcriptions was organized into three major themes: tangible supportive action, tangible supportive inaction, and non-tangible supportive perceptions. For each theme, subthemes were further delineated to elaborate upon specific domains of support behaviors.

Tangible Supportive Action.

For this theme of support, participants pointed to specific actions of their partners that helped them stay physically active. Specifically, for one participant, this act involved their partner adapting to join them for PA/EX. For example, Claire indicated that she feels supported by Drake when he joins her for walks:

> "…the walking he, even though sometimes I know he doesn't really feel like it. If I say 'let's go for a walk,' he's up for it." *Claire, Dyad 6*

Drake's adaptation to join Claire for walks is similar to the Positive Social Control Questionnaire item of "Changed their schedule so you could exercise together." However, Claire's statement offers additional context for Drake's support, indicating that his willingness to participate in her preferred form of PA/EX, walking, at a time when she wants to be active, is one of the things Drake does to support her PA/EX.

For other participants, this act involved verbal communication from their partner for PA/EX planning purposes. For example, Lynn indicated that her partner John supports her by asking about her Pilates participation so they can make plans to be active:

> "Well, he plans, you know. Like, so, like he always says, are you going to Pilates tomorrow? You know? And so, just the, I guess the verbal kind of questioning and encouragement so that we could plan." *Lynn, Dyad 7*

John's planning communication with Lynn is similar to the Positive Social Control Questionnaire items of "Planned for exercise on recreational outings" and "Discussed exercise with you." However, because of an earlier statement from Lynn about how they coordinate their PA/EX participation, we're able to understand both the context of PA/EX planning discussion and the outcome:

> "Yeah, when I do Pilates we drive in together and then he goes, you know, it's an hour. I go in and do the Pilates for an hour and he goes on a run." *Lynn, Dyad 7*

John and Lynn have different PA/EX preferences—he likes to run while she likes to do Pilates. Lynn feels supported by John's communication and planning, so that their schedule accommodates each of their exercise preferences. While John and Lynn participate in PA/EX at the same time, they do their preferred activities separately.

For another participant, this tangible supportive act involved verbal communication from their partner coupled with shared PA/EX participation. For example, Gerry indicated that his partner Marsha offers reminders for him to participate in PA/EX in the form of walking:

> "So she's always saying me, 'I know you bike, but you know, your bones need that, a little bit of pounding and, and so forth.' So, that's why when we're up in the mountains and occasionally here we'll go on a long walk, you know, a four mile walk or something like that." *Gerry, Dyad 5*

Marsha's verbal support for Gerry's PA/EX is similar to the Positive Social Control Questionnaire item of "Gave you helpful reminders to exercise." However, Gerry's statement

also helps us to understand both the context and the outcome of Marsha's support. Marsha's reminder supports Gerry's PA/EX by reminding him to participate in other types of PA/EX in addition to biking. His statement also indicates that Marsha then joins him for this walking that she reminds him to do. This is similar to the Positive Social Control Questionnaire item of "Exercised with you." Gerry's statement helps us connect these two questionnaire items. Marsha does not just remind him to exercise or exercise with him, she reminds him to participate in a form of PA/EX that he does not do on his own, and then joins him for these walks. Additionally, from Marsha's perspective, she points to Gerry's participation in PA/EX with her as a source of support:

> "And we just have a great time going on bike rides together. Spinning, we don't pay attention to each other particularly, but on a bike ride we really will get out in the boondocks and chat…But we just really enjoy that." *Marsha, Dyad 5*

Marsha's statement similar to Gerry's connects back to the Positive Social Control Questionnaire item of "Exercised with you." However, because of the interview statements from both halves of the couple, the understanding of the PA/EX support dynamics for this couple is enhanced. For Marsha and Gerry, they are concordant in their PA/EX support in that they both feel supported by their partner participating in PA/EX with them.

Tangible Supportive Inaction.

For this theme of support, participants pointed to specific inactions of their partners that helped them stay physically active. In other words, instead of indicating what their partner does to keep them active, they specified what their partner does not do that helps sustain their PA/EX participation. Specifically, for one participant, this inaction involves a lack of PA/EX

participation. For Jack, when asked about how Marie supports his PA/EX, he indicates that he still goes to group exercise class even when she does not want to join him:

> "Oh, this is all individually for me. You know, and there are sometimes where she's said, I'm not coming [to group exercise class]. And I'll say, okay. I mean, I'll come by myself, I'll come with her. I mean, it doesn't, I'm comin'. You know, and, and she's good about it." *Jack, Dyad 1*

Jack's statement points to Marie's occasional unwillingness to go to their group exercise class as something that does not prevent him from attending, thus providing him PA/EX support. In other words, Jack experiences PA/EX support from Marie when he is simply able to participate in what is normally shared PA/EX even when she does not want to participate. This inaction as a form of support does not directly connect to any items on the Positive or Negative Social Control Questionnaires, and thus, expands our understanding of PA/EX support. Here, we see that, similar to a partner's actions, a partner's inaction can also provide support, or at the very least, lack of anti-support. That is, inaction from the partner does not prevent the individual from participating in PA/EX.

For another participant, this supportive inaction involves a lack of complaint from his partner about his PA/EX. For Gary, when asked about how Connie supports his PA/EX, he points to Connie's lack of complaint as a means of support:

> "…It's just that she does not complain, at all about me, about my walking. There's times when, when she's comfortable joining me, but there's times when she's just too busy…" *Gary, Dyad 8*

Gary's statement, while similar to the Negative Social Control Questionnaire item of "Nag you about exercise," helps us to understand that the mere absence of this control is what he perceives

as support. Gary's statement also helps us to understand the context and outcome of Connie's tangible inaction—sometimes she joins him for walks, sometimes she does not, but regardless, she does not complain about the fact that he wants to walk, and because of this helps him experience PA/EX support. Here, again, we see that, similar to a partner's actions, a partner's inaction can also provide support.

For another participant, this inaction involves a lack of suggestion to participate in PA/EX. For Alice, when asked how Marty supports her PA/EX, she points to Marty refraining from telling her what PA/EX to do as a means of support:

> "What is most helpful is that he does not say to me, you need to go walking, you need to exercise more. He doesn't tell me what I need to do. The one thing probably that he doesn't tell me I need to do in that because if he did, I'd plant my feet and probably not take another step." *Alice, Dyad 2*

Alice's statement is relatively similar to the Negative Social Control Questionnaire items of "Tell you ideas on how you can get more exercise" and "Pressure you to exercise." From this statement we, again, are able to connect this absence of partner control with the perception of partner support. Additionally, Marty's own statement in response to the interview question about PA/EX support helps us to more clearly understand the context of Alice's statement and connect both these statements back to their dyadic PA/EX patterns.

> "So basically, I'll, I'll typically start walking first and so I'll walk…And so, Alice's not always ready to start walking then. So, I'll just start walking without her and so I'll walk back. And then we walk down to the end of [local road] and back.…So we accommodate each, we accommodate and support each other's needs. I think…So here we've reached compromises that allow each their freedom to, you know, each of us are

> free to do what we want. You know, we have time for ourselves, time alone to do what we want." *Marty, Dyad 2*

By connecting Alice and Marty's statements, we begin to capture a clearer picture of what their dyadic PA/EX and support behaviors look like. While Alice and Marty walk together, Marty prefers to walk for a longer distance than Alice. Thus, Marty begins walking first to accumulate his desired walking distance and then returns home to meet up with Alice, who joins him for the last portion of their walking route. Because Marty does not tell Alice to walk the entire distance with him, she feels that he is supporting her PA/EX. Marty likens the compromise they have reached as a means of PA/EX support.

While some aspects of the tangible inaction theme were captured by the Negative Social Control Scale items, the participants interview responses, particularly when presented from both halves of the partnership, offer additional insight into the interpersonal dynamics of dyadic PA/EX participation and support.

Non-Tangible Supportive Perceptions.

For this theme of support, some participants pointed to the presence of their partner in their life and the existence of their relationship as a means of supporting their PA/EX. For Dave, when asked about how Lori supports his PA/EX, he did not point to any action she does or does not do:

> "She enjoys doing these things, and if I'm not able to do them, then I'm holding her back. Right? So that's another good reason for me to exercise. Right? Because I kind of owe it to her. I mean, it's not that she and I have a contract or anything. And it's not that she's ever said anything about it, but it's, you know, I feel like, you know, we got into this

> relationship because we enjoyed doing things outdoors together. And so I've set an expectation, well I need to continue to fulfill that expectation." *Dave, Dyad 3*

Dave's statement highlights his feelings about his commitment to Lori, their relationship, and their shared activities as a means of Lori supporting his PA/EX. Essentially, Dave's statement elaborates on dyadic PA/EX support dynamics that are not captured on the Positive Social Control Scale. By coupling Lori's statement in response to the interview question about PA/EX support, we are able to see the recursive dynamics of PA/EX support within their partnership.

> "I probably wouldn't be doing it [water aerobics class] if he wasn't encouraging, and he's definitely the exercise person of our relationship…never purposefully did it before, so he definitely influences that…" *Lori, Dyad 3*

Here, Lori also acknowledges that Dave's presence as her partner influences her PA/EX participation. While her mention of encouragement does suggest that she experiences PA/EX partner support in the form of tangible action, her view of Dave as "the exercise person" and her acknowledgement of his influence on her PA/EX behavior also suggests the presence of non-tangible perceptions of PA/EX support.

For another participant, she points to her partner's presence and his PA/EX participation as what keeps them moving as a couple. For Connie, Gary supports her PA/EX by initiating their activity:

> "That he does? That helps me stay active? He keeps us on the move all the time. I would, he's, semi-retired, but he still works. And, well, we both are. But he loves to go places…" *Connie, Dyad 8*

Here, Connie struggles to point to a specific action that Gary does to support her PA/EX, and instead, points to a perception of him as the one who "keeps us on the move all the time." In this

way, Connie's statement, similar to Lori's, suggests that her view of her partner's influence is what supports her PA/EX. Similar to the other responses highlighted above, Connie's statement elaborates on non-tangible dyadic PA/EX support dynamics that aren't captured on the Positive Social Control Scale.

