THE MATING/PARENTING TRADE-OFF:
EVIDENCE AND IMPLICATIONS

by

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Abstract

According to the biological principles of life history theory, there is a fundamental trade-off between mating effort and parenting effort. The five studies reported here \((N = 3,439)\) tested two conceptually distinct ways in which that trade-off might manifest at a psychological level of analysis. Studies 1 and 2 focus on developmental processes and individual differences in the chronic activation of the mate acquisition and parenting motivational systems. Studies 3, 4, and 5 focus on temporary activation and inhibition of the mate acquisition and parenting motivational systems.

The primary results of Study 1 \((n = 305)\) suggest that men who express a greater desire to engage in short-term mating behavior have a less intense *nurturant* parental response to infants; Study 2 \((n = 2252)\) revealed similar inverse relations, this time among both men and women (as well as parents and nonparents). Study 2 additionally noted a *positive* correlation between short-term mating orientation and chronic *protective* parental tendencies.

Results from Study 3 \((n = 92)\) indicate that the temporary arousal of a parental caregiving motivational state consequently inhibits self-reported inclinations toward short-term mating; this effect was only found in women.

Results from Studies 4 \((n = 308)\) and 5 \((n = 482)\) suggest that temporary arousal of a mate acquisition motivational state consequently inhibits self-reported tender emotional responses towards infants. No consistent sex differences were noted in this latter result. Results of Study 5 additionally suggest that the temporary arousal of a disease- and predator-avoidance motivational states consequently inhibit self-reported nurturant emotional responses towards infants as well. No consistent sex differences were noted in these effects.
Taken together, the present research yields results consistent with hypothesized psychological manifestations of the mating/parenting trade-off. But the present research also yields additional results that pose a challenge to these seemingly straightforward hypotheses, suggesting that a more nuanced approach must be taken to understand how the mating/parenting trade-off might manifest psychologically.
Preface

The research presented in this dissertation is the product of collaborations between Dr. Mark Schaller, Dr. Jessica L. Tracy, and myself. Under their supervision, I was responsible for the formulation of the research questions, design and implementation of surveys, data collection, statistical analyses of data, and composition of manuscripts. All projects and associated methods were approved by the University of British Columbia’s Behavioral Research Ethics Board (certificates H09-02165 and H15-00042).

Chapter 1 is a theoretical review of my research area. Portions of Chapter 1 are under review. Beall, A.T., Tracy, J.L. (under review). Emotivational psychology: How distinct emotions facilitate fundamental motives. I have adapted the theoretical content of the manuscript so that it fits the context of this dissertation.

Portions of Chapter 2 have been published. Beall, A.T. & Schaller, M. (2014). Affective implications of the mating/parenting trade-off: Short-term mating motives and desirability as a short-term mate predict less intense tenderness responses to infants. *Personality and Individual Differences, 68*, 112-117. For this paper, I formulated the research questions, collected the data, and conducted all of the statistical analyses under the guidance of Dr. Schaller, and the manuscript was written by both authors.

Other portions of Chapter 2 along with portions of Chapter 3 are under review. Beall, A.T. & Schaller, M. (under review). Evolution, Motivation, and the Tug-of-War Self: The Case of the Mating / Parenting Trade-off. For this paper, I formulated the research questions, collected the data, and conducted all of the statistical analyses under the guidance of Dr. Schaller, and the manuscript was written by both authors.
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List of Abbreviations

STMO = Short-term Mating Orientation

LTMO = Long-term Mating Orientation

PCAT = Parental Caring and Tenderness

2D:4D = Ratio of the 2nd (the “index” finger) to the 4th (the “ring” finger) digit

SD = Standard Deviation

M = Mean
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Chapter 1: Introduction

A gene is a basic physical and functional unit of heredity, and its primary concern is replication. As a result of this basic truth, all organisms have evolved as biological vehicles through which their genes maximize the number of copies of themselves passed on throughout the world. All organisms are compelled to prioritize their reproductive success through phenotypic expressions of their innate genetic motive (Dawkins, 1976). Mating effort and parenting effort both contribute to reproductive success (the passing on of genetic material), but do so in different ways—each with evolutionary costs as well as benefits (Clutton-Brock, 1990). According to life history theory, physiological and psychological mechanisms facilitating mating behavior utilize the same bioenergetic resources as those facilitating parenting behavior (Del Giudice, Gangestad, & Kaplan, 2016). Therefore, when resources are invested in the development or deployment of mating mechanisms, those resources are unavailable for investment in parenting mechanisms; this fundamental tension is referred to as the mating/parenting trade-off.

Evolutionary perspectives on internal motivational systems purport that adaptive behaviors (i.e., behaviors which serve the ultimate goal of enhancing reproductive success such as mate acquisition and nurturant/protective parenting) are underpinned by coordinated suites of related physiological and psychological mechanisms which act in concert (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). According to the logical tenets of life history theory then, if evolutionary pressures related to the mating/parenting trade-off have existed in humans for generations, then it would have shaped the development of finely tuned motivational systems for the differential facilitation of these reproductive goals. The aim of this thesis is to explore
whether a tension exists between the mate acquisition and parenting motivational systems and how this tension might manifest psychologically at the level of the individual.

One focus of this thesis centers around a hypothesized inverse relationship between stable, dispositional, inclinations toward mate acquisition and toward nurturant (as well as protective) parental care. Another focus is on momentary deployment and investigates a hypothesized mutually inhibitory relationship between the temporary activation of the mate acquisition and parenting motivational systems. Put together, findings from this thesis suggest that the chronic and temporary activation of the mate acquisition and parenting motivational systems may be inversely related; however, additional findings suggest that, while the abstract concept of a mating/parenting trade-off is relatively simple and straightforward at a purely logical level, it is more complicated when applied to actual psychological processes.

