Biological Markets and Long-Term Cooperation: Partner Choice, Attraction, and Maintenance

by

Sara Kafashan

A Thesis
presented to
The University of Guelph

In partial fulfillment of requirements
for the degree of
Doctorate of Philosophy
in
Psychology

Guelph, Ontario, Canada

© Sara Kafashan, January, 2017
ABSTRACT

Biological Markets and Long-Term Cooperation: Partner Choice, Attraction, and Maintenance

Sara Kafashan
University of Guelph, 2017

In this doctoral thesis, I use basic principles of natural selection to understand and predict interpersonal human behaviour. Specifically, I focus my research on the various strategies people employ to form and maintain social bonds. I begin this dissertation by showing that similar patterns of preferences for ability (i.e., traits that affect one’s capacity to provide benefits; e.g., wealth, intelligence, attractiveness) and willingness traits (i.e., traits that affect one’s likeliness to provide benefits; e.g., kindness, generosity) are found across four types of long-term relationships. I argue that this is because all relationships serve as a means of gaining valuable benefits through social exchange. In Chapter 2, I present a two-part investigation of the trade-offs people make in forming either narrow social networks with strong connections or broad social networks with weak connections. I show that preferences for the trade-off between network size and intimacy vary depending on the type of social interaction, and discuss the possibility of domain-specific (i.e., within the workplace, personal life, neighbourhood, family, etc.) preferences in the network size and intimacy trade-off. In Chapter 3, I assess the relative costs and benefits of helping kin over non-kin. Two main findings were obtained: (1) costlier help was found to be directed disproportionately towards kin over non-kin, and (2) status was a motivating factor for investment in kin and non-kin. In Chapter 4, I examine how two key aspects of interpersonal dynamics – (1) tracking: the degree to which people monitor the behaviours of others; and (2) tolerance: the degree to which one is lenient of temporary imbalances – are influenced by emotional closeness, changes in the availability of partners in one’s social environment, and stable preferences for the distribution of outcomes. My findings suggest that tracking and tolerance have separate adaptive functions. To conclude, I discuss the major contributions of my research, future directions of study, and real-life applications.
This dissertation would not be possible without the important contributions of numerous individuals. I would like to express my sincere gratitude to the following people:

First, I’d like to thank my advisor, Dr. Pat Barclay. Thank you for your supervision throughout my several years as a graduate student. Thank you for always being available to help strengthen my research and writing skills. Thank you for pushing me to do the very best that I can.

Thank you to my advisory committee members, Dr. Dan Meegan and Dr. Benjamin Giguère. The both of you have been very helpful in providing knowledge, expertise, encouragement, and valuable feedback throughout this dissertation.

Thank you to my participants, volunteer coders, and funding source (SSHRC). A special thank you to my friend, Art Hare, for volunteering to teach me how to program the modified version of the Ultimatum Game in z-tree.

Thank you to my wonderful lab-mates, Adam Sparks and Amanda Rotella. Adam, thank you for always having the time to answer any question I had about the research process. Amanda, thank you for being so encouraging and willing to help me tackle any issues I had with my research. Thank you both for making my time with BLEEP so memorable and fun!

Thank you to my family – mom, dad, and doite – for being there to cheer me on throughout this dissertation. Thank you for finding so many ways to make me feel loved and supported in my academic endeavours.

Thank you to my lovely friends for always supporting me. A big thank you to my dear friend, Erika Lonseth, for patiently listening to me vent my frustrations, talking me through my academic challenges, and providing me with loving encouragement. Thank you to my colleagues, combat girls, and childhood friends for making sure I had lots of fun while completing a PhD!

And finally, thank you to my furry roommate, Todd, for the doggy cuddles and unconditional love while writing my thesis.
# TABLE OF CONTENTS

**Title Page** ................................................................. i
**Abstract** ................................................................ ii
**Acknowledgements** .................................................. iii
**Table of Contents** ......................................................... iv
**List of Tables** ............................................................ vi
**List of Figures** ........................................................... vii

**General Introduction** .................................................. 1
**Chapter 1: Preferences for Ability and Willingness Traits in Four Relationship Types** .......................... 13
  **Introduction** .......................................................... 13
  **Study 1** .................................................................... 17
    Method ....................................................................... 18
    Results ....................................................................... 20
  **Study 2** .................................................................... 22
    Method ....................................................................... 22
    Results ....................................................................... 23
  **General Discussion** ................................................... 29

**Chapter 2: Preferences for Network Size** .......................................................... 36
  **Chapter 2A: No effect of Individual Differences in Need for Help on Preferences for Network Size** .......................... 36
  **Introduction** .......................................................... 36
  **Study 1** .................................................................... 39
    Method ....................................................................... 39
    Results ....................................................................... 41
  **Study 2** .................................................................... 42
    Method ....................................................................... 42
    Results ....................................................................... 43
  **Study 3** .................................................................... 45
    Method ....................................................................... 46
    Results ....................................................................... 49
  **General Discussion** ................................................... 50

  **Chapter 2B: Preferences for Network Size Vary Depending on Type of Social Interaction** .......................... 53
  **Introduction** .......................................................... 53
  **Study 1** .................................................................... 56
    Method ....................................................................... 56
    Results ....................................................................... 57
  **Study 2** .................................................................... 58
    Method ....................................................................... 58
    Results ....................................................................... 58
  **Study 3** .................................................................... 59
    Method ....................................................................... 59
**LIST OF TABLES**

Chapter 1:.................................................................................................................................13
Table 1 – Descriptions used to define relationship types to participants.................................19
Table 2 – Correlations among ability (A) and willingness (B) traits for self and partners........20
Table 3 – Ratings of self and ideal relationship partners for ability and willingness traits........21

Chapter 2:........................................................................................................................................36
Chapter 2A: No effect of Individual Differences in Need for Help on Preferences for Network
Size..............................................................................................................................................36
Table 1 – Materials used in study 1 to prime need for help.......................................................40
Table 2 – Materials used in study 2 to prime need for help........................................................43
Table 3 – Materials used in study 3 to prime need for help........................................................47

Chapter 3:.........................................................................................................................................65
Table 1 – Descriptive statistics and correlations among status variables for self (A) and recipients
(B).................................................................................................................................................84

Chapter 4:......................................................................................................................................107
Table 1 – Descriptions used to define relationship types to participants.................................119
Table 2 – Descriptive statistics and zero-order correlations for variables in study 2..................127
Table 3 – Descriptive statistics and zero-order correlations for variables in study 3.................133
Table S1 – Distribution of tracking scores as measured by responders’ willingness to pay to see
the proposer’s offer in the Ultimatum Game.............................................................................149
Table S2 – Distribution of tolerance scores as measured by responders’ minimum acceptance
offer in the Ultimatum Game.......................................................................................................149
LIST OF FIGURES

Chapter 1..........................................................................................................................13
Figure 1 – Preferences for willingness and ability traits at each trait level for friends (A), roommates (B), business partners/colleagues (C), and romantic partners (D).................................27

Chapter 2..........................................................................................................................36
Chapter 2A: No effect of Individual Differences in Need for Help on Preferences for Network Size..........................................................................................................................36
Figure 1 – Scale used in study 1 to assess preferences for the trade-off between network size and level of intimacy..............................................................................................................36
Figure 2 – The effect of condition on preferences for the trade-off between network size and level of intimacy for study 1.....................................................................................................41
Figure 3 – The effect of needing and receiving help (A) and receiving help only (B) on preferences for the trade-off between network size and level of intimacy for study 2.................44
Figure 4 – No effect of receiving help on preferences for the trade-off between network size and level of intimacy for study 3................................................................................................50

Chapter 2B: Preferences for Network Size Vary Depending on Type of Social Interaction.....53
Figure 1 – Scale used to assess preferences for the trade-off between network size and level of intimacy..........................................................................................................................57

Chapter 3..........................................................................................................................65
Figure 1 – Giving and receiving help from friends and siblings as a function of the cost of help.................................................................................................................................................75
Figure 2 – Giving and receiving help from siblings as a function of siblings’ status relative to self, averaged across all costs of help (A), and as a function of cost of help (B).....................77
Figure 3 – Low-cost (A), medium-cost (B), and high-cost help (C) given to and received by kin and non-kin as a function of status differences...........................................................................79
Figure 4 – Giving and receiving help from siblings and friends as a function of cost of help.....85
Figure 5 – Giving and receiving help from recipients as a function of status relative to self, averaged across all costs of help...........................................................................................................87
Figure S1 – Giving and receiving help from siblings as a function of siblings’ status relative to self, averaged across all costs of help (A), and as a function of cost of help (B)..............96
Figure S2 – Investment in siblings and friends as a function of cost of help.................................99
Figure S3 – Investment in siblings as a function of siblings’ status relative to self..................100
Figure S4 – Investment in kin and non-kin as a function of status.................................................................................................................................................................................101
Figure S5 – Giving and receiving help from siblings and friends as a function of cost of help..102
Figure S6 – Giving and receiving help from recipients as a function of status relative to self, averaged across all levels of cost of help..................................................................................103
Figure S7 – Help received from siblings as a function of siblings’ status relative to self, averaged across all levels of cost of help....................................................................................105
Figure S8 – Help received from recipients as a function of recipients’ status relative to self, averaged across all levels of cost of help..............................................................................106
Chapter 4.........................................................................................................................................107
Figure 1 – The predicted relationship between tracking, intolerance, and closeness...............112
Figure 2 – The theoretical link between relational mobility, SVO, closeness, tracking, and tolerance........................................................................................................................................................................120
Figure 3 – The Inclusion of Other in Self Scale (Aron et al., 1992), one of two measures used to assess closeness........................................................................................................................................................................122
Figure 4 – The effect of closeness on tracking (A) and intolerance (B) for study 2...............125
Figure 5 – Path coefficients for a simple mediation analysis on tracking for study 2.........127
Figure 6 – The interaction between social value orientation and type of tracking for study 2....129
Figure 7 – The effect of closeness on tracking (A) and intolerance (B) for study 3.............132
Figure 8 – Path coefficients for a simple mediation analysis on tracking for study 3..........133
Figure 9 – The interaction between social value orientation and type of tracking for study 3....135
Figure S1 – The interaction between social value orientation (prosocials, egoists, and competitors) and type of tracking for study 2.................................................................156
Figure S2 – The interaction between social value orientation (prosocials, egoists, and competitors) and type of tracking for study 3.................................................................157
GENERAL INTRODUCTION

On what basis do people choose and form friendships? Why do people invest in some more than others? And, what factors affect interpersonal dynamics? In this doctoral dissertation, I address these questions by examining the strategies people employ to choose, attract, and maintain cooperative relationships. In doing so, I present four chapters that each focus on a distinct problem to advance our scientific understanding of social bonds.

Because each chapter contains an extensive introduction and discussion for a specific line of inquiry, the purpose of this general introduction is to provide the reader with a broad overview of the relevant terms, concepts, and theoretical frameworks. I begin by first defining friendship and discussing the significance of platonic bonds. I then outline the various ways that friendship, as well as any other behaviour, can be examined. Before providing an overview of the four chapters, I present a brief description of biological markets, the main theoretical framework used throughout this thesis.

Friendships

How do we define friendships? Why are friendships important?

Defined broadly, friendships generally refer to stable cooperative bonds between non-kin (DeScioli & Kurzban, 2009; Hruschka, 2010). These platonic bonds are characterized by long-term exchanges of support, usually in the form of emotional and material help (Silk, 2003; Xue & Silk, 2012). Friendships are pervasive and ubiquitous: platonic relationships are not only found in all human societies (Hruschka, 2010), but also among various other animal species

1 Throughout this dissertation, the terms “friendship”, “platonic bonds”, “cooperative relationship”, “social relationships” will be used interchangeably to refer to the abovementioned definition.
(e.g., primates: Silk, 2002; Schino, 2007; dolphins: Connor, 2007; horses: Marinier & Williams, 1982; hyenas: Holekamp, Sakai, & Lundrigan, 2007).

Friendships are important because they not only affect our physical and mental health, but also the well-being of our offspring (reviewed by Brent, Chang, Gariépy, & Platt, 2014 and Massen, Sterck, & de Vos, 2010). For instance, having many friends can protect men from deadly harm during intra-sexual conflicts (Phillips & Cooney, 2005). And, having close female friends reduces stress in women (Taylor et al., 2000). Moreover, social relationships play a significant role in the risk of death (Berkman et al., 2004; Holt-Lunstad, Smith, & Layton, 2010; Smith, Holt-Lunstad, & Layton, 2010) and the likelihood of developing feelings of loneliness and depression (Cacioppo, Hawkley, & Thisted, 2010).

In terms of the health of offspring, women of low socioeconomic status with more social supports give birth to heavier babies than similar status women with smaller social circles (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993). Similarly, women with stronger support networks are less likely to develop postpartum depression, a mental illness among mothers that has been shown to negatively affect infant health (Collins et al., 1993). Furthermore, high-quality social relationships reduce stress among mothers, and such a reduction in maternal stress has been associated with increased intelligence of pre-schoolers (Slykerman et al., 2005).

Levels of Analysis

How can we examine and understand friendship?

A complete, and full, understanding of any given behaviour requires four levels of analysis (Tinbergen, 1963). Proximate explanations focus on factors that occur within the lifespan of an individual. Such proximate explanations include questions, hypotheses, and
predictions about *mechanism* (i.e., the various physiological, psychological, hormonal, neural, cognitive, and emotional structures underlying a given behaviour) and *ontogeny* (i.e., the genetic and environmental factors that interact to produce the mechanism(s) for a given behaviour).

Ultimate explanations emphasize factors that span across several generations or various animal species and taxa. Like proximate explanations, ultimate accounts of behaviour also come in two forms: *phylogeny* (i.e., the evolutionary origins and history of a mechanism) and *function* (i.e., the selective pressures that give rise to a particular mechanism; the fitness benefits conferred on the bearer of a particular mechanism). Together, these four levels of analyses – mechanism, ontogeny, function, and phylogeny – are all equally important and complementary in the examination of behaviours.

In this dissertation, I focus on a functional account of friendship. That is, I use underlying assumptions about the likely fitness costs and benefits associated with certain behaviours to make specific predictions about the way people choose, attract, and keep friends. Even though people may behave in fitness-enhancing ways, they do not necessarily need to be conscious of the fitness benefits of friendship (Tinbergen, 1963). This is because natural selection has favoured a preference or liking for certain traits, decisions, and/or behaviours that maximize one’s fitness. For example, we tend to like and be-friend certain individuals, specifically those who like us (Hruschka, 2010). Such a preference leads us to approach people who reciprocate our liking and attempt to form friendships with them. Behaving in this manner is fitness-enhancing because it allows us to maximize benefits (i.e., form partnerships with those who are likely more willing to invest in us and provide us with benefits) while minimizing costs (i.e., reducing the risk of rejection or exploitation). But, people need not be conscious of the overall
fitness gains of such a strategy; instead, people can simply be conscious of their preferences that allow for fitness-maximizing behaviours.

With this in mind, I emphasize the following functional questions in my dissertation: What traits do people pay attention to when choosing and attracting friends that allow for a net fitness gain across the relational exchange? How do changes in the social environment affect the fitness costs and benefits of friendship maintenance? And, how does the fitness cost-to-benefit ratio change for interactions with kin and non-kin? Because I take a functional approach to understanding friendship, it is important to note specific terms used. In particular, my use of the terms ‘costs’ and ‘benefits’ explicitly refer to the effects a behaviour might have on inclusive fitness (i.e., the reproductive success of an individual and his/her genetic kin).

**Functional explanations of friendship**

*Why does friendship exist? What selective pressures caused individuals to form long-term cooperative bonds with non-kin? And how does friendship affect fitness?*

Several functional accounts have been used to explain the existence of friendship and the potential fitness benefits associated with platonic bonds. In this section, I begin by presenting a brief history of the relevant progression of theoretical models used to understand cooperation. I then present a description of the main theoretical framework used in this thesis, biological markets. I conclude by highlighting the ways in which partner choice models, such as biological markets, extend, add, and complement traditional understandings of cooperation.
How have functional researchers studied the puzzle of cooperation?

Traditionally, models of reciprocity (also referred to as prisoner’s dilemma models (e.g., Novak & Sigmund, 1993) or conventional game theory; Maynard Smith & Price, 1973) have been employed to explain basic cooperation, or the fundamentals of friendship. These models generally examine repeated interactions between two individuals to investigate how one person can maximize her total pay-offs over a series of interactions by either cooperating or defecting (i.e., failing to cooperate; Alexander, 1987; Trivers, 1971). Traditional models of reciprocity have widely advanced our understanding of how decisions about defection or cooperation in ongoing interactions affect the distribution of benefits between two parties. For example, tit-for-tat strategies, whereby one begins interactions by cooperating and then acting as the other person did in the previous move, explain many human interactions (see Nesse, 2007).

Arguably, however, much of the work using traditional models de-emphasizes a key aspect of human relationships: the element of partner choice (Fraser, 2013; Nesse, 2007; Noe, 2001). Two-player games usually anonymously pair individuals (e.g., Ellison, 1994), allow little control over who pairs with whom, and/or limit the information presented about interaction partners (Fraser, 2013; Nesse, 2007). This fact is a setback for traditional models because realistic human interactions necessarily involve partner choice. For example, people need to be able to (a) choose a viable partner among many other potentials, (b) decipher if such a partner is able, willing, and available to provide benefits, (c) decipher if one is able, willing, and available to provide what a partner wants to maintain the relationship, and (d) finding ways to promote oneself as an attractive partner to be chosen and kept by high-quality partners. Thus, the key added value of partner choice approaches is that they allow us to understand cooperation in relation to partner formation; i.e., the decisions needed to outcompete others in attracting and
keeping partners that maximize the benefits obtained through exchange (Barclay, 2013; Fraser, 2013; Nesse, 2007; Noë & Hammerstein, 1994; 1995).

Although partner choice approaches add a key element to our understanding of cooperation, it is important to note that such models are not intended to replace traditional models of reciprocity (Fraser, 2013). Instead of acting as mutually exclusive alternatives, partner choice approaches are meant to extend, add, and complement traditional models (Noe, 2006; Schino & Aureli, 2010). As such, several researchers have employed partner choice models to extend our knowledge of cooperation (e.g., Aktipis, 2004; Barclay, 2016; Bull & Rice, 1991; Fraser, 2013; McNamara, Barta, Frohmage, & Houston, 2008; Nesse, 2007; Noë & Hammerstein, 1994; 1995). In the next sub-section, I describe a prominent partner choice approach known as biological markets.

**What is a biological market?**

One such partner choice model that has been used to understand the evolutionary function of all types of relationships comes from the notion of biological markets (Barclay, 2013; 2016; Noë & Hammerstein, 1994; 1995). The theory of biological markets relies on the premise that natural selection should favour individuals who choose, and spend the most time with, partners that provide the most net fitness benefits (Noë & Hammerstein, 1994; 1995). These benefits can come in various currencies (e.g., food, shelter, protection from enemies) and trade does not need to stay within the boundaries of a specific currency (e.g., one may trade food for help with building shelter). The supply and demand of benefits varies depending on the type of benefit and the given environment. For example, some individuals may be more able, willing, and/or available to provide certain types of high cost benefits, such as protection from enemies.
In an environment where warfare and conflict is prominent, individuals providing protection could be in high demand as potential partners because having an ally to protect against enemies could save one’s life and the life of one’s family. Because certain individuals may be of high demand in given environments and partner choice is necessarily a two-way street, individuals may need to outcompete others to access to the most beneficial partnerships. Mutual partner choice often lends itself to assortative pairing, whereby individuals similar in their value as a partner (i.e., ‘market value’) are likely to pair up. Thus, partner choice relies not only on a multitude of traits related to the capacity of an individual to provide different types of valued benefits, but also on the relative, as opposed to absolute, level of one’s traits.  

How do biological markets extend traditional models of cooperation?

As mentioned, partner choice models extend traditional models by assessing how people exercise choice in forming and keeping relationships to maximize gains (Noe, 2006; Schino & Aureli, 2010). A biological markets perspective offers this added value and extends other basic partner choice approaches in at least three ways (Barclay, 2013). First, biological markets emphasize the importance of showcasing one’s relative levels of a trait versus absolute levels of a trait. Being very generous, for example, may not allow one to outbid competitors to access to the most beneficial partnerships if others in a given social environment are just as generous. One must, instead, be more generous than others to be deemed an attractive partner. Second, biological markets illustrate that people can choose partners based on many other traits than reciprocity (Barclay, 2011; 2013). Of course, under usual circumstances, people will choose those who reciprocate over those who do not. But, biological markets allow us to understand that

---

2 Again, it is important to note that people are not usually consciously pursuing the abovementioned benefits. Instead, our evolved preferences are in line with the relevant fitness costs and benefits and we act according to these preferences.
non-reciprocators may be desirable if such individuals bring various other traits to the relational exchange. Lastly, a biological markets perspective highlights the importance of supply and demand in carving out one’s market value (Barclay, 2013). The supply and demand of traits necessarily changes over time and across different contexts. And, such a shift necessarily affects the value of one’s traits relative to others. Thus, biological markets theory informs us of the processes that contribute to why some individuals might be deemed high market value partners while others might not be.

Overview of the current work

This doctoral thesis uses the notion of biological markets to formulate predictions about human friendships. I present four separate chapters that each have a distinct set of questions, predictions, methodology, findings, and implications. For many of the chapters, I replicated previous findings in addition to presenting novel contributions. In this section, I begin with a brief discussion of the importance of replicated findings. I then present a summary of each chapter, highlighting the predictions and key replicated as well as novel findings.

The importance of replication

The replicated findings in this thesis are of particular importance given the recent replication crisis in psychology (e.g., Bohannon, 2015; Maxwell, Lau, & Howard, 2015; Pashler & Wagenmakers, 2012; Stanley & Spence, 2014). In current years, psychologists have uncovered several previous psychological findings that are not replicable. This concern has alarmed many researchers and raised concerns over the discipline’s credibility and the institutional scientific practices of academia. In an effort to monitor the crisis, initiatives like the
Reproducibility Project have been launched to better scope out the replication crisis and determine factors that may contribute to this crisis (Stanley & Spence, 2014). Others have called for an increase in the production and publication of replications, claiming that such systematic checking of work should be more common and incentivized (e.g., Bohannon, 2015).

In this thesis, I attempt to contribute to the field of psychology by re-testing previous findings related to interpersonal relationships. In doing so, I also extend previous work by offering novel predictions and findings about friendships.

**Chapter 1: Preferences for willingness and ability traits in four relationship types**

How do people choose and attract high-quality relationship partners? I begin this dissertation by investigating the traits that people find desirable in various relationship partners. Specifically, I investigate why people possess preferences for certain traits, and why these preferences may be comparable in various long-term relationships. I pay special attention to two distinct sets of traits: (1) ability traits, which refer to personal characteristics that affect one’s capacity to confer benefits on others (e.g., wealth, intelligence, attractiveness); and (2) willingness traits, which refer to an individual’s likelihood to offer benefits in a partnership (e.g., degree of kindness and generosity). Preferences for these distinct traits have already been tested in friendships (Vigil, 2007). Thus, I sought to replicate and extend findings by testing preferences for willingness and ability traits in four types of long-term relationships (e.g., friends, romantic partners, roommates, and business partners). Because the broad functional goal (but not the conscious goal) of all relationships is to maximize net benefits gained, I predict that similar strategies should emerge when choosing different types of long-term partners. Data replicated previous results on preferences for friends and yielded novel findings on preferences.
for the other three relationship types. Overall, the results were supportive of my predictions, indicating that all relationships share commonalities in being a reliable form of social exchange of valuable benefits. These findings can be used to modify our current conceptualization of relationships. Furthermore, results can be applied to help people strengthen approaches to choosing and attracting partners to form strong personal bonds.

Chapter 2: Preferences for social network size

Chapter 2A: No effect of individual differences in need for help on preferences for network size

Chapter 2B: Preferences for network size vary depending on type of social interaction

In choosing partners to maximize net benefits gained, one necessarily faces a trade-off between the quality and quantity of partners. Because time is a limiting factor (i.e., time spent with one partner necessarily takes away from time with another), people must assess the general pay-offs for forming social networks that comprise of strong bonds with few versus weak ties with many. Several factors affect this trade-off, including individual variation in need for help and the benefits brought through each type of relationship (e.g., colleagues versus friends). In the second chapter, I add to our scientific understanding of friendships by investigating two novel predictions about the factors that affect the trade-offs people make in forming their social networks. In Chapter 2A, I fail to find an effect of individual differences in help needed on preferences for network size. In Chapter 2B, I show that preferences for network size vary depending on the type of social interaction (i.e., informal interactions with friends versus formal interactions with coworkers). I discuss the implications of these results by presenting suggestions for future studies, and applications within the workplace.
Chapter 3: Investment in kin and non-kin: the role of status and cost of help

In Chapter 3, I examine the costs and benefits of kinship and friendship, and investigate two factors that might influence investment each relationship type. Following the logic of biological markets, I test three predictions. First, I attempt to replicate previous findings that show costlier help should be disproportionately directed towards kin because indirect fitness benefits (i.e., the survival and reproduction of genetic kin) offset the greater fitness costs in providing such help. For the second and third prediction, I test the novel notion that status does not only motivate helping among non-kin, but also among kin. Specifically, in my second prediction, I test if people invest more in non-kin and kin of high status because status allows better access to resources, thus motivating individuals to invest in partners who have the ability to confer greater benefits. And, my third prediction examines the specific circumstances in which investment in non-kin over kin may occur: if benefits from partnerships with non-kin exceed the benefits provided by kin (inclusive fitness as well as other benefits), people should invest more heavily in partnerships that bring the most net benefits. Results supported the first two predictions, but not the third. I discuss the implications of my findings for understanding how help is preferentially directed in kin and non-kin relationships.

Chapter 4: Tracking and tolerance

Together, the first three chapters provide readers with a basic understanding of how one’s market value influences preferences for whom we form cooperative bonds with and what traits we preference in various relationship partners. In Chapter 4, I take a closer look at people’s investment in their current friendships by examining characteristics of interpersonal dynamics. Specifically, I focus on two aspects of interpersonal dynamics: (1) tracking, the degree to which
one monitors the behaviours of others; and (2) tolerance, the degree to which one is lenient with temporary imbalances in partnerships. I test two replicated and five novel predictions related to tracking and tolerance. And, I present three key findings. First, I replicated previous findings in illustrating that people more readily track and are more intolerant of imbalances with those they are not as close to relative to those they have a strong bond with. Second, I present novel results that the link between tracking and closeness is mediated by intolerance such that people do not bother tracking if they are willing to tolerate short-term imbalances. And third, I present novel evidence that people’s stable preferences for outcome distributions between themselves and others predicts amount of self-tracking and other-tracking. I discuss the implications these findings have for understanding the psychology of friendship, and emphasize the importance of my results in assessing the circumstances that lead to the deterioration or maintenance of platonic relationships.
CHAPTER 1
PREFERENCES FOR ABILITY AND WILLINGNESS TRAITS IN FOUR RELATIONSHIP TYPES

1. INTRODUCTION

Those with strong support networks enjoy several benefits (e.g., Brent, Chang, Gariépy, & Platt, 2014; Massen, Sterck, & De Vos, 2010; Seyfarth & Cheney, 2012; Silk, Alberts, & Altmann, 2003), including reduced stress and risk of illnesses, improved happiness and well-being, as well as increased longevity (Berkman et al., 2004; Holt-Lunstad, Smith, & Layton, 2010). But, these benefits are not without costs: It can be difficult to know what cues to pay attention to in choosing good partners and even more challenging to attract and keep highly desirable partners (Barclay, 2013; Noë & Hammerstein, 1994; 1995; Roberts et al., 2009). How then do people choose partners to maximize benefits gained while minimizing the costs of forming and maintaining these relationships?

In choosing partners to provide the most net benefits, people commonly attend to two distinct factors – abilities and willingness– of interpersonal attraction (Barclay, 2013; Kummer, 1978; Tooby & Cosmides, 1996; Vigil, 2007; Zarbatany, Conley, & Pepper, 2004). Abilities refer to an individual’s capacity to provide benefits to others. Generally, abilities can be assessed by a potential partner’s personal attributes or indicators of quality such as intelligence, wealth, and health. Willingness, on the other hand, refers to an individual’s motivation, likeliness, and eagerness to share benefits with others. Compared to abilities, cues of willingness are more readily available through evaluations of a potential partner’s interpersonal behaviours, such as trustworthiness, kindness, and generosity. The most desirable partners are high on abilities and
willingness: These people provide many benefits by possessing several valuable abilities and a strong motivation to share benefits with others. People who possess many useful abilities but have lowered willingness to help (or vice versa) are usually less desirable partners because they provide fewer benefits overall.

Now that we know that partner choice is based on cues of abilities and willingness, what determines who pairs up with whom? To answer this question, we must remember that partner choice is a two-way street, and both parties benefit from entering, and staying, in relationships that allow for a net gain (Barclay, 2013; Noë & Hammerstein, 1994; 1995). This necessarily means that to attain an attractive partner, one must necessarily be attractive oneself and adequately signal such attractive qualities to potential partners. So, although many may want the most desirable partners, few will actually possess the qualities to outcompete others in offering a mutually beneficial partnership to these high quality individuals. Instead, to minimize search costs, the potential for rejection and/or the risk of exploitation, people generally approach and actually pair with those that are of relatively equal value as a relationship partner (McElwain & Volling, 2002; Seyfarth, 1977; Seyfarth & Cheney, 2012; Trivers, 1971; Vigil, 2007).

The abovementioned rationale leads to several predictions about partner choice and partner attraction (see Vigil, 2007). The first obvious prediction is that people will prefer partners that have similar but slightly higher levels of abilities and willingness traits than themselves. This makes sense given that such a preference allows for a net gain within a relationship as it minimizes search costs and lowers the potential of rejection or exploitation from those of much higher quality than oneself.

Willingness traits signal a tendency to share, and sharing is the basis for any relationship. Thus, without a motivation to share, the capacity of a partner to provide valuable benefits is
irrelevant. This logic leads to my second prediction, which is that people should prefer partners with higher levels of willingness than ability traits. In order to attract the best possible partners, people should also correspondingly signal the same traits that are deemed desirable in others. Thus, my third prediction is that people, too, will rate themselves higher on willingness than ability traits.

My fourth and final prediction is that people should exhibit distinct patterns of preferences for willingness and ability traits that minimize the costs while maximize the benefits of being in a relationship. Specifically, people should prefer partners with increasing levels of willingness such that preferences should be for the highest levels of willingness traits. As mentioned, this preference is expected because the ability to provide benefits is irrelevant without a tendency to share. On the contrary, people should prefer those with similar, but slightly higher, levels of abilities to themselves. Assuming the average individual has a moderate level of abilities, most individuals should prefer partners with moderate, or slightly higher than moderate, levels of abilities over partners with much lower or higher levels of abilities than oneself. Again, such a preference allows for a net gain across the reciprocal exchange by minimizing search costs and reducing the risks of rejection or exploitation from the chosen partner.

1.1. Current research

Certain relationships have been best explained by specific theories and models. For example, kinship has primarily been understood through kin selection (Hamilton, 1963), friendship through reciprocal altruism (Trivers, 1971), and romantic partners through sexual selection (Darwin, 1871 as cited by Buss & Schmitt, 1993) and parental investment (Trivers, 1972). But overall, evolutionary psychologists conceptualize all long-term relationships as a mutually valuable way of exchanging resources, for an extended time, to provide both parties
with net fitness benefits (Barclay, 2013; Noë & Hammerstein, 1994; Tooby & Cosmides, 1996; Trivers, 1971; Vigil, 2007). Despite the general consensus of this definition of relationships, little work to date has utilized an evolutionary framework to compare and contrast various types of relationships. Instead, much work has narrowly focused on preferences for a single type of relationship (romantic partner: e.g., Buss et al., 1990; Buss, Shackelford, Kirkpatrick, & Lansen, 2001; Li, Bailey, Kenrick, & Linsenmeier, 2002; Shackelford, Schmitt, & Buss, 2005; friendship: e.g., DeScoili & Kurzban, 2009; Tooby & Cosmides, 1996; Vigil, 2007). For example, many of my predictions have been tested either directly (Lusk, MacDonald, & Newman, 1998; Vigil, 2007) or indirectly (e.g., Buss et al., 1990) for specific relationship types. Work that compares preferences for various relationships does exist, but is not without limitations. Specifically, such work has been atheoretical, exploratory, and focussed on proximate psychological mechanisms (e.g., Cann, 2004; Eschel, Sharabany, & Friedman, 1998; Goodwin & Tang, 1990; Sprecher & Regan, 2002). Thus, to my knowledge, few studies have applied an evolutionary perspective to investigating preferences for various relationship types.

The purpose of the current research is twofold. First, I plan to add to the literature on partner choice and attraction by replicating previous work on preferences for willingness and ability traits in friends (Vigil, 2007). Second, I plan to test novel predictions by comparing partner choice strategies for four types of relationships: friends, roommates, business partners/colleagues, and long-term romantic partners. Because the broad goal of all relationships is to maximize benefits, I expect that preferences for ability and willingness traits will be the same across all relationship types.

For the second prediction, two of the four relationship types – friendship and romantic partners – were specifically chosen for two reasons: (1) friends and romantic relationships are
highly evolutionarily relevant relationships; and (2) there is good theoretical reasoning to believe that similar patterns of partner choice strategies exists for these two relationships because partner choice is an element in both relationships (romantic and platonic bonds are both subject to the logic of social selection; romantic relationships are just a special case (i.e., sexual selection) of social selection; Barclay, 2013; 2016). The two other relationship types – business partners/colleagues and roommates – are evolutionary novel relationships and were included for two reasons: (1) I sought to compare and contrast the ways in which partner choice strategies for evolutionary relevant and novel relationships were similar/different; and (b) I sought to add to the social (e.g., Demir, Ozdemir, & Weitekamp, 2007; Park & Antonioni, 2007) and organizational psychology (e.g., Holmes & Marra, 2002; Myers & Johnson, 2004) literature by understanding the partner choice strategies for roommates and business partners/colleagues.

To test predictions, the present work consists of two studies. The first study sought to examine predictions 1-3, whereas the second study investigated prediction 4. Both studies replicated and extended methodologies from Vigil (2007). Studies were conducted as online surveys.

2. STUDY 1

The purpose of study 1 was threefold. First, I investigated if people preferred partners (i.e., friends, roommates, business partners/colleagues, and romantic partners) with slightly higher levels of abilities and willingness than themselves. Second, I examined if people preferred partners with higher levels of willingness than ability traits. Lastly, I assessed if people rated themselves higher on willingness than ability traits.
2.1. Method

2.1.1. Participants

Participants ($n = 249$) were recruited from a crowdsourcing site, Amazon Mechanical Turk (AMT). Of the 249 participants, 47.8% identified as female ($n = 119$) and 51.8% identified as male ($n = 129$). One participant did not identify their gender. Participants’ ages ranged from 19 to 79 years old; the mean age was 33.6 years and a standard deviation of 10.9 years.