Between-dyads PA/EX support from interview transcriptions was organized into three major themes: tangible action, tangible inaction, and non-tangible perceptions. Organization of these PA/EX partner support themes highlighted multiple connections between the Positive Social Control Scale items and the theme of tangible supportive action, some connections between the Negative Social Control Scale and the theme of tangible supportive inaction and expanded the concept of PA/EX support with the theme of non-tangible supportive perceptions.

3.5 Discussion

The overarching goal of this study was to utilize a convergent MMR approach to comprehensively characterize active older couples' PA/EX support behaviors and expand the understanding of dyadic influence on PA/EX behaviors.

3.5a Mixing Premise

Quantitative findings demonstrated the presence of associations between outcomes of interest at the group level—empirically supporting the theoretical premise that partners PA/EX behaviors and PA/EX support are related. Qualitative analysis enabled generation of themes to capture each individual's experiences of PA/EX behaviors and PA/EX support within their dyad. The integration of these findings augmented the understanding of older couples' PA/EX behaviors and support. The premise of mixing quantitative and qualitative findings was to gain a

deeper understanding of physically active older couples' experiences with PA/EX and support. Due to the small sample size and the homogeneity of participants, partners were distinguished for quantitative analyses under the assumption that cisgender identity was a relevant distinguishing variable. While between-dyads group means were compared based upon the dyadic analysis convention, i.e., distinguishing each half of the heterosexual partnership by cisgender identity (male versus female), qualitative analysis enabled exploration of patterns between dyads without cisgender identity restricting the analysis or findings between each dyad to gender-specific patterns. Additionally, this comparison provides a means of understanding if and how this dyadic variability in PA/EX behaviors and PA/EX support is obscured quantitatively via group means. Thus, mixing the data in this way is necessary to reveal subtle but important patterns in findings.

3.5b Integrated Study Findings

Quantitative trends in Partner Support and PA levels suggest that: 1) males feel more supported when their female partners are more active, and 2) females may feel more supported when their male partners are less active. Furthermore, quantitative findings indicated that while couples' relationship satisfaction strongly agrees, these findings suggest that this agreement is not as strongly associated with PA/EX behaviors or PA/EX support. Additionally, female partners had more relationship satisfaction when male partners perceived more Partner Control, while male partners had more relationship satisfaction when female partners perceived less Partner Control. These findings alone offer minimal insight into the dyadic context and dynamics of PA/EX habits and support behaviors.

Qualitative data were organized to gain insight into dyadic context and dynamics of influence. The PA/EX partner support theme of tangible supportive action connected back to multiple Positive Social Control Scale items, with some connections between the Negative Social Control Scale items and the theme of tangible supportive inaction present, as well. Qualitative analysis also expanded upon the concept of PA/EX support with the theme of non-tangible supportive perceptions. By using qualitative methodology to capture and make meaning of individual's PA/EX support experiences within the context of their relationship, this approach created space for exploring the PA/EX support dynamics in physically active older couples. Through expansion of quantitative findings, a deeper understanding of PA/EX support nuances was constructed within each dyad. Moreover, this qualitative analysis provided context to the group trends in the quantitative findings. Through integration of findings, we see how QUAL expands upon the QUANT in the following ways:

1) QUANT analysis showed that all couples are physically active, while QUAL analysis allowed us to understand partners' PA/EX patterns - they are physically active together and separately.

2) QUANT assessment of PA/EX support as assessed with partner support and partner control indicated patterns of discordance, while QUAL analysis constructed the notion that PA/EX support is present in ways that cannot fully be captured with questionnaire items - tangible supportive inaction and non-tangible supportive perceptions may be present.

3.5c Integration with Current Literature

Previous studies seeking to qualitatively explore older couples' PA/EX have examined couples' influence on one another's PA/EX in retirement, as well as couples' approaches to

"working together to become more active," (Barnett et al., 2013; Griesemer et al., 2020, p. 752). Barnett, Gruell, and Ogilvie (2013), identified spousal influence themes of: spousal attitudes towards PA, spousal PA behavior, and spousal support. Their data analysis procedure, while relatively detailed, was only loosely supported by previous qualitative methodological publications, with no paradigmatic stance or theoretical framework indicated and no mention of navigating the data analysis process within and between dyads. Additionally, within this particular cohort of older heterosexual couples, spousal influence themes led researchers to conclude that "physical activity and exercise behaviour was often gendered…each partner's physical activity behaviours reflected his or her individual and independent preferences and habits" (Barnett et al., 2013, pp. 8-9). Thus, these couples were physically active independent of one another, with the exception of "some couples walked together more frequently" (Barnett et al., 2013, p. 7). Within our sample, heterosexual couples participated in PA/EX both together and separately, thus individual PA/EX participation reflected dyadic PA/EX patterns. Additionally, the findings from our study advance this line of inquiry into older couples' PA/EX behaviors by exploring PA/EX support themes without restricting between dyad findings by cisgender identity.

Griesmer et al (2020) qualitatively examined narratives from people with osteoarthritis (PWOA) and their partners to develop a couple typology for couples increasing their PA/EX together. They examined narrative concordance within dyads and classified partner attitudes about working together between partners to arrive at four couple typologies: working together works, doing our own thing, conscious conflict, and different realities (Griesemer et al., 2020). While Griesmer et al (2020) offered this couple typology, application of this classification system is restricted due to the participants sampled, the methods employed, and the analytical

framework. Within the context of the Griesmer et al (2020) study, individuals were classified as PWOA and their partners, which also influenced researchers' interview protocols. Specifically, interviewers asked PWOA about how their partners helped them become more active and asked their partners how they helped PWOA become more active. This line of questioning positions the PWOA as the one in need of support and also fails to capture receipt of support from the PWOA's partner. This patient-caregiver dyadic characterization is commonly seen in studies that examine older dyads (Khan et al., 2013; Pucciarelli et al., 2017; Winters-Stone et al., 2016), thus, the utility of the Griesmer et al. (2020) couple typologies may be less applicable in more healthy, physically active older dyads.

The qualitative basis of these studies, respectively, offered novel insights into patterns of PA/EX support through classification of couple typologies and patterns. However, this qualitative literature exploring PA/EX habits and support behaviors in older couples has predominately sampled less active individuals in a state of behavior change (Barnett et al., 2013; Griesemer et al., 2020). Whereas our study examined PA/EX participation and identified PA/EX support patterns for physically active older dyads.

Furthermore, our study findings offer support for the notion that, to understand the interactive dynamics of interpersonal influence on older adults' PA/EX behaviors, an interpersonal approach is necessary. Transactive Goal Dynamics (TGD) theory posits that because an individual's health behaviors do not occur in isolation, the system of social influence should be examined (vanDellen, 2019). Through utilization of a convergent MMR design, qualitative analysis expanded the understanding of older adults' PA/EX support dynamics that cannot fully be captured with quantitative questionnaire items. Thus, in order to effectively examine and contextually characterize the dynamic construct of PA/EX support, research must

capture the context at the systems level. MMR approaches that effectively combine elements from quantitative and qualitative research methodologies maximize the strengths and minimize the weaknesses of each research paradigm in pursuit of a deeper understanding of the social intersection of aging, health, and human movement.

Strengths and Limitations. Because this study utilizes an MMR design, it maximizes the potential for meta-inferences, or tentative explanations, to occur throughout. While an MMR approach creates the opportunity to combine the strengths that both quantitative and qualitative research methods offer, combining these different methods and methodologies also creates the possibility for exacerbating limitations of each. A clear strength of this MMR study lies in its ability to utilize QUAL methodology to overcome QUANT sample size limitations. That is, with a sample of less than 35 dyads, non-consequential interdependence cannot be assessed and non-independence of data is assumed (Kenny, 2015). Furthermore, with a sample of eight dyads, most QUANT analyses are substantially underpowered, which is why QUANT analysis in the present study was primarily descriptive with preliminary exploration of variable associations via a cisgender identity distinction. While, it is advisable to treat dyads as distinguishable when there is both theoretical *and* empirical support for a distinction (Kenny, 2015), a sample size of eight dyads precluded meaningful empirical examination of distinguishability. Thus, the theoretical assumption of distinguishability on the basis of cisgender identity was intentional to enable examination of QUANT associations among outcomes of interest that then informed QUAL analysis. Inevitably, this assumption restricted the lens through which we viewed QUANT dyadic data patterns. However, this theoretical limitation was minimized through QUAL analysis that constructed themes of PA/EX support between-dyads without distinguishing themes by cisgender identity. This complementary approach created space for our study to push beyond the

gendered patterns, like the gender-specific PA/EX behavior patterns seen in previous research (Barnett et al., 2013). While the sequential data collection and analysis process was in-line with convergent MMR design practices, it did not enable constant integration between the quantitative and qualitative pieces of this project, which reduces opportunities for meta-inferences. Additionally, inclusion of non-probability sampling strategies, such as those utilized in our study, increases the likelihood of sampling error. Findings from this study are restricted in terms of generalizability due to the exploratory nature of this study, the sampling strategies employed, and the specific participants included, especially the homogenous sample with respect to race and ethnicity.

3.6 Conclusion

This study utilized qualitative analysis to expand the concept of PA/EX partner support through delineating the themes of tangible supportive action, tangible supportive inaction, and non-tangible supportive perceptions. The PA/EX partner support themes of tangible supportive action and tangible supportive inaction connected older couples lived experiences of dyadic PA/EX partner support back to quantitative assessment of PA/EX partner support via the Positive and Negative Social Control Scales. Notably, multiple individuals indicated that shared PA/EX was a key supportive action from their partner. Qualitative analysis further advanced understanding of the concept of PA/EX partner support with the theme of non-tangible supportive perceptions. For this theme of support, some participants pointed to the presence of their partner in their life and the existence of their relationship as a means of supporting their PA/EX routines. In this way, this MMR study was able to offer further support for use of the

Positive and Negative Social Control Scales for assessment of tangible supportive action and inaction within older dyads.