1.1 Life History Theory and the Mating/Parenting Trade-off

Life history theory draws upon evolutionary principles to predict organisms’ developmental trajectories and behavioral strategies (Del Giudice, Gangestad, & Kaplan, 2016). Central to life history theory is the assumption that there is a finite supply of bioenergetic resources available to organisms; so, when resources are invested in the development or deployment of any specific physiological or psychological mechanism, those resources are unavailable for investment in other mechanisms. Though organisms differ in the total amount of resources they have available for investment (e.g., organisms with larger energy budgets can invest more than others into all systems; Reznick, Nunney, & Tessier, 2000), no organism’s energy budget is unlimited. Developmental trajectories and behavioral strategies are therefore characterized by trade-offs. One fundamental trade-off is between somatic growth and reproductive effort: When resources are allocated to building somatic tissue, investment in
reproductive mechanisms is correspondingly withdrawn; and vice-versa. Furthermore, even within the broad category of reproductive effort there is another fundamental trade-off. This is the trade-off between mating effort and parenting effort.

Mating effort refers to the devotion of resources to the production of offspring and the acquiring of mates as sexual partners. Therefore, mating effort may include mate-seeking (e.g., resources devoted to mechanisms facilitating encounters with suitable, receptive mates), mate attraction (e.g., resources devoted to mechanisms facilitating enhancement/advertisement of attractiveness to potential mates), and same-sex competition over access to receptive mates (e.g., resources devoted to mechanisms facilitating confrontations over breeding territories) (Rowe, Vazsonyi, & Figueredo, 1997; Lancaster & Kaplan, 1992).

Parenting effort can be defined as “any investment by the parent in an individual offspring that increases the offspring’s chance of surviving (and hence reproductive success)... parental investment includes the metabolic investment in the primary sex cells but refers to any investment (such as feeding or guarding the young) that benefits the young” (Trivers, 1972, p. 139). In essence, parenting effort includes the investment of resources into mechanisms which facilitate the nurturance and protection of existing offspring (Rowe, Vazsonyi, & Figueredo, 1997; Lancaster & Kaplan, 1992).

According to life history theory, when resources (e.g., metabolic resources; but also time, energy, attention) are allocated to mechanisms involved in the production of new offspring (i.e., mating effort), there is a corresponding withdrawal of investment in mechanisms involved in the provision of parental care to existing offspring (i.e., parenting effort); and vice-versa. This conflict is referred to as the mating/parenting trade-off and tends to be resolved differently
depending upon the balance of reproductive benefits garnered versus costs incurred from investment into either mating effort or parenting effort (Clutton-Brock, 1991).

The reproductive benefits of investment into mechanisms facilitating mating effort are straightforward: Through successful reproduction (i.e., mating, conception) an organism is able to pass on its genes to future generations. The reproductive benefits of investment into mechanisms facilitating parenting effort on the other hand, are somewhat more complex: In essence, offspring must be reared in such a way that facilitates their eventual passing on of genes to future generations in order for the parent organism to be reproductively successful as well. A host of evidence suggests that the benefits of provisioning parental care are often substantial to an organism’s reproductive success through offspring survival and offspring reproductive success (Clutton-Brock, 1991). For example, in many social primates, parental nurturance and protection from conspecifics at an early age can help establish a higher social rank of offspring, which in turn enhances their reproductive performance in later life (Berman, 1980). Importantly, just as there are reproductive benefits to investment in mating and parenting effort, there are also costs.

The reproductive costs of investment into mechanisms facilitating mating effort may be substantial: Frequent, unrestricted mating could potentially de-stabilize existing romantic and/or parental alliances which would be particularly detrimental in species for which bi-parental care (parental care from both parents) contributes greatly to offspring reproductive success. Devotion to mating effort may also come with survival-related costs as well: Same-sex competition over access to mates (a form of male-typical mating effort) can often lead to violent, sometimes fatal physical exchanges among certain species. Further, as implied by life-history theory, there is some evidence that devotion of physiological resources into mechanisms facilitating mating
effort may come at the expense of mechanisms facilitating immune function. For example, in peacocks, the metabolic investment into physiological mechanisms devoted to the development of a large, vibrant, high-quality tail (a mating display to which peahens are attracted) can simultaneously have immunosuppressive effects which negatively impact health (Petrie & Williams, 1993).

The reproductive costs associated with provisioning parental care may also be substantial. First, devoting resources towards parental effort may detract from success in gaining additional mating opportunities and subsequent breeding success. For example, some male birds expend metabolic energy provisioning young which could have been used on sexual ornamentation (in an effort to gain additional mating opportunities; Blount, 2004). Much additional evidence suggests that under certain circumstances provisioning parental care may also be detrimental to the survival of the parent (Clutton-Brock, 1991). For example, the mobility and running speed of females carrying eggs is significantly reduced in many reptilian species, causing them to be far more vulnerable to predators (Shine, 1980).

Indeed, there are substantial benefits as well as costs to reproductive success associated with both mating and parenting effort; the mating/parenting trade-off is resolved differently depending upon the balance of these costs incurred versus benefits garnered. Thus, much between-species variation has evolved in the differential investment into either of these two strategies.

1.2 Between- and Within-Species Differences in the Mating/Parenting Trade-Off

A species’ investment in parenting versus mating effort depends largely on features of, and constraints imposed by, their environment and biology (Pianka, 1970). Environmental factors may include survival-related predictability. For example, species evolved in
unpredictable, unsafe environments, with many predators (e.g., rabbits) tend to invest more in the production (rather than provisioning) of offspring, whereas species evolved in relatively stable, safer environments, with few predators (e.g., elephants) tend to invest more in the parenting of existing offspring (see Figuerdo et al., 2005). In essence, if offspring have a high likelihood of dying at any moment—even if they receive heavy parental investment—then the costs associated with parenting effort may not outweigh the benefits of mating effort (e.g., producing many offspring, some of whom may survive). One major biological constraint which governs the cross-species balance of investment in mating effort versus parenting effort is the ability (or inability) of young to survive and reproduce on their own. For many species, offspring are incapable of early provisioning themselves and necessarily require postnatal parental investment in order to survive—let alone successfully reproduce (Starck, & Ricklefs, 1998; Hawkes & Pain, 2006). Parents in these species (such as humans), thus typically devote more resources to parenting effort and less to mating effort than those of other species (Del Giudice, Gangestad, & Kaplan, 2016).