To ensure high-quality data, specific qualifications were used for AMT participants. Only participants who resided in the USA and were fluent in English were included. And, participants could only participate if they had a 95% approval rate for at least 100 studies completed on AMT. In line with the standard compensation rate for AMT participants ($1.40 USD/hour; Paolacci, Chandler, & Ipeirotis, 2010), participants received $0.40 USD for the 15 minute study. Participants were only allowed to participate in this study once.

2.1.2. Materials and design

To test predictions, participants rated themselves in relation to other same-sex peers (using a seven-point scale that ranged from “lower than almost everyone” to “higher than almost everyone”) on various traits (see Appendix A for questions presented to participants). Twelve traits were selected based on prior research (e.g., Lusk, MacDonald, & Newman, 1998; Rodkin, Farmer, Pearl, & Van Acker, 2000; Vigil, 2007). Six of the twelve traits were personal characteristics used to assess one’s ability to reciprocate (i.e., athleticism, appearance, creativity, intelligence, popularity, wealth) while the other six traits comprised of qualities associated with one’s willingness to reciprocate within a relationship (i.e., cooperativeness, friendliness, generosity, helpfulness, kindness, trustworthiness). The same methodology was used to assess
preferences for an ideal friend, roommate, business partner/colleague, and long-term romantic partner (see Table 1 for descriptions of relationship types).

All traits were presented in randomized order. Additionally, participants were always asked to rate themselves first on traits, but the order for which participants rated ideal friends, roommates, business partners/colleagues, and romantic partners were randomized. This order of presentation made logical sense because rating oneself first on the traits allowed participants to think about their own market value. Perceptions of one’s own market value are thought to impact what people deem ‘ideal’ or attractive in other partners (e.g., reviewed in Barclay, 2013). And thus, it makes logical sense to ensure participants have a sense of their own market value before explicitly listing preferences for traits in other partners.

*Table 1.*

<table>
<thead>
<tr>
<th>Relationship type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friend</td>
<td>“the person you would be the closest to, and share and confide in regularly”</td>
</tr>
<tr>
<td>Roommate</td>
<td>“a person you would share a house/apartment with”</td>
</tr>
<tr>
<td>Business partner/colleague</td>
<td>“a person you would be able to work well with on numerous projects/assignments”</td>
</tr>
<tr>
<td>Long-term romantic partner</td>
<td>“a person you would marry or be in a committed relationship with”</td>
</tr>
</tbody>
</table>

2.1.3. *Data pre-processing*

The six ability traits were highly correlated for self, friend, roommate, business partner/colleague, and romantic partner respectively. Ability traits for self ($\alpha = .72$), friend ($\alpha = .80$), roommate ($\alpha = .79$), business partner/colleague ($\alpha = .74$), and romantic partner ($\alpha = .83$) showed appropriate levels of internal consistencies and were aggregated. Similarly, willingness traits were also highly and significantly correlated for self and all relationship types. The six
willingness traits for self ($\alpha = .87$), friend ($\alpha = .92$), roommate ($\alpha = .92$), business partner/colleague ($\alpha = .88$), and romantic partner ($\alpha = .91$) showed high levels of internal consistencies and were also aggregated.

2.2. Results

2.2.1. Preferences for partners with similar but slightly higher levels of abilities and willingness than ourselves

To examine if people preferred partners with similar but slightly higher levels of ability and willingness traits than themselves, two analyses were conducted. First, participants’ ratings of partners and self were significantly correlated indicating that people preferred partners with similar levels of ability and willingness traits to themselves (see Table 2). Second, paired sample t-tests for ratings of self and partners on traits were conducted to assess if preferences for partners were slight higher than ratings for self. Results confirmed predictions as all comparisons were significant with a Bonferroni correction (see Table 3).

Table 2.

Correlations among ability (A) and willingness (B) traits for self and partners.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self ability</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Roommate ability</td>
<td>.53**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Bus part./coll. ability</td>
<td>.35**</td>
<td>.56**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Romantic partner ability</td>
<td>.51**</td>
<td>.55**</td>
<td>.56**</td>
<td>-</td>
</tr>
</tbody>
</table>
B.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Self willingness</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Roommate willingness</td>
<td>.23**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Bus part./ Coll. Willingness</td>
<td>.26**</td>
<td>.63**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Romantic partner willingness</td>
<td>.35**</td>
<td>.53**</td>
<td>.68**</td>
<td>-</td>
</tr>
</tbody>
</table>


Table 3.

Ratings of self and ideal relationship partners for ability and willingness traits.

<table>
<thead>
<tr>
<th>Relationship</th>
<th>Trait</th>
<th>Raw mean Partner</th>
<th>Raw mean Self</th>
<th>Mean difference (partner – self)</th>
<th>S.D.</th>
<th>Cohen’s d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Friend</td>
<td>Ability</td>
<td>4.64</td>
<td>4.34</td>
<td>.30***</td>
<td>.76</td>
<td>.40</td>
</tr>
<tr>
<td></td>
<td>Willingness</td>
<td>5.63</td>
<td>5.08</td>
<td>.55***</td>
<td>1.05</td>
<td>.64</td>
</tr>
<tr>
<td>Roommate</td>
<td>Ability</td>
<td>4.54</td>
<td>4.34</td>
<td>.20***</td>
<td>.73</td>
<td>.25</td>
</tr>
<tr>
<td></td>
<td>Willingness</td>
<td>5.65</td>
<td>5.08</td>
<td>.57***</td>
<td>1.07</td>
<td>.66</td>
</tr>
<tr>
<td>Bus. part. / Colleague</td>
<td>Ability</td>
<td>5.08</td>
<td>4.34</td>
<td>.74***</td>
<td>.83</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Willingness</td>
<td>5.75</td>
<td>5.08</td>
<td>.67***</td>
<td>1.04</td>
<td>.78</td>
</tr>
<tr>
<td>Romantic partner</td>
<td>Ability</td>
<td>4.98</td>
<td>4.34</td>
<td>.64***</td>
<td>.78</td>
<td>.78</td>
</tr>
<tr>
<td></td>
<td>Willingness</td>
<td>5.84</td>
<td>5.08</td>
<td>.76***</td>
<td>.96</td>
<td>.91</td>
</tr>
</tbody>
</table>


2.2.2. Preferences for partners with higher levels of willingness than ability traits

A repeated measures ANOVA was used to assess the effect of trait type (ability; willingness) and relationship type (friends, roommates, business partners/colleagues, romantic partners) on ratings. As expected, a significant main effect of trait type was found, $F(1,205) = 467.67, p < .001$, partial $\eta^2 = .70$. This result confirmed predictions that people preferred partners for all relationship types with higher levels of willingness than ability traits. Additionally, a main effect of relationship type ($F(2.89, 591.72) = 36.58, p < .001$, partial $\eta^2 = .15$) and a significant
trait type X relationship type interaction was found, $F(2.93, 601.36) = 30.58, p < .001$, partial $\eta^2 = .13$.

2.2.3. *Higher self-ratings of willingness than ability traits*

As predicted, a paired samples t-test showed that people rated themselves higher on willingness ($M = 5.08, SE = .06$) than ability traits ($M = 4.34, SE = .05$), $t(244) = 12.60, p < .001$, Cohen’s $d = .86$.

### 3. Study 2

The purpose of this study was to examine the last prediction: people should prefer partners with increasing levels of willingness but moderate levels of ability traits. For the first part of this prediction, I investigated if people preferred partners (i.e., friends, roommates, business partners/colleagues, romantic partners) with increasing levels of willingness. Specifically, for this prediction, people should prefer the highest level (i.e., “higher than almost everyone”) of willingness traits over other levels. For the second part of this prediction, I examined if people preferred partners (i.e., friends, roommates, business partners/colleagues, romantic partners) with moderate, or slightly higher than moderate, levels of abilities. In particular, people should prefer partners with “average” (i.e., fourth of seven levels) or “above average” (i.e., fifth of seven levels) levels of abilities over higher levels of abilities.

#### 3.1. Method

3.1.1. *Participants*

Participants ($n = 251$) were recruited from SONA, the University of Guelph psychology participant pool. Of the 251 participants, 62.9% identified as female ($n = 158$) and 36.3% identified as male ($n = 91$). Two participants did not identify their gender. Participants’ ages
ranged from 17 to 60 years old; the mean age was 21.2 years with a standard deviation of 5.6 years.

3.1.2. Materials and design

Participants imagined meeting a new individual and were asked to rate how likely they would prefer this person as an ideal friend, roommate, business partner/colleague, or long-term romantic partner (i.e., 1: never to 5: definitely; see Table 1 for descriptions of each relationship type; see Appendix A for Questionnaires) if this individual’s willingness (kindness; friendliness) and ability (appearance; intelligence; wealth) varied on a seven point scale (ranging from “lower than almost everyone” to “higher than almost everyone”). Participants viewed all combinations (i.e., relationship type (4) X trait type (2) X trait level (7)) for a total of 140 items.

3.2. Results

3.2.1. Preferences for partners with increasing levels of willingness but moderate levels of abilities

To test if people preferred partners with increasing levels of willingness traits but a moderate level of ability traits, I conducted a three-way repeated measures ANOVA (relationship [4] X trait [2] X level [7]). I used the Greenhouse-Geisser correction to correct for sphericity violations. I found a significant main effect showing that people had different preferences for friends, roommates, business partners/colleagues, and romantic partners ($F(2.79, 424.19) = 12.70, p<.001$, partial $\eta^2=.08$; see Figure 1). Also, I found a significant main effect illustrating that people had higher preferences for willingness traits over ability traits ($F(1, 152) = 52.70, p<.001$, partial $\eta^2=.26$; see Figure 1), and preferences for higher levels of traits than lower levels of traits ($F(1.64, 249.89) = 781.63, p<.001$, partial $\eta^2=.84$; see Figure 1). Additionally, I found that people valued traits differently depending on the relationship (i.e., relationship by trait
interaction: $F(2.76, 419.18) = 4.23, p = .007, \text{partial } \eta^2 = .03$; see Figure 1), levels of traits
differently depending on the relationship (i.e., level by relationship interaction: $F(8.36, 1270.58) = 18.09, p < .001, \text{partial } \eta^2 = .11$; see Figure 1), and traits differently depending on the level (i.e.,
trait by level interaction: $F(1.82, 275.92) = 261.61, p < .001, \text{partial } \eta^2 = .63$; see Figure 1). I also
found a significant three-way interaction between relationship, trait, and level ($F(8.32, 1265.60) = 30.70, p < .001, \text{partial } \eta^2 = .17$; see Figure 1). To further explore the three-way interaction, post-
hoc analyses were conducted.

3.2.2.1. Preferences for friends

To assess preferences for friends, a repeated measures ANOVA with trait type and trait
level was conducted. I found a significant main effect such that people preferred willingness
over ability traits ($F(1, 208) = 44.39, p < .001, \text{partial } \eta^2 = .18$; see Figure 1A) and higher levels of
traits over lower levels of traits ($F(2.25, 467.22) = 614.00, p < .001, \text{partial } \eta^2 = .75$; see Figure
1A). I also found that people valued traits differently depending on the level of the trait (i.e., trait
by level interaction: $F(2.39, 497.92) = 151.91, p < .001, \text{partial } \eta^2 = .58$; see Figure 1A). Further
examination revealed that the most preferred level of willingness was the second highest level
(“higher than most”; $M = 4.20, SD = .67$). Post-hoc Bonferroni tests showed that the second
highest level was not statistically different to the highest level (“higher than almost everyone”; $M = 4.19, SD = .72; p = 1.00, \text{Cohen’s } d = .01$). As expected, the most preferred level of abilities
was the “above average” level ($M = 3.69, SD = .63$). With a post-hoc Bonferroni test, the “above
average” level of abilities was rated significantly higher than the next level (i.e., “higher than
most”; $M = 3.39, SD = .67; p < .001, \text{Cohen’s } d = .46$), indicating that slightly higher than
moderate levels of abilities was preferred to much higher levels of abilities. Thus, the results for
friend preferences support my predictions.
3.2.2.2. Preferences for roommates

To investigate preferences for roommates, a repeated measures ANOVA with trait type and trait level was conducted. Investigation of roommate preferences indicated a significant main effect showing that people valued willingness traits more than ability traits ($F(1, 213) = 64.25, p<.001$, partial $\eta^2 = .23$; see Figure 1B) and higher levels of traits over lower levels of traits ($F(2.23, 474.56) = 837.82, p<.001$, partial $\eta^2 = .79$; see Figure 1B). People also valued traits differently depending on the level of the trait (i.e., trait by level interaction: $F (2.82, 600.94) = 324.06, p<.001$, partial $\eta^2 = .60$; see Figure 1B). As expected, the most preferred level of willingness was the highest level (“higher than almost everyone”; $M = 4.32, SD = .63$). With a post-hoc Bonferroni test, this level was statistically more preferred than the next highest level (“higher than most”; $M = 4.19 SD = .57; p< .001$, Cohen’s $d = .22$). As expected, the most preferred level of abilities was the “above average” level ($M = 3.75, SD = .61$). Using a post-hoc Bonferroni test, this level was not statistically different to the next level (i.e., “higher than most”; $M = 3.72, SD = .62; p = .25$, Cohen’s $d = .05$), indicating that preferences for abilities peaked at “above average” and remained consistent for the next level. Thus, the results provide partial support for my predictions: people preferred roommates with increasing levels of willingness, but slightly higher than moderate levels of abilities was equally preferred to higher levels of abilities.

3.2.2.3. Preferences for business partners/ colleagues

Using a repeated measures ANOVA with trait type and trait level, I found a significant main effect such that people preferred willingness over ability traits ($F(1, 209) = 27.42, p<.001$, partial $\eta^2 = .12$; see Figure 1C) and higher levels of traits over lower levels of traits for business partners/ colleagues ($F(1.96, 409.23) = 737.51, p<.001$, partial $\eta^2 = .78$; see Figure 1C).
found a significant interaction whereby preferences for traits were dependent on the level of the trait (i.e., trait by level interaction: $F(1.99, 416.04) = 43.42$, $p<.001$, partial $\eta^2 = .17$; see Figure 1C). The most preferred level of willingness was the highest level (“higher than almost everyone”; $M = 4.17, SD = .72$), which, according to a post-hoc Bonferroni test, was not statistically different to the next highest level (“higher than most”; $M = 4.15, SD = .66$; $p = 1.00$, Cohen’s $d = .03$). Interestingly, similar patterns of preferences were found for abilities. Specifically, the most preferred level of abilities was the second highest level (“higher than most”; $M = 4.00, SD = .57$), and a post-hoc Bonferroni test showed that this level was not statistically different to the highest level (“higher than almost everyone”; $M = 3.98, SD = .62$; $p = 1.00$, Cohen’s $d = .03$). Thus, people preferred business partners/colleagues with increasing levels of willingness and abilities.

### 3.2.2.4. Preferences for romantic partners

An examination of preferences for romantic partners was conducted with a repeated measures ANOVA (2x7: trait type by trait level). Results indicated a significant main effect whereby people preferred willingness over ability traits ($F(1, 218) = 58.21$, $p<.001$, partial $\eta^2 = .21$; see Figure 1D) and higher levels of traits over lower levels of traits ($F(1.88, 410.75) = 868.91$, $p<.001$, partial $\eta^2 = .80$; see Figure 1D). Preferences for traits depended on the level of the trait such that I found a significant trait by level interaction, $F(3.01, 656.97) = 121.45$, $p<.001$, partial $\eta^2 = .36$ (see Figure 1D). As expected, the most preferred level of willingness was the highest level (“higher than almost everyone”; $M = 4.18, SD = .65$). But, using a Bonferroni post-hoc test, this level was not statistically different to the next highest level (“higher than most”; $M = 4.17, SD = .62$; $p = 1.00$, Cohen’s $d = .02$). As expected, the most preferred level of abilities was the “above average” level ($M = 3.91, SD = .55$). This level was not statistically different to the
next level using a Bonferroni post-hoc test (i.e., “higher than most”; $M = 3.89$, $SD = .58$; $p = 1.00$, Cohen’s $d = .04$). Thus, the results provide partial support for my predictions: people preferred romantic partners with increasing levels of willingness, but slightly higher than moderate levels of abilities was not preferred to higher levels of abilities.

A.

![Graph showing friend preference]

B.

![Graph showing roommate preference]
Figure 1. Preferences for willingness and ability traits at each trait level for friends (A), roommates (B), business partners/colleagues (C), and romantic partners (D).

3.3. Summary

In summary, people preferred increasing levels of willingness traits across the four relationships. Unexpectedly, however, preferences for abilities differed based on relationship type. Specifically, friend preferences for abilities were consistent with predictions: people preferred friends with above average levels of abilities compared to those with much higher levels of abilities. Unexpectedly, roommates and romantic partners with slightly higher than moderate levels of abilities were equally preferred to those with much higher levels of abilities. And, interestingly, people preferred business partners/colleagues with increasing levels of ability traits. Thus, all in all, results partially support my predictions: People preferred increasing levels of willingness for all relationships, but moderate levels over higher levels of abilities was only preferred for friends.

4. General Discussion

As predicted, people preferred friends, roommates, business partners/colleagues, and romantic partners with similar but slightly higher levels of abilities and willingness traits. These findings are consistent with Vigil (2007), whereby similar preferences were found for friends. Additionally, these findings provide further support for the notion of homophily, which refers to the principle that contact occurs more frequently when people are highly similar than dissimilar (e.g., Marsden, 1988; Massen & Koski, 2014; McPherson, Smith-Lovin, & Cook, 2001; Shrum, Cheek Jr., & Hunter, 1988; Yamaguchi, 1990). Specifically, this finding suggests that homophily is pertinent for various types of relationships.

I also found further support for the importance of dividing interpersonal attraction into two distinct factors – abilities and willingness. Specifically, my research shows that people
preferred partners with higher levels of willingness than ability traits. And, in a complimentary fashion, people rated themselves higher on willingness than ability traits. This finding has two key implications. First, it highlights the importance of willingness traits, suggesting that a tendency to share is a key attractive aspect of a potential partner. This provides additional support for prior laboratory research showing that generosity may be used by individuals to enhance their desirability as a partner and outcompete others to access to the most desirable partnerships (e.g., Barclay, 2004; 2016; Barclay & Willer, 2007; Roberts, 1998; Sylwester & Roberts, 2010). Second, these findings suggest that perceptions of oneself are driven, at least in part, by what others deem attractive. Such self-perceptions may be an adaptive way to advertise qualities that will increase one’s chances of forming partnerships that allow for a net fitness gain.

In line with predictions, people preferred increasing levels of willingness traits for friends, roommates, business partners/colleagues, and romantic partners. This finding makes sense given that, for all relationships, the capacity of a potential partner to provide benefits is irrelevant if he/she lacks a willingness to share. Inconsistent with predictions, however, people did not prefer moderate or slightly higher than moderate levels of abilities over much higher levels of abilities for all relationships. Instead, the anticipated preference for above average levels over much higher levels of abilities was only found for friends. This pattern of results indicate that people may specifically seek out friends who are only slightly higher than themselves on ability traits to avoid the rejection or exploitation that might be pertinent from attracting those with much higher abilities than oneself.

Ability preferences for business partners/colleagues, roommates, and romantic partners were not as expected. For roommates and romantic partners, people equally preferred individuals with “slightly higher than moderate” levels of abilities and those with “much higher levels” of
abilities. These findings have two implications. First, people appear to have identical patterns of preferences for traits in roommates and romantic partners. This is slightly surprising given that this pattern was found among a student population, whereby roommates and romantic partners are usually distinct relationship types (i.e., students usually live with roommates and do not live with romantic partners). Such findings would be less surprising with a non-student population because many adults live with their romantic partners, rendering roommates the same as romantic partners. It is possible, however, that student participants conceptualized an “ideal roommate” and “ideal romantic partner” as the same individual because they were thinking in terms of long-term preferences. Thus, it is difficult to ascertain if the similarity in preferences for roommates and romantic partners is a product of student participants thinking of romantic partners as long-term roommates, or if preferences for non-cohabitating romantic partners and roommates are actually similar. Further work may be needed to test this possibility. A second implication of this finding is that people with slightly above average abilities and people with much higher levels of abilities are equally valued as roommates and romantic partners. This is interesting because it suggests that people may be more willing to put up with imbalances in a roommate or romantic relationship. Although potentially costly (e.g., exploitation), there may be benefits to such preferences for a romantic partner: pairing with a romantic partner that has much higher capabilities than oneself may increase one’s fitness by reproducing more genetically fit offspring (e.g., Buss & Schmitt, 1993; Gangestad, Garver-Apgar, & Simpson, 2007). It is unclear if these same benefits explain preferences for roommates because participants conceptualized roommates as cohabitating romantic partners, or if other benefits drive this effect for roommates. Again, this remains a research question for further inquiry.
Lastly, people preferred business partners/colleagues with increasing levels of ability traits. This was the only relationship type whereby participants preferred ability traits that were “higher than almost everyone” equally to those that were “higher than most”. At first glance, these findings suggest that people actually prefer business partners/colleagues with much higher abilities than themselves. But, a potential explanation is that participants may have assumed that relationships with business partners/colleagues are not based on mutual partner choice. Part of this may be due to the provided definition of business partners/colleagues: “a person you would be able to work well with on numerous projects/assignments”. This definition likely prompted students to think of university coursework and course assignments whereby students are usually assigned a work partner or teams to work with. In such scenarios, being randomly paired or teamed up with those with much higher abilities than oneself would be ideal and beneficial for the student. Thus, although people preferred business partners/colleagues with increasingly levels of abilities, it is likely that this preference reflected specific circumstances where mutual partner choice is not available.

4.1. A brief discussion of the psychological mechanisms underlying these relationships

Do these relationship types (friends, roommates, business partners/colleagues, and romantic partners) operate under different and distinct psychological mechanisms? Or, do these relationships simply tap into different aspects of the same psychological mechanism? In this section, I briefly speculate about the underlying mechanism for these relationships.

First off, I would argue that to some extent, partner choice strategies for these four relationships (as well as all other relationships) are similar and operate within the same principles. This is because all of these relationships are merely variations of social selection (i.e., choosing a romantic partner is a specialized version of social selection known as sexual
selection). Thus, it seems plausible that the same mechanism(s) may be triggered in slightly different ways whenever one is making decisions regarding choosing social partners.

In another vein, however, some of these four relationships may be more closely linked than others. Specifically, romantic relationships and friendships are evolutionary relevant relationships that have been a part of human history for several millennia. In such a case, one might assume that a somewhat specialized and separate mechanism for mating and friendships, respectively, would arise. These specialized ‘mating’ and ‘friendship’ psychological mechanisms may include distinct rules regarding the ways in which one should interact with and make decisions regarding potential mates and potential friends. And, such mechanisms may also be differently triggered based on one’s sex: Such logic makes sense given the extensive literature on the differences in parental investment and minimal reproductive investment for males and females. For instance, females tend to treat friends as kin whereas males tend to treat friends as potential mates (e.g., Ackerman et al., 2007; Park & Ackerman, 2011).

But, it is also possible that modules for mating and friendship are not necessarily distinct. Instead, humans may have two distinct mechanisms: one for interactions with kin and one for non-kin. And the ways in which each module (kin or non-kin) is activated for decisions surrounding mates or friends might differ based on one’s sex. Specifically, in making decisions regarding friends, females may activate the same mechanism for processing decisions regarding kin. Males, however, might trigger the same mechanism for processing mating decisions when interacting with friends.

Regardless of which possibility is true – distinct mechanisms for mates and friends vs shared mechanisms for mates and friends – I would argue that the same mechanism is being triggered in slightly different ways for at least three of the tested relationships (i.e., roommates,
business partners/colleagues, and friends). This is because roommates and business partners/colleagues are evolutionary novel relationship types that were irrelevant in ancestral environments. And, given their novelty in evolutionary history, such relationships likely operate under slightly different aspects of the same psychological mechanism used to form decisions regarding cooperation with non-kin.

In summary, it is unclear if domain-general or domain-specific mechanisms underlie these relationships. Although interesting, such line of inquiry was beyond the scope of this chapter. Future research, however, should continue to test predictions that can shed light on the psychological mechanisms underlying various social interactions.

4.2. Applications

Findings from the current research can be used to develop strategies for forming and maintaining strong interpersonal bonds. For example, my findings suggest that displaying willingness traits is a key factor in attracting potential partners for any type of relationship. This means that one can increase his/her desirability as a friend, colleague, and potential romantic partner or roommate by behaving in a generous or kind manner to others. Such a strategy may be particularly effective for individuals who have difficulty forming close bonds (e.g., individuals with autism, low theory of mind), or those who may need to restart their personal social networks (e.g., moving to a new city for school or a new job). In a complimentary fashion, when looking for potential friends, coworkers, or romantic partners, people should pay attention to cues that signal a willingness to share. This information is particularly useful as one may be better off approaching those who exhibit higher levels of kindness. Such kind individuals may be more willing to share benefits with potential relationship partners, and thus allow for better resource exchange within a relationship.
4.3. Conclusion

The present research utilized an evolutionary framework to investigate partner choice and partner attraction for various relationship types. As intended, I was able to replicate several findings about preferences for friends to other evolutionary relevant (i.e., romantic partners) and novel (i.e., roommates, business partners/colleagues) relationships. Specifically, I show that, much like friends, people prefer roommates, business partners/colleagues, and romantic partners with similar but slightly higher levels of willingness and ability traits. Additionally, I was able to show that Vigil’s (2007) findings that people prefer friends with higher willingness than ability traits extends to at least three other relationships. Such results provide evidence that partner choice preferences may be similar regardless of the relationship type. This suggests that although each relationship type may be unique in certain aspects, all relationships share, at least in part, commonalities in being a reliable form of social exchange of benefits. Such a conceptualization of relationships may be useful for better understanding the ways people choose, attract, and maintain partners of all relationship types.
CHAPTER 2

PREFERENCES FOR NETWORK SIZE

CHAPTER 2A

NO EFFECT OF INDIVIDUAL DIFFERENCES IN NEED FOR HELP ON PREFERENCES FOR NETWORK SIZE

Note: This chapter (Chapter 2A) was included in the thesis for posterity. The main predicted effect was not found, but these studies were included to have a record of this research.

1. INTRODUCTION

Human social networks have distinct characteristics pertaining to structure and size (e.g., Hill & Dunbar, 2003; Zhou, Sornette, Hill, & Dunbar, 2005). On average, peoples’ social networks consist of sustained regular contact with a total of 150 individuals (Hill & Dunbar, 2003). These 150 members are categorized into four layers, with the two inner layers being the most active in providing support (Hill & Dunbar, 2003; Roberts, Dunbar, Pollet, & Kuppens, 2009). The innermost layer, the support clique, is comprised of 4-5 individuals (e.g., best friends, kin, intimate partners), and is the source of personal advice, and help during times of distress (Dunbar & Spoors, 1995). The second layer is the sympathy group, which has 12-15 people and constitutes a person’s full circle of friends (Dunbar & Spoors, 1995).

Although these characteristics are true of all social networks, individual differences in network size are considerable. Support cliques can range from 0-14 individuals, while sympathy groups can comprise anywhere between 6 and 20 people (Dunbar & Spoors, 1995; Hill & Dunbar, 2003). One factor that constrains the number of individual friendships we are able to form is the time we have to form such relationships (Dunbar, 2008; Tooby & Cosmides, 1996).
Because we have a finite amount of time, we need to be wise with our investment in social relationships. Time spent with one individual necessarily takes away from time with another, and thus, one must selectively invest in some over others.

To ensure social networks provide maximum net benefits (Noë & Hammerstein, 1994; 1995), people employ various strategies (e.g., Barclay, 2013). One strategy involves assessing the relative payoffs for forming associations that are strong and narrow versus weak and distributed (Barclay 2013; Hill & Dunbar, 2003). There are costs and benefits to each type of social network. Strong bonds are usually only formed with few partners because they are time consuming and demanding to develop and maintain. Research shows that very close relationships have high frequencies of face-to-face and phone contact, and that without such an active effort even the closest of relationships tend to decay over time (Roberts et al., 2009). Although time consuming, strong bonds allow many benefits, such as reliable access to extensive emotional, instrumental, and social support at times of need. In contrast, weak ties can be formed with a higher number of partners because they do not demand as much time and investment (i.e., lower frequency of contact, more superficial contact; Roberts et al., 2009). Wide networks provide access to a greater variety of information, ideas, and experiences (Granovetter, 1973), but may not allow one reliable access to extensive support.

Variation in preferences for social networks has been partially explained by factors such as gender (Dunbar & Spoors, 1995), attractiveness (Reis et al., 1982), SES (McPherson, Smith-Lovin, & Brashears, 2006) and personality (Roberts, Wilson, Fedurek, & Dunbar, 2008). Because help is often provided through social networks, preferred social network size should also be dependent on the help the individual requires. Thus, another key factor that could affect variation in preference for social network size is the amount and type of help that one may need.
Variation in need for help should correspond to preferences for distinct patterns in network size based on two lines of evidence. First, people with larger networks tend to be less emotionally close to and have lower frequency of contact with each member in the network (Roberts & Dunbar, 2011; Roberts et al., 2009). Thus, there is a trade-off between number of individuals and intimacy for each relationship. Second, social support varies depending on the burden imposed on the helper to provide such help (Stewart-Williams, 2007; 2008; Xue, 2013). In particular, some help (i.e., trivial help) can be provided by almost any individual because it does not bear a great cost on the provider (e.g., change for a parking metre). Other forms of help (i.e., costly help), however, require the helper to incur a larger burden (e.g., help during a crisis), and are therefore more likely to be provided by those one has strong bonds with (e.g., family, friends, romantic partners). Together, these findings lead to two predictions:

**Prediction 1.** People who need costly help should prefer smaller networks with strong connections because support that is burdensome for the helper is usually provided by those one has strong bonds with.

**Prediction 2.** People who need trivial help should prefer larger networks with weak connections because such support requires low cost from the helper and could be provided by almost any individual in one’s social network.

1.1. The present research

To test the above predictions, three studies were conducted. These studies employed similar methodology but varied slightly in design and materials. All studies were conducted as online surveys and generally yielded null results.
2. STUDY 1

2.1. Method

2.1.1. Participants

I recruited participants \((n = 249)\) from Amazon Mechanical Turk (AMT). Of the 249 participants, 47.8% identified as female \((n = 119)\) and 51.8% identified as male \((n = 129)\). One participant did not identify their gender. Participants’ ages ranged from 19 to 79 years old; the mean age was 33.6 years with a standard deviation of 10.9 years.

High-quality AMT data was ensured with certain qualifications. Only participants with the following three qualifications completed the study: Participants who (1) resided in the USA; (2) were fluent in English; (3) and, had a 95% approval rate for at least 100 studies completed on AMT. For a 15 minute study, participants were compensated $0.40USD, which is consistent with the standard compensation rate for AMT participants (Paolacci et al., 2010). Participants were only allowed to participate in this study once.

2.1.2. Materials and design

To test predictions, a priming method was used. A priming methodology was employed because, at the time, several previous studies had used a semantic priming method that yielded key results (e.g., Burnham, McCabe, & Smith, 2000; Griskevicius, Cialdini, & Kenrick, 2006; Griskevicius et al., 2007; Rodeheffer, Hill, & Lord, 2012; Sundie et al., 2011). Thus, priming was rendered an appropriate methodology to test predictions. For criticisms of the priming methodology, which might have affected the results, see discussion in 5.1.

Participants first wrote about a time in the past or imagined a time when they could have benefited from help from an individual (the prime). A between-subjects design was implemented, so participants wrote about one vignette in one of five conditions: control, high
benefit from trivial help, low benefit from trivial help, high benefit from costly help, and low benefit from costly help (see Table 1; see Appendix B). Next, participants reported their preference for number of friends offset by level of intimacy. This preference for types of network was assessed using a scale generated by Vigil (2007; see Figure 1). For this scale, higher numbers indicate preferences for broader but weaker networks; whereas lower numbers indicate preferences for smaller but stronger networks (see Figure 1; Appendix B).

Table 1.

Materials used in study 1 to prime need for help.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Items: “Please write about a time in the past (or imagine a time) when you”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>were walking to work</td>
</tr>
<tr>
<td></td>
<td>were reading a book</td>
</tr>
<tr>
<td></td>
<td>were brushing your teeth</td>
</tr>
<tr>
<td>High benefit from trivial help</td>
<td>felt like you would benefit from having someone to ask advice from</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to comfort you when you</td>
</tr>
<tr>
<td></td>
<td>were feeling sad.</td>
</tr>
<tr>
<td>Low benefit from trivial help</td>
<td>felt like you would not benefit from having someone to ask advice from</td>
</tr>
<tr>
<td></td>
<td>felt like you would not benefit from having someone to comfort you when you</td>
</tr>
<tr>
<td></td>
<td>were feeling sad.</td>
</tr>
<tr>
<td>High benefit from costly help</td>
<td>felt like you would benefit from having someone to help you during an illness</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to help you during a crisis</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to help you with everyday living (e.g., household chores, errands)</td>
</tr>
<tr>
<td>Low benefit from costly help</td>
<td>felt like you would not benefit from having someone to help you during an illness</td>
</tr>
<tr>
<td></td>
<td>felt like you would not benefit from having someone to help you during a crisis</td>
</tr>
<tr>
<td></td>
<td>felt like you not would benefit from having someone to help you with everyday living (e.g., household chores, errands)</td>
</tr>
</tbody>
</table>
2.2. Results

A one-way ANOVA unexpectedly revealed no effect of condition on preferences for the trade-off between number of friends and intimacy, $F(4, 240) = 1.41, p = .23$, partial $\eta^2 = .02$ (see Figure 2).

Figure 1. Scale used in study 1 to assess preferences for the trade-off between network size and level of intimacy (Vigil, 2007).

Figure 2. The effect of condition on preferences for the trade-off between network size and level of intimacy for study 1. Error bars represent 95% confidence intervals.
3. STUDY 2

The purpose of study 2 was to test predictions using modified materials and study design with a student sample.

3.1. Methods

3.1.1. Participants

I recruited participants ($n = 202$) from the University of Guelph psychology participant pool. Of the 202 participants, 87.1% identified as female ($n = 176$) and 11.4% identified as male ($n = 23$). Three participants did not identify their gender. Participants’ ages ranged from 17 to 36 years old; the mean age was 18.65 years with a standard deviation of 1.86 years.