When exploring social constructs like partner PA/EX support, quantitative findings alone offer minimal insight into the dyadic context and dynamics of PA/EX habits and support behaviors. By using qualitative methodology to capture and make meaning of individual's PA/EX support experiences within the context of their relationship, this creates space for exploring the PA/EX support dynamics in dyads. Through expansion of quantitative findings, we are then able to construct a deeper understanding of PA/EX support nuances within and between dyads. Moreover, this qualitative analysis provided context to the group trends in the quantitative findings. Through integration of findings, we see the utility of implementing qualitative methodology to expand upon the quantitative data, particularly when quantitative analyses are underpowered.

Quantitative questionnaire assessment cannot fully capture dyadic PA/EX support dynamics. Thus, future research should seek to employ qualitative methodologies to contextualize quantitative data and enhance understanding of dyadic influence when examining the construct of PA/EX partner support. Ultimately, this information may offer insights into the design of effective PA/EX programs and interventions, specifically those leveraging social support to enhance adherence to PA/EX guidelines for older adults.

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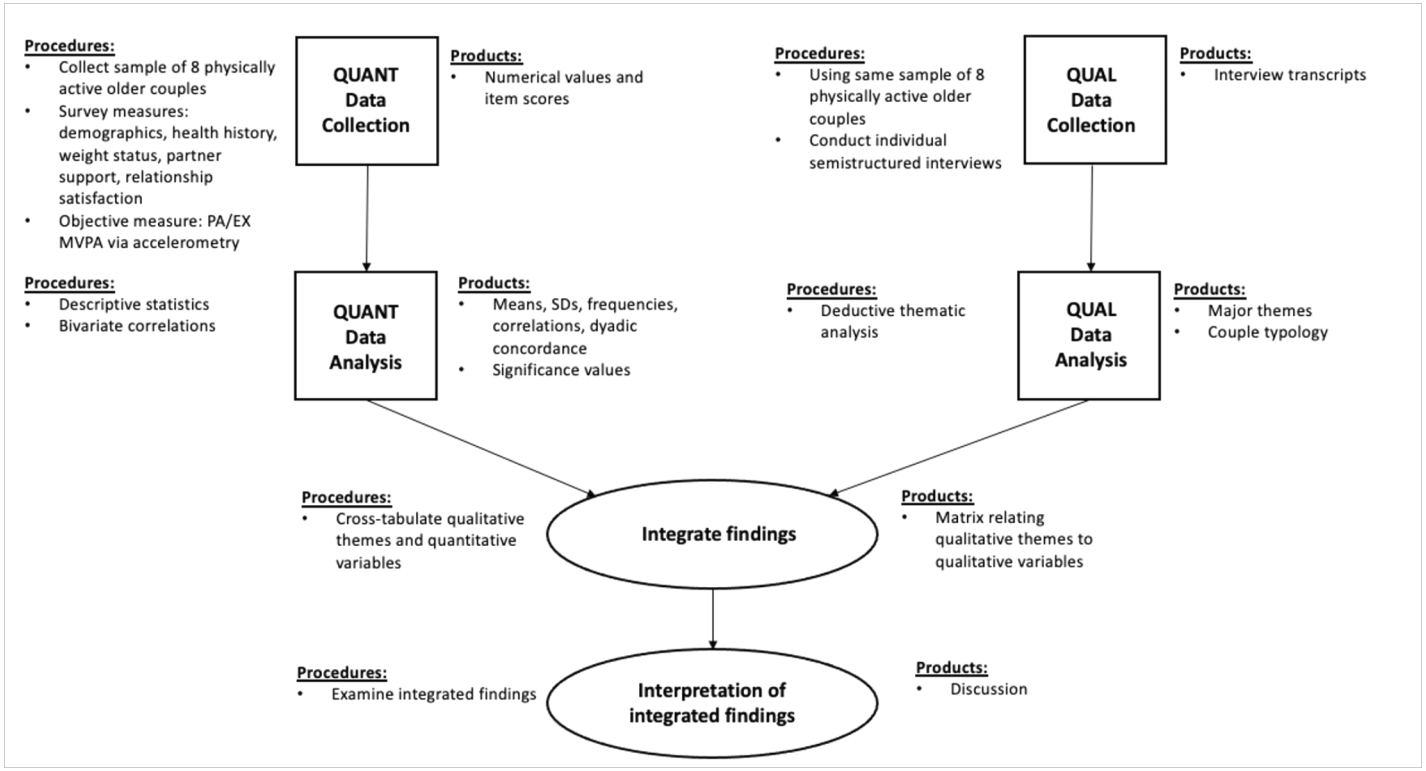

Figure 3.0 Phase One Mixed-Methods Study Design
Adapted from Creswell & Clark (2018) *Diagram for a Study that Used the Convergent Design*

Table 3.0 Participant Descriptive Characteristics (n = 8 dyads)

	Total Sample *[Range]*	Females *[Mean ± SD]*	Males *[Mean ± SD]*	Within Dyad Correlations *[r]*
Age (years)	59-77	69.3 ± 3.8	70.4 ± 5.5	0.64
BMI (kg/m^2)	20.6-37.2	24.7 ± 4.3	28.0 ± 4.8	0.67
Rx Meds (total)	0-8	2.4 ± 3.3	2.3 ± 1.0	0.27
Comorbidities (total)	0-3	1.6 ± 1.3	1.6 ± 0.5	-0.24
MVPA (minutes/week)	64.0-761.0	316.1 ± 192.9	475.8 ± 176.0	0.31
Steps/day	4311.4-12094.6	8373.0 ± 2509.7	8637.3 ± 2505.9	0.4
Partner Support	2.4-5	3.7 ± 0.9	3.6 ± 0.6	-0.16
Partner Control	1.0-4.1	1.6 ± 1.0	1.6 ± 0.8	-0.29
Satisfaction	104-158	143.3 ± 13.4	139.4 ± 19.6	0.66

$p < .05$
$p < .10$
$p = 0.1$

Table 3.1 Dyadic Associations Between Demographic, Partner Support and Control, and Relationship Satisfaction Outcomes by Male and Female Partner

	Age	BMI	RX Meds	Comorbidities	Steps/day	MVPA	Partner Support	Partner Control	Satisfaction
Age	0.64	0.19	-0.46	0.20	-0.49	-0.53	-0.12	0.04	-0.09
BMI	0.51	0.67	0.45	0.84	-0.35	-0.39	-0.37	0.40	0.01
RX Meds	-0.09	0.69	0.27	0.40	-0.79	-0.83	0.05	0.63	-0.15
Comorbidities	0.13	-0.51	-0.07	-0.24	-0.46	-0.21	0.60	-0.35	0.49
Steps/day	0.73	-0.45	-0.23	0.12	0.40	0.48	-0.22	-0.62	0.33
MVPA	0.73	0.02	-0.01	0.59	0.34	0.31	-0.43	-0.30	0.18
Partner Support	0.03	-0.07	0.15	0.39	0.56	0.36	-0.16	0.02	0.02
Partner Control	0.48	-0.40	-0.17	0.09	-0.04	-0.05	0.01	-0.29	0.41
Satisfaction	-0.30	-0.16	0.43	0.15	0.09	0.18	-0.14	-0.35	0.66

Below diagonal is male variable correlated with partner variable; above the diagonal is female variable correlated with partner variable.
Note. RX Meds = Total prescription medications. BMI = Body Mass Index. MVPA = Moderate to Vigorous Physical Activity.

$p < .05$
$p < .10$
$p = 0.1$

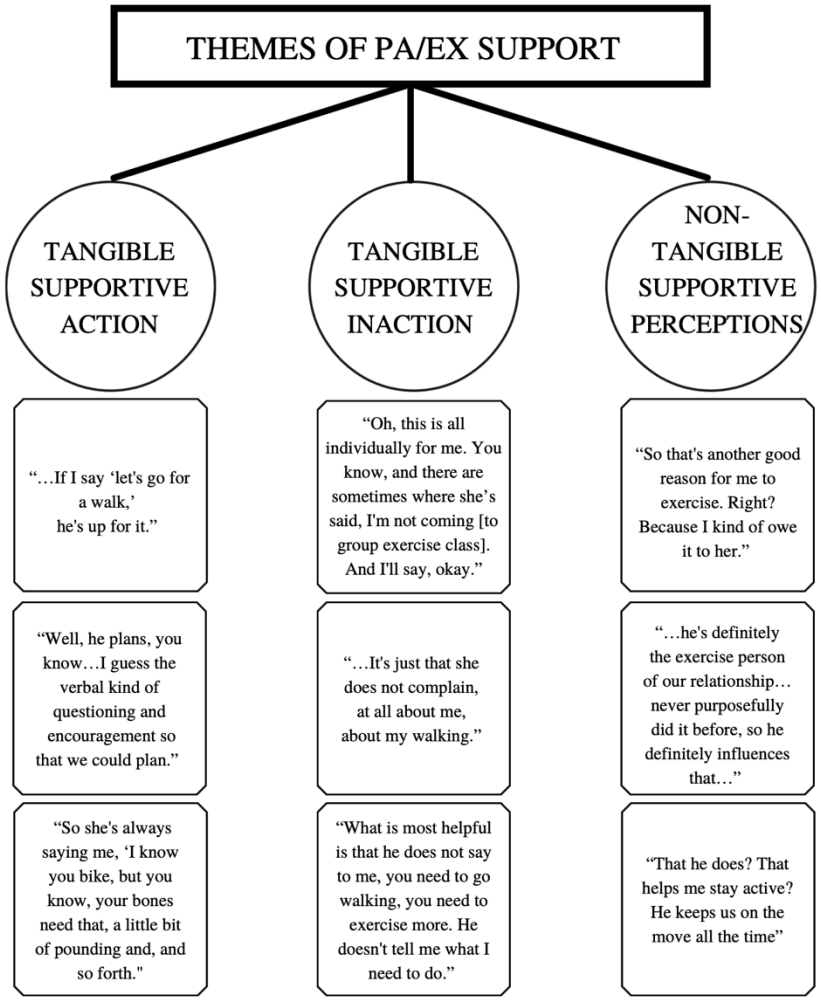

Figure 3.1 Themes of PA/EX Support. Note. Tangible Supportive Action = participants pointed to specific actions of their partners that helped them stay physically active. Tangible Supportive Inaction = participants pointed to specific inactions of their partners that helped them stay physically active. Non-Tangible Supportive Perceptions = participants pointed to the presence of their partner in their life and the existence of their relationship as a means of supporting their PA/EX.