In addition to the implications for between-species differences, this trade-off between mating effort and parenting effort also has important implications for within-species differences as well. Some of these within-species differences reflect adaptive responses to developmental milestones; life history theory posits that organisms are adapted to exhibit behaviors throughout their lifespan which maximize their reproductive success at different stages of development (Engqvist & Sauer, 2002). For humans, the actual production of offspring triggers a predictable change in the manner in which the mating/parenting trade-off is resolved, with relatively more resources allocated to physiological systems facilitating parental care and fewer resources allocated to mating effort. Indeed, becoming a parent is associated with hormonal changes which
may serve to facilitate a parenting strategy while simultaneously lowering inclinations toward short-term mating (e.g., Gray, Yang, Pope, 2006). Specifically, a host of cross-sectional and longitudinal evidence suggests that testosterone (which is linked to mating effort and discussed in greater detail later) is lower among parents than nonparents (Muller, Marlowe, Bugumba, & Ellison, 2009; Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002; Gray, 2003; Gray, Yang, & Pope, 2006; Gettler, McDade, Feranil, & Kuzawa, 2011; Storey, Walsh, Quinton, & Wynne-Edwards, 2000) and also among those who are in committed relationships, married, or expecting the birth of a child (Marazziti & Canale, 2003; Booth & Dabbs, 1993; Mazur & Michalek, 1998; Burnham et al., 2003; Gray et al., 2004; van Anders & Watson, 2006). This developmental change is also evident in actual behavior (i.e., more caregiving behavior and less mating behavior): Parents exhibit stronger dispositional parental caring and tenderness toward infants while holding less positive attitudes towards unrestricted mating (e.g., Buckels, Beall, Hofer, Lin, Zhou, & Schaller, 2015).

The mating/parenting trade-off may also be resolved differently for the different sexes. In species characterized by sex differences in obligatory parental investment, the sex with greater obligatory investment (e.g., gestation) is characterized by relatively greater allocation of resources to parental care, and fewer resources allocated to mating effort. In human women, the energy cost associated with producing larger gametes than men (eggs vs. sperm)—as well as gestation and lactation of infants—is relatively high (Gangestad & Simpson, 2000). As a result, the potential rate of reproduction for men is higher than that of women (i.e., men are able to sire comparatively more offspring over their lifetime), and gender differences in the optimal resolution of the mating/parenting trade-off are predicted (Clutton-Brock, 2007): Because men typically incur low costs of reproduction, they may be geared more towards a reproductive
strategy which maximizes indiscriminant mating (Bjorklund & Schackelford, 1999). Women, on the other hand, are able to produce fewer offspring over the course of their lifetime, thus they may be geared more towards a sexual strategy which favors provisioning of parental care to their limited existing offspring (Clutton-Brock, 2007; Trivers, 1972). Among humans, this trade-off is evident in well-documented sex differences, in which women not only exhibit relatively greater dispositional inclination toward parental caregiving but typically also have relatively lower testosterone and lower inclination toward unrestricted mating than men (Buckels et al., 2015; Jackson & Kirkpatrick, 2007; Torjesen & Sandnes, 2004; Clark & Hatfield, 1989; Lawson & Samson, 1988; Schmitt, 2005; Buss & Barnes, 1986).

The implications of this fundamental trade-off are not limited just to these categorical differences between parents and nonparents and between men and women. If indeed the development (or maintenance or deployment) of systems devoted to mating effort occurs at the expense of the development (or maintenance or deployment) of systems devoted to parental care, this implies a more general tendency for motivational inclinations toward short-term mating and parental care-giving to be mutually inhibitory at the level of the individual. If so, then the development or deployment of internal motivational systems facilitating mating effort may be inhibited by the development or deployment of internal motivational systems facilitating parenting effort, and vice-versa.

Up to this point, this thesis has focused on selection pressures which may have shaped allocation decisions regarding devotion to mechanisms facilitating mating and parenting effort. Before exploring the various physiological and psychological implications the mating/parenting trade-off might have at an individual difference level, a discussion of proximate mechanisms
which may have evolved to enact these allocation decisions (internal motivational systems) will be useful.

1.3 Evolutionary Perspectives on Motivational Systems

From an evolutionary perspective, motives are conceptualized not in terms of subjective experiences (e.g., needs), but in terms of underlying mechanisms that evolved to regulate behavior (Tooby, Cosmides, Sell, Lieberman, & Sznycer, 2008). Different motivational systems are activated in response to different kinds of information that connote specific fitness-relevant threats or opportunities. When any particular motivational system is activated (such as when the sound of a wet sneeze activates the “disease-avoidance system”, or when the sight of a helpless child activates the “parenting system”) it produces a cascade of physiological, affective, cognitive, and behavioral responses that, in ancestral environments, were likely to have been functionally adaptive.

Operating within this evolutionary framework, Kenrick and colleagues revisited Maslow’s (1943) famous pyramid of needs, and reformulated it to conform more closely to the kinds of motivational systems that are likely to have actually evolved (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). They identified six motivational systems which met these criteria and would have been central to the survival and proliferation of our ancestors’ genetic material: Self-protection, affiliation, status/esteem, mate acquisition, mate retention, and parenting. Beneath these higher-order psychological motivational systems the authors also located a seventh, lower-order system—immediate physiological needs (e.g., hunger, thirst)—driven by largely unconscious biological deficits (see Figure 1-1).
These fundamental motivational systems promote sets of actions directed towards enhancing individuals’ survival and reproductive success by virtue of fostering a coordinated suite of physiological and psychological responses, which facilitate the related adaptive behavioral responses. Among the fundamental motivational systems, those which appear to be most relevant to parenting and mating effort are the “parenting” and the “mate acquisition” motivational systems.
The link between the parenting motivational system and parenting effort is relatively straightforward: According to evolutionary perspectives on motivational systems, the parenting motivational system evolved to facilitate the adaptive behavior of providing nurturance and protection to vulnerable offspring; two behaviors characteristic of parenting effort (Kenrick et al., 2010; Trivers, 1972). The link between the mate acquisition motivational system and mating effort may be somewhat less obvious: The mate acquisition motivational system is thought to have evolved to facilitate the adaptive pursuit of sexual opportunities when available; this mate-seeking behavior is characteristic of investment into mating effort as conceptualized within the context of life-history theory (Kenrick et al., 2010; Rowe, Vazsonyi, & Figueredo, 1997). The mate retention motivational system may share some overlap with mating effort (both may facilitate the production of additional offspring). However, within the context of life-history theory, the maintenance of long-term romantic bonds (the adaptive goal of this system) may actually be more closely connected to parenting effort; because bi-parental care contributes to offspring survival and reproductive success, parental investment may also include provisioning of mates and the establishment and maintenance of pair-bonded relationships as well (Rowe, Vazsonyi, & Figueredo, 1997; Lancaster & Kaplan, 1992). Thus, behaviors geared towards mating effort and parenting effort appear to be most closely driven by underlying mate acquisition and parenting motivational systems, respectively.