3.1.2. Materials and design

Participants were explicitly instructed to write about needing, but not receiving, trivial or costly help. A between-subjects design was used, so participants were in one of three conditions: control, need for trivial help, and need for costly help (see Table 2; see Appendix B). A different measure was used to assess preferences for social network: Participants divided 150 ‘friendship points’ between their 15 friends, in proportion of time spent with each individual (DeScioli & Kurzban, 2009; see Appendix B). The standard deviation of the distribution of points was used as an indicator of preference for the trade-off between intimacy and number of friends. For this scale, those with higher variation in their distributions (i.e., high standard deviation) preferred smaller and tighter networks as they allocated a larger proportion of their ‘friendship points’ to fewer individuals. More equal distributions of points, however, resulted in a lower standard deviation, and indicated a preference for larger and wider networks.
Table 2.

Materials used in study 2 to prime need for help.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Items: “Please write about a time in the past (or imagine a time) when you”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>were walking to work or school</td>
</tr>
<tr>
<td></td>
<td>were reading a book</td>
</tr>
<tr>
<td></td>
<td>were brushing your teeth</td>
</tr>
<tr>
<td>Need for trivial help</td>
<td>needed someone to provide directions to the store</td>
</tr>
<tr>
<td></td>
<td>needed help carrying a box up a flight of stairs</td>
</tr>
<tr>
<td></td>
<td>needed a small amount of change (e.g., for the parking metre)</td>
</tr>
<tr>
<td>Need for costly help</td>
<td>needed someone to drive you to the store</td>
</tr>
<tr>
<td></td>
<td>needed help moving to a new house</td>
</tr>
<tr>
<td></td>
<td>needed to borrow more than $40 (e.g., to cover a restaurant meal)</td>
</tr>
</tbody>
</table>

3.2. Results

A one-way ANOVA showed that a significant main effect of condition was found, $F(2, 199) = 3.96, p = .02$, partial $\eta^2 = .04$ (see Figure 3A). But, post-hoc Tukey HSD analyses revealed that needing costly help ($M = 9.94$, $SD = 5.02$) did not yield preferences that were significantly different from controls ($M = 10.14$, $SD = 5.93$, $p = .98$, Cohen’s $d = .04$). Needing trivial help ($M = 12.32$, $SD = 5.50$), however, led to preferences for marginally smaller and more intimate networks than controls ($M = 10.14$, $SD = 5.93$, $p = .05$, Cohen’s $d = .38$).

Interestingly, these findings were in the opposite direction to predictions. A possible explanation for this could be that memories of needing help triggered memories of receiving help. To determine if this was supported by the data, two independent raters coded responses as either (a) needed but did not receive or (b) needed and received trivial/costly help. Inter-rater agreement was 83%, which was appropriately reliable. Because of the high agreement between coders, I only used data that both raters agreed upon. As expected, a majority of participants wrote about a time they received help ($n_{\text{trivial help}} = 35; n_{\text{costly help}} = 47$), but some wrote about needing help ($n_{\text{trivial help}} = 28; n_{\text{costly help}} = 12$). Analyses were re-run using only participants who
received help. A significant main effect of condition was found, $F (2, 143) = 3.12, p = .02,$ partial $\eta^2 = .04$ (Figure 3B). Tukey post-hoc analyses revealed a similar pattern in differences between conditions as the main analyses. Specifically, receiving costly help ($M = 9.55, SD = 5.01$) did not lead to different preferences than controls ($M = 10.09, SD = 5.32, p = 1.00$, Cohen’s $d = .10$). And, those who received trivial help ($M = 12.49, SD = 5.45$) showed preferences that were marginally different from controls ($M = 10.09, SD = 5.32, p = .06$, Cohen’s $d = .45$)

A.
4. STUDY 3

The purpose of study 3 was twofold. First, this study sought to replicate findings from study 2 by using modified methods. Specifically, participants were asked to think about receiving, instead of needing, trivial or costly help (or control). Second, this study aimed to further explore findings from the previous study. In study 2, receiving trivial help led to marginal preferences for smaller and stronger networks. Such results may be explained in one of two ways. Receiving trivial help could have led people to feel as though their current relationships are not as deep, and thus, they preferred fewer friends with more intimacy. Alternatively, receiving trivial help could have made people feel as though they already have a large wide network, but need deeper friendships, and thus they indicated a preference for fewer but more meaningful relationships. To explore these potential explanations for findings in study 2, additional questions were included in this study.
4.1. Method

4.1.1. Participants

Two hundred and fifty-five participants were recruited from the University of Guelph psychology participant pool. Of the 255 participants, 57.3% identified as female (n = 146) and 42.7% identified as male (n = 109). Participants’ ages ranged from 17 to 43 years old; the mean age was 18.7 years with a standard deviation of 2.82 years.

4.1.2. Materials and design

Participants read vignettes about described individuals receiving trivial or costly help, and were asked to imagine how the described individuals feel (see Appendix B). After reading vignettes, participants were instructed to write about a time in the past when they were in a similar situation. Similar to study 2, a between-subjects design was employed so that participants wrote about one vignette in one of three conditions: control, receiving trivial help, or receiving costly help (Table 3). Vignette and condition type were counterbalanced. For these vignettes, each participant only saw the name that matched their gender (see Table 3). Gender-specific vignettes were used to help participants better imagine such a scenario/time in the past.

Next, participants completed DeScioli and Kurzban’s (2009) modified measure of preference for the trade-off between network size and intimacy (see Appendix B). Similar to Study 2, this measure was used to assess preferences for social network: Participants divided 150 ‘friendship points’ between their 15 friends, in proportion of time spent with each individual (DeScioli & Kurzban, 2009; see Appendix B). The standard deviation of the distribution of points was used as an indicator of preference for the trade-off between intimacy and number of friends. For this scale, those with higher variation in their distributions (i.e., high standard deviation) preferred
smaller and tighter networks as they allocated a larger proportion of their ‘friendship points’ to fewer individuals.

Two items were included as manipulation checks: Participants were asked if they felt they received the help they needed at the time, and if they felt the help they needed was demanding for someone to provide. I included two questions to explain the potential effect of receiving trivial help leading to preferences for larger but less intimate networks. Specifically, participants were asked to report how close they feel to their friends to assess if receiving trivial help leads participants to feel as though their current relationships are less deep. If this explanation is true, I expect those who received trivial help to prefer smaller and stronger networks than those in the control condition and that such effect would be mediated by closeness. Participants also reported how many friends they have. This question assessed if receiving trivial help leads people to feel as though they have many shallow friendships but need more deep friendships. If this explanation is true, I expect those who received trivial help to prefer smaller and stronger networks than the control condition, and that number of friends would mediate this effect. I only planned to analyze data from these two questions if I was able to replicate the effect from study 2, whereby receiving trivial help led to preferences for larger but less strong networks.

Table 3.
Materials used in study 3 to prime need for help.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Vignettes</th>
<th>Items: “Please write about a time when you”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>“Briana/Brian was happy to get a summer job working at subway. She wanted a part-time job close to her house so that she could walk to work every morning, allowing her to enjoy</td>
<td>were walking to work or school</td>
</tr>
</tbody>
</table>
the warm summer weather. She began work at 9am on Monday. She felt excited as she walked to work for her first shift.”

“Andrea/ Andrew enjoyed reading fiction. Her favourite was the Harry Potter series. But, she also enjoyed the Song of Ice and Fire series. These days, Heather usually reads her textbooks for the courses she is taking at university. Last night, before bed, she read a chapter for her introduction to psychology course.”

“Marta/ Marty woke up at 7am every Thursday to make sure she would not be late for her 8am Calculus class. She usually had cereal for breakfast and enjoys reading the news on her iphone while she ate. After breakfast, she showers, gets dressed and brushes her teeth before catching the bus to university.”

<table>
<thead>
<tr>
<th>Trivial Help</th>
<th>“Erica/ Eric just moved to a new city for university. She was on her way to the store when her phone battery died. She no longer had GPS and needed someone to provide her directions to the store. She looked around and asked a friend walking towards her. Erica was grateful to receive the help she needed.”</th>
<th>needed someone to provide directions to somewhere close by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Michelle/ Michael was moving to a new house. Some friends had helped with the move earlier in the day and she was almost done. But, Michelle’s friends had to leave and now she needed help carrying a large box up a flight of stairs. Michelle asked a friend for help. She was grateful to receive the help she needed.”</td>
<td>needed help carrying a box up a flight of stairs</td>
</tr>
<tr>
<td></td>
<td>“Christy/ Chris was running late for an appointment. Luckily, there was a parking spot close to the building. After parking the vehicle, Christy started looking for change for the parking metre. She didn’t have any. Christy saw a friend close by and asked her for spare change for parking. She was grateful to receive the help she needed.”</td>
<td>needed a small amount of change (e.g., for the parking metre)</td>
</tr>
</tbody>
</table>
"Jane/ James just moved to a new city for university. She was feeling sick and needed someone to drive her to the walk-in clinic. Jane called her friend to ask for help. Her friend drove her and waited several hours at the clinic with her. Jane was grateful to receive the help she needed. Please imagine being in a similar situation to what was described in the passage above. Imagine how the person described feels."

"Louise/ Louis was moving to a new house in two weeks. She already booked a U-Haul for the move but needed someone to help move furniture. Louise called her friend to ask for help with the move. It took Louise and her friend the entire afternoon to move. Louise was grateful to receive the help she needed."

"Patricia/ Patrick was running late for a dinner. After parking, she ran into the restaurant to meet her friends. She ordered a fancy meal and a beverage. But when the bill arrived, she realized she forgot her wallet. Patricia had to borrow $40 from her friend. She was grateful to receive the help she needed."

---

4.2. Results

I conducted a t-test to run analyses for the manipulation check. Results from the manipulation check revealed that costly help ($M = 5.36, SD = 2.76$) was deemed more demanding to provide than trivial help ($M = 3.58, SD = 2.39$), $t(174) = -4.71$, $p < .001$ Cohen’s $d = .69$. Participants in the costly help condition also reported receiving more costly help ($M = 7.43, SD = 2.41$) than controls ($M = 4.89, SD = 2.41$), $t(174) = 6.98$, $p < .001$, Cohen’s $d = 1.05$. And, participants in the trivial help condition reported receiving more trivial help ($M = 8.12, SD = 1.80$) than controls ($M = 4.89, SD = 2.41$), $t(174) = 10.64$, $p < .001$, Cohen’s $d = 1.52$. Thus, manipulations of costliness of help and receiving help worked.
A one-way ANOVA was conducted to assess the main predictions. Unexpectedly, there was no main effect of condition, $F(2, 249) = 1.69, p = .24$, partial $\eta^2 = .01$ (see Figure 4). Because I failed to replicate the effect of receiving trivial help leading to preferences for larger but weaker networks, I did not conduct further tests regarding measures of closeness to friends and number of friends.

Figure 4. No effect of receiving help on preferences for the trade-off between network size and level of intimacy for study 3. Error bars represent 95% confidence intervals.

5. GENERAL DISCUSSION

Three studies failed to yield an effect of need for help on preferences for the trade-off between network size and level of intimacy. Since this effect was tested three times and failed to yield intended results, further attempts to explore this effect were not pursued.

5.1. Why is there no effect of need for help on preferences for the trade-off between network size and intimacy?

There are several potential explanations for the null effects found. One possibility is that priming a need for help did not produce a large enough effect to influence preferences (Newall &
Shanks, 2014; Shanks et al., 2015). This lack of salience might be because primes are too fleeting to impact preferences that have been set in place through a lifetime of past experiences and interactions with others (Shanks et al., 2015). If this is true, then the priming method may produce superficial or temporary effects on preferences and/or behaviour that may not accurately represent human social behaviour (Shanks et al., 2015). This has interesting implications for research findings in disciplines that rely heavily on the priming methodology, such as social psychology and social cognition.

A related explanation is that preferences for the trade-off between number of friends and intimacy are not plastic. That is, critical and sensitive time periods in one’s life may play a defining role in setting these preferences, which are then not easily changed throughout one’s lifetime. This dynamic change in relationship could be especially true because people tend to err on the side of receiving costly help when they need it, as opposed to trivial help. Not receiving costly help at a time of dire need may have severe fitness costs, whereas forgoing trivial help, by definition, would likely result in less extreme fitness consequences. Accordingly, people may be more prone to developing strong bonds with few individuals to ensure they receive help at harsh times.

A third possibility of the null effects is that friendship was not conceptualized using the correct functional framework. Traditionally, evolutionary-minded researchers have explained the evolution of friendship as a form of repeated reciprocal interactions, based on mutual forms of exchange (Trivers, 1971). But, some findings has been inconsistent with this view (Clark, 1984; Silk, 2003; Tooby & Cosmides, 1996), leading other researchers to assert that friendship may be less about exchange and more about coalitions and alliance formation (DeScioli & Kurzban, 2009). That is, mechanisms designed for friendship formation and maintenance may have, in
part, been selected for to ensure one has adequate support in times of group conflict. If this theory is accurate, then the null effects found may be due to the stimuli used. Specifically, the stimuli used tapped into exchange notions of friendship, whereby described individuals were asking for trivial or costly help at times of need. Stimuli that focused on friendships as alliance formation (e.g., need help during a physical fight), however, may have yielded different findings. This remains a testable possibility for future studies.

5.2. Alternative methods for future studies

Instead of priming participants to need help, future studies could employ different methods to assess the effect of need for help on preferences for network size. For example, participants could complete social exclusion tasks, such as cyberball (a virtual ball throwing game where two individuals exclude the participant in passing the ball; Williams, Cheung, & Choi, 2000), to induce loneliness and complete measures for preferences for the trade-off between network size and level of intimacy. Alternatively, future research could include populations that generally need more emotional and material support from others. For instance, researchers could compare the preference for the trade-off between network size and level of intimacy of clinically depressed and non-depressed individuals. Because clinically depressed individuals would generally have higher needs from their social network than non-depressed individuals, I would expect depressed individuals to prefer smaller and stronger networks than non-depressed individuals.
CHAPTER 2B
PREFERENCES FOR NETWORK SIZE VARY DEPENDING ON TYPE OF SOCIAL INTERACTION

1. INTRODUCTION

Social networks comprise of several types of relationships, including relatives, friends, colleagues, and neighbours (Hill & Dunbar, 2003). Despite the variety of relationship types, much work on personal relationships has focused exclusively on distinguishing kin and non-kin relations (e.g., Ackerman, Kenrick, & Schaller, 2007; Allen-Arave, Gurven, & Hill, 2008; Pollet, 2007; Roberts & Dunbar, 2010; Salmon & Daly, 1996; Stewart-Williams, 2007; Xue, 2013). And, little research has examined other key relationships, such as colleagues, within social networks (reviewed in Bridge & Baxter, 1992). Thus, in this chapter, I sought to add to the literature by conducting an exploratory analysis about preferences for the trade-off between network size and level of intimacy for two types of non-kin relations, friends and colleagues.

Many of us know that friends and colleagues are not mutually exclusive relationships: coworkers can become friends (and often do), and friends can share the same workplace (Berman, West, & Richter Jr., 2002; Sais, 2005; Sais & Cahill, 1998). But, on average, most people view friends and coworkers as distinct relationship types that differ in at least two fundamental ways (Sais & Cahill, 1998). First, friendships are voluntary as people are often able to choose who they befriend. This, of course, is not typical for coworkers. Second, interactions among coworkers generally differ from those between friends. While friends tend to assort on various traits (e.g., playing on the same intramural volleyball team, going through parenthood at the same time, attending the same high school, living on the same street), coworkers are
primarily linked through a shared knowledge or skillset relevant to a particular profession or workplace.

People have predictable patterns of giving (or receiving) social support based on the different characteristics of friends and colleagues. Not surprisingly, people tend to rely on work colleagues for work-related problems and issues (Ray, 1987). But, when dealing with personal issues, friends are more commonly sought out for emotional support (Hackman, Danvers, & Hruschka, 2015; Kruger, 2003; Stewart-Williams, 2007; 2008; Xue, 2013). All of this makes sense given the specific roles of friends and colleagues, and the fact that people often deem coworkers acquaintances instead of friends (Sais & Cahill, 1998; Goldenberg, Libai, & Muller, 2001).

The diverging roles that friends and colleagues play in a person’s life could also translate to relationship-specific preferences for the trade-off between network size and level of intimacy. This logic is mostly derived from research showing that broader networks can be highly beneficial within the workplace. Larger networks of colleagues better expose people to novel information, including diverse information about jobs, which can significantly increase an individual’s chances of gaining a well-suited high-paying job (Granovetter, 1973). Furthermore, having more colleagues creates new opportunities for people to collaborate on various projects and potentially move up the corporate ladder (e.g., Hansen, 1999; Levin & Cross, 2004; Lin, Ensel, & Vaughn, 1981). Thus, larger networks are exceedingly valuable in a workplace setting.

In a personal setting, however, broader networks may not offer the same perks. While larger social circles expose one to more social opportunities, experiences, and information (Granovetter, 1973), having many friends generally leaves less time for each individual relationship (Dunbar, 2008; Roberts, 2010; Roberts, Dubar, Pollet, & Kuppens, 2009; Zhou,
Sornette, Hill, & Dunbar, 2005; Wellman & Frank, 2001). This constraint is problematic because time is crucial in relationship formation and the creation, and maintenance, of strong emotional bonds (e.g., Dunbar, 2008; Roberts et al., 2009). High levels of intimacy are time-consuming but allow for reliable extensive support during times of need. Because people often turn to their personal networks at times of need, it makes sense that most people, on average, would gain from maintaining smaller networks to ensure reliable support. Accordingly, smaller networks may be particularly valuable in a personal setting.

Despite the potential benefits of relationship-specific network size, research to date has yet to explore people’s preferences for network size for colleagues and friends. As such, I sought to explore preferences for the trade-off between network size and level of intimacy by testing the following prediction:

*Prediction.* People should prefer larger networks of colleagues than friends because more colleagues offers opportunities to climb the corporate ladder, but fewer friends allow for reliable support at times of need.

1.1. The present research

This chapter consists of three exploratory studies to test the above prediction. All three studies utilized a within-subjects design with the same materials. Studies were conducted using online surveys.
2. STUDY 1

2.1. Method

2.1.1. Participants

I recruited 297 participants from the University of Guelph psychology participant pool. Of the 297 participants, 85.5% identified as female \((n = 254)\) and 13.4% identified as male \((n = 40)\). Four participants did not identify their gender. Participants’ ages ranged from 17 to 43 years old; the mean age was 18.64 years with a standard deviation of 2.16 years.

2.1.2. Materials

To assess preferences for the trade-off between network size and level of intimacy, participants completed a scale created by Vigil (2007; see Chapter 2A, Figure 1; Appendix B). For this scale, each letter (i.e., A-J) was converted to a number for the analysis. A preference for the lowest number of friends with highest level of intimacy (i.e., “A”) was recorded as 1, whereas a preference for the highest number of friends with the lowest level of intimacy (i.e., “J”) was recorded as 10. Participants completed this scale twice, once with preferences for friends in mind and another for preferences for colleagues in mind. Friends were defined as “people you hang out with, talk to about personal issues, do activities with, and/or attend social events with”, whereas colleagues were defined as “people you work with at your job or career, such as your boss and individuals within your workplace”. Participants were also asked if they were currently in the workforce and reported their current occupation.

Unlike Vigil (2007), I did not provide a definition of intimacy (as emotional support) to participants. I did, however, clarify that, for the sake of this study, participants should define friends and colleagues not just by the definitions provided but also by a lack of sexual or romantic relationship (see Appendix B). Thus, although participants were not directly given a
definition of intimacy as emotional support, participants arguably interpreted intimacy in such a manner since they were explicitly instructed to rule out sexual or romantic intimacy.

![Figure 1. Scale used to assess preferences for the trade-off between network size and level of intimacy (Vigil, 2007).](image)

2.2. Results

To examine preferences for the trade-off between network size and level of intimacy for friends and colleagues, I used a two-way ANOVA with gender as the between-subjects variable and relationship type as the within-subjects variable. Gender was included in the analysis because this study was exploratory, and thus, even though no a priori predictions regarding gender were put forth, it was important to assess if gender differences for this effect were possible. As expected, there was a main effect of relationship type illustrating that people preferred a larger, but less intimate, social network of colleagues ($M = 5.54, SE = .12$) than friends ($M = 3.99, SE = .10$), $F(1, 291) = 41.03, p < .001$, partial $\eta^2 = .12$. I did not find a main
effect of gender \( (F(2, 291) = 1.13, p = .29, \text{ partial } \eta^2 = .00) \) or an interaction between gender and relationship type \( (F(2, 291) = .08, p = .78, \text{ partial } \eta^2 = .00) \).

Preferences for a larger but less intimate network of colleagues \( (M = 5.85, SE = .23) \) than friends \( (M = 3.79, SE = .15) \) held when the analysis was re-run to only include participants currently in the workforce, \( F(1, 94) = 34.90, p < .001, \text{ partial } \eta^2 = .27 \). Again, no main effect of gender \( (F(2, 94) = 2.64, p = .11, \text{ partial } \eta^2 = .03) \) or interaction with gender was found \( (F(2, 94) = .01, p = .91, \text{ partial } \eta^2 = .00) \).

3. STUDY 2

Because study 1 was exploratory, the purpose of study 2 was to replicate findings.

3.1. Method

3.1.1. Participants

Participants \( (n = 282) \) were recruited from the University of Guelph psychology participant pool. Of the 282 participants, 53% identified as female \( (n = 150) \) and 47% identified as male \( (n = 133) \). Participants’ ages ranged from 17 to 43 years old; the mean age was 18.64 years with a standard deviation of 2.16 years.

3.1.2. Materials

The same materials and methods used in study 1 were employed in study 2.

3.2. Results

To examine preferences, a two-way ANOVA with gender \( (2) \) as the between-subjects variable and relationship type \( (2) \) as the within-subjects variable was conducted. I found a main effect of relationship type with people preferring a larger and less strong network of colleagues \( (M = 5.39, SE = .13) \) than friends \( (M = 3.81, SE = .09), F(1, 280) = 119.02, p < .001, \text{ partial } \eta^2 = \).
Again, gender was included in the analysis because this study was exploratory. No main effect of gender \( (F(2, 280) = 1.27, p = .26, \text{partial } \eta^2 = .00) \) or interaction between gender and relationship type was found \( (F(2, 280) = .17, p = .68, \text{partial } \eta^2 = .00) \).

Preferences for larger but less intimate networks of colleagues \( (M = 5.33, SE = .22) \) than friends \( (M = 4.03, SE = .19) \) was also observed for participants currently in the workforce, \( F(1, 88) = 24.46, p < .000, \text{partial } \eta^2 = .22 \). And, no main effect of gender \( (F(2, 88) = .39, p = .53, \text{partial } \eta^2 = .00) \) or interaction with gender was found \( (F(2, 88) = 1.37, p = .25, \text{partial } \eta^2 = .00) \).

4. STUDY 3

The purpose of study 3 was to replicate findings from the previous studies using a non-student population.

4.1. Method

4.1.1. Participants

I recruited participants \( (n = 298) \) from a crowdsourcing site, Crowdflower. Crowdflower is a similar crowdsourcing site to AMT with one exception: Crowdflower provides services for researchers residing in countries outside the US. Of the 298 participants, 59.1\% identified as female \( (n = 176) \) and 40.3\% identified as male \( (n = 120) \). Two participants did not report their sex. Participants’ ages ranged from 18 to 80 years old; the mean age was 36.4 years with a standard deviation of 13.4 years.

Similar to AMT, Crowdflower offers researchers restrictions to ensure high-quality data. Only participants living in USA and those were fluent in English were included. The ‘maximum judgement per contributor’ was set to 1, so that each participant could only complete the survey once. Level settings were set to level 3 (out of a possible 1, 2, or 3), to ensure only well-
performing participants were included. Participants were paid $0.20/USD for a 5 minute study (based on other crowdsourcing rates, Paolonni et al., 2010).

4.1.2. Materials

Study 3 used the same materials and methods as those presented in in the two previous studies.

4.2. Results

To assess predictions, a two-way ANOVA with gender (2) as the between-subjects variable and relationship type (2) as the within-subjects variable was conducted. Replicating previous findings, I found a main effect of relationship type with people preferring a larger and less intimate network of colleagues ($M_{col} = 4.84, SE = .13$) than friends ($M_{fri} = 3.58, SE = .10$), $F(1, 295) = 12.92, p < .001$, partial $\eta^2 = .04$. I included gender in the analysis to ensure sex differences were not present for this effect. I did not find a main effect of gender ($F(2, 295) = 2.13, p = .12$, partial $\eta^2 = .01$) or interaction between gender and relationship type ($F(2, 295) = 1.84, p = .16$, partial $\eta^2 = .01$).

These preferences were observed for participants currently in the workforce, $M_{col} = 4.95, SE = .16; M_{fri} = 3.66, SE = .13; F(1, 163) = 58.05, p < .001$, partial $\eta^2 = .26$. Again, no main effect of gender ($F(2, 163) = .82, p = .44$, partial $\eta^2 = .01$) or interaction with gender was found ($F(2, 88) = 1.15, p = .32$, partial $\eta^2 = .01$).

5. GENERAL DISCUSSION

The aim of the current research was to examine people’s preferences for the trade-off between network size and intimacy level for two relationship types, friends and colleagues. As expected, findings from three studies consistently showed that people preferred larger and less
intimate networks of colleagues than friends. This pattern of findings was observed for a student as well as non-student population. And, this effect was found regardless of whether or not one was presently in the workforce.

Results from this research are important for two main reasons. First, to my knowledge, this is the first empirical investigation of variation in preferences for the trade-off between network size and level of intimacy based on the type of social interaction. Empirically examining untested but seemingly common knowledge, such as people’s preferences for more colleagues than friends, is crucial to ensure that such phenomena actually exist in the real world (reviewed by Richard, Bond Jr., & Stokes-Zoota, 2001). Second, this research opens up several avenues for further work that can broaden our understanding of social relationships.

An immediate next step in this line of inquiry is an investigation of peoples’ motivations behind relationship-specific preferences for network size. Specifically, my study did not directly examine if people preferred larger but less intimate networks of colleagues as a means to gain status-building opportunities. Future work may investigate this issue by asking participants to report motivations for preferences or examining potential differences in preferences for subgroups of individuals that might be differentially driven by status. For example, those earlier in their careers might be more motivated than those later on in their careers to have larger but less intimate networks within the workplace because doing so provides a good platform to build connections, broaden one’s skill set, and climb the corporate ladder. It is also possible that ambition is a key mediating factor that explains preference for larger networks within the workplace: more ambitious individuals may be more status driven and thus might prefer larger networks of colleagues to gain opportunities to increase their status. These are just two possibilities to further explore why these preferences might exist.
More generally, findings from my research suggest that people might have domain-specific (e.g., within the workplace, personal life, neighbourhood, family) variation in interpersonal relations. That is, preferences for interpersonal characteristics (e.g., frequency of communication, emotional intensity, network size) might be dependent on the type of social interaction or relationship. An initial step in exploring this issue is to examine if relationship-specific preferences for the trade-off between network size and level of intimacy exist for other relationship types such as neighbours or family members.

If relationship-specific preferences do exist more widely, as my research suggests, it is also possible that perceptions of the social environment might differ based on the type of social interaction. Specifically, people’s perceptions of ease of meeting new individuals, forming new relationships, and/or switching social groups (i.e., relational mobility: Falk, Heine, Yuki, & Takemura, 2009; Schug, Yuki, Horikawa, & Takemura, 2009; Yuki et al., 2007) may vary based on whether one is thinking about her workplace, neighbourhood, or personal life. This line of inquiry raises several possible research questions. For example, does ease of meeting new friends necessarily translate to ease of meeting and socializing with many colleagues? Are perceptions of opportunities to form friendships similar to perceptions of opportunities to form romantic partnerships? These questions have implications for a better understanding of social relationships and should be attended to by further research in the field.

A potential limitation with this research is that people generally have more control over who they interact with in their personal life than in the workplace. Thus, friend network size is more under one’s control than colleague network size. This could affect our interpretation of the findings from this chapter. Specifically, people may simply prefer larger but weaker networks of colleagues than friends because they might never have had the opportunity to experience work in
a small company, which could foster preferences for smaller and more intimate networks. One way to ascertain if this issue indeed affects preferences for the trade-off between networks size and level of intimacy for friends and colleagues is to conduct follow-up research. Further studies could explore if such preferences are observed among individuals who have only worked in small companies or have had some work experience in smaller organizations, and compare preferences to individuals who have only (or predominantly) experienced larger work environments. For now, however, I would argue that even though people do not have as much control in the workplace as they do in their personal life, people still have some degree of autonomy in the workplace (e.g., people are able to choose who they befriend in the workplace; Sais, 2005; Sais & Cahill, 1998). And, given that this research was an exploratory first step at investigating potential relationship-specific preferences for network size, my findings provide researchers with a good initial point to further explore what is still left unknown about this topic.

Another potential confound regarding this research is that people tend to spend more time at work among non-kin than they do outside of the workplace. Again, this could affect the interpretation of network size preferences. Specifically, it is possible that people prefer broader but weaker networks within the workplace because this allows them to meet many individuals and potentially gain close friendships within the workplace. As such, a preference for broader but less intimate networks of colleagues could simply be a by-product of people trying to expand their personal networks by adding close friends that they met at work. This possible interpretation of the results should be further explored in future studies.

5.1. Applications

Since my results show that people consistently prefer larger but less intimate networks of colleagues, having such a preferred network within the workplace might have implications for
employee happiness. Accordingly, a possible application of my research is that people might be happier in the workplace if they are given more opportunities to meet and work with others within the profession or organization. Employee happiness and well-being is a hot topic within organizations and academics in the field of organizational psychology (e.g., Fisher, 2010; Grant, Christianson, & Price, 2007). In fact, many leaders and managers believe that employee happiness increases work productivity (Fisher, 2003) and are willing to allocate substantial resources to this cause (Hartwell et al., 1996). As such, my research has the potential for real-life recommendations for organizations, or at the very least, opens up further research avenues into the possible link between employee happiness and opportunities to grow one’s social network within the workplace. It is possible that organizations hoping to increase employee well-being and happiness could consider hosting regular socials and networking opportunities for employees to broaden their networks within the workplace. Additionally, leaders, managers, and supervisors could also foster larger networks by encouraging employees not only to work in groups, but in groups comprising of new members, which ultimately may increase employee happiness.

5.2. Conclusion

In conclusion, the current work is the first empirical research to examine relationship dependent preferences for the trade-off between network size and level of intimacy. Much research in this area has yet to be investigated. I hope that my research will foster further research that has real-life implications for the way we interact with others and how we form and maintain healthy relationships.
CHAPTER 3
INVESTMENT IN KIN AND NON-KIN: THE ROLE OF STATUS AND COST OF HELP

1. INTRODUCTION

Why do some individuals receive more help than others? A biological markets perspective suggests that the costs of help are investments strategically chosen to maximize inclusive fitness benefits to the helper (Noë & Hammerstein, 1994; 1995). Inclusive fitness can be maximized by propagating the individual’s survival and reproduction (i.e., direct fitness) or the survival and reproduction of genetic relatives (i.e., indirect fitness; Hamilton, 1964). Accordingly, helpers can increase inclusive fitness by ensuring that the fitness costs of help are discounted by any fitness benefits repaid to themselves (reciprocal altruism: Trivers, 1971) or genetic kin (kin selection: Hamilton, 1964). This logic suggests two patterns of expected helping. First, help is expected to be preferentially directed towards those who are likely to reciprocate, such as friends, and those who increase one’s indirect fitness, such as genetic family members. Second, kin are expected to typically receive disproportionately more help than non-kin because genetic relatives can repay help through direct and indirect fitness whereas friends can only offer direct fitness benefits.

Consistent with this logic, people, on average, receive more help from kin than non-kin (e.g., Burnstein, Crandall, & Kitayama, 1994; Cialdini, Brown, & Lewis, 1997; Essock-Vitale & McGuire, 1985; Hogan & Eggebeen, 1995; Ivey, 2000; Kruger, 2003; Mateo, 2015; Shavit, Fischer, & Koresh, 1994; Stewart-Williams, 2007; 2008; Webster, 2003). Not surprisingly, friends are a category of non-kin that are exceptions to this rule. In fact, friends gain similar levels of help to, and at times even more help than, kin (Kruger, 2003; Stewart-Williams, 2007; 2008; Xue, 2013).
One factor that affects the proportion of help given to kin and non-kin is the cost associated with providing help. Studies show that when the cost of help is low, friends tend to gain more help than family members (Stewart-Williams, 2007; 2008; Xue, 2013). But, as the cost of help increases, kin receive a disproportionally larger amount of help than non-kin (Burnstein et al., 1994; Stewart-Williams, 2007; 2008; Xue, 2013). Why do we give more help to (and receive more help from) kin as the cost of help increases? According to researchers, the answer to this question lies in the uncertainty of return (e.g., Stewart-Williams, 2007; 2008).

When one helps non-kin, it is never guaranteed that such help will be repaid. And, the greater the costs of help, the greater the net direct fitness cost if there is no return benefit for the helper. This uncertainty of return leads people to be more sensitive to the costs of help. Or, framed differently, people should be less sensitive to the costs of providing help when there is certainty of repayment. Such certainty of repayment only occurs when help is directed at kin: Even when helpers do not receive direct benefits, helping genetic relatives provides certainty of returns in the form of kin selection. And, the indirect benefits one receives from helping kin offset the fitness costs for the helpful individual. Thus, because helping kin guarantees helpers a return, at least in the form of indirect benefits, whereas helping non-kin does not, it is expected that people will invest in kin and non-kin differentially depending on the costs of help. This rationale leads to the first goal of the current research. I will replicate previous findings regarding the effect cost of help might have on help among kin and non-kin. Specifically, my first prediction is as follows:

*Prediction 1.* Costlier help should be disproportionately directed towards kin over non-kin because kin offer helpers certainty of return for any fitness costs incurred in providing help.
Another potential factor that affects investment in kin and non-kin is status. Status, which is related to constructs such as socioeconomic status and social status, can be defined as an individual’s relative power to impact group decisions surrounding the distribution and utilization of important resources (reviewed in Cheng, Tracy, & Henrich, 2010). One’s status relative to the group has been shown to allow better access to precious resources such as food, land, and cooperative, as well as reproductive, partners (reviewed in Cheng et al., 2010; also see Kafashan, Sparks, Griskevicius, & Barclay, 2014). Having preferential access to valuable resources allows one to bear a lower fitness cost for providing benefits to others. To elaborate on this point, imagine two individuals, one of high status and the other of lower status, trying to provide X amount of benefits. The high status individual shares a smaller portion of her total resources than the lower status individual does to provide the same amount of benefits, thus paying a lower fitness cost. This lower fitness cost of providing benefits inevitable results in a greater ability and/or willingness of higher status individuals to confer benefits upon others (Barclay & Reeve, 2012; Diekmann, 1993; Silk, Alberts, & Altmann, 2004; also see Kafashan et al., 2014 for a review).