CHAPTER 4

EXAMINING OLDER COUPLES' PHYSICAL ACTIVITY BEHAVIORS IN THE CONTEXT OF SUPPORT AND CONTROL PERCEPTIONS: AN APPLICATION OF THE ACTOR-PARTNER INTERDEPDENCE MODEL[1]

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4.1 Abstract

Introduction: It is well established that social support is linked to habitual physical activity and exercise (PA/EX) behaviors across the lifespan, especially in older adults. Limited data also indicates that one's romantic cohabitating partner may exert salient influence on habitual PA/EX behaviors in both positive (support) and negative (control) ways. Because the concepts of partner PA/EX support and control arise in an interpersonal context, there is a need to include both partners' perspectives in analyses that accounts for the interdependence of these dyadic constructs. The aim of this study was to examine the influence of individual and partner perceptions of PA/EX support and control on PA/EX participation in older couples. Methods: Community-dwelling, heterosexual couples (n=47), 60-84 years (69.4±5.3 years) participated in this cross-sectional online study. The Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire was used to capture PA/EX, the Couples Satisfaction Index assessed relationship satisfaction, and the Positive and Negative Social Control Scales measured partner support and control. Results: Our two Actor-Partner Interdependence Models revealed the following patterns of dyadic influence: 1) individuals' PA/EX was influenced by their partner's perceptions of PA/EX support and control, and 2) individuals' perceptions of PA/EX support are influenced by their partners' PA/EX, as well as, their partner's BMI and their own perceptions of partner PA/EX. Thus, our novel findings suggest that individuals' PA/EX is influenced by their partners perceptions of support, and individuals' perceptions of support are influenced by their partners' PA/EX. Conclusions: Collectively, these two APIMs suggest the possibility of a bidirectional influence between partners' PA/EX and partners' PA/EX support. While these findings should be interpreted with caution due to the cross-sectional nature of the study, this notion offers novel insight into the dynamics of dyadic influence of PA/EX support and PA/EX

behavior. Future studies should seek to enhance understanding of the potential bidirectional influence of PA/EX participation and PA/EX support perceptions in older couples. Ultimately, this information may offer insights into the design of effective PA/EX programs and interventions, specifically those leveraging social support to enhance adherence to PA/EX guidelines for older adults.

4.2 Introduction

Although many factors influence poor adherence to health behaviors and poor health outcomes in older adults, research supports a clear link between social context and health habits, including physical activity (PA) and exercise (EX) behaviors (Smith et al., 2017). One specific aspect of social context—social support—is associated with higher levels of PA/EX in older adults (Smith et al., 2017). Williams et al. (2004) critically examined the multifaceted concept of social support in the literature and identified categories of social support definitions, which included social relationships that offer reciprocity, accessibility, and reliability, and provide any combination of supportive resources (Smith et al., 2017; Williams et al., 2004).

Within the context of older adults' PA/EX, social support has predominately been quantitatively assessed using the Social Support and Exercise Survey (SSES) (Sallis et al., 1987). This 13-item measure was developed to assess perceived social support specific to EX behaviors, separating social support into two categories: family and friends (Sallis, et al., 1987). In the years since it was developed, the SSES has been administered in numerous studies to assess PA/EX social support in older adults (Smith et. al, 2017). In 2012, Cotter adapted the measure to more specifically examine PA/EX social support (social control) received from a partner/spouse (Cotter, 2012). Cotter (2012) created two scales: the Positive and Negative Social Control Scales,

to assess individuals' perceptions of their partners' supportive and controlling behaviors related to PA/EX (Cotter, 2012).

Because close social relationships have been shown to impact health and PA/EX participation in both positive and negative ways (Craddock et al., 2015), capturing both PA/EX support and control in the dyadic context is vital to better understand how partners influence each other's PA/EX behavior (Cotter, 2012). Cotter's study revealed important gender-specific insights into older adults PA/EX support and control: 1) more support and control were associated with significantly less PA/EX in males but not females (Cotter, 2012). These patterns in Cotter's findings, while novel, are limited in their generalizability to older couples for two reasons. First, while support and control were assessed in the partner domain, friends and family domains were also assessed and merged to create an average "across social partners." Thus, the support and control associations reported are reflective of each individual's total social support and control, partner specific support and control were not examined. Additionally, because Cotter's sample included a total of 166 older individuals, not dyads, only one half of the partnership is represented in the results. Cotter's study, like much of the research in older adults' PA/EX social support (Smith, 2017), included an independent sample of individuals (Cotter, 2012). This approach limits insight into the social context and interactive dynamics of partner PA/EX support and control.

Because the concepts of PA/EX support and control arise in an interpersonal context, there is a need to further examine the dyadic dynamics of partner PA/EX support and control through 1) inclusion of both halves of the dyad, and 2) application of statistical techniques to assess effects among these interdependent dyadic constructs. The purpose of this study was to examine the dyadic influence of perceptions of PA/EX support and control, on PA/EX

participation, among older adult couples. To address this objective, the following question and aim guided our study:

Research Question: Do individual and partner perceptions of PA/EX support and PA/EX control influence PA/EX participation in older couples?

Specific Aim: To examine the actor and partner effects of support perceptions and control perceptions in the prediction of PA/EX behaviors in older adult couples.

Hypothesis: It is expected that more partner support and less partner control will be associated with greater engagement in PA/EX behaviors in older adult couples.

4.3 Methods

Study Design, Sample Characteristics, and Recruitment. This was a cross-sectional, quantitative study in which PA/EX participation, PA/EX support, and PA/EX control were assessed concurrently in older adult couples through online self-report questionnaires. To complete the proposed study design, we recruited 47 older couples (dyads) from across the U.S. To be eligible, dyads met the following inclusion criteria: 1) community-dwelling, 2) currently romantically involved for at least 6 months and living together, 3) 60 years of age or older, and 4) both halves of the partnership were willing to participate. Due to the novelty of the exploratory research design, a convenience sample was selected through use of probability, purposive, and snowball sampling techniques. Specific recruitment strategies included community and university listservs, recruitment flyers, newspaper advertisements, and word of mouth. Participants' informed consent was obtained digitally prior to online participation and all procedures were approved by the Institutional Review Board at the University of Georgia. Each partner provided their own consent and questionnaire responses and were encouraged to

complete these tasks separate from their partner to decrease influence from the partner on the decision to participate.

Demographics, Weight Status, Comorbidities, and Medication Usage. Participant demographics were collected via a standard questionnaire that inquired about annual household income, educational history, racial and ethnic background, gender identity, and geographical location in the U.S. Weight status was assessed via self-report, and body mass index (BMI) was calculated. The total number of comorbidities, or pre-existing health conditions, and the total number of prescription medications were also collected via a conventional health history questionnaire.

PA/EX Behaviors: The Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire (Stewart et al., 2001) was used to estimate weekly participation in moderate to vigorous intensity PA/EX (MVPA). This 65-item self-report measure of PA/EX was originally designed to assess "… the types and intensity levels of physical activity that are meaningful and appropriate for older adults, including lighter (e.g., leisurely walking, water exercises, stretching) as well as more vigorous activities" (Stewart et al., 2001). CHAMPS scoring algorithms enable estimation of total weekly duration of MVPA, defined as PA/EX $\geq$ 3 METs, in the 19 types of MVPA (Hekler, 2012). While objective assessment of PA/EX (i.e. accelerometry) is considered the gold standard of PA/EX measurement, the CHAMPS questionnaire is a viable alternative for capturing PA/EX in older adults when an objective measure is unattainable (Glynn et al., 2020).

Relationship Satisfaction, Partner PA/EX Support Perceptions, and Partner PA/EX Control Perceptions. Relationship satisfaction was assessed via the Couples Satisfaction Index (CSI-4) (Funk & Rogge, 2007). A higher score on the CSI-4 is indicative of greater relationship

satisfaction. Partner PA/EX support and control perceptions were assessed via the Positive and Negative Social Control Scales, respectively (Cotter, 2012).

Data Analysis. All data analysis was conducted in SPSS version 27. Descriptive statistics (means, standard deviations, frequencies) were calculated to summarize demographic characteristics, weight status, health status, relationship satisfaction, partner support, partner control, and MVPA. Bivariate correlational analyses were used to examine dyadic associations among the aforementioned variables. Next, to examine dyadic influence we used a multilevel modeling approach to the Actor-Partner Interdependence Model (APIM) to first explore the individual and partner effects of support and control perceptions on MVPA, before then, using a second APIM to examine the individual and partner effects of MVPA and control perceptions on support perceptions (Cook & Kenny, 2005). Prior to the APIM analysis and because all dyads were composed of a male and female partner, a distinguishability test was performed to assess gender as a distinguishing variable (Kenny et al., 2006).

4.4 Results

Characteristics of Dyads. Participant characteristics described below are presented for the entire sample and by gender in Table 4.0. A total of 47 community-dwelling, cisgender, heterosexual couples 60-84 years (69.4±5.3 years) participated in the study. Couples had been together for an average of four decades (40.65±12.43 years), and all but one couple were married. The majority of the participants were Non-Hispanic (84%), White (97.9%), from the southern U.S. (60.3%), retired and not working (71.3%), earned at least a Bachelor's degree (70.2%), and had an annual household income of at least $75,000 (73.4%).