According to an evolutionary perspective, internal motivational systems fuel goal-driven behavior by virtue of fostering coordinated suites of physiological and psychological mechanisms (Kenrick et al., 2010). Therefore, if the development or deployment of mating mechanisms occurs at the strategic expense of the development or deployment of parental care mechanisms—as implied by the mating/parenting trade-off—there is a straightforward
implication for individual differences in motivational tendencies: An inverse relationship between the extent to which the mate acquisition and parenting motivational systems are chronically and temporarily active.

1.4 Psychological Manifestations of the Mating/Parenting Trade-Off

An extensive literature on phenotypic plasticity reveals that input from the environment guides the manner in which bioenergetic resources are allocated during development (e.g., Gluckman, Hanson, Spencer, & Bateman, 2005). Some of this research identifies specific aspects of individuals' early environment that disposes them toward an enduring life history strategy characterized by increased investment in mating mechanisms (Del Giudice, 2009; Ellis, 2004). For example, some people are more generally interested in acquiring mates (i.e., the mate acquisition system is chronically more activated), and this has implications for mate preferences, person perception, and other social psychological outcomes (e.g., Sacco, Hugenberg, & Sefcek, 2009; Simpson & Gangestad, 1992). Other developmental circumstances may dispose individuals toward increased investment in parental care mechanisms (Cabeza de Baca, Figueredo, & Ellis, 2012; Del Giudice, 2009). For these people, the parenting motivational system may be more chronically active; these individual differences—which are observed among non-parents as well as parents—not only have implications for responses to children, they also predict a variety of less obvious outcomes, such as moral judgments and trait inferences about adults (Buckels, et al., 2015).

According to life history theory, the development of mating mechanisms occurs at the strategic expense of the development of parental care mechanisms; therefore, enduring life history strategies characterized by increased investment into mating effort may be inversely related to those characterized by increased investment into parenting effort. It follows then, that
the development of the mate acquisition motivational system may occur at the strategic expense of the parenting motivational system (and/or vice-versa), and chronic activation of one system may be negatively correlated with chronic activation of the other. The research presented in this thesis (Chapter Two) provides tests of this hypothesis.

Just as motivational inclinations vary across individuals, they vary across situations too and each motivational system may be temporarily activated more readily under some circumstances rather than others. Temporary activation of the mate acquisition motivational system is likely elicited during situations in which the reproductive benefits of seizing a mating opportunity outweigh the reproductive costs. For example, organisms in species with seasonal fluctuations in mate availability typically devote more resources to mating effort during times when groups of receptive conspecifics have congregated for the purpose of breeding (Stiver & Alonso, 2009; Szekely & Cuthill, 2000). Humans may benefit in the same way by taking advantage of situations in which mate availability is high (e.g., at social gatherings, parties), by temporarily devoting more effort into mating. Similarly, temporary activation of the parenting motivational system may be particularly increased during situations in which reproductive benefits of parenting existing offspring outweigh the reproductive costs. For example, during early infancy of many mammalian species, a period of postnatal milk-feeding is essential to offspring survival, therefore, during this period, the reproductive benefits of investment in parental effort are high, and mating effort is typically suppressed (McNeilly, 1997; Stiver & Alonso, 2009). Humans may also benefit reproductively by devoting more parental effort to offspring during times that the need for parental care is temporarily higher such as when offspring are sick, distressed, or in danger.
If, as implied by the mating/parenting trade-off, the context-specific activation of one of these two motivational systems occurs at the strategic expense of the other system, then (a) temporary activation of the mate acquisition motivational system may temporarily inhibit motivational inclinations to provide care to infants, and (b) temporary activation of the parenting motivational system may temporarily inhibit motivational inclinations toward mate acquisition. The research presented in this thesis (Chapter Three) provides direct tests of these hypotheses.

Indeed, there are two conceptually distinct ways in which the mating/parenting trade-off might manifest psychologically at the level of the individual, each with different empirical implications investigated in this thesis. One manifestation occurs on a developmental timescale and implies a negative relation between the chronic activation of the mate acquisition and parenting motivational systems. The other manifestation pertains not to development, but to deployment: The temporary activation of mating motives may temporarily inhibit activation of the parenting motivational system, and vice versa. Up to this point, the notion of motivational system “activation” has been left somewhat opaque and elucidating a clearer operationalization of this abstract concept will help with the interpretation of the findings in this thesis.