Because status changes the costs and benefits of helping, investment in kin and non-kin may be dependent on the status of the recipient. Specifically, people should be more motivated to help those who have greater ability to confer direct benefits because doing so not only (a) increases the likelihood of repayment but also (b) allows for the possibility of repayment to be in the form of more or higher quality benefits. This rationale leads to the expectation that status should affect both kin and non-kin relations. Indeed, previous research has shown that status affects helping among non-kin, specifically whereby higher status individuals help lower status individuals (e.g., Fiddick & Cummins, 2007; Fiddick, Cummins, Janicki, & Erlich, 2013). But,
to date, I am not aware of research that has (a) examined the impact of status on helping among kin, or (b) compared the effects of status on helping kin vs. non-kin.

With that being said, status should be a stronger driving force for investment in non-kin relative to kin. This is because increased status allows one to potentially bestow higher quality, or more, direct (but not indirect) fitness benefits on helpers. And since non-kin can only offer direct benefits, the status of recipients is more important in non-kin relations. This is not the case with kin because regardless of status, only kin can offer indirect fitness returns for helpers. Accordingly, this logic leads to two novel predictions:

**Prediction 2a.** People should invest more in kin and non-kin of higher status than themselves because status allows better access to resources, thus motivating individuals to invest in partners who have the ability to confer greater benefits.

**Prediction 2b.** Status should be a stronger motivating force for help among non-kin because status increases the potential gains from direct fitness benefits, but not from indirect fitness benefits.

Investment in kin and non-kin should also change depending on the quality and quantity of the total benefits (direct as well as indirect benefits) exchanged within partnerships. Specifically, if direct benefits offered by non-kin outweigh the combined indirect and direct fitness benefits offered by kin, then people should invest more heavily in non-kin to maximize net benefits gained. The opposite pattern should be true for those with kin offering much higher overall benefits relative to non-kin.

Because status is one factor that heavily affects one’s ability to provide better direct benefits (reviewed in Cheng, Tracy, & Henrich, 2010; also see Kafashan et al., 2014), the status
of kin and non-kin may be a determining factor that leads to differential investment in non-kin over kin, or vice versa. As such, people should invest less in kin that are of lower status than non-kin. But, people should invest more in kin that are of higher status than friends. Thus, together, this leads to my third novel prediction:

*Prediction 3.* If benefits from partnerships with non-kin exceed the benefits provided by kin (indirect as well as direct fitness benefits), people should invest more heavily in partnerships that bring the most net benefits.

1.1. The present research

The present research consisted of two studies to investigate the role of status and cost of help on investment in kin and non-kin. Specifically, this study sought to (a) replicate findings that show costlier help is directed at kin over non-kin, and (b) test novel predictions regarding the impact of status differences on helping behaviour among kin and compare such status effects to helping among non-kin. The first study tested all three predictions and had a within-subjects design, whereby participants reported helping behaviour with kin and non-kin. Although a within-subjects design allowed for the examination of the third prediction (i.e., investment in siblings vs. friends), there were potential limitations with this design. Specifically, a within-subjects design might have fostered carry-over effects whereby participants attempt to keep ratings for kin and non-kin consistent. Such a design could also foster demand effects whereby participants accentuate differences for help between kin and non-kin. It is difficult to ascertain which of these problematic issues (or both) could affect the data. To combat these potential limitations, the second study used a between-subjects design to replicate findings for the first two predictions (prediction 3 could not be tested with a between-subjects design as it required examining one’s investment in kin over non-kin). A between-subjects design, however, also had
a potential limitation in that participants in each condition (i.e., friend vs. sibling) could be fundamentally different as the design could have selected individuals without siblings for the friend condition (i.e., participants were recruited to specifically complete a ‘sibling study’ or a ‘friend study’). Given these issues, both the within-subjects and a between-subjects design had specific flaws for this research. Thus, if results from both studies converge, conclusions can be drawn about the data despite the problematic issues with each design.

2. STUDY 1

Study 1 served three purposes. First, it examined if kin gained disproportionately more help as the cost of help increased. Second, it assessed if kin and non-kin of high status gained more help relative to lower status individuals. And third, it investigated if people invested more in non-kin relations if such partnerships yield more benefits than partnerships with kin.

2.1. Method

2.1.1. Participants

A total of 410 participants from U.S.A were recruited on a crowdsourcing site, Amazon Mechanical Turk (AMT). Of the 410 participants, 42.2% identified as female ($n = 173$) and 56.3% identified as male ($n = 231$). Six participants did not identify their gender. Participants’ ages ranged from 18 to 70 years old; the mean age was 31.9 years with a standard deviation of 10.9 years.

Only participants who met the following qualifications were included: Participants who (1) resided in the USA, (2) were fluent in English, and (3) had a 95% approval rate for at least 100 studies completed on AMT. In line with the standard compensation rate for AMT participants ($1.40 USD/hour: Paolacci et al., 2010), participants received $0.50 USD for the 15-
20 minute study. Participants were only allowed to complete questions once; also, those who participated in this study were barred from participating in Study 2 of this chapter.

2.1.2. Materials and design

Study 1 was a within-subjects design. Thus, participants were specifically recruited on the basis that they had at least one same-sex sibling and one same-sex close friend (see Appendix C). Same-sex dyads were used to control for potential confounds regarding the relationship between helping behaviour and the sex of the target individual (see Bickman, 1973; Gruder & Cook, 1971). Participants were given explicit instructions to answer questions with only one individual in mind (i.e., one same-sex friend and one same-sex sibling; see Appendix C). Thus, the data collected is based on helping behaviours between the participant and one other individual. The entire study was conducted as an online survey.

2.1.2.1. Measures of cost of help

Participants were asked to rate how much help they give and receive from kin (siblings) and non-kin (close friends). Help items were divided into three categories: Low-cost help (i.e., emotional support; e.g., personal advice) that consisted of items pertaining to emotional support items, medium-cost help (e.g., help during illness) that consisted of items pertaining to instrumental support, and high-cost help (e.g., donating an organ; Stewart-Williams, 2007; 2008) that consisted of items pertaining to life-threatening forms of help. Using a nine-point scale (i.e., 1: never to 9: often), participants reported how regularly they provided and received low-cost and medium-cost help from kin (siblings) and non-kin (friends) in the last three months. Because of the rarity of high-cost help, participants reported willingness to provide and receive high-cost help from the target (9pt scale: not at all willing to extremely willing). This categorization and conceptualization of cost of help was a replication of methods used by Stewart-Williams (2007;
2008) and Xue (2013). This conceptualization of cost of help items was used because it most adequately allowed us to test predictions related to fitness costs: Items for low-cost help require helpers to bear minimum fitness costs to provide such help (e.g., time and talking), items for medium-cost help require helpers to bear slightly higher fitness costs (i.e., more than just time and talking), and items for high-cost help require helpers to bear much higher fitness costs (i.e., potentially life-threatening).

I chose to use scales for low- and medium-cost help (i.e., actual engagement of such help) that were different from the scale used for high-cost help (i.e., willingness to engage in high-cost help) for two main reasons. First, when possible, it is important to use measures of actual behaviour, instead of measures of hypothetical behaviour. This is because the study of hypothetical behaviours is subject to more methodological concerns, such as demands effects, than measures of actual behaviour (e.g., Hertwig & Ortmann, 2001). The use of different scales, however, meant that I was unable to directly compare raw scores for low-cost or medium-cost help with high-cost help. Raw scores, however, are not of particular importance. Instead, comparing the scores for kin with the scores for non-kin is more relevant in terms of testing my predictions, and thus, this rationale led me to use different scales for low- and medium-cost help vs high-cost help.

2.1.2.2. Measures of socioeconomic status

Two measures of socioeconomic status were used. Using a seven-point scale (i.e., 1: less than high school to 7: Doctoral degree [PhD, MD, JD, etc.]), participants reported education level for themselves as well as their kin and non-kin. Participants also reported the current or longest held occupation for themselves and targets. Occupations were coded using the most
commonly used SES scale in U.S.A, the Hollingshead Four Factor SES Scale (Hollingshead, 1975; Edwards-Hewitt & Gray, 1995).

2.1.3. Data pre-processing

Help provided and received were highly correlated and were combined for each level of help. For investment in siblings and friends, items for low-cost help ($\alpha_{sib} = .91; \alpha_{fri} = .93$), medium-cost help ($\alpha_{sib} = .91; \alpha_{fri} = .92$), and high-cost help ($\alpha_{sib} = .92; \alpha_{fri} = .91$) showed high levels of internal consistencies and were therefore aggregated. The two measures of status, education level and occupation, did not correlate ($r_{self} = -.01, p = .84; r_{sib} = -.09, p = .06; r_{fri} = .01, p = .88$) and were therefore kept distinct. Because status is a relative concept (i.e., one’s ability to influence group decisions is based on one’s relative standing within the group), three variables (each for education and occupation) were computed for three separate analyses to assess relative status differences. To test if people invested more in those of relative high status (prediction 2), two analyses were conducted. The first analysis assessed investment in siblings as a function of siblings’ status relative to self. The status variable for this analysis involved subtracting sibling-status from self-status. This allowed negative numbers to be grouped as ‘sibling higher status than self’ ($n = 86$), positive numbers to be grouped as ‘sibling lower status than self’ ($n = 165$), and scores of 0 to be grouped as ‘sibling same status as self’ ($n = 142$). The second analysis examined investment in friends as a function of friends’ status relative to self, and involved subtracting friend-status from self-status. Negative numbers were grouped as ‘friend higher status than self’ ($n = 82$), positive numbers were grouped as ‘friend lower status than self’ ($n = 114$), and scores of 0 were grouped as ‘friend same status as self’ ($n = 201$). To test prediction 3, which examined investment in kin and non-kin as a function of status, sibling-status was subtracted from friend-status. Similar groupings were then used to categorize scores
into ‘sibling higher status than friend’ \( n = 98 \), ‘sibling status same as friend’ \( n = 114 \), or ‘sibling status lower than friend’ \( n = 131 \). These new status variables allowed analyses to examine how relative status differences between participant and recipient (i.e., sibling and friend) affect helping behaviour.

Results reported below are for status differences measured by education only. Results for status differences measured by occupation yielded similar results and are available in supplementary information.

Previous research that used similar methods to this study have standardized the helping variables using t-scores to ensure that the data for low- and medium-cost help can be compared to hypothetical behaviours reported for high-cost help (i.e., Stewart-Williams, 2007; 2008). T- or z-scores were not used in the main analyses (but, results with t-scores were included in supplementary information) because such standardization would leave no variation to analyze the main effects for type of help. Thus, raw scores were used for analysis, keeping in mind that potential effects of type of help could be due to the different scales used for low- and medium-cost help vs. high-cost help.

2.2. Results

2.2.1. Investment in kin and non-kin as a function of cost of help

To test if costlier help was directed towards kin over non-kin (prediction 1), I conducted a 3(cost of help) X 2(recipient: sibling vs friend) repeated measures ANOVA to assess investment in kin and non-kin when the cost of help was low, medium, and high. To correct for sphericity violations, I used the Greenhouse-Geisser correction. A main effect of recipient \( (F (1, 667.19) = 7.76, p = .006, \text{partial } \eta^2 = .22) \) and cost of help was found \( (F (1.61, 667.19) = 760.82, p < .001, \text{partial } \eta^2 = .67) \). These effects should be interpreted with caution, however, given the significant
interaction between cost of help and recipient, $F(1.91, 667.19) = 103.30, p < .001$, partial $\eta^2 = .23$ (Figure 1). Post-hoc repeated measured t-tests revealed that friends ($M = 5.34, SE = .13$) gave and received more low-cost help than siblings ($M = 4.16, SE = .12$), $t(382) = -8.75, p < .001$, Cohen’s $d = .48$. Similarly, friends ($M = 3.41, SE = .12$) gave and received more medium-cost help than siblings ($M = 3.07, SE = .12$), $t(361) = -2.77, p = .006$, Cohen’s $d = .15$. But, as expected, the mean difference between friends and siblings for low-cost help ($M = 1.19; SE = .14$) was much larger than the mean difference between friends and siblings for medium-cost help ($M = .29; SE = .12$), $t(355) = 8.27, p < .001$, Cohen’s $d = .36$. And lastly, as predicted, siblings ($M = 7.60, SE = .10$) gave and received more high-cost help than friends ($M = 7.08, SE = .10$), $t(390) = 4.65, p < .001$, Cohen’s $d = .27$. These results confirmed the first prediction, illustrating that costlier help was directed more towards kin.

![Figure 1](image-url)  

**Figure 1.** Giving and receiving help from friends and siblings as a function of the cost of help. Error bars represent the standard error of the mean.
2.2.2. *Investment in high status kin*\(^3\)

To examine if people invested more in siblings of higher status than themselves (prediction 2), I conducted a 3X3 ANOVA with cost of help as the within-subjects factor and status differences between sibling and self as the between-subjects factor. To correct for sphericity violations, I used the Greenhouse-Geisser correction. As predicted, there was a significant main effect of status differences, \(F(2, 362) = 3.91, p = .02, \text{ partial } \eta^2 = .02\) (Figure 2A). Tukey HSD post-hoc analyses revealed that people gave and received more in siblings with similar status to themselves (\(M = 5.31, SE = .15\)) than siblings with less status than themselves (\(M = 4.74, SE = .14\), \(p = .03\), Cohen’s \(d = .35\)). But, there was no difference between siblings with similar status and siblings of higher status than themselves (\(M = 4.92, SE = .15\); \(p = .16\), Cohen’s \(d = .16\)). Additionally, there was no difference between siblings with higher status and siblings with lower status than themselves (\(p = 1.00\), Cohen’s \(d = .08\)).

Furthermore, I found a significant main effect of cost of help (\(F(1.63, 590.12) = 728.09, p < .001, \text{ partial } \eta^2 = .77\), Figure 2B). I also found a marginally significant interaction between cost of help and status differences (\(F(3.26, 590.12) = 2.45, p = .06, \text{ partial } \eta^2 = .01\), Figure 2B).

\(^3\) Separate analyses for help provided and help received are presented in Supplementary Information.
Figure 2. Giving and receiving help from siblings as a function of siblings’ status relative to self, averaged across all costs of help (A), and as a function of cost of help (B). Error bars represent standard error of the mean.

2.2.3. Investment in high status non-kin

To examine if people invest more in friends that are of higher status than themselves (prediction 2), I conducted a 3X3 ANOVA with cost of help as the within-subjects factor and
status differences between friend and self as the between-subjects factor. I used the Greenhouse-Geisser correction to correct sphericity violations. I found a significant main effect of cost of help, $F(1.76, 632.33) = 373.56, p < .001$, partial $\eta^2 = .51$. Unexpectedly, however, there was no significant main effect of status differences ($F(2, 324) = 1.36, p = .26$, partial $\eta^2 = .01$) or interaction between cost of help and status differences ($F(3.51, 632.33) = .62, p = .63$, partial $\eta^2 = .00$). These results were puzzling, but further examination of the data using repeated measures t-tests revealed absolute status differences for sibling-self ($M = 1.22, SD = 1.22$) were significantly larger than those for friend-self ($M = .75, SD = .94$), $t(388) = 6.022, p < .001$, Cohen’s $d = .43$. Thus, it is possible that status did not have an effect on friends because status differences for friend-self were too small.

2.2.4. *Investment in partnerships that yield the most benefits*

To examine if people invested more in relationships that provided the most net benefits (prediction 3), I used an ANOVA. In this ANOVA, the dependent variable was help given and received, whereas the independent variables were cost of help and status differences between sibling and friend. I used the Greenhouse-Geisser correction to correct for sphericity violations. I found a significant main effect of recipient ($F(1, 645.04) = 7.85, p = .005$, partial $\eta^2 = .02$) and cost of help ($F(1.62, 645.04) = 736.56, p < .001$, partial $\eta^2 = .68$; Figure 3). But, I did not find a significant main effect of status, $F(2, 340) = .62, p = .54$, partial $\eta^2 = .00$. Additionally, I found a significant interaction between recipient and cost of help ($F(1.90, 645.04) = 100.07, p < .001$, partial $\eta^2 = .30$; Figure 3). But, contrary to prediction 2b (status should be a stronger motivating force for investment in non-kin), I did not find a significant interaction between recipient and status ($F(2, 340) = 1.34, p = .26$, partial $\eta^2 = .01$). I also did not find a significant interaction between cost of help and status ($F(3.24, 550.44) = .31, p = .84$, partial $\eta^2 = .00$). And, a significant
three-way interaction was found, $F(3.79, 645.04) = 2.69, p = .03$, partial $\eta^2 = .02$ (Figure 3). To further explore the three-way interaction, post-hoc analyses were conducted. When looking at low-cost help, I found marginally significant differences between those with siblings of lower, similar, and higher status levels than friends ($F(2, 370) = 2.42, p = .09$, partial $\eta^2 = .01$; Figure 3A). Specifically, analyses using the Studentized range statistic $Q$ showed that participants gave and received more low-cost help in siblings that are of similar status to their friends ($M = 4.51; SE = .24$; relative to if the sibling is higher; $M = 3.98, SE = .25 [q (3, 370) = 3.47, p = .03, Cohen’s d = .21]$ or lower status than friend; $M = 3.97, SE = .20 [q (3, 370) = 3.50, p = .03, Cohen’s d = .21]$; Figure 3A). But, people gave and received a not statistically different amount of low-cost help when siblings were of higher status ($M = 3.98, SE = .25$) or lower status than friends ($M = 3.97, SE = .20$), $q (3, 370) = .48, p = .43$, Cohen’s $d = .00$.

A.
Figure 3. Low-cost (A), medium-cost (B), and high-cost help (C) given to and received by kin and non-kin as a function of status differences. Error bars represent standard error of the mean.

2.3. Summary

In summary, five main results were obtained. First I replicated findings by showing that as the cost of help increased, participants gave and received more help from kin than non-kin. Second, I present novel results showing that participants gave and received more help from siblings of similar status to themselves, relative to siblings of lower status to themselves. Third,
contrary to predictions, status had no effect on helping friends. Fourth, contrary to predictions, status was not a stronger motivating force for non-kin. And, lastly, participants gave and received more low-cost help from siblings when siblings are of equal status to friends, relative to siblings of higher or lower status than friends.

3. **STUDY 2**

Study 2 sought to test predictions 1 and 2 using a between-subjects design. As mentioned, the third prediction could not be tested in this study because it required examining investment in siblings vs. friends, and thus needed a within-subjects design.

3.1. **Method**

3.1.1. **Participants**

Participants were 279 Americans recruited from AMT. Of the 279 participants, 59.9% identified as female ($n = 167$) and 38.7% identified as male ($n = 108$). Four participants did not identify their gender. Participants’ ages ranged from 18 to 74 years old; the mean age was 35.2 years with a standard deviation of 12.5 years.

Only participants who met the following qualifications were included: Participants who (1) resided in the USA, (2) were fluent in English, and (3) had a 95% approval rate for at least 100 studies completed on AMT. In line with the standard compensation rate for AMT ($1.40 USD/hour: Paolacci et al., 2010), participants received $0.35USD for the 10-15 minute study. Participants were only allowed to complete questions once; also, those who participated in this study were barred from participating in Study 1 of this chapter.
3.1.2. Materials and design

Study 2 was a between-subjects design whereby participants were specifically recruited to complete either a ‘friendship study’ (about a same-sex close friend) or a ‘sibling study’ (about a same-sex sibling). Thus, participants were not randomly assigned to conditions. Similar to study 1, this study was conducted as an online survey. The same instructions were presented to participants so that they answered questions regarding helping behaviour with only one person in mind (see Appendix C). The same measures in study 1 were used to assess cost of help in study 2. Several measures of status were used in this study. Similar to study 1, participants reported education level and occupation for themselves and the target individual (same-sex friend or sibling). Participants also reported the annual income (i.e., 1: less than $10,000 to 8: More than $100,000) and socioeconomic status (i.e., lower, middle, upper middle, or upper class) for themselves and targets. Additionally, I used two measures from the MacArthur Subjective Scale of Socioeconomic Status (Goodman et al., 2001). For these items, participants were presented with a picture of a ladder with 10 rungs and read the following description: “Think of this ladder as representing where people stand in your country of residence (i.e., U.S.A). At the top of the ladder are people who are best off – those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off – those who have the least money, the least education, and the least respected jobs or no jobs.” Participants selected the rung that best represented their relative standing on the ladder. This question was asked twice, once for relative standing in their country and another for relative standing in their community. Participants reported relative standing in the countries and communities for themselves as well as targets.
3.1.3. *Data pre-processing*

The same pre-processing for the cost of help variable in study 1 was applied in study 2. Items for low-cost help ($\alpha = .94$), medium-cost help ($\alpha = .93$), and high-cost help ($\alpha = .89$) showed high levels of internal consistencies.

The six measures of status (i.e., socioeconomic status, annual income, education level, occupation level, and two measures of MacArthur Subjective Socioeconomic Status Scale) were significantly correlated for self-status (i.e., participant) and target individual-status (i.e., recipient; see Table 1). Thus, these six measures were standardized (i.e., subtracting the mean and dividing by standard deviation) and aggregated into a single composite status variable for self-status and recipient-status. Items for composite self-status ($\alpha = .73$) and composite recipient-status ($\alpha = .81$) showed appropriate levels of internal consistencies. Similar to study 1, because status is a relative concept, I created a status difference variable to assess status differences between self and recipients. For this variable, composite self-status was subtracted from composite recipient-status. Scores within +/- 1 standard deviation were grouped as ‘recipient having the same status as self’ ($n = 197$), whereas positive numbers beyond 1 standard deviation were grouped as ‘recipient having lower status than self’ ($n = 37$) and negative numbers beyond 1 standard deviation were grouped as ‘recipient having higher status than self’ ($n = 45$). With this new status variable, I was able to examine how relative status differences between participant and target individuals affected help given and received.
Table 1.

Descriptive statistics and correlations among status variables for self (A) and recipients (B).

A.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SES</td>
<td>1.86</td>
<td>.64</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Income</td>
<td>4.57</td>
<td>2.13</td>
<td>.52**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Education</td>
<td>4.41</td>
<td>1.32</td>
<td>.17**</td>
<td>.18**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MSS Comm</td>
<td>5.26</td>
<td>1.86</td>
<td>.48**</td>
<td>.38**</td>
<td>.18**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. MSS Count</td>
<td>5.08</td>
<td>2.02</td>
<td>.49**</td>
<td>.37**</td>
<td>.24**</td>
<td>.57**</td>
<td>-</td>
</tr>
<tr>
<td>6. Occupation</td>
<td>5.08</td>
<td>2.48</td>
<td>.20**</td>
<td>.23**</td>
<td>.24**</td>
<td>.16**</td>
<td>.19**</td>
</tr>
</tbody>
</table>

B.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SES</td>
<td>2.08</td>
<td>.71</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Income</td>
<td>4.77</td>
<td>2.04</td>
<td>.55**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Education</td>
<td>3.87</td>
<td>1.54</td>
<td>.32**</td>
<td>.32**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. MSS Comm</td>
<td>5.62</td>
<td>1.95</td>
<td>.49**</td>
<td>.44**</td>
<td>.29**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. MSS Count</td>
<td>5.45</td>
<td>2.02</td>
<td>.50**</td>
<td>.45**</td>
<td>.35**</td>
<td>.67**</td>
<td>-</td>
</tr>
<tr>
<td>6. Occupation</td>
<td>4.67</td>
<td>2.54</td>
<td>.25**</td>
<td>.25**</td>
<td>.31**</td>
<td>.26**</td>
<td>.22**</td>
</tr>
</tbody>
</table>

Note: MSS Comm refers to MacArthur Subjective Socioeconomic Status Scale for community comparisons; MSS Count refers to MacArthur Subjective Socioeconomic Status Scale for country comparison.

3.2. Results

3.2.1. *Investment in kin and non-kin as a function of cost of help and status*[^4]

To examine the predictions, an ANOVA was conducted with recipient and status differences as the between-subjects factors and cost of help as the within-subjects factor. I used the Greenhouse-Geisser correction to correct for sphericity violations. The first prediction (i.e.,

[^4]: Separate analyses for help provided and received for the main effect of status are provided in supplementary information.)
costlier help should be directed towards kin over non-kin) was confirmed by a significant interaction between cost of help and recipient, $F(1.72, 456.58) = 15.29, p < .001$, partial $\eta^2 = .05$ (Figure 4). Specifically, friends ($M = 5.78, SE = .27$) gave and received more low-cost help than siblings ($M = 4.11, SE = .28$), $F(1, 547.99) = 37.55, p < .001$, partial $\eta^2 = .04$. Similarly, friends ($M = 4.00, SE = .27$) gave and received more medium-cost help than siblings ($M = 2.94, SE = .28$), $F(1, 547.99) = 14.51, p < .001$, partial $\eta^2 = .02$. But, as expected, siblings ($M = 7.50, SE = .21$) gave and received more high-cost help than friends ($M = 7.22, SE = .20$), $F(1, 547.99) = 5.06, p = .02$, partial $\eta^2 = .01$.

\[\text{Figure 4. Giving and receiving help from siblings and friends as a function of cost of help. Error bars represent the standard error of the mean.}\]

The second prediction (i.e., people should invest more in individuals that are of relatively higher status than themselves) was partially confirmed by a significant main effect of status, $F(2, 272) = 3.38, p = .03$, partial $\eta^2 = .02$ (Figure 5). Tukey HSD post-hoc tests showed that people gave and received more help from recipients (friends and siblings) of similar status to themselves ($M = 5.62, SE = .13$) than recipients of lower status than self ($M = 4.75, SE = .31, p = .03$). There
was no significant difference in help given and received between recipients with similar status to themselves and recipients with higher status than themselves ($M = 5.41, SE = .28, p = .69$). Also, no differences were found between recipients with higher status than themselves and recipients with lower status than themselves ($p = .38$). These results are identical to the first study, except we now find an effect of status on friends. As mentioned, the data for Study 1 revealed significantly larger absolute status differences for sibling-self ($M = 1.22, SD = 1.22$) than friend-self ($M = .75, SD = .94; t(388) = 6.022, p<.001, \text{Cohen's } d = .43$), suggesting that status did not have an effect on friends because status differences for friend-self were too small. This, however, was not the case for study 2 as absolute status differences for sibling-self ($M_{\text{self-sib}} = .54, SD_{\text{self-sib}} = .48$) and friend-self ($M_{\text{self-fri}} = .52, SD_{\text{self-fri}} = .44$) were similar; $t(277) = .38, p = .70$, Cohen’s $d = .04$. A possible explanation may lie in the measures used to assess status. Study 1 used measures of occupation and education to assess status whereas study 2 had four additional measures that were combined into a composite measure of status. The additional measures used to assess status in the second study might have contributed to more variance for the friend-self status difference variable, which in turn, enabled us to find an effect of status.

Despite finding a main effect of status, prediction 2b (i.e., status should be a stronger motivating force for investment among non-kin) was not confirmed as an interaction between recipient and status was not found, $F(3.35, 456.58) = .08, p = .92$, partial $\eta^2 = .00$. A main effect of recipient, however, was found whereby friends ($M = 5.67, SE = .21$) gave and received more overall help than siblings ($M = 4.85, SE = .21$), $F(1, 272) = 7.76, p = .007$, partial $\eta^2 = .03$. And, I found a main effect of cost of help, $F(1.67, 456.58) = 4.57, p = .01$, partial $\eta^2 = .02$. I did not find a significant interaction between cost of help and status ($F(3.35, 456.58) = 1.41, p=.23$,
partial $\eta^2 = .01$). Also, I did not find a significant three-way interaction between cost of help, status, and recipient, $F(3.35, 456.58) = .80, p = .53, \text{ partial } \eta^2 = .01$.

![Figure 5](image_url)

*Figure 5.* Giving and receiving help from recipients as a function of status relative to self, averaged across all costs of help. Error bars represent the standard error of the mean.

4. **GENERAL DISCUSSION**

Across both studies, I was able to replicate the well-known effect of costlier help being directed at kin over non-kin. This research is also the first, to my knowledge, to show that status differences between self and kin influenced helping behaviour. In this section, I discuss the key findings, implications, limitations, and conclusions from this research.

4.1. **The cost of help affects giving and receiving among kin and non-kin**

As predicted, high-cost help was directed towards kin over non-kin. Unexpectedly, however, friends gave and received more medium-cost help than siblings. But, the bias towards friends giving and receiving more help than siblings was much larger for low-cost help than medium-cost help. Thus, the general (albeit imperfect) pattern of increased cost of help leading
to more help given and received from kin over non-kin still stands and is consistent with other studies (e.g., Stewart-Williams, 2007; Xue, 2013).

Interestingly, both siblings and friends provided and received less medium-cost help overall, relative to low-cost help. One potential explanation lies in the opportunities individuals may have to provide, and receive, medium-cost help over low-cost help. Recall that to assess medium-cost help, I included items of instrumental support (e.g., providing and receiving help during illness, help during a crisis), whereas items to assess low-cost help consisted of examples of emotional support (e.g., personal advice, comfort when sad). The provisioning of such medium-cost help (i.e., instrumental support) is contingent on helpers being physically present, whereas low-cost help, in the form of emotional support, can be easily provided from a distance using multiple forms of technology. Also, instances where medium-cost help is needed (e.g., help during illness) may, on average, be less frequent than times of need for low-cost help (e.g., personal advice). Thus, it is possible that people gave and received less medium-cost help than low-cost help because there was a lack of opportunity to do so.

The difference in measures for cost of help (i.e., actual reported helping behaviour for low- and medium-cost help versus reported willingness to engage in high-cost help) could explain the finding that friends gave and received more low-cost help and more medium-cost help than siblings. Specifically, people might have spent more time with friends and thus there may have been more opportunities to provide friends, instead of siblings, with low- or medium-cost help. If this is indeed the case (i.e., this result is based on opportunities to help), then it is possible that this effect would not have been found had I used modified methods. That is, if I had used measures of willingness to help for all levels of cost of help (instead of using measures of actual helping for low- and medium-cost help, but measures of willingness to help for high-cost
help) I may have found effects showing that siblings were just as willing to provide and receive low- or medium-cost help as friends.

Although this remains a possibility, I do not think a change in my methodology could have affected my results in such a way. This is because helping friends and siblings is associated with different fitness benefits for the helper. In particular, indirect fitness benefits can only be gained when help is directed at kin. This fact necessarily affects the interpersonal dynamics between kin and non-kin relations. In this study, I have shown that such differences in fitness benefits between kin and non-kin relationships affects who is likely to gain or provide high-cost help. But, the different fitness pay-offs for helping kin and non-kin also have other implications in interpersonal dynamics. Specifically, because kin relationships always provide indirect fitness benefits for helpers, kin ties are generally more stable than non-kin ties (e.g., Roberts, 2010; Roberts & Dunbar, 2011). As such, in comparison to kin relations, non-kin relationships tend to require more effort, in the form of emotional support, for example (or other forms of relationship maintenance behaviours, such as frequent communication, face-to-face interactions, and time spent together), to maintain the relationship and avoid decay (e.g., Roberts, 2010; Roberts & Dunbar, 2011). This difference in effort needed to maintain kin and non-kin relationships leads me to believe that even with a methodology that measured willingness to offer or gain low- and medium-cost help, I still would have found similar patterns with friends investing more low- and medium-cost help than siblings.

The difference in effort required to maintain friendships and kin ties also explains another finding from both studies: overall, people gave and received more help from friends than siblings. A general pattern of helping and gaining more help from friends than siblings makes sense given that friendships are less stable and require a higher minimum level of investment to
maintain the relationship. As such, my finding that people overall gave and received more from friends than siblings would have been expected given the above rationale.

4.2. The effect of status on giving and receiving among kin and non-kin

A second key finding is that status influenced help given and received from siblings and friends. Specifically, people gave and received more help from those that had similar status to themselves, relative to those of lower status than themselves. But, status preferences were not monotonic: participants did not invest most in higher status recipients. Additionally, contrary to predictions, status was not a stronger motivating force for investment in friends over siblings. In fact, the role of status appeared to be equally valid for investment in friends and siblings. Together, these results imply two potential patterns of helping among siblings and friends.

First, the finding that people do not have monotonic preferences for status, but instead give and receive more from those of similar status to themselves (relative to those with lower status than themselves) suggests that reciprocity is a key factor in relations with both siblings and friends. Giving and receiving help from those with similar status to ourselves makes good evolutionary sense because it promotes symmetry in the exchange flow, which protects against the exploitation or rejection that is commonly found in uneven relationships (Vigil, 2007). This pattern of preferences is evident for market-based reasons, whereby mutual partner choice creates assortative pairings such that individuals of similar value are likely to match up (Noe & Hammerstein, 1994; 1995).

A second implication is that reciprocity appeared to be just as important in friendships as it was in kinship. This is puzzling because unreciprocated help can be compensated by indirect benefits with kin. Although true of all kin, this may be especially true for asymmetrical kin relations such as the parent-offspring relationship (Stewart-Williams, 2007). In such
relationships, the flow of resources moves heavily from parent to offspring, and rarely (or less commonly) in the opposite direction. This pattern is expected given that offspring have a higher reproductive value than parents, and the needs of parents are not the same as those of offspring. With similar-aged kin such as siblings or cousins, however, unreciprocated help may be less common because both parties have similar reproductive values and similar needs for resources. Thus, when kin relations exhibit a more symmetrical relationship (i.e., similar needs and reproductive value), reciprocity may be of higher importance. Alternatively, the finding of status being an equally motivating force for kin and non-kin may be explained by the fact that people tend to have more mobility in North American societies (e.g., Falk, Heine, Yuki, & Takemura, 2009; Schug, Yuki, & Maddux, 2010; Yuki et al., 2007). And, more mobility comes with an increased ease of creating new partnerships (Schug et al., 2010), which could allow similar choice effects on friends to occur among siblings.