Dyadic Associations Between PA/EX, Partner PA/EX Support Perceptions, Partner PA/EX Control Perceptions, and Relationship Satisfaction. Dyadic associations are presented in Table 4.1. Couples were significantly concordant for MVPA ($r=0.44$, $p<0.01$) and relationship satisfaction ($r=0.57$, $p<0.01$), though there was almost no association between MVPA and relationship satisfaction ($r=0.04$ and $r=0.07$, $p>0.10$). These associations indicated that the more physically active one partner is, the higher the physical activity level of their partner, with relationship satisfaction displaying a similar pattern, but unlikely influencing PA/EX behaviors in partners. While associations between female and male partners' control perceptions did not pass significance, a small negative association was still present ($r=-0.19$, $p=0.21$). Additionally, partners' support perceptions displayed a positive, but still nonsignificant association ($r= 0.21$, $p=0.18$). These findings, while nonsignificant, suggest that male and female partners' perceptions of partner control differ, while perceptions of partner support are similar. Interestingly, female's perceptions of control were negatively associated with male's perceived support ($r=-0.40$, $p<0.01$). In other words, as female partners' perceptions of PA/EX control increased, their male counterparts' perceptions of PA/EX support decreased. Furthermore, though nonsignificant, both females and male's perceived support displayed small, positive associations with their counterparts' MVPA ($r=0.15$, $p=0.13$; $r=0.22$, $p=0.31$, respectively). Essentially, both male and female partners felt more supported when their partners participated in more PA/EX. These findings, while not all significant, suggest clear associations among partner's PA/EX participation and perceptions of PA/EX support and control that warrant further analysis.

Distinguishability Test. Dyads can be distinguished based upon any variable that enables researchers to make a distinction between partners (Kenny, 2015). Typically, heterosexual

couples, like those in this sample, are distinguished by cisgender identity, i.e., partners are distinguished by male and female identity. However, it is only advisable to treat dyads as distinguishable when there is both theoretical *and* empirical support for a distinction (Kenny et al., 2006). A distinguishability test was conducted to assess empirical support for this theoretical gender distinction within our sample and provided no evidence for considering our sample of dyads distinguishable $X^2(6) = 5.963$, p=0.202. In accordance with these findings and in the interest of maintaining statistical power, our APIM analyses were conducted by treating the dyads as indistinguishable.

PA/EX Participation and PA/EX Support and Control Perceptions: Individual and Partner Effects. APIM results are presented in Table 4.2. In the first model, we entered four predictors (i.e., individual and partner perceptions of support and control) into the model simultaneously to predict MVPA. This selection, i.e. support and control perceptions as predictors of the outcome of MVPA, was intentional and based upon the older adult PA/EX support literature notion that "older individuals with greater support to undertake PA, specifically from their family, will be more likely to be physically active in general" (Smith et al., 2017, p. 16). However, in this model, significant partner effects were evident, but actor effects remained insignificant (See Table 4.2). Essentially, an individual's perceptions of support and control did not predict their MVPA, but their partner's perceptions of support and control did. This finding suggested the possibility of a reversed pathway in the APIM—an individual's PA/EX influences their partner's feelings of PA/EX support and control. For this reason, we then used a second APIM to examine individual and partner effects of MVPA in the prediction of support perceptions. Individual and partner MVPA were simultaneously entered into the second model as predictors of support perceptions with individual and partner perceptions of control and

BMI being allowed to covary. In this final model, positive partner effects were approaching significance for MVPA, significant negative partner effects were significant for BMI, and significant positive actor effects were observed for control (See Table 4.3). Thus, the following important patterns were revealed with this second APIM: 1) an individual's feelings of support were predicted from their partner's PA/EX participation and BMI and 2) an individual's perceptions of support were predicted by their own perceptions of control. In other words, for this sample of older couples, individuals perceived more PA/EX support from their partner when their partner was more active, more controlling, and had a healthier weight status. Furthermore, this model was able to account for 29.7% of the variance in perceptions of partners PA/EX support. Collectively, these two APIMs suggest that individuals' PA/EX is influenced by their partners perceptions of support, and individuals' perceptions of support are influenced by their partners' PA/EX.

4.5 Discussion

The purpose of this study was to examine dyadic influence among older adult couples' PA/EX participation, perceptions of PA/EX support, and perceptions of PA/EX control. As such, we applied an APIM to address our objective. Our two APIMs revealed the following patterns of dyadic influence: 1) individuals' PA/EX was influenced by their partner's perceptions of PA/EX support and control, and 2) individuals' perceptions of PA/EX support are influenced by their partners' PA/EX, as well as, their partner's BMI and their own perceptions of partner PA/EX. Thus, our novel findings suggest that individuals' PA/EX is influenced by their partners' perceptions of support, and individuals' perceptions of support are influenced by their partners' PA/EX. While these results suggest that there may be bidirectional influence between partners'

perceptions of support and PA/EX, these findings should be interpreted within the context of limitations. The cross-sectional nature of our data and the inability of the APIMs to account for this, undermines our ability to know for sure if this is in fact a bidirectional effect. The potential bidirectionality of influence is intriguing, that is, a partners' PA/EX support perceptions influencing their partners' PA/EX participation, as well as, a partners' PA/EX influencing their partners' perceptions of PA/EX support. While this statistical bidirectionality should be interpreted with caution, this notion offers novel insight into the dynamics of dyadic influence of PA/EX support and PA/EX behavior and warrants further exploration of the potential presence of bidirectional influence between partner PA/EX support and PA/EX participation.

Social support is positively associated with health behaviors (Craddock et al., 2015), and receipt of support is predictive of higher engagement in health behaviors and better health outcomes (DiMatteo, 2004; Eyler et al., 1999; Song et al., 2017; vanDellen, 2019). Specific to PA/EX health behaviors, a recent systematic review identified that, in older adults, social support is associated with greater engagement in PA/EX (Smith et al., 2017). Thus, our examination of dyadic PA/EX support was informed by the predominate PA/EX support literature notion that "older individuals with greater support to undertake PA, specifically from their family, will be more likely to be physically active in general" (Smith et al., 2017, p. 16). This notion implicitly implies an intuitive directionality of this relationship (i.e., the more PA/EX support one experiences, the more PA/EX they will perform). Thus, we modeled our first APIM accordingly to examine the actor and partner effects of support and control perceptions in the prediction of MVPA. Upon initial examination, our results revealed significant partner effects but not actor effects indicating that an individual's PA/EX is predicted by their partner's feelings of support.

By using a second APIM with a reversed directionality, we were then able to more closely examine these patterns of partner influence.

Our most notable finding was that within this sample of older couples, a partners' PA/EX support perceptions influenced their partners' PA/EX participation, and, a partners' PA/EX influenced their partners' perceptions of PA/EX support. As previously noted, the cross-sectional nature of our data and corresponding analyses undermines our ability to draw conclusions about this potential bidirectionality. However, this finding aligns with PA/EX support dynamics noted in previous research utilizing qualitative analyses (dissertation Phase One manuscript; in preparation). That is, for some partners, they felt PA/EX support from their partners when their partners were present and exercising with them. In this capacity, PA/EX partner support is simply shared PA/EX. This concept supports the potential bidirectional influence in our findings by introducing the possibility of shared PA/EX as a mediator of the dyadic bidirectional influence of PA/EX partner support and PA/EX participation. Although the literature regarding older couples support for PA/EX is sparse, our findings align with those of Berli et al. (2018), that suggest adult dyads' joint engagement in PA/EX contribute to both received and provided support (Berli et al., 2018). While PA/EX social support has been predominately examined as a predictor of PA/EX in older adults, PA/EX support within our sample of older dyads appears to challenge this assumption of directionality. This notion of reversed directionality aligns with the findings from a study by Li and Zhang (2015) that explored the reverse causality of health on social networks (Li & Zhang, 2015). Despite the literature's focus on the "one-way effect from social relationships to health," their longitudinal design coupled with a path model produced findings suggesting that individuals' health influenced social network patterns (Li & Zhang, 2015, p. 60). Thus, by resolving the design limitations in the present study, future studies will be

better able to adequately assess PA/EX support in an interpersonal context to longitudinally examine the dyadic influence of PA/EX support and PA/EX participation.

Our findings also further complicate our understanding of partner PA/EX control in that, here, we see an individual's perceptions of PA/EX control (i.e., how controlling their partner is with respect to PA/EX) influencing their feelings of PA/EX support. This finding may suggest that participants find their partner's controlling behaviors supportive or alternatively, individuals who are more supportive of their partner's PA/EX are also more controlling. Within the broader context of the social control literature, mixed findings surround the impacts of control on health behaviors, and Craddock et al. (2015) found that control was "significantly related to a decrease in health behavior" (Craddock et al., 2015, p. 127). Even in the developmental study for the Positive and Negative Social Control Scales, Cotter (2012) found that more control was associated with less PA/EX for older men (Cotter, 2012). Typically, control, specifically PA/EX control, has been examined in terms of its association with health behaviors, but not examined in terms of how control works alongside support. Explanation for this contradictory finding may reside in assessment of PA/EX support and control. While the items "gave you helpful reminders to exercise" and "nag you about exercise" carry different tones in their wording, this scale may need revision to more clearly tease apart these closely related constructs within the dyadic PA/EX context (Cotter, 2012). Regardless, further study of dyadic PA/EX control is warranted to better understand the causality of this actor effect of perceptions of PA/EX control predicting perceptions of PA/EX support.

Limitations and Future Directions. This study's findings, while novel, should be considered within the context of some limitations, some of which were discussed above. First, our sample included predominately Non-Hispanic, White, heterosexual, cisgender older couples,

so our findings may not be generalizable to couples who differ demographically from older couples included in this sample. Secondly, our sample size precluded our ability to examine potential moderating factors (e.g., age, socioeconomic status, and years in relationship) and interaction effects. Thirdly, because we used an indistinguishable APIM to address our aim, our findings do not offer perceptions of gender-specific effects on PA/EX partner support. Furthermore, this model does not enable examination of reciprocal causation or feedback. That is, the APIM allowed us to explore influence but not bidirectional causation. Future research should seek to incorporate longitudinal data collection and the mutual influence model utilizing adequate sample sizes (Kenny et al., 2006) to better examine the potential bidirectional reciprocity of PA/EX participation and PA/EX support perceptions in older couples. Additionally, because data collection occurred during the COVID-19 pandemic, older adults' PA/EX behaviors and relationship dynamics may have been impacted. Thus, additional study is warranted to follow-up on study findings.