1.5 The Activated Mate Acquisition and Parenting Motivational Systems

The mate acquisition and parenting motivational systems evolved to facilitate short-term mating and nurturant/protective parental behaviors, respectively; therefore, activation of each motivational system should be characterized by predictable psychological responses which facilitate these goal-driven behaviors (Kenrick et al., 2010). It will therefore be useful for the interpretation of findings from the current research to consider what some of the psychological responses associated with the mate acquisition and parenting motivational systems are.
Within the context of close relationships, there is a distinction between dispositions regarding long-term and short-term mating relationships. Long-term mating attitudes are characterized by the extent to which individuals desire the commitment of an enduring long-term relationship such as marriage; this dispositional psychological response may be indicative of a chronic activation of mate-retention motives. Conversely, short-term mating attitudes are characterized by the extent to which individuals desire casual sexual relationships and are likely indicative of a mate acquisition motive. Long-term and short-term mating attitudes are conceptually distinct constructs, have empirically distinct implications, and can be measured separately (Jackson & Kirkpatrick, 2007). Psychological responses associated with activation of the mate acquisition motivational system may include thoughts and attention devoted to noncommittal sex or gaining access to noncommittal sex partners; therefore, short-term mating attitudes (but not long-term mating attitudes) are likely to facilitate a short-term mating strategy and be characteristic of the mate acquisition motivational system (Jackson & Kirkpatrick, 2007; Simpson & Gangestad, 1991). Self-perceived attractiveness may also be indicative of activation of the mate acquisition motivational system (see Clark, 2004): People are more likely to engage in behaviors that they expect to produce successful outcomes, therefore individuals who believe that they are more physically attractive may also believe that they have a greater ability to actually engage successfully in a short-term mating strategy. Lust (also referred to as sexual arousal or sexual desire; Fisher, 2000) may be an important emotion associated with activation of the mate acquisition motivational system (see Beall & Tracy, invited revision); among heterosexual individuals, lust is typically elicited by the presence of subjectively attractive members of the opposite sex (e.g., Regan, 1998; Regan & Berscheid, 1997; Buunk, Dijkstra, FETCHENHAUER, & KENRICK, 2002; SPRECHER & REGAN, 2002; REGAN & JOSHI, 2003; FLETCHER, TITHER,
O’Loughlin, Friesen, & Overall, 2004) and feeling lust is associated with an enhanced willingness to engage in a wide range of sexual activities and risky sexual practices (Ariely & Loewenstein, 2006).

In the case of the parenting motivational system, associated psychological responses may include at the very least, a positive attitude toward children. But activation of the parenting motivational system implies more than mere liking; there must also be a willingness to protect children from harm, as well as an inclination to embrace the role of caregiver (i.e., to experience the provisioning of care to children as rewarding; Buckels et al., 2015; Lancaster & Kaplan, 1992). Parenting motives are not uniquely associated with one single emotion. Instead parental behavior may be facilitated by several distinct emotional responses, including feelings of affection, caring, compassion, and tenderness; all of which have been associated with parent-child interaction and care-giving (Goetz, Keltner, & Simon-Thomas, 2010; McDougal, 1908).

An emerging body of literature now empirically differentiates tenderness from other, superficially similar emotions (such as empathy, sympathy, and love; Kalawski, 2010), leading some to contend that tenderness should be thought of as the key affective component galvanizing parenting behavior (Beall & Tracy, under review; Buckels et al., 2015). As offspring outcomes depend, not only on parental response to immediate needs (e.g., when a child is in pain or discomfort), but also on proactive nurturance of various kinds, the extent to which individuals experience tenderness across a variety of situations involving children—including some situations that are potentially aversive—is an important psychological response facilitating parental care. Therefore, the tendency to experience tenderness (e.g., the ease with which tenderness is aroused and the intensity of the tenderness experience when it is aroused) may be indicative of a parental care motive.
The mating/parenting trade-off implies an inverse relationship between the activation of the mate acquisition and parenting motivational systems; as activation of either system is characterized by distinct psychological responses such as those summarized above, evidence of inverse relationships between short-term mating and parenting psychological responses is suggestive of an inverse relationship between the mate acquisition and parenting motivational systems more broadly. The studies in this thesis adopt this approach and focus on the hypothesized inverse relationship between attitudinal and affective responses relevant to these systems.

1.6 Overview of Current Studies

Guided by the functional logic of the mating/parenting trade-off, the aim of this thesis is to explore whether a motivational tension exists between activation of the mate acquisition and parenting motivational systems. The present research seeks to investigate whether psychological implications of this hypothesized tension manifest at the level of the individual in two conceptually distinct ways.

Put together, the present research tests, a) whether this hypothesized trade-off influences the course of development; manifesting in a negative relation between dispositional inclinations toward short-term mating and toward parental care (Chapter 2) and, b) whether the resolution of this hypothesized trade-off is influenced by situational factors; manifesting in the temporary suppression of parenting responses when the mate acquisition motivational system is active, and vice versa (Chapter 3).

Studies 1 and 2 in Chapter Two provide a rigorous test of the hypothesized negative relation between dispositional psychological mechanisms associated with the mate acquisition and the parenting motivational systems—and test whether this relation might differ between men
and women and between parents and nonparents. Study 1 investigates relations between self-reported dispositional inclinations toward unrestricted mating and self-reported dispositional nurturant parental responding. Study 2 provides a replication of Study 1, while also investigating whether a similar relation is noted with dispositional protective parental responding. Importantly, individuals with stronger dispositional inclinations towards long-term partnerships may have more positive attitudes regarding parenting. Therefore, Studies 1 and 2 also assess and control for this related psychological construct providing a rigorous test of whether dispositional attitudes regarding short-term mating are inversely associated with dispositional attitudes toward nurturant (and protective) parental care.

The perceptual appraisal of functionally-relevant stimuli is often sufficient to activate a specific motivational system (and thus to elicit associated psychological responses). Therefore, Study 3 attempts to experimentally activate the parenting motivational system (i.e., elicit tender emotional responses towards functionally relevant stimuli) using images of cute baby animals paired with phrases suggesting they are vulnerable and in need of care; then notes whether this manipulation (versus a control manipulation) has a suppressive effect on participants’ self-reported unrestricted mating attitudes. Conversely, Studies 3 and 4 attempt to experimentally activate the mate acquisition motivational system (i.e., elicit lustful emotional responses towards functionally relevant stimuli) using images of sexually attractive opposite-sex others paired with erotic narratives; then notes whether this manipulation (versus a control manipulation) has a suppressive effect on participants’ self-reported tender emotional responses towards infants.