When friends are of equal status to siblings, we see effects on the amount of low-cost help siblings gave and received, but not medium- or high-cost help. Specifically, people gave and received more low-cost help from siblings when siblings are of similar status to friends, relative to siblings of higher or lower status than friends. This finding is interesting because previous research has consistently shown that emotional support (low-cost help in this research was conceptualized solely as emotional support) is not only preferentially provided by friends, but is also more important in friendships (Hackman, Danvers, & Hruschka, 2015; Kruger, 2003; Stewart-Williams, 2007, 2008; Xue, 2013). Yet, my data show that a person may give and receive more comparable levels of emotional support (i.e., low-cost help) from siblings when friends and siblings are of similar status. This makes sense given that similar status individuals are of equal value as a reciprocal partner. And so, when kin and non-kin are of similar value,
both parties gain similar investment. What is puzzling, however, is that this result did not hold true for medium- or high-cost help, suggesting that low-cost help is unique. A possible explanation is that emotional support is not only an efficient form of helping, which is low-cost to the helper yet potentially highly beneficial to the recipient (Korchmaros & Kenny, 2006; Leider, Mobius, Rosenbalt, & Do, 2009; Xue, 2013), but also a commitment signal (Ohtsubo et al., 2014; Yamaguchi, Smith, & Ohtsubo, 2015). So, if reciprocity is just as important among siblings as it is among friends, as suggested by the data, then emotional support between siblings may act as a way to maintain these relationships and ensure that help is reciprocated.

4.3. Limitations

A potential limitation with the current research was the comparison of actual (i.e., low-cost and medium-cost help) versus hypothetical accounts of helping (i.e., high-cost help). Although the use of hypothetical scenarios allowed for tight control of variables of interest, hypothetical scenarios might have also prompt hypothetical decisions from participants, which inevitably may have affected results. Real-life examples would have been preferred, but given the rarity of high-cost help, such scenarios would have not been realistic for participants, creating a floor effect. It is important to note, however, that even with hypothetical scenarios, the results revealed an expected pattern of helping whereby kin disproportionately received more high-cost help than non-kin. This finding is consistent with previous research (e.g., Stewart-Williams, 2007), and suggest, at the very least, that people report being more willing to incur high-costs to help kin than non-kin.

Another potential limitation with my research is that cost of help was confounded with type of help. Specifically, low-cost help only included items of emotional support whereas medium-cost help only included items of instrumental support. Despite this confound, however, I
believe that the examples used for low-cost and medium-cost help were highly appropriate for testing predictions. This is because this research was most concerned with help in terms of the fitness costs imposed on the helper to provide such help to another. Emotional support was considered low-cost help because at minimum, offering emotional support generally only involves the helper providing time to talk to another (i.e., low fitness cost). Providing instrumental support, on the other hand, is costlier than emotional support because it requires more than just time and talking (i.e., higher fitness cost than emotional support). As such, even though cost of help was confounded with type of help (see earlier sections of the discussion for the implications of this), this conceptualization and categorization of helping behaviour was most appropriate and relevant for this study.

4.4. Conclusion

The present study explored how two factors – status and the cost of help – affected help provided to and received from siblings and friends. My findings replicated previous work by showing that costlier help was directed at kin over non-kin. Furthermore, my research is the first, to my knowledge, to illustrate that status differences between self and target individual (kin or non-kin) can affect helping behaviour. So, overall, this research extended previous work by providing insight into the reasons people form relationships with some but not others, and the grounds for differential investment in those within one’s social network. In application, I hope this line of inquiry has the potential to promote a better understanding for forming and maintaining strong interpersonal bonds.
SUPPLEMENTARY INFORMATION

1. Study 1 Occupation Results

In study 1, education and occupation were used to assess status differences between participants and recipients (i.e., siblings and friends). In the main text, I reported results for status differences based on measures of education only. This is because education and occupation measures did not correlate and could not be amalgamated. Results for status differences based on occupation were similar to education, and are presented below.

1.1. Data pre-processing

I coded occupations with the most commonly used SES scale in the USA, the Hollingshead Four Factor SES Scale (Hollingshead, 1975; Edwards-Hewitt & Gray, 1995). This coding system grouped occupations into one of nine categories, ranging from 1: ‘Farm labourers, menial service workers’ to 9: ‘Higher executives, proprietors of large businesses, major professionals’. To assess if status differences between self and other (i.e., sibling or friend) influenced helping behaviour (prediction 2), two variables were computed. In creating one of these variables, I subtracted sibling-occupation from self-occupation. I grouped negative numbers as ‘sibling higher occupation than self’ (n = 113), positive numbers as ‘sibling lower occupation than self’ (n = 129), and scores of 0 as ‘sibling similar occupation as self’ (n = 93).

To examine status differences between friends, I subtracted friend-occupation from self-occupation. I grouped negative numbers as ‘friend higher occupation than self’ (n = 139), positive numbers as ‘friend lower occupation than self’ (n = 115), and scores of 0 as ‘friend similar occupation as self’ (n = 107). To examine if people invested more in partnerships that bring the most benefits (i.e. prediction 3), I subtracted sibling-occupation from friend-
occupation. I used similar groupings to categorize scores into ‘sibling higher occupation than friend’ (n = 115), ‘sibling occupation similar as friend’ (n = 79), or ‘sibling occupation lower than friend’ (n = 164).

1.2. Investment in high status kin

I conducted an ANOVA with cost of help as the within-subjects variable and status differences (measured by occupation code) as the between subjects variable. I used the Greenhouse-Geisser correction to correct sphericity violations. I found a significant main effect of cost of help, $F(1.62, 538.75) = 693.28, p < .001$, $\text{partial } \eta^2 = .68$. As predicted, a marginally significant main effect of status differences was found, $F(2, 332) = 2.97, p = .052$, $\text{partial } \eta^2 = .02$ (Figure S1A). Post-hoc Tukey HSD analyses revealed that people gave and received more help from siblings with similar occupation levels to themselves ($M = 5.42, SE = .15$) than siblings with lower occupation levels than themselves ($M = 4.99, SE = .14$), $p = .04$, Cohen’s $d = .21$. However, there was no difference between siblings with similar occupation levels and siblings of higher occupation levels than themselves ($M = 5.08, SE = .15; p = .19$, Cohen’s $d = .13$). Additionally, there was no difference between siblings with higher occupation levels and siblings with lower occupation levels than themselves ($p = .88$, Cohen’s $d = .04$). Also, a marginal interaction between cost of help and status differences was found, $F(3.25, 538.75) = 2.51, p = .05$, $\text{partial } \eta^2 = .02$ (Figure S1B).
Figure S1. Giving and receiving help from siblings as a function of siblings’ status relative to self, averaged across all costs of help (A), and as a function of cost of help (B). Error bars represent standard error of the mean.

1.3. Investment in high status non-kin

A 3 X 3 ANOVA with cost of help as the within-subjects variable and status differences as the between subjects variable was used to examine investment in friends as a function of
friends’ occupation level relative to self. I used the Greenhouse-Geisser correction to correct sphericity violations. I found a significant main effect of cost of help, $F (1.76, 570.36) = 399.51, p < .001$, partial $\eta^2 = .55$. Unexpectedly, a main effect of occupation code was not found, $F (2, 324) = 1.36, p = .26$, partial $\eta^2 = .01$; an interaction between cost of help and status differences was also not found, $(F (3.52, 570.36) = .72, p = .56$, partial $\eta^2 = .00$).

1.4. Investment in partnerships that yield the most benefits

I conducted a repeated measures ANOVA to examine investment in sibling and friend as a function of cost of help and status differences. I used the Greenhouse-Geisser correction to correct for sphericity violations. I found a significant main effect of recipient $(F(1, 561.07) = 7.57, p = .006$, partial $\eta^2 = .03$) and a main effect of cost of help $(F(1.62, 561.07) = 611.25, p < .001$, partial $\eta^2 = .67$). I also found a significant interaction between cost of help and recipient $(F(1.86, 561.07) = 96.48, p < .001$, partial $\eta^2 = .25$). Post-hoc paired t-tests revealed that friends $(M = 5.34, SE = .13)$ gave and received more low-cost help than siblings $(M = 4.16, SE = .12), t(382) = -8.75, p < .001$, Cohen’s $d = .48$. Similarly, friends $(M = 3.41, SE = .12)$ gave and received more medium-cost help than siblings $(M = 3.07, SE = .12), t(361) = -2.77, p = .01$, Cohen’s $d = .15$.

But, as expected, the mean difference between friends and siblings for low-cost help $(M = 1.19; SE = .14)$ was much larger than the mean difference between friends and siblings for medium-cost help $(M = .29; SE = .12), t(355) = 8.27, p < .001$, Cohen’s $d = .36$. And, as predicted, siblings $(M = 7.60, SE = .10)$ gave and received more high-cost help than friends $(M = 7.08, SE = .10), t(390) = 4.65, p = .006$, Cohen’s $d = .27$. These results are identical to those found in the main analyses (p. 35-40), which illustrated that costlier help was directed more towards kin.

Unexpectedly, however, there was no main effect of status differences, $F(2, 301) = .28, p = .76$, partial $\eta^2 = .00$. I did not find an interaction between cost of help and status $(F(3.22,
561.07) = .76, \( p = .55 \), partial \( \eta^2 = .01 \), but the expected interaction between cost of help and recipient was found \( (F(1.86, 561.07) = 96.45, p < .001, \text{ partial } \eta^2 = .25) \). Also, I did not find a significant three-way interaction between recipient, cost of help, and status differences, \( F(3.72, 561.07) = .53, p = .71, \text{ partial } \eta^2 = .00 \).

2. Results for Study 1 and Study 2 using t-scores

Study 1 results

2.1.1. Data pre-processing

Similar data pre-processing processes were conducted to those in the main analyses. Specific differences included the use of t-scores and slightly different DVs for predictions 1 and 3.

The raw scores for the dependent variable (i.e., cost of help) were converted to t-scores whereby standardized scores were centered on 50 with a standard deviation of 10 units. Converting raw scores to t-scores allowed a comparison between the three types of helping behaviour: Low-cost and medium-cost help were based on frequency of engagement of behaviour, but because of the rarity of high-cost help, participants reported willingness to engage in such help. It also allowed for comparison of help between different target individuals (e.g., comparing low-cost help for siblings and friends.

To test predictions 1 and 3, which included examining investment in kin vs. friends, the dependent variable was computed by subtracting investment in friends from investment in kin. Thus, larger negative numbers indicated more investment in friends, whereas positive numbers indicated more investment in kin. Results reported below are for status differences measured by education only.
2.1.2. Investment in kin and non-kin as a function of cost of help

A one-way repeated measures ANOVA was conducted to assess the relative likelihood of helping sibling vs. friend when the cost of help was low, medium, and high. As expected, a significant main effect of cost of help was found, $F(1.91, 667.19) = 103.30, p < .000$, partial $\eta^2 = .23$ (Figure S2). Post-hoc analyses revealed that the bias towards helping friends is significantly less pronounced for medium-cost help ($M = -.29, SE = .12$) than low-cost help ($M = -1.19, SE = .14$), $t(355) = -8.27, p<.000, d = .36$. Helping was also more biased towards kin for high-cost help ($M = .60, SE = .12$) than medium-cost help ($M = -.29, SE = .12$), $t(355) = -6.84, p<.000, d = .40$. These results confirmed the first prediction, illustrating that as the cost of help increased, disproportionately more help was invested in kin.

![Figure S2](image)

**Figure S2.** Investment in siblings and friends as a function of cost of help.

2.1.3. Investment in high status kin

To examine investment in siblings as a function of siblings’ status relative to self a 3X3 ANOVA with cost of help as the within-subjects factor and status as the between-subjects factor was conducted. As predicted, there was a significant main effect of status, $F(2, 390) = 3.70,$
Post-hoc analyses revealed that people invested more in siblings with similar status to themselves ($M = 51.73$, $SE = .64$) than siblings with less status than themselves ($M = 49.50$, $SE = .59$), $p < .05$. But, there was no difference in investment between siblings with similar status to themselves and siblings of higher status than themselves. Thus, it appears we invest more in siblings with similar status to ourselves than siblings with lower status than ourselves.

![Graph showing investment in siblings as a function of siblings’ status relative to self.](image)

*Figure S3.* Investment in siblings as a function of siblings’ status relative to self.

2.1.4. **Investment in high status non-kin**

To examine investment in friends as a function of friends’ status relative to self a 3X3 ANOVA with cost of help as the within-subjects factor and status as the between-subjects factor was conducted. Unexpectedly, there was no significant effect of status found.

2.1.5. **Investment in partnerships that yield the most benefits**

A repeated measures ANOVA was conducted to assess the relative likelihood of helping sibling vs. friend with varying levels of cost of help and status differences. As expected, a significant interaction between cost of help and status was found, $F(4, 645.05) = 2.69, p < .05$,.
partial $\eta^2 = .02$ (Figure S4). Post-hoc analyses showed there were significant differences between those with kin of lower, similar, and higher education level than friends for low-cost help ($F(2, 662.16) = 3.01, \ p < .05$, partial $\eta^2 = .01$), but not medium-cost and high-cost help. Specifically, the bias towards providing friends with low-cost help is less pronounced if the sibling and friend are of the same status (relative to if the sibling is higher $[q(3, 662.16) = 3.61, \ p < .05]$ or lower status than friend $[q(3, 662.16) = 3.33, \ p < .05]$). This suggests that status may play a role in determining the provisioning of low-cost help, but not medium or high-cost help.

Figure S4. Investment in kin and non-kin as a function of status.

**Study 2 results**

To examine the predictions, an ANOVA was conducted with recipient and status differences as the between-subjects factors and cost of help as the within-subjects factor. I used the Greenhouse-Geisser correction to correct for sphericity violations. The first prediction (i.e., costlier help should be directed towards kin over non-kin) was confirmed by a significant interaction between cost of help and recipient, $F(1.62, 527.32) = 9.62, \ p < .001$, partial $\eta^2 = .03$ (Figure S5). Specifically, friends ($M = 52.89, \ SD = .09$) gave and received more low-cost help
than siblings ($M = 47.15$, $SD = 9.98$), $F(1, 545.56) = 18.35$, $p < .001$, partial $\eta^2 = .04$. Similarly, friends ($M = 51.72$, $SD = 10.19$) gave and received more medium-cost help than siblings ($M = 48.25$, $SD = .95$), $F(1, 545.56) = 9.51$, $p < .001$, partial $\eta^2 = .03$. But, as expected, siblings ($M = 50.95$, $SD = 9.65$) gave and received more high-cost help than friends ($M = 49.20$, $SD = 10.05$), $F(1, 545.56) = 4.32$, $p = .03$, partial $\eta^2 = .01$.

![Figure S5](image-url) Giving and receiving help from siblings and friends as a function of cost of help.

Error bars represent the standard error of the mean.

The second prediction (i.e., people should invest more in individuals that are of relatively higher status than themselves) was partially confirmed by a significant main effect of status, $F(3, 326) = 3.25$, $p = .04$, partial $\eta^2 = .01$ (Figure S6). Tukey HSD post-hoc tests showed that people gave and received more help from recipients (friends and siblings) of similar status to themselves ($M = 51.62$, $SE = .51$) than recipients of lower status than self ($M = 48.28$, $SE = 1.19$, $p = .03$). There was no significant difference in help given and received between recipients with similar status to themselves and recipients with higher status than themselves ($M = 50.45$, $SE = 1.08$, $p = .
Also, no differences were found between recipients with higher status than themselves and recipients with lower status than themselves ($p = .35$).

Despite finding a main effect of status, prediction 2b (i.e., status should be a stronger motivating force for investment among non-kin) was not confirmed as an interaction between recipient and status was not found, $F(3, 326) = .05$, $p = .98$, partial $\eta^2 = .00$. A main effect of recipient, however, was found whereby friends ($M = 50.43$, $SE = .73$) gave and received more overall help than siblings ($M = 47.36$, $SE = .77$), $F(1, 326) = 7.42$, $p = .004$, partial $\eta^2 = .03$. I did not find a significant interaction between cost of help and status ($F(4.85, 545.56) = 2.34$, $p = .31$, partial $\eta^2 = .01$). Also, I did not find a significant three-way interaction between cost of help, status, and recipient, $F(3.35, 545.56) = 1.22$, $p = .65$, partial $\eta^2 = .00$.

![Figure S6](image-url)

*Figure S6.* Giving and receiving help from recipients as a function of status relative to self, averaged across all levels of cost of help. Error bars represent the standard error of the mean.
3. **Separate analyses for help provided and help received for significant results regarding the main effect of status.**

3.1. **Study 1: Help provided to high status kin**

To examine if people gave more help to siblings of higher status than themselves (prediction 2), I conducted a 3X3 ANOVA with cost of help as the within-subjects factor and status differences between sibling and self as the between-subjects factor. To correct for sphericity violations, I used the Greenhouse-Geisser correction. Unexpectedly, there was no effect of status differences $F(2, 362) = 1.37, p = .26, \text{partial } \eta^2 = .01$.

3.2. **Study 1: Help received from high status kin**

To examine if people received more help from siblings of higher status than themselves (prediction 2), I conducted a 3X3 ANOVA with cost of help as the within-subjects factor and status differences between sibling and self as the between-subjects factor. To correct for sphericity violations, I used the Greenhouse-Geisser correction. As expected, there was a significant main effect of status differences $F(2, 362) = 7.71, p = .001, \text{partial } \eta^2 = .04$ (see Figure S7). Tukey HSD post-hoc analyses revealed that people received more from siblings with similar status to themselves ($M = 5.12, SE = .15$) than siblings with less status than themselves ($M = 4.29, SE = .14$), $p < .001$, Cohen’s $d = .55$. But, there was no difference between siblings with similar status and siblings of higher status than themselves ($M = 4.75, SE = .20; p = .45$, Cohen’s $d = .22$). Additionally, there was no difference between siblings with higher status and siblings with lower status than themselves ($p = .19$, Cohen’s $d = .12$).
Figure S7. Help received from siblings as a function of siblings’ status relative to self, averaged across all levels of cost of help. Error bars represent standard error of the mean.

3.3. Study 2: Help provided to high status individuals

To examine if people gave more to individuals of higher status than themselves (prediction 2), I conducted a 3X3X2 ANOVA with cost of help as the within-subjects factor and status differences and partner as the between-subjects factor. Unexpected, there was no main effect of status differences $F(3, 327) = 1.94, p = .20$, partial $\eta^2 = .00$.

3.4. Study 2: Help received from high status individuals

To examine if people received more help from individuals of higher status than themselves (prediction 2), I conducted a 3X3X2 ANOVA with cost of help as the within-subjects factor and status differences and partner as the between-subjects factor. A main effect of status differences was found $F(3, 327) = 6.61, p = .01$, partial $\eta^2 = .04$ (Figure S8). Tukey HSD post-hoc analyses revealed that people received more from individuals with similar status to themselves ($M = 5.48, SE = .15$) than those with less status than themselves ($M = 4.47, SE = .14$), $p = .03$, Cohen’s $d = .31$. But, there was no difference for help received between individuals with
similar status and those of higher status than themselves ($M = 5.23, SE = .20; p = .45$, Cohen’s $d = .22$). Additionally, there was no difference in help received between those with higher status and those with lower status than themselves ($p = .11$, Cohen’s $d = .25$).

Figure S8. Help received from recipients as a function of recipients’ status relative to self, averaged across all costs of help. Error bars represent standard error of the mean.
CHAPTER 4
INTERPERSONAL TRACKING AND TOLERANCE

1. INTRODUCTION

Friendships are a human universal (Hruschka, 2010). These long-term cooperative bonds are characterized by an exchange of several benefits, mainly in the form of material and emotional support (Hruschka, 2010; Silk, 2003; Xue & Silk, 2012). Benefits can be costly to provide (Silk, 2003), and so interactions with non-kin should adhere to the principles of contingent reciprocity (Axelrod & Hamilton, 1981; Trivers, 1971). Specifically, people should only continue relationships when the costs are offset by the benefits brought through the friendship (Barclay, 2013; Noë & Hammerstein, 1994; 1995; Silk, 2003). This logic predicts that people should track (at least some of) the behaviours of friends. Tracking is expected because it could be a way for individuals to avoid exploitation: information gathered from monitoring friends can be used to assess if friendships should be continued (if beneficial) or terminated (if non-beneficial) (Hruschka & Henrich, 2006; McNamara, Stephens, Dall, & Houston, 2009; Silk, 2003; Xue & Silk, 2012).

If tracking is a way to ensure a net gain within relationships, do people monitor the behaviours of friends? Research to date has yielded inconsistent findings. On one hand, there is evidence that at least some degree of tracking occurs among friends. Specifically, people not only report a strong preference for balanced, over imbalanced, friendships, but also an awareness of how balanced their friendships are (Shackelford & Buss, 1996; Walker, 1995). These findings, however, are met with uncertainty when compared to studies showing that people generally avoid tracking among friends (e.g., Clark, 1981; Mills & Clark, 1994; Shackelford &
Buss, 1996). The aversion to track friends is so strong that people even report feelings of betrayal when friends reciprocate exchanges immediately and directly (Mills & Clark, 1994). This inconsistency between findings is puzzling and confusing. How can we make sense of these findings?

Xue and Silk (2012) offer a possible solution by noting that cooperative relationships should be characterized not only by tracking, but also by tolerance for temporary imbalances (Bendor, Kramer, & Stout, 1991; Hruschka & Henrich, 2006). In particular, the authors argue that previous work have confounded a lack of tracking among friends with tolerance for short-term imbalances. Xue and Silk conducted a study to test if people do not track friends or if people track friends but tolerate temporary imbalances. Their results revealed that tracking did occur among friends, but people were tolerant of imbalances. Taken together, their findings suggest two main points. First, both tracking and tolerance are important interpersonal dynamics involved in cooperative bonds such as friendships. Second, tracking and tolerance may serve distinct functions, both of which serve to maintain mutually beneficial long-term relationships. Specifically, tracking may be a way to avoid exploitation whereas tolerance of temporary imbalances may signal one’s commitment to a long-term cooperative relationship (Jordan, Hoffman, Nowak, & Rand, 2016). This is because tolerance for short-term imbalances protects against the breakdown of valuable cooperative relationships, which in the long-run can yield several fitness benefits (Bendor et al., 1991).

So, how do tracking and tolerance play out in interactions with others? What factors affect the frequency of tracking and/or level of tolerance one has for those in his/her social network? In this chapter, I attempt to answer these questions by exploring three factors that may affect tracking and tolerance within friendships. My first line of inquiry examined the effect of
closeness on tracking and tolerance. My second research question investigated whether interpersonal tracking and tolerance might be influenced by the availability of partners in one’s social environment. And lastly, my third investigation assessed if tracking was related to stable individual differences in preferences for resource distribution.

1.1. The effect of closeness on tracking and tolerance

1.1.1. Tracking and closeness

If tracking functions as a means to avoid exploitation by ensuring a well-balanced relationship (Hruschka & Henrich, 2006; McNamara et al., 2009; Silk, 2003; Xue & Silk, 2012), then monitoring should vary with different interaction partners. In particular, people should more carefully track the behaviours of strangers than friends. People should upregulate tracking when interacting with strangers because one is unlikely to have many ongoing interactions with strangers, and thus the risk of exploitation is higher. With friends, however, there are several potential future opportunities for repayment to occur, so tracking of friends should be reduced relative to strangers. An extension of this logic is that closeness or trust should also affect interpersonal tracking. Specifically, in addition to tracking strangers more than friends, tracking should co-vary with levels of closeness. People should more heavily track those they are not at all close to, relative to those they are moderately close to. And, people should more strictly track those they are moderately close to than those they are extremely close to.

To date, many studies have tested tracking between strangers and friends (e.g., Clark, 1981; Mills & Clark, 1994; Shackelford & Buss, 1996; Walker, 1995; Xue & Silk, 2012). And, as expected, findings have unanimously shown that people track strangers at a higher rate than they do friends. To my knowledge, however, previous studies have not extended their investigation to specifically examine the effect of closeness on tracking. Thus, the first aim of
this chapter is to replicate previous findings by (a) extending the stranger vs friend dichotomy used in all previous studies to closeness (a slightly different measure of how well one knows another), and (b) using different methods to test the effect of closeness on tracking (no studies to date have used survey items to assess behavioural intentions to track others). My prediction is as follows:

*Prediction 1.* Tracking of those one is not at all close to should be higher than tracking of those one is moderately close to; and, tracking of those one is moderately close to should be higher than tracking of those one is extremely close to (tracking: not at all close > moderately close > extremely close).

1.1.2. *Tolerance and closeness*

Tolerance for temporary imbalances is a key part of cooperative interactions (Bendor et al., 1991; Hruschka & Henrich, 2006). Behaving forgivingly towards interaction partners can be beneficial as it acts as a way to preserve valuable cooperative relationships. This is because one-time, or temporary, defection, may even out in the long-run of an ongoing relationship (Xue & Silk, 2012). As such, similar to tracking, tendency to be lenient of short-term unevenness may be dependent on whom one interacts with. Compared to friends, we might expect people to be more intolerant of imbalances with strangers because (a) strangers are more likely to have limited future interactions and thus, (b) there may be fewer opportunities to even out temporary imbalances. Such logic can be extended to closeness: relative to those one is close to, people should be more intolerant of imbalances with those one is less close to.

To my knowledge, only one study has specifically examined interpersonal tolerance (Xue & Silk, 2012). This study used an experimental economic game, the Ultimatum Game (Sigmund, Hauert, & Nowak, 2001), to examine behavioural tolerance between friends and strangers. In this
chapter, I attempt to replicate Xue and Silk’s (2012) findings of people exhibiting higher levels of tolerance for friends than strangers. It is of particular importance to replicate findings for tolerance because this aspect of interpersonal relationships has been understudied (as mentioned, only Xue & Silk (2012) have examined the effects of tolerance in friendships). My specific contribution will add to the existing literature in the following ways: (1) I will extend our knowledge of interpersonal dynamics by examining how tolerance is affected by closeness (not just strangers vs. friends), and (2) I will use a survey measure (as opposed a behavioural measure in the Ultimatum Game used by Xue and Silk, 2012) to assess tolerance. Thus, my second testable prediction is as follows:

**Prediction 2.** People should be more intolerant of temporary imbalances with those one is not at all close to relative to those one is moderately close to; and, intolerance of temporary unevenness should be higher among those one is moderately close to compared to those one is extremely close to (intolerance: not at all close > moderately close > extremely close).

1.1.3. Tracking, tolerance, and closeness

In the past two sections, I have laid out logic that shows closeness should have distinct effects on interpersonal tracking and tolerance. It is possible, however, that closeness, tracking, and tolerance may all be inter-related. Specifically, people should be more intolerant of temporary imbalances with those they are less close to because there are fewer opportunities for future interactions with such individuals, and thus a lowered likelihood of gaining repayment. If one is intolerant of inequality, then tracking is necessary. But, if a person is tolerant of inequality, then this person would not bother tracking. Consequently, this logic means that a
person’s level of intolerance could explain why she is more likely to track those she is less close to. Accordingly, this logic leads to my third prediction:

**Prediction 3.** The relationship between closeness and tracking should be mediated by intolerance (see Figure 1).

![Figure 1](image)

*Figure 1.* The predicted relationship between tracking, intolerance, and closeness. Intolerance is expected to mediate the effect of closeness on tracking.

The above prediction (prediction 3) is novel as no research, to my knowledge, has examined the inter-related effects of tracking, tolerance, and closeness.

1.2. Tracking, tolerance, and the social environment

As a social species, people are profoundly influenced by the social environment (e.g., Chen, 1995; Schug, Yuki, & Maddux, 2010; Yuki & Schug, 2012). Many features of the social environment (e.g., culture, social context, and social structure) affect our interactions with others (reviewed in Schug et al., 2010; Yuki & Schug, 2012). A key aspect of the social environment that affects interpersonal relationships, however, is the notion of relational mobility (Falk, Heine, Yuki, & Takemura, 2009; Schug, Yuki, Horikawa, & Takemura, 2009; Schug et al., 2010; Yuki et al., 2007). Relational mobility refers to the availability of partners and opportunities for
individuals to voluntarily form and maintain new partnerships. Social environments with high relational mobility allow individuals the freedom to terminate undesirable partnerships and easily find others to bond with. On the other hand, less relationally mobile environments are characterized by few available partners and difficulty in partner switching.

Although relatively new, the notion of relational mobility has been used to explain various findings in cross-cultural interpersonal differences. For example, studies have consistently shown that North Americans enjoy higher levels of relational mobility than East Asians (for a review, see Schug et al., 2009 and Yuki & Schug, 2012). And, such differences in relational mobility have explained differences in homophily (Schug et al., 2009) as well as self-disclosure behaviours between friends (Schug et al., 2010).

Relational mobility could also affect interpersonal tracking and tolerance. Specifically, people should upregulate levels of tracking when there are greater opportunities to invest in other relationships (i.e., high relational mobility). This is because monitoring the behaviours of others could allow individuals to assess if partnerships are favourable enough to maintain. In relationally mobile environments, the costs of finding new partners are lowered, and thus increased monitoring of relationships partners allows one to gain the necessary information to ensure the benefits of partnerships outweigh the costs. Tracking is expected to be reduced in low relational mobile environments because regardless of whether or not partners are reciprocating at threshold levels, the cost of finding other partners is extremely high. Thus, in such non-mobile environments, people may be more likely to stay in unsatisfactory relationships (e.g., Schug et al., 2009).

Similarly, people should be more intolerant of short-term imbalances when partner switching is easy because of a larger pool of available partners (i.e., high relational mobility).
Intolerance for imbalances should increase because people can easily find more symmetrical partnerships in high relationally mobile environments. The opposite, however, would be true for societies with lower relational mobility. The lack of available partners changes the costs and benefits of partner search such that costs of one-time, or temporary, defection would be less than the combined costs of ending a friendship and searching for a new partnership.

Thus, the above logic leads to my fourth and fifth prediction:

**Prediction 4.** People should engage in higher levels tracking when their immediate social environment is highly relationally mobile.

**Prediction 5.** People should be more intolerant of temporary imbalances when their social environment includes a large pool of available partners (i.e., high relational mobility).

The fourth and fifth predictions of this chapter are the first (to my knowledge) to examine the impact of relational mobility on interpersonal tracking and tolerance. Thus, these predictions are novel contributions to this field of study.

### 1.3. The link between stable preferences for outcome distribution and tracking

Cooperation is the basis of all relationships, and thus, factors that effectively predict cooperation can have value in understanding interpersonal dynamics. One such factor is social value orientation (SVO), defined as stable preferences for distributions of outcomes between oneself and others (Brucks & Van Lange, 2007; De Cremer & Van Lange, 2001; Van Lange, 1999; Van Lange & Kuhlman, 1994). Some individuals tend to prefer equal distributions of outcomes, whereas others prefer unequal distributions. There are three social value orientations: (1) prosocials prefer equality; (2) egoists prefer to gain more than others; and (3) competitors prefer to maximize their relative advantage over others. These orientations can be further
categorized as prosocials and proselfs, which constitute egoists and competitors (Van Lange & Kuhlman, 1994).

Social value orientation has been widely investigated and linked to cooperation. For instance, SVO is predictive of strategies in several laboratory social dilemmas, such as the prisoner’s dilemma, the public goods dilemma, and the commons dilemma (e.g., Balliet, Parks, & Joireman, 2009; De Cremer & Van Lange, 2001; van Dijk, De Cremer, & Handgraaf, 2004). Moreover, SVO also predicts real-life acts of cooperation, like pro-environmentalism (e.g., Joireman, Van Lange, & Van Vugt, 2004) and charitable giving (Van Lange, Bekkers, Schuyt, & Van Vugt, 2007).

In terms of interpersonal dynamics, a majority of research has focused on the effect SVO has on relational bargaining (e.g., van Dijk et al., 2004), willingness to sacrifice within relationships (Van Lange, Agnew, Harink, & Steemers, 1997a), commitment (Van Lange et al., 1997a), and reciprocity (De Cremer & Van Lange, 2001; Parks & Rumble, 2001). To date, however, I am unaware of research that investigates the link between SVO and interpersonal tracking. This is surprising, given that clear predictions of interpersonal tracking can be derived from differences in SVO. Because SVO is based on preferences for outcomes between oneself and others, I expect prosocials and proselfs to differ in whom (themselves or others) they track in a relationship. Specifically, because proselfs prefer to maximize their own gains within a relationship, proselfs (relative to prosocials) should be highly concerned with tracking the behaviours of others. This is because tracking others allows proselfs the necessary information to decipher if such a relationship is either worth continuing (if benefits outweigh the costs) or terminating (if costs exceed returned benefits). Prosocials, however, desire maximized joint
outcomes and are concerned with equality. And thus, compared to proselfs, prosocials should be more prone to self-tracking to ensure they bring an equal and fair share to a reciprocal friendship.

Together, the above logic leads to my last goal of this chapter. I plan to add novel knowledge about SVO and interpersonal dynamics by examining a potential link between SVO and interpersonal tracking. Specifically, I will test two predictions:

*Prediction 6.* Prosocials (i.e., those who prefer maximized joint outcomes) will engage in more self-tracking than proselfs (i.e., those who prefer maximizing own outcomes) to ensure they contribute equally to a relationship.

*Prediction 7.* Compared to prosocials, proselfs should engage in more other-tracking to ensure relationships allow them to maximize their own gains.

### 1.4. The present research

The current research sought to add to the literature by testing seven predictions related to interpersonal dynamics: The first two predictions are predominantly replications of previous findings, whereas the latter five predictions have never been tested (to my knowledge). To test predictions, three studies were conducted. The first study tested the first five predictions. This study was conducted in the research laboratory, and required participants to complete an experimental economic game known as the Ultimatum Game (Sigmund et al., 2001) to allow for a behavioural measure of tracking and tolerance. Data from this study, however, were non-significant because of potential issues with the measures used from the Ultimatum Game (See Supplementary Information for a thorough discussion of these issues). Thus, this study was included in the thesis for posterity and is presented in supplementary information.
For the second and third study, different design and methods were employed. Specifically, participants completed online surveys with questionnaires to examine all seven predictions related to tracking and tolerance. Study 2 used a student sample to test the predictions. The third and final study sought to replicate findings from study 2 using a non-student population.

2. STUDY 1

As mentioned, data from study 1 did not effectively test predictions because of potential problematic issues with the measures of tracking and tolerance (See Supplementary Information for an in-depth discussion of issues). Consequently, the methods, results, and discussion for this study were included in this thesis merely as a means to record this research. This study is presented in supplementary information.

3. STUDY 2

The purpose of study 2 was to test all seven predictions. First, I attempted to replicate previous findings (e.g., Clark, 1981; Mills & Clark, 1994; Shackelford & Buss, 1996; Walker, 1995; Xue & Silk, 2012) by showing that people engaged in more tracking of those they are less close to. Second, I aimed to replicate Xue and Silk’s (2012) findings that people are more intolerant of imbalances with those they are less close to. Third, I examined a novel prediction regarding the interplay between tracking, tolerance, and closeness: I tested if the relationship between closeness and tracking was mediated by intolerance. Fourth, I investigated if a greater availability of social partners (i.e., high relational mobility) was associated with more intolerance of imbalances. Fifth, I assessed if a greater availability of partners (i.e., high relational mobility)
was related to more tracking behaviours. Sixth, I examined if prosocials engaged in more self-tracking than proselfs. And lastly, I investigated if proselfs engaged in more tracking of others (i.e., strangers or friends) than prosocials. All of the predictions regarding relational mobility (predictions 4 and 5) and social value orientation (predictions 6 and 7) are novel and have not been tested by other researchers.