4.6 Conclusion

In summary our data suggest the following: 1) individuals' PA/EX was influenced by their partner's perceptions of PA/EX support and control, and 2) individuals' perceptions of PA/EX support were influenced by their partners' PA/EX, as well as, their partner's BMI and their own perceptions of partner PA/EX. Thus, our novel findings suggest that individuals' PA/EX is influenced by their partners perceptions of support, and individuals' perceptions of support are influenced by their partners' PA/EX. While PA/EX social support has been predominately examined as a predictor of PA/EX in older adults, PA/EX support within our sample of older dyads appears to challenge this assumption of directionality. Thus, highlighting a

need to further explore the potential presence of bidirectional influence between partner PA/EX support and PA/EX participation. These findings also provide further support for the need to 1) adequately assess PA/EX support in an interpersonal context to 2) examine reciprocal dyadic pathways of influence using appropriate modeling and sampling techniques in an effort to 3) better enhance understanding of the connection between the concepts of PA/EX control and PA/EX support.

To prevent the public health crisis caused by the interaction of aging demographics and sedentary lifestyles, acceptable, effective, and sustainable PA/EX interventions that are embedded within individuals' daily social lives are needed to prevent an epidemic of physical disability and maintain quality of life. Among older adults the dynamics of partner PA/EX support, specifically in the context of romantic partnerships needs further interdisciplinary exploration in an effort to leverage these dynamics for adherence to PA/EX guidelines. Thus, future studies are warranted to enhance understanding of the dyadic dynamics of older couples' PA/EX behaviors and PA/EX support, which may be bolstered through application of mixed methods.

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Table 4.0 Participant Descriptive Characteristics (n=47 dyads; 47 female partners, 47 male partners)

	Total Sample *[Range]*	Total Sample *[Mean ± SD]*	Female Partners *[Mean ± SD]*	Male Partners *[Mean ± SD]*
Age (years)	60-84	69.38 ± 5.32	68.15 ± 4.54	70.62 ± 5.80
BMI (kg/m^2)	16.6-42.4	25.92 ± 4.83	25.13 ± 4.77	26.70 ± 4.82
Comorbidities (total)	0-5	1.32 ±1.26	0.87 ± 0.92	1.77 ± 1.39
Rx Meds (total)	0-10	2.56 ± 2.66	1.98 ± 2.05	3.15 ± 3.06
MVPA (minutes/week)	0-2640	517.5 ± 455.37	466.28 ± 464.11	568.72 ± 445.55
Partner Support	1.1-4.6	2.77 ± 0.79	2.75 ± 0.77	2.79 ± 0.83
Partner Control	1.0-3.6	1.46 ± 0.62	1.27 ± 0.50	1.65 ± 0.67
Satisfaction	5-21	16.77 ± 3.54	16.32 ± 3.53	17.21 ± 3.52

Note. BMI = Body Mass Index. RX Meds = Total prescription medications. MVPA = Moderate to Vigorous Physical Activity.

Table 4.1 Dyadic Associations Between Demographic, Partner Support and Control, and Relationship Satisfaction Outcomes by Male and Female Partner

	Age	BMI	Comorbidities	RX Meds	MVPA	Partner Support	Partner Control	Satisfaction
Age	.73	-.29	0.02	-0.001	0.17	-0.02	-0.02	-0.24
BMI	-0.05	0.25	-0.01	0.16	-0.19	-.37	0.04	-0.25
Comorbidities	0.02	0.19	.37	0.15	-0.001	-0.12	-0.10	-0.27
RX Meds	0.19	0.12	.29	0.21	0.18	-0.07	0.08	-0.13
MVPA	0.25	-0.09	0.04	-.31	.44	0.15	-0.19	-0.07
Partner Support	-0.11	-.37	0.10	0.08	0.22	0.20	-.40	0.01
Partner Control	-0.06	0.02	0.13	0.28	-0.06	-0.19	-0.19	-0.07
Satisfaction	-0.09	-0.06	-0.19	0.19	0.04	-0.08	-.30	.57

Note. Below diagonal is male partner's variable correlated with female partner's variable; above the diagonal is female partner's variable correlated with male partner's variable. BMI = Body Mass Index. RX Meds = Total prescription medications. MVPA = Moderate to Vigorous Physical Activity.

Legend

p <. 01
p < .05
p < .10

Table 4.2a First Model Actor Partner Interdependence Model Predicting MVPA

Predictor	***Actor Effect***				***Partner Effect***			
	β	*SE*	*p*	*r*	*β*	*SE*	*p*	*r*
Support Perceptions	35.30	60.62	0.56	-0.06	143.81	60.60	0.02*	0.25
Control Perceptions	109.83	0.06	0.19	-0.23	-202.60	82.15	0.02*	-0.41

Note. *β*=standardized regression coefficient, *r*=effect size.
*$p < .05$.

Table 4.2b Second Actor Partner Interdependence Model Predicting Support Perceptions

Predictor	***Actor Effect***				***Partner Effect***			
	β	*SE*	*p*	*r*	*β*	*SE*	*p*	*r*
MVPA	-1.44^{E-4}	1.6^{E-4}	0.37	-0.08	3.06^{E-4}	1.61^{E-4}	0.06	0.17
Control Perceptions	0.51	0.14	0*	.62	-0.06	0.13	0.67	-0.08
BMI	-0.03	0.02	0.10	-0.18	-0.04	0.02	0.01*	-0.29

Note. *β*=standardized regression coefficient, *r*=effect size.
*$p < .05$.