Study 5 also provides an exploratory glimpse into whether nurturant parental responses are uniquely associated with mate acquisition motives by examining the extent to which these responses are also affected by the temporary activation of other motives (discussed later).
Specifically, Study 5 tests whether the temporary activation of disease- and predator-avoidance motives (in addition to mate acquisition motives) might temporarily suppress nurturant parenting responses to a similar degree. Study 5 attempts to experimentally activate, a) predator-avoidance motives (i.e., elicit fear emotional responses towards functionally relevant stimuli) using an image of a gun-wielding stranger paired with a frightening narrative, and b) disease-avoidance motives (i.e., elicit disgust emotional responses towards functionally relevant stimuli) using an image of an unclean public restroom paired with a disgusting narrative; then notes whether these manipulations separately (versus control) had a suppressive effect on participants’ tender emotional responses towards infants and the extent to which this effect differed from that of the mate acquisition manipulation.

This thesis provides a rigorous examination of the psychological implications of the mating/parenting trade-off. The present research investigates the hypothesized inverse relationship between chronic activation of the mate acquisition and parenting motivational systems, as well as the hypothesized mutually inhibitory relationship between the temporary activation of these systems; although recent research has applied the principles of life history theory to the prediction of human individual differences (e.g., Ellis, 2004; Figueredo, et al., 2005; Neel, Kenrick, White & Neuberg, 2016), no prior empirical research directly tests either of these two hypotheses.
Chapter 2: Chronic Individual Differences

If the development of mating mechanisms occurs at the strategic expense of the development of parental care mechanisms (and vice-versa)—as implied by the mating/parenting trade-off—there is a straightforward implication for chronic individual differences in motivational tendencies: A negative correlation between the extent to which the mate acquisition and parenting motivational systems are chronically active. Studies 1 and 2 of this chapter provide a direct test of this hypothesized inverse relationship, focusing specifically on relations between individual differences in dispositional inclinations towards short-term mating and towards parental caring.

No prior empirical research directly examines the hypotheses tested in Chapter 2. Obliquely consistent is evidence that individuals differ along coordinated suites of traits (e.g., risk-tolerance, reproductive timing) that correspond to “fast” versus “slow” life-history strategies—a broad distinction that incorporates, but is not specific to, the distinction between mate acquisition and parenting motives (Figueroedo, Vásquez, Brumbach, Sefcek, Kirsner, & Jacobs, 2005). There is also some evidence that physically attractive individuals may be less empathic (Holtzmann, Augustine, & Senne, 2011), but it is unknown whether this relationship extends also to the conceptually distinct emotion of parental tenderness. Similarly, while Apicella and Marlowe (2007) found some evidence that fathers' self-perceived mate value is negatively correlated with investment of effort and attention to their children, that study focused only on fathers (no results were reported for men and women more generally), and did not include measures of tenderness or other emotional responses. Nor has any prior research examined the hypothesized linkages between short-term (or long-term) mating orientation and the emotional experience of tenderness.
A more direct test of the hypothesized inverse relationship between dispositional mate acquisition and parenting motives was reported by Neel et al. (2016) who developed measures to capture these motivational tendencies directly and assessed them in a sample of parents ($N = 665$). Results of this recent investigation revealed a weak negative correlation. Importantly, this research did not examine parenting motivation among non-parents; though the motivation to parent offspring should be higher among actual parents (Trivers, 1972), provisioning parental caring for offspring is so essential for human reproductive success that the underlying motivational system and propensities toward parental behavior are likely to develop in both parents and non-parents alike (Kenrick, Griskevicius, Neuberg, & Schaller, 2010; Buckles et al., 2015). Further, that research did not control for the effects of the mate retention motivational system (characterized by an attitudinal desire for a long-term relationship) which was found to be related to both the mate acquisition and parenting motivational systems and might have better explained the inverse relationship noted between these systems. In sum, these findings are intriguing, but, as they were part of a larger investigation into individual differences across a wide range of social motives, rather preliminary.

2.1 Study 1

Study 1 was designed to test the hypothesized negative correlation between dispositional nurturant parental responses towards infants and dispositional attitudes towards short-term mating.

Dispositional nurturant parental responses were assessed in two ways: One self-report measure captured chronic dispositional tendency to experience tenderness toward infants. In addition to assessing this chronic dispositional tendency ("trait" tenderness), I also assessed individual's temporary affective response to relevant perceptual stimuli: I presented individuals
with photographs depicting babies, and measured tender emotional responses ("state"
tenderness).

A dispositional attitude toward short-term mating was also assessed in two ways: One
self-report measure captured chronic orientation towards an unrestricted mating style.
Importantly, a dispositional attitude toward long-term mating strategies is likely to be negatively
correlated with inclinations toward short-term mating strategies and positively correlated with
parental tenderness. Therefore, I also assessed and statistically controlled for a chronic
orientation towards a long-term mating style to test for any unique relation between dispositional
short-term mating attitudes and parental tenderness. Another self-report measure used to capture
chronic orientation towards an unrestricted mating style in Study 1 was self-perceived
attractiveness as a short-term mate. Analogously, when testing this additional hypothesis, I
assessed not only the extent to which individuals perceived themselves to possess traits that
made them attractive to short-term mates, I also assessed the extent to which they perceived
themselves to possess additional traits that connote their likelihood of being a good long-term
romantic partner. These self-perceptions are likely to be positively correlated with tenderness,
and also positively correlated with self-perceived physical attractiveness (because of individual
differences in self-evaluation more broadly). Consequently, I statistically controlled for these
additional self-perceptions in order to test the unique relation between self-perceived physical
attractiveness and parental tenderness. (I also assessed, and statistically controlled for,
demographic variables, such as sex and parenthood, that might otherwise produce spurious
correlations between the variables of focal interest).

Study 1 offers the first direct test of whether a dispositional inclination toward short-term
mating is inversely associated with dispositional nurturant emotional responses toward infants.
2.1.1 Study 1: Method

Participants

Participants were 305 residents of the United States (164 men, 141 women; 109 parents, 196 non-parents; \(M\) age = 31.49 years \([SD = 11.30]\)) who were recruited through Amazon.com’s Mechanical Turk website in exchange for a payment of $0.50 USD, and who fully completed the measures described below. These procedures were administered online, on SurveyMonkey.com.