3.1. Methods

3.1.1. Participants

I recruited participants \((n = 243)\) from the University of Guelph psychology participant pool. Of the 243 participants, 51.8% identified as female \((n = 126)\) and 46.5% identified as male \((n = 113)\). Four participants did not identify their gender. Participants’ ages ranged from 17 to 25 years old; the mean age was 18.5 years with a standard deviation of 1 year.

3.1.2. Materials and design

The study was comprised of two main sections. In the first section, participants completed an assessment of perceived relational mobility (i.e., availability of partners and ease of forming new relationships) and a measure of social value orientation (i.e., stable individual differences in preferences for resource distribution). For the second section, participants completed questionnaires to examine closeness, tracking, and intolerance. In this section, participants were explicitly instructed to either keep a close friend or an acquaintance in mind when answering questions (see Table 1). I used a between-subjects design: half of the participants answered questions with a close friend in mind \((n = 139)\) while the other half completed questionnaires with an acquaintance in mind \((n = 104)\). Having participants answer questions with a close friend or acquaintance in mind ensured variation in scores for closeness, which could then be used to examine predictions.
Table 1.

Descriptions used to define relationship types to participants.

<table>
<thead>
<tr>
<th>Relationship type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close friend</td>
<td>“A same-sex individual that you have known for several years and are emotionally close to. This person is someone you are very friendly with; someone you would characterize as a close friend. This person should not be a family member or romantic/sexual partner.”</td>
</tr>
<tr>
<td>Acquaintance</td>
<td>“A same-sex individual that you have known for less than six months and are not particularly emotionally close to. This person is someone you are somewhat friendly with; someone you would characterize as an acquaintance (i.e., not a close friend). This person should not be a family member or romantic/sexual partner.”</td>
</tr>
</tbody>
</table>

The presentation order of measures (i.e., measures of relational mobility first, followed by SVO, then measures of closeness, and ending with measures of tracking and intolerance) was purposefully not counterbalanced. This is because the order of measures should follow the order for which factors logically or conceptually impact the dependent variables (DVs; i.e., tracking and tolerance; see Figure 2). In this chapter, three concepts (i.e., relational mobility, SVO, and closeness) were predicted to impact one of two (or both) DVs. Logically, external factors, such as aspects of the social environment (e.g., relational mobility: Schug et al., 2009) and stable preferences for outcome distributions (i.e., SVO), impact the way in which individuals develop feelings of interpersonal closeness within a relationship context. As such, these concepts were presented before measures of closeness. Feelings of closeness then impact the decision to engage in tracking or act tolerantly towards imbalances. So, measures of closeness were presented before measures of tracking and tolerance (see Figure 2).
Figure 2. The theoretical link between relational mobility, SVO, closeness, and tracking and tolerance (and the justification for the presentation order of measures).

3.1.2.1. Relational Mobility Scale

Participants completed the Relational Mobility Scale (Yuki et al., 2007), a measure of perceived availability of social partners and ease of forming new relationships. The 12-item measure required participants to rate (on a seven-point scale: 1 = strongly disagree, 7 = strongly agree) the accuracy of statements in describing people in their immediate social environment (i.e., school, workplace, town, neighbourhood, etc.). Examples of items include “people can choose who they interact with” and “there are few opportunities for people to form new friendships.”
3.1.2.2. Social Value Orientation Triple-Dominance Measure

The Social Value Orientation Triple-Dominance Measure (Van Lange, Otten, de Bruin, & Joireman, 1997b) was included to determine participants’ social value orientation. For this scale, participants completed nine hypothetical forced-choice options regarding point distribution between themselves and another individual (this individual was not specified and was solely referred to as ‘Other’). For each of the nine items, participants chose between a prosocial, individualistic, and competitor option of point distribution. The prosocial option allowed for a completely equal distribution of points (e.g., participant receives 500 and Other receives 500). The individualistic option allowed participants to maximize their outcome (e.g., participant receives 550 and Other receives 300). And the competitor option allowed participants to maximize the difference in point distribution between themselves and others (e.g., participant received 500 and Other receives 100). Social value orientation was determined by participants selecting six or more decisions consistent with either a prosocial, individualistic, or competitor orientation.

3.1.2.3. Measures of closeness

To examine closeness, I used two measures. The Subjective Closeness Index (Berscheid, Snyder, & Omoto, 1989) comprised of two items: Participants rated their closeness to the target individual (i.e., close friend or acquaintance) relative to (1) all of their other relationships and (2) relative to what they know about other people’s relationships using a seven-point scale (i.e., 1 = not at all close; 7 = extremely close). Additionally, the Inclusion of Other in Self Scale (Aron, Aron, & Smollan, 1992) was a second measure of closeness. This scale consisted of one question that presented participants with seven images (Figure 3). Images were Venn diagrams with one circle representing the self and one circle representing the other (in this case, participants we
instructed that the other was either a close friend or acquaintance). Each Venn diagram had varying levels of overlap between the self-circle and the other-circle. Participants selected the Venn diagram that best described their relationship to their target individual (i.e., close friend or acquaintance).

![Venn Diagrams](image)

*Figure 3. The Inclusion of Other in Self Scale (Aron et al., 1992), one of two measures used to assess closeness.*

### 3.1.2.4. Measures of self- and other-tracking

Tracking was measured with a modified version of the Revised Underbenefitting and Overbenefitting Exchange Orientation Scale (Murstein, Wadlin, & Bond Jr., 1987; Sprecher 1998). The underbenefitting version of this scale assessed tracking of others (i.e., close friend or acquaintance; e.g., “I usually do not forget if a close friend/ an acquaintance owes me a favour”). On the other hand, the overbenefitting version used the same questions to examine tracking of the self (i.e., “I usually do not forget if I owe a close friend/an acquaintance a favour”). Each
version of the scale had eight-items. For each item, participants rated their level of agreement using a five-point scale (i.e., 1 = strongly disagree; 9 = strongly agree).

3.1.2.5. Measure of intolerance

To examine intolerance, I used a modified version of the Reciprocity Scale (i.e., Xue, 2013). This 4-item scale required participants to rate (on a nine-point scale: 1 = not at all likely; 9 = extremely likely) their likeliness to ignore or dismiss an individual (i.e., either a close friend or acquaintance) who does not reciprocate various forms of support (e.g., providing personal advice, borrowing money).

3.1.3. Data pre-processing

The twelve items on the Relational Mobility Scale had appropriate levels of internal consistency ($\alpha = .73$) and were therefore aggregated. Items on the Social Value Orientation Triple-Dominance Measure were also highly internally consistent ($\alpha = .97$) and aggregated. Most participants were prosocial ($n = 156; 64.2\%$), with fewer participants identifying as individualists ($n = 69; 28.4\%$) and competitors ($n = 18; 7.4\%$). Individualists and competitors were combined to represent a proself orientation ($n = 87; 35.8\%$). Researchers can almost never investigate competitors as a separate group because this SVO sub-type is too rare to allow sufficient power for analyses. As such, combining individualists and competitors to a proself SVO type is common practice (e.g., De Cremer & Van Lange, 2001; Joireman et al., 2003; Van Lange et al., 2007). For this study, analysis that compares prosocials, egoists, and competitors can be found in Supplementary Information..

The two closeness measures, the Subjective Closeness Index and the Inclusion of Other in Self Scale, were highly correlated and combined. The three items from these measures had high levels of internal consistency ($\alpha = .94$). For a better understanding of findings, the closeness
variable was divided into three categories: participants reported either being not at all close (i.e., score of 1-2.5 out of 7, n = 66), moderately close (i.e., score of 3-5.5 out of 7, n = 113), or extremely close (i.e., score of 6-7 out of 7, n = 56) to the target individual (i.e., close friend or acquaintance).

Items on the modified version of the Revised Underbenefitting Exchange Orientation scale (α = .78), which assessed tracking of others, had appropriate levels of internal consistency and were aggregated. Similarly, the eight items used to assess tracking of oneself (i.e., the modified version of the Revised Overbenefitting Exchange Orientation scale) also had appropriate levels of internal consistency (α = .73) and were combined. Intolerance items from the modified version of the Reciprocity Scale showed appropriate levels of internal consistency (α = .79) and were aggregated.

3.2. Results

3.2.1. Tracking and closeness

To examine the impact of closeness on tracking behaviour, I conducted a one-way ANOVA. As predicted, I found a main effect of closeness on tracking, $F(2, 232) = 4.45, p = .01$, partial $\eta^2 = .04$ (Figure 4A). Tukey HSD post-hoc tests revealed that people tracked those they were not close to ($M = 5.36, SE = .14$) significantly more than those they are extremely close to ($M = 4.72, SE = .19, p = .01, \text{Cohen’s } d = .50$). But, tracking in the moderately close condition ($M = 4.96, SE = .11$) did not significantly differ from the not close ($p = .09, \text{Cohen’s } d = .35$) and extremely close condition ($p = .44, \text{Cohen’s } d = .18$). Thus, although imperfect, findings support predictions that people engage in more tracking of those they are less close to.
3.2.2. *Intolerance and closeness*

I conducted a one-way ANOVA to examine the effect of closeness on intolerance. As predicted, I found a main effect of closeness on intolerance ratings, $F(2, 232) = 19.64, p < .001$, partial $\eta^2 = .15$ (Figure 4B). Tukey HSD post-hoc tests revealed that people were significantly more intolerant of those they are not close to ($M = 5.08, SE = .25$) than those they were moderately close ($M = 3.77, SE = .15, p < .001$, Cohen’s $d = .71$) and extremely close to ($M = 3.17, SE = .22, p < .001$, Cohen’s $d = 1.03$). But, intolerance in the moderately close condition did not significantly differ from the extremely close condition ($p = .10$, Cohen’s $d = .13$).
3.2.3. The mediating effect of intolerance on the association between closeness and tracking

To examine the mediating effect of intolerance on the relationship between closeness and tracking, I first conducted zero-order correlations (see Table 2). Next, I ran a simple mediation using the PROCESS macro model 4 in SPSS (Hayes, 2012). I followed recommended procedures by Preacher & Hayes (2004) and Hayes (2012). Not surprisingly, I found a significant total effect of closeness on tracking ($b = -.33, SE = .11, p < .01, CI_{95\%} = -.54$ to $.11$; path c in Figure 5). The direct effect was not significant ($b = -.10, SE = .11, p = .39, CI_{95\%} = -.32$ to .12; path c’ in Figure 5). The indirect effect, however, was significant as the lower and upper limits of confidence intervals did not include zero ($b = -.23, SE = .06, CI_{95\%} = -.36$ to -.13; paths a and b in Figure 5). Thus, as predicted, intolerance fully mediated the relationship between closeness and tracking (see Figure 5).
Table 2.

Descriptive statistics and zero-order correlations for variables in study 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Closeness</td>
<td>4.23</td>
<td>1.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Tracking</td>
<td>5.02</td>
<td>1.24</td>
<td>-.18**</td>
<td></td>
</tr>
<tr>
<td>3. Intolerance</td>
<td>3.99</td>
<td>1.89</td>
<td>-.36**</td>
<td>.37**</td>
</tr>
</tbody>
</table>

Note: ** p<.01

Figure 5. Path coefficients for a simple mediation analysis on tracking for study 2.

Unstandardized regressions coefficients are presented. The grey path represents the effect of closeness on tracking before intolerance is included as a mediator. Black paths indicate the final model with intolerance mediating the link between closeness and tracking.

Note: ** p<.01; *** p<.001.

3.2.4. Relational mobility, tracking, and intolerance

Unexpectedly, relational mobility (i.e., availability of partners) was neither related to raw tendency to track ($r(235) = .03, p = .63$) nor raw tendency to be intolerant ($r(235) = .04, p = .50$). These results cannot be explained by a lack of variation in score for perceived relational mobility.
3.2.5. **Social value orientation and tracking**

To examine if social value orientation (i.e., preferences for resource distribution) affected tracking of self and others, I conducted a three-way split plot ANOVA with social value orientation (prosocial or proself) and partner (close friend or acquaintance) as the between subjects measures and tracking (self or other) as the within-subjects measure. As predicted, I found a significant interaction between tracking and social value orientation, $F(1, 237) = 32.04$, $p < .001$, partial $\eta^2 = .12$ (Figure 6). Consistent with predictions, post-hoc t-tests showed that prosocials ($M = 6.33$, $SE = .07$) engaged in more *self*-tracking than proselfs ($M = 5.80$, $SE = .16$), $t(240) = 3.27$, $p < .001$, Cohen’s $d = .50$. Furthermore, proselfs ($M = 6.03$, $SE = .21$) engaged in more *other*-tracking than prosocials ($M = 5.22$, $SE = .09$), $t(239) = 3.92$, $p < .001$, Cohen’s $d = .60$. Moreover, in line with predictions of closeness and tracking, people tracked acquaintances ($M = 5.98$, $SE = .10$) significantly more than friends ($M = 5.69$, $SE = .10$), $F(1, 237) = 4.20$, $p = .04$, partial $\eta^2 = .02$. Surprisingly, people also tracked themselves ($M = 6.05$, $SE = .08$) more than others ($M = 5.62$, $SE = .10$), $F(1, 237) = 13.44$, $p < .001$, partial $\eta^2 = .05$.

I did not find a significant main effect of social value orientation, $F(1, 237) = 1.27$, $p = .26$, partial $\eta^2 = .01$. Furthermore, I did not find a significant interaction between social value orientation and partner ($F(1,237) = 2.02$, $p = .16$, partial $\eta^2 = .01$) or a significant interaction between tracking and partner, $F(1, 237) = .07$, $p = .79$, partial $\eta^2 = .00$. The interaction between tracking, social value orientation, and partner was also non-significant, $F(1, 237) = 1.00$, $p = .32$, partial $\eta^2 = .00$. 
4. STUDY 3

The purpose of study 3 was to replicate findings with a non-student population. This study used identical methods and design to the first study. Results from this study are essentially the same as those presented in study 2.

4.1. Methods

4.1.1. Participants

Participants were 274 workers recruited from Crowdflower, a crowdsourcing site similar to AMT (but allow researchers residing outside of the USA to collect data). Of the 274 participants, 58.7% identified as female ($n = 161$) and 41.2% identified as male ($n = 113$). Participants’ ages ranged from 18 to 80 years old; the mean age was 36.4 years with a standard deviation of 13.4 years.

Only participants living in USA and those who were fluent in English were included. The ‘maximum judgement per contributor’ was set to 1, so that each participant could only complete...
the survey once. Level settings were set to level 3 (out of a possible 1, 2, or 3), to ensure only well-performing participants were included. Participants were paid $0.40/USD for a 15 minute study (based on other crowdsourcing rates, Paolonni et al., 2010).

4.1.2. Materials and design

This study used identical methods, design, and materials as study 2.

4.1.3. Data pre-processing

I aggregated the Relational Mobility Scale because items had appropriate levels of internal consistency ($\alpha = .76$). The nine items on the Social Value Orientation Triple-Dominance Measure were also highly internally consistent ($\alpha = .96$) and combined. Most participants were prosocial ($n = 174; 71\%$), with others being proself ($n = 71; 29\%$). Of the 71 participants categorized as proself, 28 (11%) were competitors and 43 (17.5%) were egoists. As with Study 2, comparisons between prosocials, egoists, and competitors are in Supplementary Information.

The Subjective Closeness Index and the Incclusion of Other in Self Scale were highly correlated. I combined the three items from these closeness measures because they had high levels of internal consistency ($\alpha = .94$). Similar to study 2, scores on the closeness measures were categorized into three groups: not at all close (i.e., score of 1-2.5 out of 7, $n = 99$), moderately close (i.e., score of 3-5.5 out of 7, $n = 34$), or extremely close (i.e., score of 6-7 out of 7, $n = 141$).

Items on the modified version of the Revised Underbenefitting Exchange Orientation scale ($\alpha = .74$) and the Overbenefitting Exchange Orientation scale ($\alpha = .74$), which were used to examine other-tracking and self-tracking respectively, had appropriate levels of internal consistency and were amalgamated. I aggregated the four items from the modified version of the
Reciprocity Scale, which measured intolerance, because items showed appropriate levels of internal consistency ($\alpha = .81$).

4.2. Results

4.2.1. Tracking and closeness

I conducted a one-way ANOVA to examine the effect of closeness on tracking behaviour. I found a main effect of closeness, $F(2, 268) = 7.81, p < .001$, partial $\eta^2 = .06$ (Figure 7A). Tukey post-hoc tests revealed that people tracked those they are not close to ($M = 5.56, SE = .12$) significantly more than those they are moderately close to ($M = 4.94, SE = .11, p < .001$, Cohen’s $d = .50$) and those they are extremely close to ($M = 4.85, SE = .26, p = .02$, Cohen’s $d = .53$). Tracking in the moderately close condition did not significantly differ from the extremely close condition ($p = .94$, Cohen’s $d = .07$).

4.2.2. Intolerance and closeness

To investigate the effect of closeness on intolerance I conducted a one-way ANOVA. As predicted, I found a main effect of closeness on intolerance ratings, $F(2, 271) = 9.28, p < .001$, partial $\eta^2 = .06$ (Figure 7B). Tukey post-hoc tests revealed that people are significantly more intolerant of those they are not close to ($M = 4.92, SE = .18$) compared to those they are extremely close to ($M = 3.38, SE = .34, p < .001$, Cohen’s $d = .82$). Intolerance in the moderately close condition ($M = 4.40, SE = .15$) was not significantly different from the not at all close condition ($p = .08$, Cohen’s $d = .29$), but was significantly higher than the extremely close condition ($p = .01$, Cohen’s $d = .55$).
Figure 7. The effect of closeness on tracking (A) and intolerance (B) for study 3. Error bars represent the standard error of the mean.

4.2.3. The mediating effect of intolerance on the association between closeness and tracking

Before conducting a mediation analysis, I examined the zero-order correlations (see Table 3). I examined mediation using the PROCESS macro model 4 in SPSS (Hayes, 2012), following procedures by Preacher & Hayes (2004) and Hayes (2012). As expected, I found a significant total effect of closeness on tracking ($b = -.15, SE = .05, p < .01, CI_{95\%} = -.23$ to $.06$;
The direct effect of closeness on tracking was not significant \((b = -.07, SE = .04, p = .11, CI_{95\%} = -.15 \text{ to } .02; \text{ path } c' \text{ in Figure 8})\). The lower and upper limits of confidence intervals did not include zero, so the indirect effect of closeness on tracking through intolerance was significant \((b = -.08, SE = .02, CI_{95\%} = -.12 \text{ to } -.04; \text{ paths } a \text{ and } b \text{ in Figure 8})\). Thus, as predicted, intolerance fully mediated the relationship between closeness and tracking (see Figure 8).

**Table 3.**

Descriptive statistics and zero-order correlations for variables in study 3.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(M)</th>
<th>(SD)</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Closeness</td>
<td>3.64</td>
<td>1.72</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2. Tracking</td>
<td>5.12</td>
<td>1.36</td>
<td>-.22**</td>
<td>-</td>
</tr>
<tr>
<td>3. Intolerance</td>
<td>4.46</td>
<td>1.87</td>
<td>-.23**</td>
<td>.39**</td>
</tr>
</tbody>
</table>

*Note: ** \(p < .01\)

**Figure 8.** Path coefficients for a simple mediation analysis on tracking for study 3.

Unstandardized regressions coefficients are presented. The grey path indicates the effect of closeness on tracking when intolerance is not included in the model. Black paths represent the final model showing that intolerance fully mediate the link between closeness and tracking.

*Note: ** \(p < .01\); *** \(p < .001\).
4.2.4. *Relational mobility, tracking, and intolerance*

As in Study 2, relational mobility (i.e., availability of partners) was neither related to raw tendency to track ($r(274) = -.01, p = .91$) nor raw tendency to be intolerant ($r(274) = -.04, p = .55$). These results cannot be explained by a lack of variation in perceived relational mobility.

4.2.5. *Social value orientation and tracking*

To examine if prosocials and proselfs engage in different patterns of tracking others and self, I conducted a three-way split plot ANOVA with social value orientation (prosocial or proself) and partner (friend or acquaintance) as the between subjects factors and tracking (self or other) as the within-subjects factor. As predicted, I found a significant interaction between tracking and social value orientation, $F(1, 240) = 16.39, p < .001$, partial $\eta^2 = .06$ (Figure 9). Post-hoc tests showed that prosocials ($M = 6.39, SE = .08$) engaged in more *self*-tracking than proselfs ($M = 6.07, SE = .14$), $t(242) = 2.05, p = .04$, Cohen’s $d = .30$. Additionally, proselfs ($M = 5.50, SE = .14$) engaged in more *other*-tracking than prosocials ($M = 5.00, SE = .10$), $t(242) = -2.60, p = .01$, Cohen’s $d = .40$. Moreover, as predicted, people tracked acquaintances ($M = 5.92, SE = .10$) more than friends ($M = 5.54, SE = .10$), $F(1, 240) = 7.43, p = .007$, partial $\eta^2 = .03$. People also tracked themselves ($M = 6.21, SE = .08$) more than others ($M = 5.24, SE = .09$), $F(1, 240) = 108.52, p < .001$, partial $\eta^2 = .31$.

No main effect of social value orientation was found, $F(1, 240) = .15, p = .70$, partial $\eta^2 = .00$. Also, I did not find an interaction between social value orientation and partner ($F(1,240) = .01, p = .92$, partial $\eta^2 = .00$) or an interaction between tracking and partner, $F(1, 240) = 3.40, p = .07$, partial $\eta^2 = .01$. And, the three-way interaction was also non-significant, $F(1, 240) = 4.45, p = .09$, partial $\eta^2 = .02$. 
Figure 9. The interaction between social value orientation and type of tracking for study 3. Error bars represent the standard error of the mean.

5. GENERAL DISCUSSION

The aim of the current investigation was to extend our knowledge of interpersonal tracking and tolerance. With two main studies, two replicated and five novel predictions about three main components of tracking and tolerance were tested. Four main findings were discovered. First, as expected, I was able to replicate previous findings by illustrating that closeness had a significant effect on monitoring others and tolerating temporary imbalances. Second, in line with predictions, tolerance mediated the effect of closeness on tracking. Contrary to predictions, the third line of inquiry revealed that tracking and tolerance was not significantly associated with relational mobility (i.e., availability of partners and ease of partner switching). And lastly, consistent with predictions, prosocials and proselfs significantly differed in the amount of self- and other-tracking they engaged in. Thus, overall, this chapter yielded two replicated findings (predictions 1 and 2: people more readily track and are more intolerant of those they are not close to) and two novel findings (i.e., prediction 3: tolerance mediates the
relationship between tracking and closeness; prediction 6 and 7: SVO relates to who one tracks in a relationship).

5.1. Tracking, intolerance, and closeness

Overall, I found support for three predictions regarding the effect of closeness on tracking and intolerance. First, closeness significantly predicted tracking, but not entirely in the expected linear pattern. Specifically, across both studies, people more carefully tracked those they were not close to relative to those they were extremely close to. In line with predictions, study 3 showed that people significantly increased tracking of those they were not close to versus those they were moderately close to. But, this effect was not replicated in study 2. Furthermore, both studies revealed no difference in tracking between those one is moderately close to and extremely close to. Second, findings generally supported predictions for the effect of closeness on intolerance. In study 2, people were significantly more intolerant of imbalances with those they were not close to relative to those they were moderately close to. Although not significant, I found a trend for this pattern of results in the last study. When comparing intolerance ratings for moderately close individuals and extremely close individuals, I found significant results in the predicted direction for the final study and a trend in the same direction for the second study. And, lastly, as predicted, intolerance fully mediated the effect closeness had on tracking for both studies.

Together, my results have several implications. First, my findings serve as a replication, using different methods, for previous work showing that people closely track those they do not know well, such as strangers (e.g., Clark, 1981; Clark & Mills, 1979; Mills & Clark, 1994). My findings are unique, however, because they suggests that people do not necessarily alter their level of monitoring when interacting with those they are moderately close to versus those they
are extremely close to. So, although self-disclosure and frequency of contact tend to increase linearly with emotional closeness (e.g., Roberts & Dunbar, 2011; Schug et al., 2010), interpersonal tracking may operate in a more dichotomous fashion. Specifically, people may be more inclined to only upregulate monitoring of those they are unfamiliar with relative to those they have had some past interactions with. This provides additional evidence that tracking could function as a means of avoiding exploitation by allowing one to better predict potential future interactions with an unknown individual (Xue & Silk, 2012).

Although people more carefully tracked those they were not at all close to, some level of tracking still occurred among those one feels moderately and extremely close to. So, even though tracking predominantly occurs among those we do not know, people may be unable to reliably predict the behaviours of casual and close friends, and thus feel the need to monitor, at least to some degree, the behaviours of these people. To my knowledge, my results are the first to show that tracking occurs among friends. As mentioned, several studies suggest that friends do not track benefits (e.g., Clark & Mills, 1979; Mills & Clark, 1994; Shackelford & Buss, 1996). Xue and Silk (2012) provided some evidence that tracking occurred among friends, but their methodology could have affected results by altering the natural dynamic between friends. Specifically, the authors used the Ultimatum Game (Sigmund et al., 2001), which created a conflict of interest because each individual played a specific role (i.e., proposer or responder) that required defection to maximize benefits. Such conflict of interest does not accurately reflect friendships, because platonic bonds are based on similarities and common interest (Hruschka, 2010) such that defection is not beneficial (Nowak & May, 1992). Thus, my results are the first to assess tracking among friends in a natural setting (minimal interference of the natural
interpersonal dynamics by using questionnaires instead of laboratory experiments) and provide data that tracking actually occurs among friends.

I also found support for friends being tolerant of short-term imbalances. This finding, along with those showing that friends still tracked each other, provide further support for Xue and Silk’s (2012) claims regarding previous work on interpersonal dynamics. Specifically, the authors found evidence to support their claims that prior studies confounded findings of people not carefully tracking friends (e.g., Clark, 1981; Clark & Mills, 1979; Mills & Clark, 1994) with the likelihood that tracking occurs among friends, but short-term imbalances are tolerated.

Together, these results are consistent with the fact that people are often aware of how balanced their current friendships are (Shackelford & Buss, 1996; Walker, 1995), presumably because they still monitor the behaviours of friends. Furthermore, some degree of tracking among friends makes it feasible for people to exercise their strong preference for maintaining balanced, as opposed to imbalanced, relationships (Shackelford & Buss, 1996; Walker, 1995; Winn, Crawford, & Fisher, 1991). And, being tolerant of imbalances allows some leeway in mutually beneficial relationships.

Unlike tracking, intolerance did not appear to work dichotomously. Instead, I found evidence that intolerance of temporary imbalances decreased linearly with closeness. These results provide additional support for the notion that tracking and tolerance serve different interpersonal functions (e.g., Xue & Silk, 2012). Specifically, the (negative) linear link between intolerance and closeness makes sense given that friendships are based on giving and receiving benefits over several interactions. Given this type of interaction, short-term imbalances are bound to arise, but may become balanced over time. Assuming that closeness is a mechanism to maintain relationships that offer inclusive fitness benefits (Ackerman, Kenrick, & Schaller, 2007;
Korchmaros & Kenny, 2001; Lieberman, Tooby, & Cosmides, 2007), tolerance may serve to ensure such relationships do not decay or collapse over time. As such, the closer one feels to person X, the more likely one’s relationship with person X is highly valuable, and thus beneficial to preserve and maintain despite temporary shifts in payoffs.

A final implication of my results is that intolerance mediated the effect of closeness on tracking. These results suggest that tracking predominantly occurs when people are intolerant of temporary imbalances or inequity within a relationship. Or viewed differently, people do not track relationship partners when they are willing to tolerate asymmetry within such relationships. To my knowledge, this is the first line of evidence to show that tolerance mediates the relationship between closeness and tracking. And these results shed light on the specific way in which tracking and tolerance are interrelated and play out in interpersonal dynamics.

5.2. Relational mobility does not affect tracking or tolerance

Surprisingly, findings across both studies showed that tracking and tolerance were not affected by perceived differences in relational mobility, i.e. the availability of partners and opportunities to form new relationships. These findings cannot be explained by a lack of variation in the data for perceived relational mobility, tracking, or tolerance (both studies revealed highly varied data for relevant variables). So, interestingly, my results suggest that changes to the costs and benefits of switching partners might not affect level of interpersonal tracking or tolerance.

Although my results are not as predicted, these findings have implications for cross-cultural understandings of interpersonal dynamics. This is because relational mobility has been invoked to explain several culture-specific behaviours within friendships. For example, East Asians tend to share less personal information with friends than North Americans (Chen, 1995;
Kito, 2005; Ting-Toomey, 1991). People in East Asian societies, however, generally report significantly lower levels of relational mobility than North Americans. And, studies have shown that cultural differences in self-disclosure behaviours can be explained by perceptions of relational mobility: People might increase self-disclosure behaviours in highly mobile societies (i.e., more opportunities to find partners), such as the United States, because sharing information signals commitment in a relationship and produces incentives for people to stay in their current relationship (Schug et al., 2010). In a similar vein, the lack of findings linking relational mobility with tracking and tolerance suggests that only specific elements of interpersonal relationships differ across cultures. And so, despite strong theoretical reasoning to believe that a decrease in intolerance and monitoring would occur when the costs of switching partners is high (i.e., low relationally mobile societies), my results suggests that tracking and tolerance do not differ across cultures.

5.3. Social value orientation and tracking

As predicted, social value orientation (stable preferences for distribution of points or resources between self and other) was linked to tracking. Specifically, those who preferred maximizing joint outcomes (i.e., prosocials) engaged in more self-tracking than those who preferred maximizing their own outcomes (i.e., proselfs). But, the opposite pattern was found for other-tracking; proselfs more carefully tracked the behaviours of others than prosocials. These results are consistent with the literature and have several implications.

One implication from my results has to do with the measures used to assess tracking. Recall that tracking was assessed with select items (i.e., items that specifically concerned tracking) from the modified exchange orientation scale (Sprecher, 1992; 1998) such that self-tracking used items from the overbenefitting exchange orientation subscale while other-tracking
items were from the underbenefitting exchange orientation subscale (Sprecher, 1992; 1998). Given that predictions were confirmed, my findings essentially show that prosocials and proselfs have different exchange orientations (UEO; Murstein et al., 1987; Sprecher, 1998). Specifically, prosocials are high on overbenefitting exchange orientation (OEO), whereas proselfs are high on underbenefitting exchange orientation. Thus, on a theoretical level, one implication of my results is that the notion of social value orientation (SVO) overlaps, at least to some degree, with exchange orientation theory (EO; Murstein, Cerreto, & MacDonald, 1977; Murstein et al., 1987; Sprecher, 1998).

To further understand the link between SVO and EO and the implications of my findings, we must first understand what SVO and EO refer to. As we know, social value orientation refers to a stable preference for the distribution of resources, or outcomes, between oneself and another (e.g., Van Lange, 1999; Van Lange & Kuhlman, 1994). And, there are three main types of SVO, which can be further categorized into two orientations (i.e., prosocials and proselfs; Van Lange & Kuhlman, 1994). This conceptualization is strikingly similar to exchange orientation (EO), defined as the degree to which individuals believe equity is a fundamental component of relationships (Murstein et al., 1977; Mustein et al., 1987; Sprecher, 1998). EO can be distinguished by two types of orientations. That is, people can be concerned with equity in relationships for two main reasons. People high on underbenefitting exchange orientation (UEO) value equity in a relationship because they are concerned with receiving benefits from others (Sprecher, 1992; 1998; Sprecher & Schwartz, 1994). On the other hand, people high on overbenefitting exchange orientation (OEO) value equity because they are motivated to give back to others (Sprecher, 1992; 1998; Sprecher & Schwartz, 1994). These two EO share striking
similarities with prosocial and proself SVOs, and thus, it is unsurprising that my results show a link between SVO and EO.

Despite this obvious overlap between SVO and EO, however, the literature, to my knowledge, has not linked the two concepts together. It is unclear why these two concepts have yet to be compared and examined in relation to each other. My findings suggest that future research should invest the theoretical overlap between these two orientations and potentially reconceptualise each theory to incorporate similarities and/or highlight differences.

For now, however, my results have implications for the different ways in which prosocials and proselfs interact with relationship partners. Specifically, prosocials, like those high on OEO, may be more concerned with their own contributions to the relationship (Sprecher, 1992; 1998). And, thus, prosocials may more carefully self-track to ensure that their contributions to partnerships are adequate to sustain or maintain the relationship. On the other hand, proselfs, like those characterized by a high underbenefitting exchange orientation, are more egocentric in that they are highly concerned with their own gains within a relationship (Sprecher, 1998). So, proselfs may more carefully track others to ensure they receive adequate benefits from others to sustain the relationship. These differences have further implications on relationship satisfaction. Specifically, those high on OEO tend to have more satisfying romantic (Sprecher, 1998) and platonic relationships (Jones, 1991) than those high on UEO. Given the overlap between SVO and EO and my results, it is likely that similar patterns of relationship satisfaction exist for prosocials and proselfs. Such a link remains a fruitful avenue for future research.

My results are also consistent with prior SVO research by van Dijk and colleagues (2004). van Dijk and colleagues assessed how differences in SVO might affect bargaining within
the Ultimatum Game, an experimental economic game that involves one person offering another a portion of resources. The researchers found that proselves were more strategic in their interactions with others such that they adjusted the fairness of their offers based on the information recipients had. Specifically, when recipients had limited information, proselves were more likely than prosocials to take advantage of this situation by making unfair offers. van Dijk and colleagues’ findings thus illustrate that proselves are more manipulative than prosocials. This finding is consistent with my results given that people concerned with self-gain may resort to manipulative tactics to ensure they their needs are met (e.g., O’Connor & Carnevale, 1997; Nagler, Reiter, Furtner, & Rauthmann, 2014; Tenbrunsel, 1998).

5.4. Summary and conclusion

The current research investigated two replicated and five novel predictions related to interpersonal tracking and tolerance. Three key findings were obtained. First, my results replicated previous findings (i.e., Xue & Silk, 2012) in showing that people more closely track and have more intolerance for imbalances with those they are less close to. Second, I was able to show that intolerance mediated the link between tracking and closeness. Third, I presented novel effects showing that differences in SVO map on to predicted differences in self- and other-tracking.