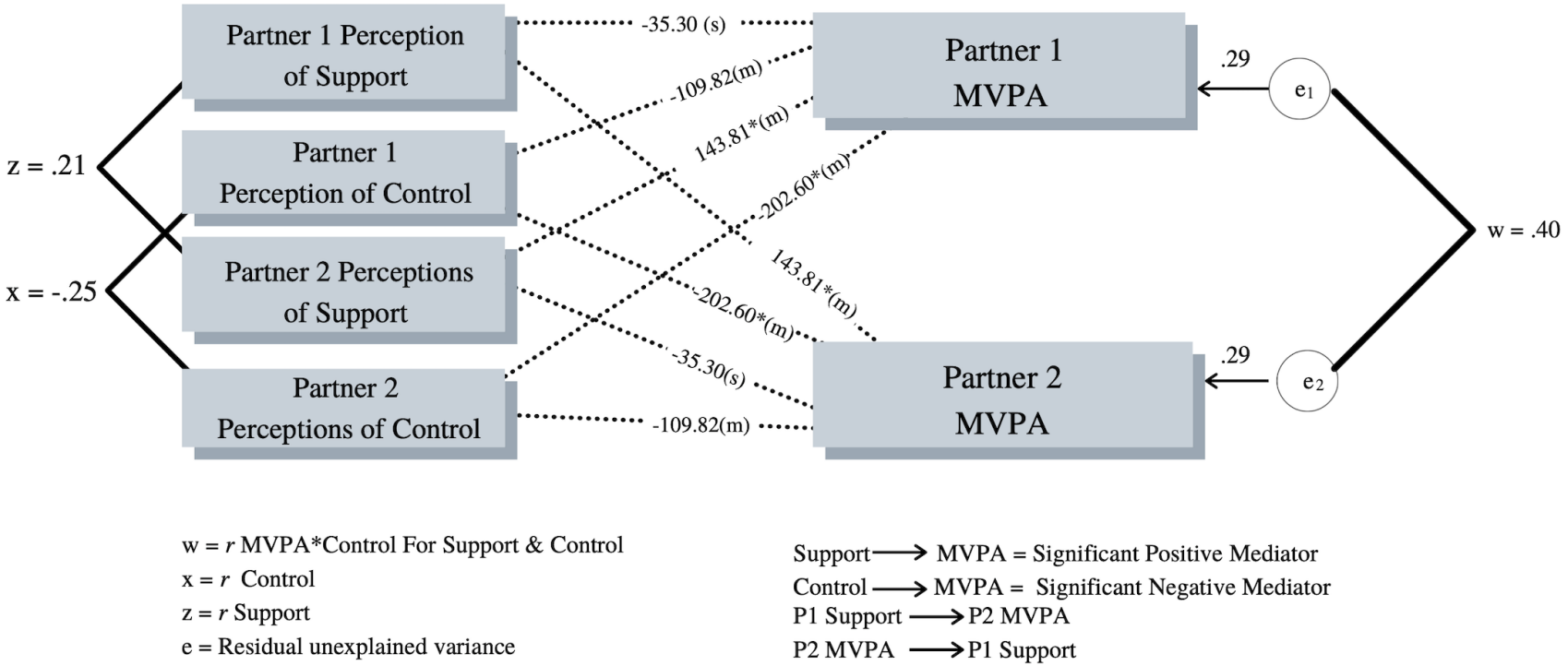

Figure 4.0 First Actor-Partner Interdependence Model Predicting MVPA

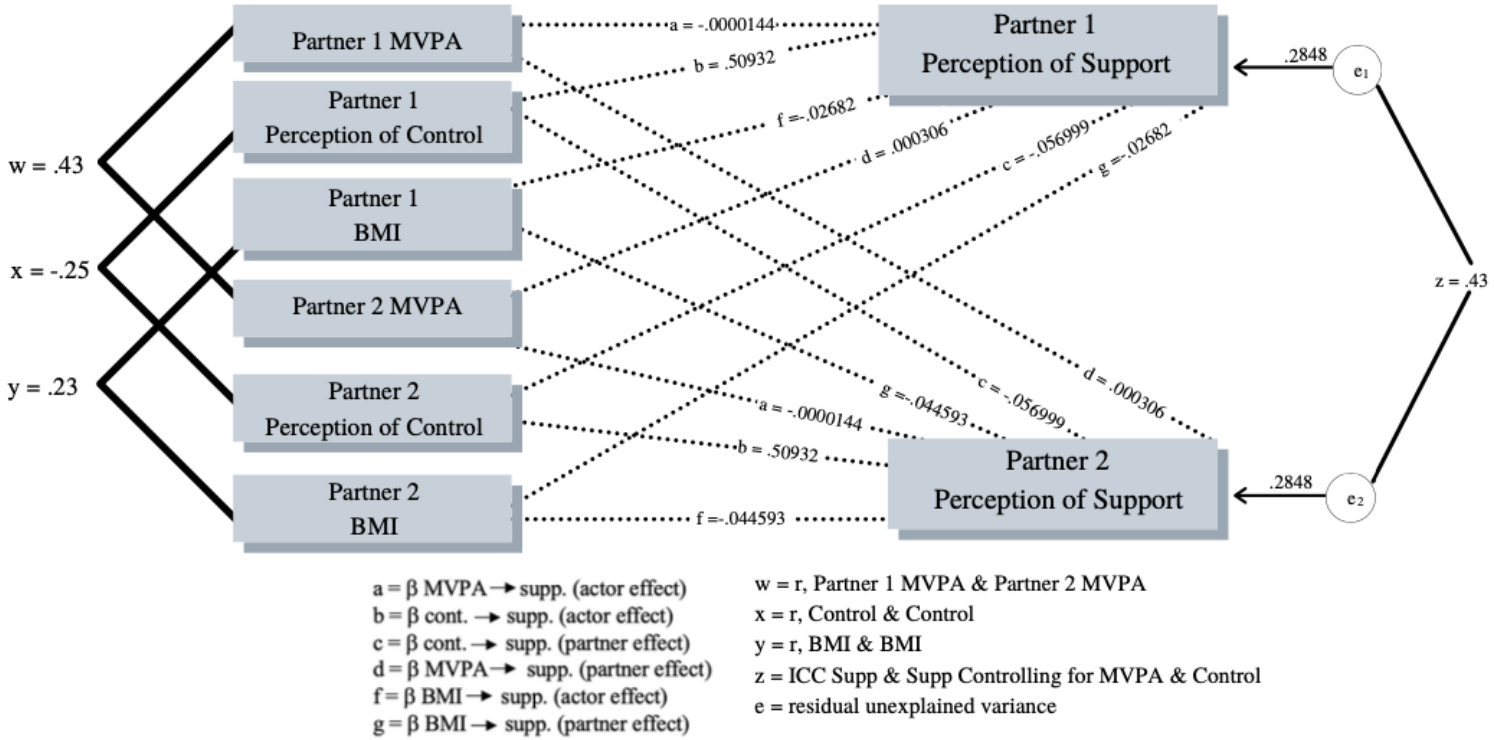

Figure 4.1 Second Actor-Partner Interdependence Model Predicting Support Perceptions

CHAPTER 5

SUMMARY AND CONCLUSIONS

The results from the present interdisciplinary, mixed-methods research (MMR) dissertation project advance our understanding of the dyadic dynamics of PA/EX behaviors and dyadic support in older adults. Specifically, these studies enhance the line of inquiry by expanding the understanding of dyadic dynamics of older couples' PA/EX habits and support through a) an interpersonal theoretical framework, b) intentional inclusion of both halves of dyads, and c) integration of an MMR approach.

In phase one, qualitative analysis expanded upon the concept of PA/EX partner support through delineating the themes of tangible supportive action, tangible supportive inaction, and non-tangible supportive perceptions. The PA/EX partner support themes of tangible supportive action and tangible supportive inaction connected older couples lived experiences of dyadic PA/EX partner support back to quantitative assessment of PA/EX partner support via the Positive and Negative Social Control Scales. Notably, multiple individuals indicated that shared PA/EX was a key supportive action from their partner. Qualitative analysis further advanced understanding of the concept of PA/EX partner support with the theme of non-tangible supportive perceptions. For this theme of support, some participants pointed to the presence of their partner in their life and the existence of their relationship as a means of supporting their PA/EX routines. In this way, this MMR study was able to offer further support for use of the Positive and Negative Social Control Scales for assessment of tangible supportive action and

inaction within older dyads. Furthermore, our results suggest that quantitative questionnaire assessment methodology cannot fully capture dyadic PA/EX support dynamics. Thus, to effectively examine the construct of PA/EX partner support, researchers should employ qualitative methodologies to contextualize quantitative data, to enhance understanding of dyadic influences on PA/EX behaviors in older adult couples.

In phase two of this MMR project, quantitative assessment further advanced understanding of PA/EX partner support through application of the Actor-Partner Interdependence Model (APIM). Use of the APIM allowed examination of the pathways of dyadic influence, i.e., the individual and partner effects of PA/EX participation and PA/EX control perceptions on PA/EX support perceptions. Our two APIMs revealed the following patterns of dyadic influence: 1) individuals' PA/EX was influenced by their partner's perceptions of PA/EX support and control, and 2) individuals' perceptions of PA/EX support are influenced by their partners' PA/EX, as well as, their partner's BMI and their own perceptions of partner PA/EX. Thus, our novel findings suggest that individuals' PA/EX is influenced by their partners perceptions of support, and individuals' perceptions of support are influenced by their partners' PA/EX. While this statistical bidirectionality should be interpreted with caution, this notion offers novel insight into the dynamics of dyadic influence of PA/EX support and PA/EX behavior in older adult couples. While PA/EX social support has been predominately examined as a predictor of PA/EX in older adults, PA/EX support within our sample of older dyads appears to challenge this assumption of directionality. Thus, highlighting a need to further explore the potential presence of bidirectional interactions between partner PA/EX support and PA/EX participation. Additionally, because data collection occurred during the COVID-19 pandemic, older adults' PA/EX behaviors and relationship dynamics may have been impacted. Thus,

additional study is warranted to follow-up on study findings. Despite these limitations, study findings provide further support for the need to 1) adequately assess PA/EX support in an interpersonal context to 2) examine reciprocal dyadic pathways of influence using appropriate modeling and sampling techniques in an effort to 3) enhance understanding of the connection between the concepts of PA/EX support and PA/EX control.

As researchers contribute to the growing literature exploring the social intersection of aging, health, and human movement, interdisciplinary and MMR approaches are of growing importance. Through combining elements from quantitative and qualitative research methodologies and including multiple perspectives from interpersonal relationships, an interdisciplinary understanding of complex human social phenomena can continue to evolve. Ultimately, this information may offer insights into the design of effective PA/EX programs and interventions, specifically those leveraging social support to enhance adherence to PA/EX guidelines for older adults. Engagement in habitual PA/EX is a key health behavior for chronic disease prevention and management, maintaining physical function with advancing age, and, ultimately, successful aging.

APPENDIX A

RESEARCHER POSITIONALITY (REFLEXIVITY) STATEMENT

As Peshkin (1988) frankly states, "…researchers, notwithstanding their use of quantitative or qualitative methods, their research problem, or their reputation for personal integrity, should systematically identify their subjectivity throughout the course of their research" (Peshkin, 1988, p. 17). With research interests that lie at the social intersection of aging and human movement, I am interested in exploring how physical activity (PA), exercise (EX), and interpersonal relationships interact, and ultimately improve, the aging process. In order to understand how these phenomena interact, we must first understand older adults' perceptions and experiences. My desire to understand is what drives my academic pursuits—I want to understand so that I know how to help. Thus, qualitative inquiry creates the space for this understanding to unfold while mixed-methods research (MMR) allows this knowledge to integrate with quantitative (QUANT) research, which is why I have chosen to apply an MMR approach to my dissertation.

Peshkin warns that for researchers, "[personal] qualities have the capacity to filter, skew, shape, block, transform, construe, and misconstrue what transpires from the outset of a research project to its culmination in a written statement" (Peshkin, 1988, p. 17). Thus, when engaging in interdisciplinary, MMR that examines dyadic PA/EX and support behaviors, I monitor my subjectivity relative to my own personal and professional experiences by memoing. Memoing enables me to document and reflect on the personal and professional thoughts, feelings, and

experiences that arise during any stage of the research process. As Maxwell (2013) articulates, "Memos are an extremely versatile tool that can be used for many purposes. This term refers to any writing that a researcher does in relationship to the research other than actual fieldnotes, transcription, or coding. A memo can range from a brief marginal comment on an interview transcript to a theoretical idea recorded in a field journal to a full-fledged analytic essay (Maxwell, 2013, pp. 19-20)." The acronym MEMO offered by Birks, Chapman, and Francis (2008), particularly the two M's- "Mapping research activities" and "Maintaining momentum" are prompts that I have continually returned to for guidance in my memoing (Birks et al., 2008, pp. 70-72). Through applying Peshkin's approach, it is my hope that "…By monitoring myself, I can create an illuminating, empowering, personal statement that attunes me to where self and subject are intertwined" (Peshkin, 1988, p. 20).

Because I have spent most of my PhD journey interacting with two worlds, QUANT and qualitative (QUAL) research, I will first unpack my subjectivity in relation to my academic journey with research before discussing specific aspects of my subjectivity. My pursuit of QUAL coursework was born from my frustrations with the QUANT research that dominates in the fields of kinesiology and gerontology. Upon beginning my PhD program, my initial coursework and research experiences left me with more questions than answers—I always had this lingering feeling that we were failing to capture the whole picture and implications of PA/EX behaviors. By beginning to pursue my graduate certificate in Interdisciplinary Qualitative Studies (IQS), this allowed me to understand the basis of these lingering questions through exposure to the positivist traditions in which so much of modern research is rooted. IQS coursework then positioned me to push beyond this positivist lens by exploring the epistemological roots of other theoretical perspectives—ultimately I found my home in the contextually-situated basis of

critical realism. These seminal experiences and critical conversations have shaped the foundation and future of my MMR agenda. My drive to understand the social context of one's experience with PA/EX was always present, QUAL inquiry simply offered me a different lens through which to view it—critical realism.

While critical realism has created space for me to reconcile my QUANT frustrations, I still tend to favor more interpretivist means of conceptualizing truth and knowledge. For this reason, treading the MMR line between QUAL and QUANT worlds has been exceptionally challenging, particularly, when attempting to conduct QUANT analyses and write-up findings. In this space is where I wrestle most with my own subjectivity.