Dispositional Attitudes Towards Short-Term and Long-Term Mating

Participants completed 20 items from the revised Sociosexual Orientation Inventory (Jackson & Kirkpatrick, 2007; See Appendix A). Ten of these assessed short-term mating orientation (STMO; sample item: ‘‘I can easily imagine myself being comfortable and enjoying ‘casual’ sex with different partners’’); 10 additional items assessed long-term mating orientation (LTMO; sample item: ‘‘I would like to have a romantic relationship that lasts forever’’). Participants responded by indicating their agreement on a 7-point rating scale (1 = Strongly disagree; 7 = Strongly agree). I computed mean responses to each of the 2 sets of items, in order to create separate composite indices of STMO and LTMO (Cronbach’s alphas = .97 and .94, respectively).

Self-Perceived Traits

Participants were asked to rate the extent to which they possessed the following traits (all of which are generally perceived to be evaluatively positive): Sex appeal, Kindness and understanding, Health, Qualities of a good parent, Physical fitness, Physical attractiveness, Faithfulness/Loyalty, Responsibility, Stable personality. (See Appendix B). They recorded their self-ratings on 7-point scales (1 = Not at all; 7 = Very much). A principal components analysis, with varimax rotation, revealed 2 underlying factors with eigenvalues > 1. (The same 2 factors
emerged when the analysis was conducted separately for men and women). Four traits (Sex appeal, Health, Physical fitness, Physical attractiveness) loaded highly on a factor that assesses qualities pertaining to one’s desirability as a short-term mate. The other five traits (Kindness and understanding, Qualities of a good parent, Faithfulness/Loyalty, Responsibility, and Stable personality) loaded highly on a separate factor that assesses qualities pertaining to one’s desirability as a long-term partner. I created two composite indices accordingly, which I refer to here as desirability as short-term mate and desirability as long-term partner (Cronbach’s alphas = .75 and .85, respectively).

Nurturant Parental Responses to Cute Infants (State Tenderness)

Participants were presented, one at a time, with 8 photographs, each depicting a different human infant. (See Appendix C; Photographs were sourced from a Google Images search with the keywords “cute baby” and “adorable baby.” A separate sample of participants \(N = 156\) viewed the stimulus photos and were asked to rate “To what extent were the photographs cute?” on a 6-point scale. The mean rating was 4.88, indicating that infants in the images were perceived to be high on “cuteness”—the subjective assessment expected to elicit caretaking responses [Sherman, Haidt, & Coan, 2009].)

After viewing the full set of 8 photographs, participants were asked to “rate how much you experienced each of the following emotions while looking at the set of photographs.” On 6-point rating scales (1 = Not at all; 6 = Very much), participants provided ratings for: Tenderness, Caring, Responsibility, Anxiety, Sadness, Pride, Affection, Happiness, Compassion, Fear, and Disgust. I computed mean ratings of Tenderness, Caring, Affection, and Compassion in order to create a composite index of state tenderness (Cronbach’s alpha = .97).
Dispositional Tendency to Experience Tenderness Toward Infants (Trait Tenderness)

Participants responded to 15 items from a questionnaire designed to assess a general dispositional tendency to experience tenderness in the presence of infants (PCAT; Buckels et al., 2015; see Appendix D for complete measure). For 5 of the items, participants rated their agreement with statements that are consistent with a chronic capacity for nurturant emotional responses towards infants (e.g., “Babies melt my heart”). Ratings were made on 5-point scales (1 = Strongly disagree; 5 = Strongly agree). The remaining 10 items presented participants with brief scenarios involving babies—5 of which depicted babies being cute (e.g., “A newborn baby curls its hand around your finger”) and 5 of which depicted babies in need of assistance (e.g., “You need to change a baby’s soiled diaper”)—and participants rated how much tenderness they would feel in response to each scenario. Ratings were made on 5-point scales (1 = No tenderness at all; 5 = A lot of tenderness). I computed the mean ratings across all 15 items to create a composite index of trait tenderness (Cronbach’s alpha = .94).

Demographic Information

Participants also completed a questionnaire assessing demographic details, including their age, sex, and whether they had any children.

2.1.2 Study 1: Results

Preliminary regression analyses were conducted that included three key demographic variables (sex, parenthood, age) as predictors of the tenderness measures. Results revealed no unique effects of age ($p$’s > .77); but there were significant effects of sex (binary coding: Males = 1; Females = -1) and parenthood (binary coding: Parents = 1, Non-parents = -1) on both trait tenderness ($p$’s < .001) and state tenderness ($p$’s < .01). In the analyses reported below, I statistically controlled for any effects of sex and parenthood. Additional preliminary analyses
revealed no meaningful correlation between short-term mating orientation (STMO) and self-rated desirability as a short-term mate \( (r = .07, p = .244) \), indicating that these two variables can be analytically treated as independent constructs.\(^1\) Therefore, I tested the two primary hypotheses in separate regression analyses.

**Short-term Mating Orientation (STMO) as a Predictor of Tenderness**

STMO and LTMO were negatively correlated, \( r = -.33 (p < .001) \); therefore, in order to assess the unique relationship between STMO and emotional tenderness, I statistically controlled for LTMO (in addition to sex and parenthood).

I first conducted a regression analysis on the combined sample of men and women to test the unique predictive effect of STMO on chronic dispositional tendencies toward tenderness (trait tenderness). STMO was included as a predictor, along with LTMO, sex, parenthood, and the 3 interaction terms involving STMO (STMO x Sex; STMO x parenthood; STMO x Sex x Parenthood). In addition to main effects of sex, parenthood, and LTMO (indicating greater dispositional tenderness among women, parents, and people with higher levels of LTMO, \( p \)'s < .001), there was a marginally significant main effect of STMO \( (\beta = -.11, p = .07) \) that was qualified by a statistically significant interaction between STMO and sex \( (\beta = -.10, p = .04) \).

Next, regression analyses were conducted separately for men and women. (Each regression analysis included STMO, LTMO, parenthood, and the STMO x Parenthood interaction term as predictors.) The results of these analyses are summarized in Table 2-1. These results revealed

\[^1\] Previous work has noted a significant positive correlation between conceptually similar indicators of self-perceived attractiveness and STMO (e.g., Clark, 2004), therefore it is somewhat unexpected that I did not note a similar association between these two related indicators of mate acquisition motive activation. Still, these constructs were at least weakly positively correlated, so it is difficult to draw confident conclusions regarding their conceptual independence from this one result.
no relation between STMO and trait tenderness among women ($\beta = .00, p = .98$). In contrast, among men, there was a significant negative relationship ($\beta = -.23, p = .006$).