Overall, these findings provide further insight into the many factors that shape the psychology of friendship. I hope my work inspires future lines of inquiry about the formation and maintenance of friendship, and the circumstances that affect the deterioration of platonic bonds. Moreover, I hope that my findings have real-life application to help people better strengthen their interpersonal bonds.
SUPPLEMENTARY INFORMATION

STUDY 1 METHOD AND RESULTS

Note: This study was included in the thesis for posterity, as a means of keeping a record of this research.

1. STUDY 1

The purpose of study 1 was fivefold. First, I tested if people engaged in more tracking of those they are less close to. Second, I investigated if people were more intolerant of imbalances with those they are less close to. Third, I examined if the relationship between closeness and tracking was mediated by intolerance. Fourth, I investigated if a greater availability of social partners (i.e., high relational mobility) was associated with more intolerance of imbalances. And lastly, I assessed if a greater availability of partners (i.e., high relational mobility) was related to more tracking behaviours.

1.1. Method

1.1. Participants

Participants (total $n = 280$) were recruited from the psychology participant pool at the University of Guelph. Of the 280 participants, 33.2% identified as male ($n = 93$) and 66.4% identified as female ($n = 186$). Participants’ ages ranged from 16 to 24 years old; the mean age was 18.3 years with a standard deviation of 1 year.

1.2. Procedure and Materials

Participants signed up to complete the study with a same-sex friend. The experiment was conducted entirely in the research laboratory, on computers. The study consisted of two
components. One component involved participants completing questionnaires individually. Another component required participants to play an experimental economic game known as the Ultimatum Game (Sigmund, Hauert, & Nowak, 2001). The Ultimatum Game allowed for an exchange of resources between two individuals, and was used as a behavioural measure of tracking and intolerance. Participants completed this game once with a friend and once with a stranger.

1.2.1. **Questionnaires**

Participants completed five sets of questionnaires. First, participants answered general biographic questions (e.g., age, gender, and ethnicity). Next, participants reported closeness felt with each partner (i.e., same-sex friend and same-sex stranger) using the Subjective Closeness Index (Berscheid, Snyder, & Omoto, 1989). The Subjective Closeness Index comprised of two items, whereby participants were asked to rate their relationship on a scale of 1 (not at all close) to 7 (extremely close). Participants then completed the Relational Mobility Scale (Yuki et al., 2007), a measure of perceived availability of social partners and ease of forming new relationships. The 12-item Relational Mobility Scale required participants to rate (on a seven-point scale: 1 = strongly disagree, 7 = strongly agree) the accuracy of statements (e.g., “People can choose who they interact with”) in describing people in their immediate social environment (i.e., school, workplace, town, neighbourhood, etc.). In the fourth section, participants completed a modified version of the underbenefitting exchange orientation scale (Murstein et al., 1987; Sprecher 1998). This scale was used as an independent measure of tracking others within a relationship. To complete this scale, participants indicated their level of agreement (on a five-point scale: 1 = strongly disagree; 5 = strongly agree) with statements about their interactions with others (e.g., “I usually do not forget if someone owes me a favour”). Lastly, a scale of
reciprocity (Xue, 2013) was included as an independent measure of intolerance. For this 4-item scale, participants rated how happy they would feel (on a nine-point scale: 1 = not at all happy; 9 = very happy) if someone had failed to reciprocate social support (e.g., personal advice) at a time of need. For this scale, lower scores indicated more intolerance.

1.2.2. Ultimatum Game

Four participants were run per session. That is, two pairs of friends were in the lab per session. Participants played two rounds of the Ultimatum Game. A round required two participants, each with different roles: A proposer and a responder. Each participant was the proposer once and the responder once. In the first round, participants played the game with a same-sex individual that s/he signed up to do the study with (friend or acquaintance). In the second round, participants played with an individual s/he did not sign up to do the study with (same-sex stranger or acquaintance). To determine roles for the first round, a coin toss was conducted by the experimenter. Participant roles were switched in the second round.

The proposer received an endowment of 100 lab dollars (10 lab dollars = CDN $0.20; each endowment = CDN $2) and was asked to divide the endowment between themselves and their partner. The responder answered two questions to make a decision about accepting or rejecting the proposer’s offer. First, responders reported the minimum amount of lab dollars that they would accept from their partner. This measure was not binding: That is, regardless of the reported minimal acceptance, participants were still able to accept or reject the offer. The minimum acceptance offer was used as the behavioural measure of intolerance, with higher minimum acceptance offers indicating greater intolerance. This measure of intolerance was used to test predictions regarding closeness and intolerance.
Before making the decision to accept or reject the offer, responders answered a second question. Specifically, responders were given the choice to see the proposer’s offer. Seeing the offer required responders to use some or all of the 100 lab dollar endowment they received as a responder. In particular, responders needed to pay for a chance to see the proposer’s offer (i.e., the responder could pay 10 lab dollars for a 10% chance of seeing the offer, 20 lab dollars for a 20% chance of seeing the offer, and so on). This payment was used as a behavioural measure of tracking, and was used to test predictions about closeness and tracking. Higher payments for higher chances to see the proposer’s offer indicated higher levels of tracking. All decisions to accept and reject offers were made with the offer being unknown. Thus, unless participants paid to track individuals, they were not able to know what was offered to them before deciding to accept or reject the offer.

If the responder accepted the offer, the endowment was split as the proposer intended. But, if the responder rejected the offer, both participants walked away empty handed from the allocation. The results for the two Ultimatum Games were revealed at the end of the experiment. Lab dollar earnings were converted to Canadian dollars (10 lab dollars = CDN $0.20).

Participants were able to earn between $0.00 and $6.00 each.

1.3. Data pre-processing

Before testing predictions, the data for the behavioural measures of tracking (i.e., responders paying for a chance to see the proposer’s offer before accepting) and intolerance (i.e., responder’s minimum amount of lab dollars accepted from the proposer’s offer) were explored. The Kolmogorov-Smirnov normality test was conducted in conjunction with visual inspection of the data via stem-and-leaf plots and Q-Q plots. Tracking scores were significantly non-normally distributed, $D(280) = .30, p < .00$. A closer examination of tracking scores revealed that over half...
of the participants chose not to track their partners (i.e., 56.8% of participants; \( n = 159 \), see Table 1). In light of this, tracking scores were converted into a dichotomous variable whereby participants either chose to track (\( n = 121; 43.2\% \)) or not (\( n = 159; 56.8\% \)). Intolerance scores also significantly deviated from normality (\( D(280) = .17, p < .00; \) see Table 2) and were converted into a dichotomous variable. Participants were grouped as either tolerant (i.e., a minimum acceptance offer of \textit{less than 50} out of 100 lab dollars; \( n = 191 \)) or intolerant (i.e., a minimum acceptance offer of \textit{50 or more} out of 100 lab dollars; \( n = 89 \)).

Items on the modified version of the underbenefitting exchange orientation scale (\( \alpha = .83 \)), which was used as an independent measure of tracking, had high levels of internal consistency and were aggregated. The four items for the reciprocity scale (\( \alpha = .79 \)), an independent measure of intolerance, showed appropriate levels of internal consistency and were aggregated. Likewise, items on the Relational Mobility Scale (\( \alpha = .79 \)) were appropriately internally consistent and aggregated.

For friends and strangers, the two items for closeness (\( \alpha_{fr} = .99; \alpha_{str} = .96 \)) showed high levels of internal consistencies and were aggregated. For better understanding of findings, the closeness variable was divided into three categories: participants were either not at all close (i.e., score of 1-2.5 out of 7, \( n = 123 \)), moderately close (i.e., score of 3-5.5 out of 7, \( n = 119 \)), or extremely close (i.e., score of 6-7 out of 7, \( n = 38 \)).
**Table S1.**

Distribution of tracking scores as measured by responders’ willingness to pay to see the proposer’s offer in the Ultimatum Game. Higher amounts paid indicate more tracking.

<table>
<thead>
<tr>
<th>Amount paid (lab dollars) to track</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>159</td>
<td>56.8%</td>
</tr>
<tr>
<td>10</td>
<td>39</td>
<td>13.9%</td>
</tr>
<tr>
<td>20</td>
<td>25</td>
<td>8.9%</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>10.7%</td>
</tr>
<tr>
<td>40</td>
<td>7</td>
<td>2.5%</td>
</tr>
<tr>
<td>50</td>
<td>12</td>
<td>4.3%</td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>70</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>80</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>90</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>100</td>
<td>4</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

**Table S2.**

Distribution of tolerance scores as measured by responders’ minimum acceptance offer in the Ultimatum Game. Lower minimum acceptance offers indicate more tolerance.

<table>
<thead>
<tr>
<th>Minimum acceptance offer</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>29</td>
<td>10.4%</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>10</td>
<td>39</td>
<td>13.9%</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>20</td>
<td>22</td>
<td>7.9%</td>
</tr>
<tr>
<td>25</td>
<td>5</td>
<td>1.8%</td>
</tr>
<tr>
<td>30</td>
<td>38</td>
<td>13.6%</td>
</tr>
<tr>
<td>35</td>
<td>3</td>
<td>1.1%</td>
</tr>
<tr>
<td>40</td>
<td>46</td>
<td>16.4%</td>
</tr>
<tr>
<td>45</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>50</td>
<td>84</td>
<td>30%</td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>0.7%</td>
</tr>
<tr>
<td>70</td>
<td>1</td>
<td>0.4%</td>
</tr>
<tr>
<td>100</td>
<td>2</td>
<td>0.7%</td>
</tr>
</tbody>
</table>


1.2. Results

1.2.1 Tracking and closeness

Because the behavioural measure of tracking was now dichotomous, and the closeness measure was categorical, a logistic regression was conducted to assess the relationship between tracking and closeness. Analyses revealed that the model, unexpectedly, was not significant, $\chi^2(2) = 4.42, p = .11$. Thus, people did not engage in more tracking of those they are less close to.

1.2.2 Intolerance and closeness

To examine the relationship between intolerance and closeness, I conducted a logistic regression. Unexpectedly, the model was not significant, $\chi^2(2) = 1.23, p = .27$. Thus, people were not more intolerance of those they are less close to.

1.2.3 The mediating effect of intolerance on the association between closeness and tracking

Before running mediation analyses, I conducted correlations to ensure that the causal variable (i.e., closeness) was correlated to the outcome variable (i.e., tracking). No association between closeness and tracking was found ($\phi_{cramer} = .12, p = .12$). Thus, because closeness was not significantly associated with tracking, mediation analyses were not conducted.

1.2.4 Relational mobility, tracking, and intolerance

To examine the association between relational mobility and tracking, correlations were calculated. Two measure of tracking were used: (1) a behavioural measure of tracking in the Ultimatum Game, and (2) an independent measure of tracking from the modified version of the underbenefitting exchange orientation scale. Unexpectedly, relational mobility and the behavioural measure of tracking was not related ($r_s = .05, p = .44$). Similarly, I did not find a significant association between relational mobility and the independent measure of tracking, but a trend in the predicted direction was found ($r_s = -.10, p = .11$).
For the association between relational mobility and intolerance, spearman rho coefficients were also used. I used two measures of intolerance: (1) intolerance behaviour as measured by the minimum acceptance offer in the Ultimatum Game, and (2) an independent measure of tolerance from the reciprocity scale. Unexpectedly, there was no association between relational mobility and behavioural intolerance ($r_s = .001, p = .98$). There was, however, a significant negative correlation between relational mobility and the independent measure of intolerance ($r_s = -.17, p = .006$). Because lower scores on the independent measure of intolerance indicate more intolerance, this result is consistent with predictions, and suggests that high relational mobility is significantly associated with more intolerance in interpersonal relationships.

1.3. Summary and Discussion

Unexpectedly, no relationship was found between tracking and closeness or intolerance and closeness. Consequently, I was unable to test my third prediction, which sought to assess if intolerance mediated the relationship between tracking and closeness. Such non-significant findings for this study are puzzling, but could be explained by several possibilities. First, it is possible that the results from this study reflect a Type 2 error. With any given study, it is always possible that random chance affects the findings and produces an error in results. Of course, if the results from this study could be a Type 2 error, then the results from study 2 and 3 (where predicted effects were found) could also be possible errors, but in the form of false positives (i.e., Type 1 errors). But, the fact that (a) I was able to replicate the same predicted effect across two studies and (b) my results are an extension and replication of past studies (e.g., Xue & Silk, 2012) renders this possibility rather slim.
A second possible explanation for the null results might be potential problems with the measures used to assess tracking and intolerance in the Ultimatum Game. To assess tolerance, responders reported their minimal acceptance offer (i.e., the minimum amount of lab dollars they would accept from the proposer; MAO). This MAO was not binding, meaning that responders could still accept or reject the proposer’s offer regardless of the reported amount of MAO. Given that the amount of the MAO did not affect acceptance of the proposer’s offer, this measure may have been ineffective in assessing true tolerance. Accordingly, a more fruitful measure of tolerance could have been to compare people’s actual acceptance of the proposer’s offers with their reported MAO. In such a case, those who accept offers that are less than their MAO would be deemed tolerant, whereas those who do not accept offers that are less than their MAO would be characterized as intolerant. Looking back at the data, 55 out of 280 participants (19.64%) received an offer that was less than their MAO. Of the 55 who received an offer less than their MAO, only 7 participants rejected the offer (12.72% of those who received an offer less than their MAO; 2.5% of all participants) while 48 participants still accepted offers below their MAO (87.27% of those who received an offer less than their MAO; 17.14% of all participants). So, 7 participants were ‘intolerant’ while 48 participants were ‘tolerant’. With such little variance in this tolerance measure (less than 13% participants were tolerant), finding an effect of closeness on tolerance would be difficult. Indeed, I conducted a logistic regression to examine the relationship between this new measure of tolerance and closeness, and the data yielded a non-significant model, $\chi^2 (2) = .84, p = .66$. So, ultimately, although this measure might be more reflective of actual tolerance, there is too little variance in the data to assess if tolerance was truly associated with closeness in this study.
Similarly, problems with the tracking measure from the Ultimatum Game could have affected results. Tracking was only assessed for one specific interaction with the target individual, in one specific mode of monitoring (i.e., one-shot Ultimatum Game, with monetary payment to track). This laboratory model of interpersonal behaviour could be too simplistic to represent people’s actual tracking behaviour. Usually, people track others over multiple interactions, and decisions to continue tracking are likely based on monitoring over several interactions. Furthermore, tracking does not usually involve a monetary cost. So, it is possible that imposing monetary costs on participants may not be a realistic model for tracking. Thus, it may be more realistic to measure tracking by examining it over several interactions (i.e., not just a one-shot Ultimatum Game) and through a different means of tracking (i.e., not involving monetary costs). Such a methodological change in measuring tracking proved to affect results as Study 2 and 3 used more realistic measures of tracking and yielded significant results in line with predictions.

Preliminary evidence for the predicted relationship between relational mobility (i.e., availability of partners and ease of forming new relationships) and tracking, and relational mobility and intolerance was found. Specifically, I found a trend relationship indicating that higher relational mobility (i.e., more available partners, easier to form new partnerships) was linked to more tracking. And, as predicted, higher relational mobility was significantly associated with more intolerance. Interestingly, this effect was not found in Study 2 and 3. One reason for this discrepancy of results could be the methods employed. In this study, people were asked rate their general level of tracking and tolerance. That is, people reported their tendency to track and tolerate others at baseline, instead of reporting the level of tracking and tolerance for a specific individual. So, this study only found an effect of relational mobility on general tracking.
and tolerance. Study 2 and 3, on the other hand, used measures of tracking and tolerance that were specific to certain individuals: Participants rated tracking and tolerance with either an acquaintance or a close friend in mind. The measures used in Study 2 and 3 were more realistic as interpersonal tracking and tolerance is dependent on the actual individual one is interacting with. Thus, results from Study 2 and 3 are more plausible in reflecting the potential effects of relational mobility on patterns of actual interpersonal tracking and tolerance.

RESULTS FOR SOCIAL VALUE ORIENTATION (PROSOCIALS VS EGOISTS VS COMPETITORS) AND TRACKING

STUDY 2

To examine if social value orientation (i.e., preferences for resource distribution) affected tracking of self and others, I conducted a three-way split plot ANOVA with social value orientation (prosocial, egoists, or competitors) and partner (close friend or acquaintance) as the between subjects measures and tracking (self or other) as the within-subjects measure. As predicted, I found a significant interaction between tracking and social value orientation, $F(1, 237) = 16.99, p < .001$, partial $\eta^2 = .12$ (Figure S1).

Consistent with predictions, post-hoc t-tests showed that prosocials ($M = 6.33, SE = .07$) engaged in more self-tracking than egoists ($M = 5.88, SE = .16$), $t(240) = 3.28, p < .001$, Cohen’s $d = .50$. Competitors ($M = 5.94, SE = .14$) did not engage in different levels of self-tracking than prosocials ($M = 6.33, SE = .07$; $t(174) = 1.59, p = .11$, Cohen’s $d = .21$) or egoists ($M = 6.33, SE = .07$; $t(87) = .65, p = .52$, Cohen’s $d = .10$).
In line with predictions, egoists ($M = 6.04, SE = .21$) engaged in more other-tracking than prosocials ($M = 5.22, SE = .09$), $t(239) = 3.93, p < .001$, Cohen’s $d = .60$. Competitors ($M = 5.52, SE = .23$) did not differ in their levels of other-tracking when compared to egoists ($M = 6.04, SE = .21; t(87) = 1.35, p = .18$, Cohen’s $d = .22$) or prosocials ($M = 5.22, SE = .09; t(174) = .97, p = .33$, Cohen’s $d = .12$).

Moreover, in line with predictions of closeness and tracking, people tracked acquaintances ($M = 5.98, SE = .10$) significantly more than friends ($M = 5.69, SE = .10$), $F(1, 237) = 4.20, p = .04$, partial $\eta^2 = .02$. Surprisingly, people also tracked themselves ($M = 6.05, SE = .08$) more than others ($M = 5.62, SE = .10$), $F(1, 237) = 13.44, p < .001$, partial $\eta^2 = .05$.

I did not find a significant main effect of social value orientation, $F(1, 237) = 1.27, p = .26$, partial $\eta^2 = .01$. Furthermore, I did not find a significant interaction between social value orientation and partner ($F(1,237) = 2.02, p = .16$, partial $\eta^2 = .01$) or a significant interaction between tracking and partner, $F(1, 237) = .07, p = .79$, partial $\eta^2 = .00$. The interaction between tracking, social value orientation, and partner was also non-significant, $F(1, 237) = 1.00, p = .32$, partial $\eta^2 = .00$. 
Figure S1. The interaction between social value orientation (prosocials, egoists, and competitors) and type of tracking for study 2. Error bars represent the standard error of the mean.

**STUDY 3**

To examine if prosocials, egoists, and competitors engage in different patterns of tracking others and self, I conducted a three-way split plot ANOVA with social value orientation (prosocial, egoists, or competitors) and partner (friend or acquaintance) as the between subjects factors and tracking (self or other) as the within-subjects factor. As predicted, I found a significant interaction between tracking and social value orientation, $F(1, 240) = 16.39, p < .001$, partial $\eta^2 = .06$ (Figure S2).

Post-hoc tests showed that prosocials ($M = 6.39, SE = .08$) engaged in more self-tracking than egoists ($M = 6.04, SE = .14; t(217) = 2.05, p = .005$, Cohen’s $d = .41$) and competitors ($M = 5.45, SE = .22; t(202) = 3.51, p = .02$, Cohen’s $d = .62$). Egoist ($M = 6.04, SE = .14$) did not differ, however, in the level of self-tracking from competitors ($M = 5.45, SE = .22; t(217) = 2.05, p = .15$, Cohen’s $d = .22$).
Additionally, egoists ($M = 5.52$, $SE = .15$) engaged in more other-tracking than prosocials ($M = 5.00$, $SE = .10$, $t(217) = -2.71$, $p = .005$, Cohen’s $d = .43$) and competitors ($M = 4.75$, $SE = .22$, $t(217) = -2.48$, $p = .03$, Cohen’s $d = .35$). Prosocials ($M = 5.00$, $SE = .10$), however, did not differ in their levels of other-tracking than competitors ($M = 4.75$, $SE = .22$, $t(202) = .83$, $p = .43$, Cohen’s $d = .13$).

Moreover, as predicted, people tracked acquaintances ($M = 5.92$, $SE = .10$) more than friends ($M = 5.54$, $SE = .10$), $F(1, 240) = 7.43$, $p = .007$, partial $\eta^2 = .03$. People also tracked themselves ($M = 6.21$, $SE = .08$) more than others ($M = 5.24$, $SE = .09$), $F(1, 240) = 108.52$, $p < .001$, partial $\eta^2 = .31$.

No main effect of social value orientation was found, $F(1, 240) = .15$, $p = .70$, partial $\eta^2 = .00$. Also, I did not find an interaction between social value orientation and partner ($F(1, 240) = .01$, $p = .92$, partial $\eta^2 = .00$) or an interaction between tracking and partner, $F(1, 240) = 3.40$, $p = .07$, partial $\eta^2 = .01$. And, the three-way interaction was also non-significant, $F(1, 240) = 4.45$, $p = .09$, partial $\eta^2 = .02$.

![Figure S2](image-url)  
*Figure S2.* The interaction between social value orientation (prosocials, egoists, and competitors) and type of tracking for study 3. Error bars represent the standard error of the mean.
GENERAL DISCUSSION
(of all thesis chapters)

In this section, I discuss the common themes, implications, future research directions, and applications of my dissertation.

Common Themes and Implications

Partner choice approaches enhance our understanding of relationships

A partner choice approach to understanding relationships is relatively new in the study of cooperation (Barclay, 2013; 2016; Fraser, 2013; Noë, 1990; Noë & Hammerstein, 1994; 1995). Many researchers have noted that such partner choice models are complementary to traditional models of reciprocity (e.g., Alexander, 1987; Trivers, 1971) and add tremendously to our understanding of cooperative bonds (e.g., Barclay, 2013; 2016; Fraser, 2013; Noë, 2006; Noë & Hammerstein, 1994; 1995). My dissertation employed a specific partner choice model, the notion of biological markets (Noë & Hammerstein, 1994; 1995), to understand and examine cooperative relationships. Together, my four thesis chapters illustrate the added benefit of a partner choice approach in learning about relationships. Specifically, a partner choice approach provides insight when examining (a) who people realistically choose as partners and the traits people signal to potential partners (Chapter 1); (b) the trade-offs between level of intimacy and network size when choosing individuals to interact with (Chapter 2); and (c) who people choose to help (Chapter 3) or continue relationships with based on the costs and benefits of interactions (Chapter 4).
**Friendships as social tools to increase inclusive fitness**

Our understanding of friendship is limited as other types of relationships, such as kinship and mating, have been the primary focus of academic and popular interest within the field of evolutionary social psychology (Brent, Chang, Gariepy, & Platt, 2013; Massen, Sterck, & de Vos, 2010; Silk, 2003). To date, much of the work on friendship falls within the realm of social sciences and biological sciences. Despite the overlap in topic, these two disciplines have very different understandings and definitions of friendship. Social scientists assert that friendships are unconditional and non-strategic, often based on factors such as mutual liking and similarity (e.g., Clark, 1984; Clark & Mills, 1979; Mills & Clark, 1994). Within biological sciences, however, friendships are viewed as strategic tools to increase fitness (e.g., DeScioli & Kurzban, 2009; Noë & Hammerstein, 1994; 1995; Tooby & Cosmides, 1996). Although puzzling at first, the discrepancy between the disciplines can be attributed to differences in levels of analysis (Tinbergen, 1963). Specifically, the social sciences focus on proximate explanations whereas the biological sciences emphasize ultimate explanations. Proximate and ultimate approaches are complementary and not mutually exclusive (Tinbergen, 1963). And, throughout this dissertation, I attempt to reconcile the differences between social and biological sciences by employing an evolutionary psychological framework. In doing so, I illustrate that human friendships are, indeed, adaptive. In particular, I show that seemingly trivial motives for friendship choice, such as mutual liking and similarity, are important in enabling individuals to maximize benefits while minimizing costs through selecting friends who are willing and able to confer benefits on others (Chapter 1). Similarly, in Chapter 2, I show that network size preferences go beyond basic personality differences (i.e., extroverts vs. introverts) and could actually relate to the costs and benefits people trade-off with smaller and larger social circles. In Chapter 3, I demonstrate that
the strong obligation to help kin derives from the inclusive fitness benefits people incur with kin-directed helping. And, finally, in Chapter 4, I provide further evidence that friendships are not unconditional, but instead characterized by some level of monitoring, and great tolerance for temporary imbalances within long-term relationships.

**Replication, in conjunction with novel work, is an important part of psychology**

Throughout this dissertation, several previous findings were replicated. These replicated findings were of particular relevance given the current crisis in psychology whereby several key psychological findings have not been reproduced (e.g., Bohannon, 2015; Maxwell, Lau, & Howard, 2015; Pashler & Wagenmakers, 2012; Stanley & Spence, 2014). In this thesis, I replicate several highly-known as well as recently-founded results within the study of interpersonal relationships. Specifically, I show that preferences for willingness and ability traits in friends are consistent with previous findings and extend to other long-term relationships (Chapter 1). In Chapter 3, I replicate the well-known finding of costlier help being directed towards kin over non-kin. And, in the last chapter, I replicate and extend Xue and Silk’s (2013) findings that people more readily track and increase intolerance for temporary imbalances of those they are not close to.

In conjunction with the replications of previous work included in this thesis, I also offer novel insight into the psychology of relationships. In Chapter 1, I illustrate that similar patterns of preferences for willingness and ability traits hold for various types of relationships beyond friendship. In Chapter 2, I present the first line of evidence that the trade-off between intimacy and size of networks may be dependent on the type of social interactions or the social environment (i.e., workplace vs. personal life). In Chapter 3, I present novel findings that
illustrate status motivates helping among siblings. And finally, in Chapter 4, I present three novel findings: (1) the relationship between tracking and closeness is mediated by intolerance, suggesting that people do not bother monitoring the behaviors of those they are willing to tolerate imbalances with; (2) in comparison to proselves, prosocials engage in higher levels of self-tracking; and (3) proselves, relative to prosocials, more carefully track the behaviours of others.

Future Research Directions

There are several avenues for future research that can be drawn from my dissertation. In this section, I briefly explore some unanswered research questions related to cooperative bonds. I focus on lines of inquiry linked to the three components of interpersonal relationships: partner choice, partner attraction, and partner maintenance.

Extending our knowledge of partner choice

In Chapter 1, I demonstrate that partner choice comprises of at least two distinct types of traits – one’s willingness to provide benefits to others and one’s ability, or capacity, to do so – and that certain patterns of preferences are consistent across four types of relationships. This finding leads to several unanswered research questions about the way that people select cooperative partners. For instance, one understudied area of partner choice research is the cues people use to assess desirable underlying traits in potential partners. Many research questions are unanswered about specific cues used: What exact cues do people pay attention to in assessing willingness and ability traits in potential relationship partners? Are cues in the modern environment similar or different from cues presented in ancestral times? Are there subtle
differences in cues used in various social ecologies and social environments? Do certain cues signal more than one trait? What cues signal the same underlying trait and which of these cues send a stronger signal? Do cues of multiple traits dilute signals for a specific trait? A deeper knowledge of the types of cues and the use of cues in partner selection could provide great insight into understanding the basics of cooperation and defection. And, such information, in turn, can help researchers create circumstances and situations that promote cooperation.

Another key criterion that people base partner choice decisions on is the availability of partners to confer benefits on others (i.e., physical presence of potential partners). My dissertation does not directly examine the availability of specific partners, but such a research avenue can be fruitful in understanding interpersonal relationships in our modern world. In particular, we have yet to understand how the technological advancement of various modes of communication influences preferences for the physical presence of partners. Could modern forms of communication level the playing field for people located elsewhere to compete with potential partners that are physically availability? Are there individual differences based on the type of help needed that influence preferences for the physical availability of partners? Answers to these questions can help us situate interpersonal relationships in a fast-paced, ever-changing world.

In Chapter 2, I show that the trade-off between level of intimacy and social network size varies for different social interactions, but surprisingly is unaffected by differences in need for help. This finding suggests that preferences for network size and intimacy level might be specific to interpersonal domains (i.e., the workplace, personal life, family, and neighbourhood), and leads to various lines of discussion. For example, we have yet to understand how trade-offs between intimacy and network size play out for different types of social interactions (e.g.,
family, neighbourhood). Additionally, little research to date has explored such trade-offs in mating. Specifically, how do monogamous and polyamorous couples view the trade-off between intimacy and number of partners? Do individuals with preferences for broad but weak platonic networks also prefer weaker bonds with many romantic partners? We also have yet to understand how each type of social network may be used by individuals to maximize benefits gained from social partners. For instance, do people exclusively prefer broader but shallow networks at a time of flux, where individuals are changing residences, cities, countries, or places of work and/or school as a strategy to diversify their social networks and build new connections?

My dissertation also provides some insight into the trade-offs between investing in kinship versus friendship (Chapter 3). Specifically, I show that people direct costlier help towards kin, but direct more help to kin and non-kin of similar status, relative to dissimilar status, to themselves. Again, these findings raise further questions about this topic. For instance, what factors other than status affect kinship and friendship similarly? Under what circumstances might investment in non-kin be more beneficial than investment in kin? How does family size affect investment in non-kin? Do those from larger families mainly interact with kin and fail to form adequate friendships with non-kin? And, more broadly, are psychological mechanisms for kinship distinct from those for friendship? These questions are necessary future lines of inquiry that can improve our understanding of cooperative bonds.

**Further exploration of partner attraction**

If partner selection is based on certain traits, it is advantageous to selectively signal such desirable qualities to attract potential partners. In Chapter 1, I briefly explore one prediction regarding partner attraction. Specifically, I illustrate that people prefer partners with higher levels
of willingness than ability traits and correspondingly rate themselves accordingly. This finding is an initial step to understanding and examining partner attraction strategies. Several further research avenues exist. One specific line of inquiry relates to the way people regulate their self-image. For instance, we have yet to investigate if people upregulate or downregulate specific behaviours to signal desirable qualities to certain individuals. Do people upregulate signals of intelligence, generosity, etc. when doing so would allow them access to specific desirable partners (i.e., those who pay special attention to intelligence, generosity, etc.)? How do people’s idiosyncratic preferences for traits affect their partner attraction strategies? For example, do those who place a higher importance on physical attractiveness in a partner correspondingly put more effort into their physical appearance? How does the social context affect impression management? What specific cues and signals do people upregulate or downregulate in novel social environments, and in specific social situations (i.e., at the workplace, family gatherings, parent-teacher meetings, etc.)? How does self-deception, and other potential psychological mechanisms involved in the regulation of impression management, work to attract valuable partners?

Partner attraction can also comprise of more negative strategies, whereby people attempt to tarnish or spoil the reputation of competitors, to attract the most desirable mates. What techniques are employed to suppress the attractiveness of competitors? Are there sex-specific tactics used to tarnish competitors? Under what conditions, circumstances, and situations, is it beneficial to tarnish competitors? What individual differences predict whether one is more likely to bring down others or pump up their own image to attract desirable partners? We have yet to gain answers to these important questions, which will aid in a more complete understanding of friendships.
Learning more about partner maintenance

In Chapter 4, I examined the effects of interpersonal tracking and tolerance on partner maintenance. I provide evidence that tracking may serve as an adaptive means to avoid exploitation and make decisions regarding whether to stay or leave a relationship. Additionally, my results demonstrate that tolerance could serve as a means for people to maintain valuable long-term relationships when short-term losses balance out over the long-term. This line of inquiry provides researchers with an initial understanding of two interpersonal strategies used for partner maintenance decisions. What other strategies might be employed to keep valuable cooperative partners? Much like partner attraction, there are two main ways to keep partners. One way to entice partners to stay is to advertise one’s commitment to the relationship. For example, people signal a desire to keep current partners by paying special attention to their partner’s needs (Ohtsubo & Tamada, 2016; Ohtsubo et al., 2014) and/or providing partners with costly gifts (Bolle, 2001; Yamaguchi et al., 2015). Such strategies make sense, but much is yet to be known about the specific circumstances in which signalling commitment occurs, and potential individual differences in the value of specific signals. For instance, what cues do people use to downregulate or upregulate commitment signals? In trying to keep partners, do people specifically advertise qualities that initially attracted their partners or do people vary the traits advertised to promote partner maintenance? How do signals of commitment in romantic relationships differ from those in platonic relationships? And, from the receiver’s side of the transaction, do people monitor the attention received from partners? Do people monitor the gifts received from partners? And, is reciprocity in signalling commitment equally important in all relationships?
A second way to maintain partners involves imposing costs on those who leave their current relationships or limiting a partner’s access to other desirable partners. For example, many religions and cultures ostracize those who get divorced or turn their backs on long-time friends (Hruschka, 2010). How do these costs affect decisions to stay or leave relationships? And how do various types of costs (e.g., financial, social, physical) differ in the effectiveness of keeping partners? What tactics are used to limit a partner’s knowledge to alternative options? And what are the most effective strategies?

Of course, before employing strategies to keep partners, one must first decide if staying in the current relationship is worthwhile. In doing so, people must determine if the benefits brought in from the current relationship outweigh the costs of new partnerships (i.e., partner search, establishing commitment/trust, etc.). One factor that would affect the costs and benefits of staying or terminating relationships is the likelihood of finding better alternatives. When people have other options, people should be (a) less willing to put up with imbalances because there’s a good chance they can find better and (b) more likely to monitor the behaviour of partners to ensure that the benefits outweigh the costs of partner switching. Interestingly, however, I failed to find an effect of relational mobility (i.e., the availability of partners in one’s immediate social environment) on tracking and tolerance (Chapter 4). This finding suggests that more research is needed to understand the way in which partner availability affects partner switching. For example, although divorce is more common among individualistic than collectivistic cultures (Diener, Gohm, Suh, & Oishi, 2000; Levine, Sato, Hashimoto, & Verma, 1995), does this pattern hold true for the dissolution of friendships and workplace relationships? Do people actually engage in increased levels of partner switching in relationally mobile environments? What factors beyond the availability of partners affect people’s decisions to stay
in or terminate relationships? Does the availability of physical/financial resources affect people’s likelihood to stay or leave partners? Again, exploring how people make decisions regarding partner maintenance can promote a better complete understanding of cooperative bonds.

**Applications**

My dissertation findings have application in the strategies people can use to create and maintain healthy interpersonal relationships. In Chapter 1, I show that people highly value willingness traits in several relationship types. An application of this finding is that people should signal a willingness to help others when looking to boost their attractiveness as a potential partner. In doing so, people should also be sure that they are perceived as *more* willing than others. That is, their relative level of willingness to help others is more important than absolute level, because a focus on one’s relative level of generosity allows one to outcompete others to access to desirable partnerships. To successfully increase one’s relative level of generosity, people should first pay attention to competitors to assess when it is necessary to increase or decrease signals of generosity/kindness. These strategies are useful for any individual to gain access to valuable relationships, but may be of particular value to individuals who have difficulty forming interpersonal bonds (e.g., individuals with autism spectrum disorder) or those who are restarting their social network (i.e., relocation, dissolution of previous relationships).