When unpacking my subjectivity, I will liken these different parts of my subjectivity to the "I's" Peshkin outlines (Peshkin, 1988). An I that lurks and presents a constant threat to my equitable treatment of all people is my Binary I, which is inclined to see things as black and white, right and wrong, good and bad. My Binary I is quick to judge, to identify people whose values resonate with mine and those who don't. Because my interdisciplinary research interests focus on human behavior, these interactions with both collaborators and participants present a stage for my Binary I to step forward. Therefore, I regularly engage in memoing surrounding interactions that create space for this part of myself to step forward. This allows me to reflect on what I'm implicitly communicating with my words and actions and to reframe, so my Binary I does not undermine my ability to listen to, connect with, and learn from my collaborators and participants alike.

Close to my Binary I, is my Equity-Seeking I. My Equity-Seeking I bears similarity to Peshkin's "Justice-Seeking I," and is the driving force behind my academic interests (Peshkin, 1988, p. 18). This part of myself is quick to identify power dynamics that connect

unacknowledged or untamed privilege to exploitation, marginalization, and ultimately oppression. This I enables me to connect with my research population, and a large part of why I feel kinship with older adults. In the U.S., older adults are frequently underestimated, marginalized, and disempowered because of their age. While I have not knowingly experienced age-related oppression, I have with respect to my gender and sexual orientation. While my Equity-Seeking I allows me to connect with my older participants, it also restricts my ability to view gendered patterns within their data. Furthermore, my Equity-Seeking I can obscure research objectives by focusing instead on larger social issues. Ageism, sexism, and homophobia all create powerful narratives to which our culture subjects us, and, in a way, trains us to subject ourselves to. To address, and attempt to subvert this oppression, I view both PA/EX and interdisciplinary conversations as a means of achieving both personal empowerment and social connection through shared vulnerability. Through memoing, I am able to provide my Equity-Seeking I with an outlet for these big-picture ideas, which then allows my focus to return to the research at hand.

With this awareness of my subjectivity, I kept a constant pulse on it throughout the completion of my dissertation. Because, ultimately, as Peshkin cautions, "Untamed subjectivity mutes the emic voice." (Peshkin, 1988, p. 21). I believe in the power of interdisciplinary MMR, and I accept the enormous responsibility that puts on me as an interdisciplinary mixed-methods researcher exploring the social intersection of aging and human movement. I will continue to "lean in" to this role and my responsibility because I believe in the power of understanding and creating social connections (Pelias, 2019, p. 228). As Roulston puts it, "To lean in involves recognizing that we don't know it all, and that there are valuable things to learn from others if we take the time to do so" (Roulston, 2020, p. 211).

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APPENDIX B

INITIAL THEMATIC MAPS

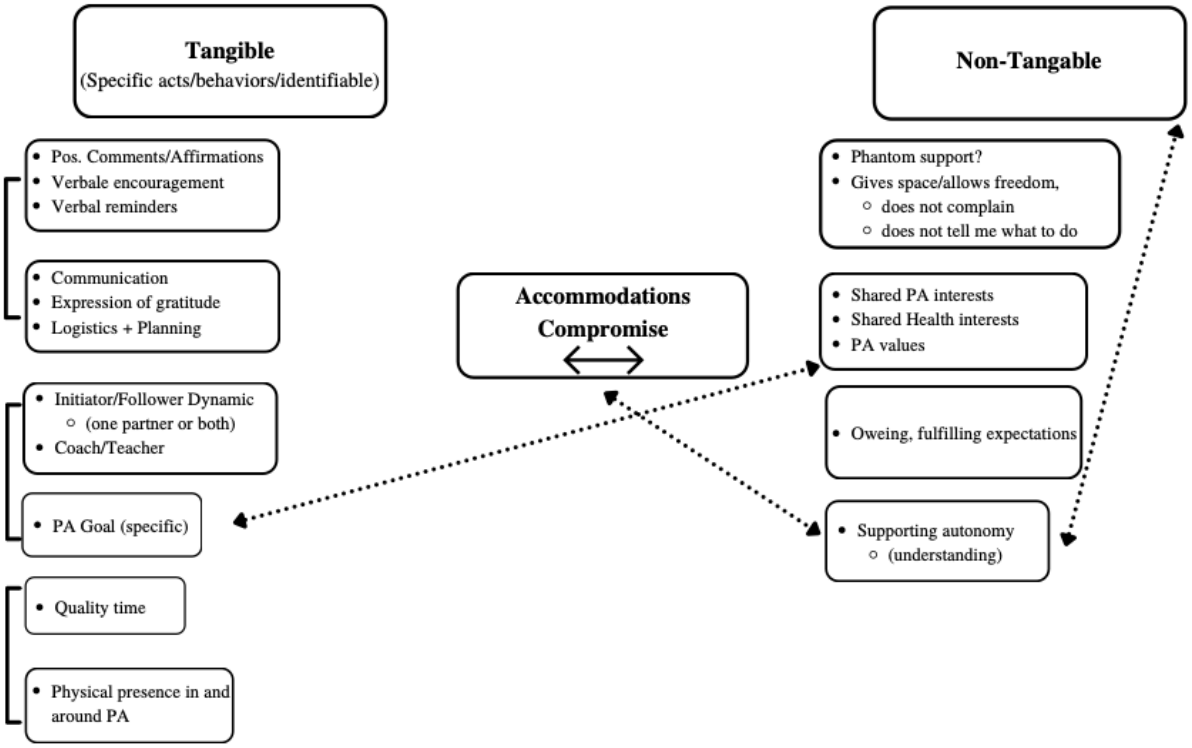

Figure 3.2 Initial Thematic Map of Dyadic Themes of PA/EX Support

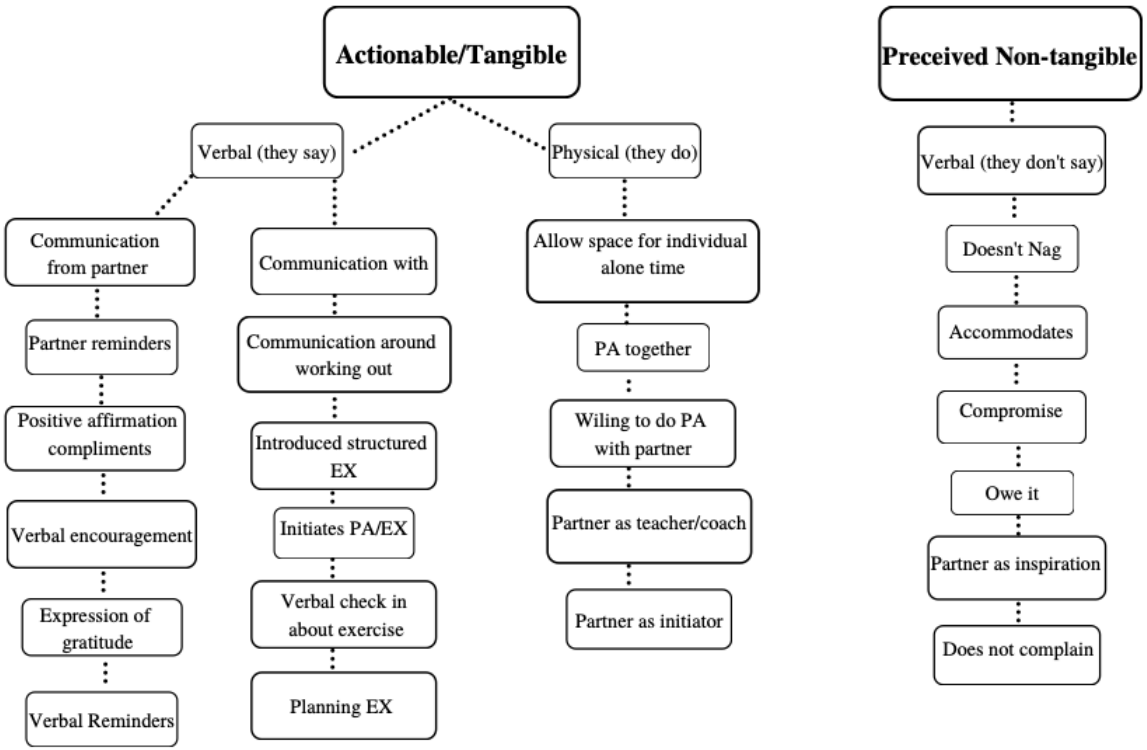

Figure 3.3 Revised Thematic Map of Dyadic Themes of PA/EX Support

APPENDIX C

POWER ANALYSIS COMPARISON OF DISTINGUISHABILITY ASSUMPTION

Table 4.3 Power Analyses Calculation Comparison for Indistinguishable vs. Distinguishable Dyads (n=47)

	Size	Power	*N*	*df*	*β*	*r*
Indistinguishable Dyads						
Actor	0.25	0.705	47	90.96	0.25	0.295
Partner	0.15	0.323	47	90.96	0.15	0.295
Distinguishable Dyads						
Actor effect for Person 1	0.25	0.374	47	44	0.25	0.295
Actor effect for Person 2	0.25	0.374	47	44	0.25	0.295
Partner effect for Person 1	0.15	0.166	47	44	0.15	0.225
Partner effect for Person 2	0.15	0.166	47	44	0.15	0.225

APPENDIX D

EFFECT SIZE CALCULATIONS FOR ACTOR-PARTNER INTERDEPENDENCE MODEL

Table 4.4 Effect Size Calculations for Actor and Partner Effects on Perceptions of Support

Estimated *r*	$t/\sqrt{df + t^2}$
Adjustment for Multicollinearity	$\sqrt{\frac{1-r^2}{2} + [\frac{(1+r_x)^2}{(1+r_y)} + \frac{(1-r_x)^2}{(1-r_y)}]}$
Adjustment for Non-Independence	$\sqrt{\frac{(1+r_x)^2}{2(1+r_y)} + \frac{(1-r_x)^2}{2(1-r_y)}}$