My research also suggests that people should approach and attempt to form bonds with individuals that are of relative equal market value (Chapters 1 and 3). Doing so would minimize the risk of rejection or exploitation from individuals of much higher market value than oneself. Attracting those of similar market value entails individuals to explicitly advertise how they might
be similar to perspective partners. For example, people may want to advertise similar levels of athleticism, financial stability, or intelligence (among many other traits) to those they want to entice as potential partners. Another important key strategy is to ensure interactions have an element of reciprocity (Chapter 3 and 4). People monitor the behaviours of friends (Chapter 4) and are sensitive to reciprocity within kin and non-kin relations (Chapter 3). Thus, people should pay special attention to returning favours in such a way that partners do not feel exploited or undervalued. Specifically, people should try not to focus explicitly on direct forms of reciprocity (i.e., returning favours immediately or with the same currency) because such transactions are not perceived to be characteristic of close friendships (Mills & Clark, 1994).

In maximizing net benefits gained in relationships, people should also assess the relative pay-offs (Chapter 2) and the cost-to-benefit ratio of specific relationships (Chapter 3). For instance, people should focus on diversifying their social network when doing so is beneficial (e.g., learning new skills, gaining new information). At the same time, narrowing their social networks and focusing on strengthening the bonds with few individuals when one foresees times of hardship on the horizon could be beneficial to ensure one receives the help they require. And, people should be sensitive to the costs and benefits of investing in kin over non-kin. So, for example, people should direct their need for costly help more towards kin because doing so not only increases the likelihood of receiving the help needed, but also decreases the likelihood of damaging relationships with non-kin.

In a similar fashion, people should engage in differing levels of interpersonal behaviours with different individuals. Specifically, people should forgo the costs of monitoring those they are willing to tolerate temporary imbalances with (Chapter 4). And, people should upregulate
tracking with those that may be more likely to exploit them (e.g., for financial gain, sexual needs, etc.) to ensure the benefits of staying such relationships still outweigh the costs of leaving.

In summary, there are several potential applications from my dissertation. It is worth noting, however, that this dissertation mainly focused on testing theoretical research ideas. As such, although findings from my research can lead to potential applications for interpersonal relationships, such applications may necessarily need additional examination by applied researchers before being further considered.

**Conclusion**

Decisions for partner choice, attraction, and maintenance are strategic and adaptive. People prefer partners that can provide a net gain across the relational exchange (Chapter 1), and alter their decisions for larger or smaller social networks depending on the costs and benefits of doing so (Chapter 2). We invest more costly help in those that increase our inclusive fitness by relying on kin when the going gets rough (Chapter 3). And, we upregulate the monitoring of behaviours of those we do not know, but tolerant temporary imbalances with those that can provide long-term benefits (Chapter 4). Collectively, these findings from the four chapters of my dissertation provide insight into the psychology of cooperation, specific to long-term cooperative bonds. The study of interpersonal bonds is ripe with several lines of inquiry, and further research in this area will be fruitful in promoting and fostering healthy and beneficial relationships for all.
REFERENCES


Bohannon, J. (2015). Many psychology papers fail replication test: An effort to repeat 100 studies yield sobering results, but many researchers are positive about the process. *Science, 349*, 910-911.


Hollingshead, A. B. (1975). Four factor index of social status. Unpublished manuscript, Yale University, New Haven, CT.


APPENDICES

Appendix A: Questionnaires used in Chapter 1

Study 1 (Predictions 1-3):

Note: Participants were always asked question 1 first, but the order of Q2-5 were randomized.

The presentation of traits were randomized.

1) In relation to your same-sex peers, please realistically rate yourself on the following traits:

2) Please realistically describe what your ideal long-term romantic partner (i.e., a person you would like to marry or be in a committed relationship with) would be like, by rating this person on the following traits:

3) Please realistically describe what your ideal best friend (i.e., the person you are closest to, and share and confide in regularly) would be like, by rating this person on the following traits:

4) Please realistically describe what your ideal business partner/colleague (i.e., a person you would be able to work well with on numerous projects/assignments) would be like, by rating this person on the following traits:

5) Please realistically describe what your ideal roommate (i.e., a person you share a house/apartment with) would be like, by rating this person on the following traits:

ATHLETICISM

☐ lower than almost everyone  ☐ lower than most  ☐ below average  ☐ average

☐ above average  ☐ higher than most  ☐ higher than almost everyone
The same format was used for all traits: athleticism, appearance, cooperativeness, creativity, friendliness, generosity, helpfulness, intelligence, kindness, popularity, trustworthiness, and wealth.

**Study 2 (Prediction 4):**

Note: The below question was asked four times, each for a different relationship partner. Again, the order of relationship partner was randomized and the presentation of traits/ trait levels was also randomized.

Please imagine a scenario where you have met a new individual, but were only told limited information about him/ her. Using the provided scale, please indicate how likely you would be to prefer this individual as a [roommate (i.e., a person you would share a house/ apartment with) / best friend (i.e., the person you are closest to, and share and confide in regularly)/ business partner/colleague (i.e., a person you would be able to work well with on numerous projects/ assignments)/ long-term romantic partner (i.e., a person you would like to marry or be in a committed relationship with)] if this person’s:

<table>
<thead>
<tr>
<th>Trait type/ trait level</th>
<th>Never</th>
<th>Not likely</th>
<th>Maybe</th>
<th>Probably</th>
<th>Definitely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kindness was lower than almost everyone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was lower than most</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was below average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was above average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was higher than most</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kindness was higher than almost everyone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Traits used: kindness, friendliness, appearance, intelligence, wealth
Appendix B: Questionnaires used in Chapter 2

CHAPTER 2A

Study 1:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Items: “Please write about a time in the past (or imagine a time) when you”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>were walking to work</td>
</tr>
<tr>
<td></td>
<td>were reading a book</td>
</tr>
<tr>
<td></td>
<td>were brushing your teeth</td>
</tr>
<tr>
<td>High benefit from trivial help</td>
<td>felt like you would benefit from having someone to ask advice from</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to comfort you when you</td>
</tr>
<tr>
<td></td>
<td>were feeling sad.</td>
</tr>
<tr>
<td>Low benefit from trivial help</td>
<td>felt like you would not benefit from having someone to ask advice from</td>
</tr>
<tr>
<td></td>
<td>felt like you would not benefit from having someone to comfort you when you</td>
</tr>
<tr>
<td></td>
<td>were feeling sad.</td>
</tr>
<tr>
<td>High benefit from costly help</td>
<td>felt like you would benefit from having someone to help you during an illness</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to help you during a crisis</td>
</tr>
<tr>
<td></td>
<td>felt like you would benefit from having someone to help you with everyday</td>
</tr>
<tr>
<td></td>
<td>living (e.g., household chores, errands)</td>
</tr>
<tr>
<td>Low benefit from costly help</td>
<td>felt like you would not benefit from having someone to help you during an illness</td>
</tr>
<tr>
<td></td>
<td>felt like you would not benefit from having someone to help you during a crisis</td>
</tr>
<tr>
<td></td>
<td>felt like you not would benefit from having someone to help you with everyday</td>
</tr>
<tr>
<td></td>
<td>living (e.g., household chores, errands)</td>
</tr>
</tbody>
</table>

1) For the previous question, did you write about a time in the past or imagine a time? Please be honest.

2) When did this event occur in the past?

3) The next question is about you preferences for number of friends. Friends can be defined as people you hang out with, talk to about personal issues, do activities with, and/or attend social events with. For the purpose of this study, please define friends with the provided definition and assume that friends are not romantic/sexual partners.
Study 2:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Items: “Please write about a time in the past (or imagine a time) when you”</th>
</tr>
</thead>
</table>
| Control           | were walking to work or school  
|                   | were reading a book  
|                   | were brushing your teeth  
| Need for trivial help | needed someone to provide directions to the store  
|                   | needed help carrying a box up a flight of stairs  
|                   | needed a small amount of change (e.g., for the parking metre)  
| Need for costly help | needed someone to drive you to the store  
|                   | needed help moving to a new house  
|                   | needed to borrow more than $40 (e.g., to cover a restaurant meal)  

1) For the previous question, did you write about a time in the past or imagine a time?  
   Please be honest.  
2) When did this event occur in the past?  
3) Please think of 15 friends and rank these friends in order of best friend to 15th best friend. Friends can be defined as people you hang out with, talk to about personal issues, do activities with, and/or attend social events with. Please do NOT include family members or romantic/sexual partners in this list. Now imagine you have 150 “friendship points” that can be divided between these friends. Please divide these friendship points in
proportion to your preferred level of closeness to each friend. That is, point allocation should reflect your preferred or ideal amount of time spent with a particular friend (e.g., talking, hanging out, going to social events, etc.). Points spent on one friend CANNOT be spent on another. That is, the points of all 15 friends should add up to your total amount of available “friendship points” (i.e., 150 points). Please feel free to use a calculator when answering this question to ensure the combined points for ALL 15 friends total to 150 points. If you do NOT have 15 friends, feel free to assign 0 friendship points to any friend starting from the last (i.e., # 15).

Study 3:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Vignettes</th>
<th>Items: “Please write about a time when you were walking to work or school”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>“Briana/ Brian was happy to get a summer job working at subway. She wanted a part-time job close to her house so that she could walk to work every morning, allowing her to enjoy the warm summer weather. She began work at 9am on Monday. She felt excited as she walked to work for her first shift.”</td>
<td>were walking to work or school</td>
</tr>
<tr>
<td></td>
<td>“Andrea/ Andrew enjoyed reading fiction. Her favourite was the Harry Potter series. But, she also enjoyed the Song of Ice and Fire series. These days, Heather usually reads her textbooks for the courses she is taking at university. Last night, before bed, she read a chapter for her introduction to psychology course.”</td>
<td>were reading a book</td>
</tr>
<tr>
<td></td>
<td>“Marta/ Marty woke up at 7am every Thursday to make sure she would not be late for her 8am Calculus class. She usually had cereal for breakfast and enjoys reading the news on her iphone while she ate. After</td>
<td>were brushing your teeth (or getting ready in the morning)</td>
</tr>
</tbody>
</table>
breakfast, she showers, gets dressed and brushes her teeth before catching the bus to university.”

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trivial</td>
<td></td>
<td>“Erica/ Eric just moved to a new city for university. She was</td>
</tr>
<tr>
<td>Help</td>
<td></td>
<td>on her way to the store when her phone battery died. She no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>longer had GPS and needed someone to provide her directions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to the store. She looked around and asked a friend walking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>towards her. Erica was grateful to receive the help she</td>
</tr>
<tr>
<td></td>
<td></td>
<td>needed.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Michelle/ Michael was moving to a new house. Some friends had</td>
</tr>
<tr>
<td></td>
<td></td>
<td>helped with the move earlier in the day and she was almost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>done. But, Michelle’s friends had to leave and now she</td>
</tr>
<tr>
<td></td>
<td></td>
<td>needed help carrying a large box up a flight of stairs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Michelle asked a friend for help. She was grateful to receive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the help she needed.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Christy/ Chris was running late for an appointment. Luckily,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>there was a parking spot close to the building. After parking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the vehicle, Christy started looking for change for the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>parking metre. She didn’t have any. Christy saw a friend</td>
</tr>
<tr>
<td></td>
<td></td>
<td>close by and asked her for spare change for parking. She was</td>
</tr>
<tr>
<td></td>
<td></td>
<td>grateful to receive the help she needed.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Jane/ James just moved to a new city for university. She was</td>
</tr>
<tr>
<td></td>
<td></td>
<td>feeling sick and needed someone to drive her to the walk-in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>clinic. Jane called her friend to ask for help. Her friend</td>
</tr>
<tr>
<td></td>
<td></td>
<td>drove her and waited several hours at the clinic with her.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jane was grateful to receive the help she needed. Please</td>
</tr>
<tr>
<td></td>
<td></td>
<td>imagine being in a similar situation to what was described in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the passage above. Imagine how the person described feels.”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>“Louise/ Louis was moving to a new house in two weeks. She</td>
</tr>
<tr>
<td></td>
<td></td>
<td>already booked a U-Haul for the move but needed someone to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>help move furniture. Louise called her friend to ask for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>help with the move. It took Louise and her friend the entire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>afternoon to move. Louise was grateful to receive the help</td>
</tr>
<tr>
<td></td>
<td></td>
<td>she needed.”</td>
</tr>
</tbody>
</table>
“Patricia/ Patrick was running late for a dinner. After parking, she ran into the restaurant to meet her friends. She ordered a fancy meal and a beverage. But when the bill arrived, she realized she forgot her wallet. Patricia had to borrow $40 from her friend. She was grateful to receive the help she needed.”

Manipulation checks:

1) Do you feel you received the help needed at the time?
2) Do you feel the help provided was demanding for someone to provide?
3) How close do you currently feel to your friends?
   a. Not at all → extremely close (9 pt)

4) How many friends do you have?

CHAPTER 2B

Note: For all studies presented in Chapter 2B, the following instructions were presented to participants. Participants were presented with the scale below twice: once for friends and once for colleagues.

1) The following questions are about your preferences for number of friends and number of colleagues. Friends can be defined as people you hang out with, talk to about personal issues, do activities with, and/or attend social events with. Colleagues can be defined as people you work with at your job or career, such as your boss and individuals within your workplace. For the purposes of this study, please define friends and colleagues with the provided definitions and assume that friends and colleagues are not romantic/sexual partners.
2) Do you currently have a job/career?
   a. If yes:
      i. Where do you work?
      ii. What is your title/position?
Appendix C: Questionnaires used in Chapter 3

Study 1: Within-subjects design

Section 1: Demographics

Note: Questions in this section were not counterbalanced

1) What is your age?

2) What is your gender?

3) What is your ethnicity?

4) How many siblings do you have?
   a. Number of brothers:
   b. Number of sisters:

5) Participant’s status
   a. What is your current or longest held occupation?
   b. What is your highest level of education?
      i. Less than high school
      ii. High school graduate
      iii. Associate degree (Community college)
      iv. Some university
      v. University graduate
      vi. Masters graduate
      vii. Doctoral degree (Ph.D, M.D., J.D., etc.)
Section 2: Identifying target individual

Note: Person S and Person F were counterbalanced in this section

In this section, you will be assigned two target individuals. Because this study is about personal relationships, identifying your two target individuals is an important stage in answering further questions in this study.

1) The first target individual will be your same-sex sibling and we will refer to him/her as “Person S” (i.e., s for sibling). If you have more than one person in mind for this category, Person S will be the individual whose name comes first alphabetically.

2) The second target individual will be your same-sex close friend, and we will refer to him/her as “Person F” (i.e., f for friend). If you have more than one person in mind for this category, Person F will be the individual whose name comes first alphabetically.

Section 3: Information about the target individual

Note: Participants answered questions 1-5 first, with the other questions being randomized

1) What is Person S/F’s age?

2) What is Person S/F’s gender?

3) What is Person S/F’s ethnicity?

4) What is Person S/F’s occupation?

5) What is Person S/F’s highest level of education?
   a. Less than high school
   b. High school graduate
   c. Associate degree (Community college)
   d. Some university
e. University graduate
f. Masters graduate
g. Doctoral degree (Ph.D, M.D., J.D., etc.)

6) How regularly do you communicate face-to-face with Person S/F?
   a. Daily, Every 2-4 days, Weekly, Bi-weekly, Monthly, Every 2 months, Every 3 months, More than 3 months

7) How regularly do you communicate via telephone call with Person S/F?
   a. Daily, Every 2-4 days, Weekly, Bi-weekly, Monthly, Every 2 months, Every 3 months, More than 3 months

8) How regularly do you communicate via text message with Person S/F?
   a. Daily, Every 2-4 days, Weekly, Bi-weekly, Monthly, Every 2 months, Every 3 months, More than 3 months

9) How regularly do you communicate via e-mail with Person S/F?
   a. Daily, Every 2-4 days, Weekly, Bi-weekly, Monthly, Every 2 months, Every 3 months, More than 3 months

10) Relative to all your other relationships (both same- and opposite-sex), how would you characterize your relationship with Person S/F?
    a. 1 (not at all close) \(\rightarrow\) 7 (extremely close)

11) Relative to what you know about other people’s relationships, how would you characterize your relationship with Person S/F?
    a. 1 (not at all close) \(\rightarrow\) 7 (extremely close)

12) In the last two months, how regularly have you provided Person S/F with
    a. personal advice
i. 1 (never) → 9 (often)

b. comfort when feeling sad
   i. 1 (never) → 9 (often)

c. help during an illness
   i. 1 (never) → 9 (often)

d. help during a crisis
   i. 1 (never) → 9 (often)

e. help with everyday living (e.g., household chores, errands)
   i. 1 (never) → 9 (often)

13) In the last two months, how regularly have you received _____ from Person S/F

  a. personal advice
     ii. 1 (never) → 9 (often)

  b. comfort when feeling sad
     ii. 1 (never) → 9 (often)

  c. help during an illness
     ii. 1 (never) → 9 (often)

  d. help during a crisis

    a. 1 (never) → 9 (often)

    e. help with everyday living (e.g., household chores, errands)
       ii. 1 (never) → 9 (often)

14) In a hypothetical scenario, how willing would you be to

   a. donate a kidney to Person S/F. Please assume that you are a suitable donor.
      i. 1 (not at all willing) → 9 (extremely willing)
b. help Person S/F in a life-or-death situation (e.g., rescuing from a burning building)
   i. 1 (not at all willing) → 9 (extremely willing)

15) In a hypothetical scenario, how willing do you think Person S/F would be to
   a. donate a kidney to you. Please assume that Person S/F is a suitable donor.
      i. 1 (not at all willing) → 9 (extremely willing)
   b. help Person S/F in a life-or-death situation (e.g., rescuing from a burning building)
      i. 1 (not at all willing) → 9 (extremely willing)

Study 2: Between-subjects design

Note: The same questions and counterbalance system was used as presented in Study 1. The exception is that participants in this study only answered questions about Person S OR Person F. Some additional questions were included for the status variable. Participants answered the additional questions in mind for themselves and their target individual (i.e., Person S/F).

1) Which of the below options best describes the socioeconomic class of [your/ Person S/F’s] current household? (For Person S/F: If you do not know, please select your best estimate)
   a. Lower class
   b. Middle class
   c. Upper Middle class
   d. Upper class
2) What was [your/ Person S/F’s] average household income last year? (For Person S/F: If you do not know, please select your best estimate)
   a. Less than $10,000
   b. $10,001 - $20,000
   c. $20,001-$30,001
   d. $30,001-$40,000
   e. $40,001-$50,000
   f. $50,001-$75,000
   g. $75,000-$100,000
   h. More than $100,000

3) Think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who are the best off - those who have the most money, the most education and the most respected jobs. At the bottom are the people who are the worst off - who have the least money, least education, and the least respected jobs or no jobs. The higher you are on this ladder, the closer you are to the people at the very top; the lower you are, the closer you are to the people at the very bottom. Where would you place [yourself/ Person S/F] on this ladder? Please select the letter (i.e., A-J) of the rung where you think you/ Person S/F stand at this time in your life, relative to other people in the United States. For Person S/F: If you do not know, please select your best estimate.
4) Think of this ladder as representing where people stand in their communities. People define community in different ways; please define it in whatever way is most meaningful to you. At the top of the ladder are the people who have the highest standing in their community. At the bottom are the people who have the lowest standing in their community. Where would you place [yourself/ Person F/S] on this ladder? Please select the letter (i.e., A -J) of the rung where you think you/ Person F/S stand at this time in your/ their life, relative to other people in your community. For Person S/F: If you do not know, please select your best estimate
APPENDIX D: Questionnaires for Chapter 4

Study 1:

Section A: Biographic information

1) What is your age?

2) What is your gender?

3) What is your ethnicity?

4) What is your sexual orientation?

5) What is your relationship status?
   a. Single, dating, in a committed relationship, common law, married, divorced, widowed
   b. Please state the current length of your relationship in years or months

6) How many siblings do you have?
   a. Number of brothers:
   b. Number of sisters:

7) I am the ____ (e.g., first, second, third, etc.) born of ____ (e.g., 0, 1, 2, 3, 4, etc.) siblings

Section B: Relationship to partner

Please answer the following questions about the person you signed up to do the study with (i.e., your partner in the first task):

1) Please select the relationship between you and your partner in this study:
   a. Strangers, casual acquaintances, Acquaintances with frequent interactions (but not friends), Friends, Close friends
If you are friends or acquaintances:

2) How long have you known your partner?
   a. ______ years OR _____ months OR _____ weeks

3) Relative to all your other relationships (both same- and opposite-sex), how would you characterize your relationship with your partner?
   a. 1 (not at all close) → 7 (extremely close)

4) Relative to what you know about other people’s relationships, how would you characterize your relationship with your partner?
   a. 1 (not at all close) → 7 (extremely close)

Please answer the following questions about the person you did not sign up to do the study with (i.e., your partner in the second task)

1) Please select the relationship between you and your partner in this study:
   a. Strangers, casual acquaintances, Acquaintances with frequent interactions (but not friends), Friends, Close friends

If you are friends or acquaintances:

2) How long have you known your partner?
   a. ______ years OR _____ months OR _____ weeks

3) Relative to all your other relationships (both same- and opposite-sex), how would you characterize your relationship with your partner?
   a. 1 (not at all close) → 7 (extremely close)

4) Relative to what you know about other people’s relationships, how would you characterize your relationship with your partner?
Section C: Relational mobility (Yuki et al., 2007)

How much do each of the following statements accurately describe the people in the immediate society (your school, workplace, town, neighborhood, etc.) in which you live? Please indicate how true you feel each statement to be for the people around you by checking the appropriate number on the scale provided.

1 = Strongly Disagree
4 = Undecided
7 = Strongly Agree

1) They have many chances to get to know other people.
2) It is common for these people to have a conversation with someone they have never met before.
3) They can choose who they interact with.
4) There are few opportunities for these people to form new friendships.
5) It is uncommon for these people to have a conversation with people they have never met before.
6) If they did not like their current groups, they would leave for better ones.
7) It is often the case that they cannot freely choose who they associate with.
8) It is easy for them to meet new people.
9) Even if these people were not completely satisfied with the group they belonged to, they would usually stay with it anyway.

10) These people are able to choose the groups and organizations they belong to.

11) Even if these people were not satisfied with their current relationships, they would often have no choice but to stay with them.

12) Even though they might rather leave, these people often have no choice but to stay in groups they don’t like.

Section D: The revised exchange orientation scale (Murstein et al., 1987)

Please indicate how much you agree or disagree with each statement using the following scale:

1 – Strongly disagree

3 - Neutral

5 – Strongly agree

1) I usually do not forget if someone owes me a favor.

2) If I have something to offer the relationship that my partner is incapable of also giving (e.g., money, status, physical attractiveness) I expect him/her to compensate by giving other things in return.

3) I usually remember if someone owes me money.

4) If I take a friend out to dinner, I expect him/her to do the same for me sometime.
5) When I exchange gifts with a significant other on an important occasion (Christmas, anniversary) I feel bad (cheated) if I have spent significantly more money on him/her than he/she has on me.

6) If someone owes me a favor, I don't mind if she/she waits a long time before repaying.

7) If my partner feels entitled to an evening out with friends of either sex, then I feel entitled to do the same.

8) It bothers me if people don't fulfill their obligations to me.

9) If I do dishes three times a week then I expect my partner to do them three times a week also (or something equivalent).

10) If I were to campaign for someone running for office, I'd expect some sort of compensation or at least recognition.

11) If I tell someone about my private affairs (business, family, love experiences) I expect him/her to tell me something about his/hers.

12) If I'm out to dinner with a close friend, I would much rather that he/she pay the bill entirely than if I paid the bill entirely.

13) I prefer not to send a second letter to a friend unless I had received a letter or phone call in response to my first letter.

14) When I invite someone to dinner at my house, I prefer that he/she offers to bring something (e.g., wine, dessert).

15) If I praise a friend for his/her accomplishments, I expect him/her to praise me for mine as well.

16) If I give someone a ride to work on an occasional basis (approximately 6 times a month), then I expect him/her to repay me in some way.
17) I wish people would show more acknowledgement when I say or do nice things to them.
18) It bothers me if people I like do less for me than I do for them.
19) When buying a present for someone I often try to remember the value of what he/she has
given me in the past and I try not to buy something of more value.
20) If I show up on time for an appointment, I become upset if the person with whom I have
the appointment shows up late.

Section E: Reciprocity (Xue, 2013)

Please rate the following items on this scale:

1 – Not at all happy
9 – Very happy

1) Suppose you provided someone with personal advice, but when you needed personal
   advice, this person did not provide you with any. How would you feel?
2) Suppose you provided someone with comfort when they were sad, but when you needed
   comfort, this person did not provide you with any. How would you feel?
3) Suppose you provided someone with help during an illness, but when you needed help
   because you were sick, this person did not provide you with any. How would you feel?
4) Suppose you provided someone with help during a crisis, but when you needed help
   because of a crisis, this person did not provide you with any. How would you feel?

Section F: Ultimatum task (responders only) [while proposers divide]

1) What is the minimum amount of lab dollars you would accept from your partner for this
   allocation? Please note that this question is NOT binding. That is, regardless of what your
answer is, you will still be able to accept or reject the offer and you will still be able to pay for a chance to see your partner’s offer before making a decision if you wish to do so.

   a. ____ lab dollars of the 100 lab dollars

2) Before accepting or rejecting your partner’s offer, you can have the chance to see his/her decision. If you pay 10 lab dollars, you will have a 10% chance of seeing your partner’s decision. You could also pay more for a higher chance of seeing the decision: For example, 20 lab dollars for a 20% chance, 30 lab dollars for a 30% chance, and so on.

   a. Are you willing to pay to see your partner’s decisions? Y/N

   b. If yes, how much are you willing to pay?

      i. 10 lab dollars for a 10% chance of seeing the decision

      ii. 20 lab dollars for a 20% chance of seeing the decision

      iii. 30 lab dollars for a 30% chance of seeing the decision

      iv. 40 lab dollars for a 40% chance of seeing the decision

      v. 50 lab dollars for a 50% chance of seeing the decision

      vi. 60 lab dollars for a 60% chance of seeing the decision

      vii. 70 lab dollars for a 70% chance of seeing the decision

      viii. 80 lab dollars for an 80% chance of seeing the decision

      ix. 90 lab dollars for a 90% chance of seeing the decision

      x. 100 lab dollars for a 100% chance of seeing the decision

Study 2/3:

Section A: Biographic information

1) What is your age?
2) What is your gender?

3) What is your ethnicity?

4) What is your sexual orientation?

5) What is your relationship status?
   a. Single, dating, in a committed relationship, common law, married, divorced, widowed
   b. Please state the current length of your relationship in years or months

6) How many siblings do you have?
   a. Number of brothers:
   b. Number of sisters:

7) I am the ____ (e.g., first, second, third, etc.) born of ____ (e.g., 0, 1, 2, 3, 4, etc.) siblings

Section B: Relational mobility (Yuki et al., 2007)

How much do each of the following statements accurately describe the people in the immediate society (your school, workplace, town, neighborhood, etc.) in which you live? Please indicate how true you feel each statement to be for the people around you by checking the appropriate number on the scale provided.

1 = Strongly Disagree

4 = Undecided

7 = Strongly Agree

1) They have many chances to get to know other people.

2) It is common for these people to have a conversation with someone they have never met before.
3) They can choose who they interact with.

4) There are few opportunities for these people to form new friendships.

5) It is uncommon for these people to have a conversation with people they have never met before.

6) If they did not like their current groups, they would leave for better ones.

7) It is often the case that they cannot freely choose who they associate with.

8) It is easy for them to meet new people.

9) Even if these people were not completely satisfied with the group they belonged to, they would usually stay with it anyway.

10) These people are able to choose the groups and organizations they belong to.

11) Even if these people were not satisfied with their current relationships, they would often have no choice but to stay with them.

12) Even though they might rather leave, these people often have no choice but to stay in groups they don’t like.

Section C: Social Value Orientation

In this set of questions, we ask you to imagine that you have been randomly paired with another person, whom we will refer to simply as the “other.” Other is someone you do not know and that you will not meet in the future. Both you and Other will be making choices by circling either the letter A, B, or C. Your own choices will produce points for yourself and Other. Likewise, Other’s choice will produce points for him/her and for you. Every point has value: The more points you receive, the better for you, and the more points Other receives, the better for him/her.
In this example, if you chose A you would receive 500 points and Other would receive 100 points; if you chose B, you would receive 500 points and Other 500; and if you chose C, you would receive 550 points and Other 300. So, you see that your choice influences both the number of points you receive and the number of points the other receives.

Before you begin making choices, keep in mind that there are no right or wrong answers – choose the option that you, for whatever reason, prefer most. Also, remember that the points have value: The more of them you accumulate, the better for you. Likewise, from the Other’s point of view, the more points s/he accumulates, the better for him/her.

For each of the nine choice situations below, choose A, B or C, depending on which column you prefer most. Please proceed in the order the choices appear.
1. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>480</td>
<td>540</td>
<td>480</td>
</tr>
<tr>
<td>Other Gets</td>
<td>80</td>
<td>280</td>
<td>480</td>
</tr>
</tbody>
</table>

2. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>560</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>Other Gets</td>
<td>300</td>
<td>500</td>
<td>100</td>
</tr>
</tbody>
</table>

3. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>520</td>
<td>520</td>
<td>580</td>
</tr>
<tr>
<td>Other Gets</td>
<td>520</td>
<td>120</td>
<td>320</td>
</tr>
</tbody>
</table>

4. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>500</td>
<td>560</td>
<td>490</td>
</tr>
<tr>
<td>Other Gets</td>
<td>100</td>
<td>300</td>
<td>490</td>
</tr>
</tbody>
</table>

5. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>560</td>
<td>500</td>
<td>490</td>
</tr>
<tr>
<td>Other Gets</td>
<td>300</td>
<td>500</td>
<td>90</td>
</tr>
</tbody>
</table>

6. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>500</td>
<td>500</td>
<td>570</td>
</tr>
<tr>
<td>Other Gets</td>
<td>500</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>

7. |       | A    | B    | C    |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>You Get</td>
<td>510</td>
<td>560</td>
<td>510</td>
</tr>
<tr>
<td>Other Gets</td>
<td>510</td>
<td>300</td>
<td>110</td>
</tr>
</tbody>
</table>
Section D: Relationship with target individual, closeness, tracking and tolerance

Note: Participants either answered questions about a close friend OR an acquaintance.

In the following section, you will be asked to answer questions with a specific individual in mind.

This individual should be a same-sex individual that you have known for several years AND are emotionally close to. This person is someone you are very friendly with; someone you would characterize as a CLOSE FRIEND. If you have more than one person in mind for this category, this person will be the individual whose name comes first alphabetically. This person should NOT be a family member or romantic/sexual partner. OR

This individual should be a same-sex individual that you have known for LESS than 6 months AND are not particularly emotionally close to. This person is someone you are somewhat friendly with; someone you would characterize as an ACQUAINTANCE (NOT close friend). If you have more than one person in mind for this category, this person will be the individual whose name comes first alphabetically. This person should NOT be a family member or romantic/sexual partner.
**member or romantic/sexual partner.** Questionnaire 3 will be about your interactions with this person.

1) Please select the relationship between you and this person:
   a. Strangers, casual acquaintances, Acquaintances with frequent interactions (but not friends), Friends, Close friends

2) How long have you known this person?
   a. ______ years OR _____ months OR _____ weeks

3) Relative to all your other relationships (both same- and opposite-sex), how would you characterize your relationship with this person?
   a. 1 (not at all close) \(\rightarrow\) 7 (extremely close)

4) Relative to what you know about other people’s relationships, how would you characterize your relationship with this person?
   a. 1 (not at all close) \(\rightarrow\) 7 (extremely close)

5) Which of the pictures below (A-G) best describes your relationship with this person?

(Aron et al., 1992)
Please indicate how much you agree or disagree with each statement using the following scale:

1 = Strongly disagree; 3 = Neutral; 5 = Strongly agree

Tracking other

1) I would not forget if this person owed me a favour

2) If I had something to offer this person, I would notice if s/he was incapable of giving other things (e.g., money, status, physical attractiveness) in return

3) I would usually remember if this person owes me money

4) If I exchanged gifts with this person, I would notice if I have spent significantly more money on him/her than he/she has on me.

5) I would notice if this person didn’t respond to my text message/phone calls

6) I would notice if this person did not bring something (e.g., wine, dessert) to a dinner at my house

7) I would notice if this person showed up late to our meeting

8) I don’t keep track of benefits this person has given to me

Tracking self

1) I would not forget if I owed this person a favour

2) If this person had something to offer me, I would notice if I was incapable of giving other things (e.g., money, status, physical attractiveness) in return

3) I would usually remember if I owed this person money

4) If this person exchanged gifts with me, I would notice if s/he had spent significantly more money on me than I had on him/her.
5) I would notice if I didn’t respond to this person’s text message/phone calls

6) I would notice if I did not bring something (e.g., wine, dessert) to a dinner at this person’s house

7) I would notice if I showed up late to a meeting with this person

8) I don’t keep track of benefits I have given to this person (Clark et al., 1987; Mills & Clark, 1994)

Please answer the following questions with this person in mind:

1) Suppose you provided this person with advice, but when you needed personal advice, this person did not provide you with any.
   a. How would you feel? (1 – Not at all happy; 9 – Extremely happy)
   b. How likely are you to ignore or dismiss this person the next time they ask for person advice? (1 – Not at all likely; 9 – Extremely likely)

2) Suppose you provided this person with comfort when they were sad, but when you needed comfort, this person did not provide you with any.
   a. How would you feel? (1 – Not at all happy; 9 – Extremely happy)
   b. How likely are you to ignore or dismiss this person the next time they ask you to comfort them when they are sad? (1 – Not at all likely; 9 – Extremely likely)

3) Suppose you provided this person with a small amount of money (e.g., less than $5), but when you needed to borrow money, this person did not provide you with any.
   a. How would you feel? (1 – Not at all happy; 9 – Extremely happy)
   b. How likely are you to ignore or dismiss this person the next time they ask borrow money? (1 – Not at all likely; 9 – Extremely likely)
4) Suppose you provided this person with class notes when they were sick, but when you needed notes because you were sick, this person did not provide you with any.

   a. How would you feel? (1 – Not at all happy; 9 – Extremely happy)

   b. How likely are you to ignore or dismiss this person the next time they ask you for class notes when they are sick? (1 – Not at all likely; 9 – Extremely likely)