Table 2-1. Results of Regression Analyses Predicting Trait Tenderness from Short-Term and Long-Term Mating Orientations (STMO and LTMO), Conducted Separately for Men (n = 163) and Women (n = 140).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>$t(159)$</td>
</tr>
<tr>
<td>STMO</td>
<td>-.23</td>
<td>-2.81</td>
</tr>
<tr>
<td>LTMO</td>
<td>.26</td>
<td>3.54</td>
</tr>
<tr>
<td>Parenthood</td>
<td>.17</td>
<td>2.26</td>
</tr>
<tr>
<td>Parenthood X</td>
<td>-.03</td>
<td>-0.31</td>
</tr>
</tbody>
</table>

Because emotional states are, to some extent, situation-specific manifestations of dispositional tendencies to experience those emotional states; it follows that any predictive effect of STMO on state tenderness may be somewhat weaker than its effect on trait tenderness. Also, given the preceding results, it follows that the effect is likely to be observed primarily among men. These expectations were borne out by the results of regression analyses on emotional responses to photographs of cute babies (state tenderness). A preliminary regression analysis that included STMO, LTMO, sex, parenthood, and the 3 interaction terms involving STMO revealed higher levels of state tenderness among women, parents, and people with higher levels of LTMO.
(p’s < .05); but neither the main effect for STMO nor the STMO x Sex interaction were significant (p’s = .10 and .13, respectively).

Although the latter interaction was non-significant, it may be useful to conduct regression analyses separately for men and women, in order to avoid over-general conclusions. Indeed, separate analyses on male and female data reveal patterns of results similar to, but weaker than, the results on trait tenderness (see Table 2-2). There was a negligible relation between STMO and state tenderness among women (β = -.02, p = .78), and there was a significant negative relationship between STMO and state tenderness among men (β = -.19, p = .03).

Table 2-2. Results of Regression Analyses Predicting State Tenderness from Short-Term and Long-Term Mating Orientations (STMO and LTMO), Conducted Separately for Men (n = 163) and Women (n = 140).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t(159)</td>
<td>p&lt;</td>
<td>β</td>
</tr>
<tr>
<td>STMO</td>
<td>-.19</td>
<td>-2.17</td>
<td>.03</td>
<td>-.02</td>
</tr>
<tr>
<td>LTMO</td>
<td>.25</td>
<td>3.25</td>
<td>.001</td>
<td>.15</td>
</tr>
<tr>
<td>Parenthood</td>
<td>.16</td>
<td>2.15</td>
<td>.03</td>
<td>.41</td>
</tr>
<tr>
<td>Parenthood X STMO</td>
<td>-.06</td>
<td>-0.77</td>
<td>.44</td>
<td>.08</td>
</tr>
<tr>
<td>STMO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

28
Self-Perceived Desirability as a Short-Term Mate as a Predictor of Tenderness

For multiple reasons (e.g., individual differences in self-esteem, rating-scale usage) people who rate themselves highly on one desirable trait tend to rate themselves highly on other desirable traits too. Indeed, self-rated desirability as a short-term mate was positively correlated with self-rated desirability as a long-term partner ($r = .42, p < .001$), therefore, in order to isolate my variable of interest (self-rated desirability as a short-term mate), I statistically controlled for desirability as a long-term partner (as well as sex and parenthood).

I first conducted a regression analysis to test the unique predictive effect of desirability as a short-term mate on trait tenderness. Predictor variables included desirability as a short-term mate, desirability as a long-term partner, sex, parenthood, and the 3 interaction terms involving desirability as a sexual partner. In addition to main effects of sex, parenthood, and desirability as a long term partner ($p$’s < .001), there was also a significant main effect of desirability as a short-term mate ($\beta = -.14, p = .01$) and this main effect was qualified by a statistically significant interaction with sex ($\beta = -.11, p = .04$).

Next, I conducted regression analyses separately for men and women. (Each regression analysis included four predictor variables: desirability as a short-term mate, desirability as a long-term partner, parenthood, and the interaction between parenthood and desirability as a short-term mate.) Results are summarized in Table 2-3. Among women there was negligible relation between trait tenderness and desirability as a short-term mate ($\beta = -.03, p = .67$); but, among men, there was a significant negative relationship ($\beta = -.30, p < .001$).²

² Table 2-3 also reveals that, among men only, there was a statistically significant interaction between parenthood and desirability as a short-term mate: The negative relation between desirability as a short-term mate and trait tenderness was stronger among fathers than among male non-parents. A convincing interpretation of this interaction is not immediately evident; and, given that no such interaction emerged in any other analyses involving either
Table 2-3. Results of Regression Analyses Predicting Trait Tenderness from Self-Perceived Desirability as a Short-Term Mate and as a Long-Term Partner, Conducted Separately for Men (n = 163) and Women (n = 140).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t(159)</td>
</tr>
<tr>
<td>Desirability as short-term mate</td>
<td>-.30</td>
<td>-3.30</td>
</tr>
<tr>
<td>Desirability as long-term partner</td>
<td>.44</td>
<td>5.52</td>
</tr>
<tr>
<td>Parenthood</td>
<td>.12</td>
<td>1.55</td>
</tr>
<tr>
<td>Parenthood X Desirability as short-term mate</td>
<td>-.19</td>
<td>-2.33</td>
</tr>
</tbody>
</table>

An identical, but weaker, pattern of results emerged on the measure of state tenderness (see Table 2-4). A preliminary regression analysis (that included the same seven predictor variables described above) revealed higher levels of state tenderness among women, parents, and people who perceive themselves to be more desirable as long-term partners (p’s < .01); there was desirability as a short-term mate or STMO, it may be premature to draw meaningful conclusions from this single finding.
no significant effect for desirability as a short-term mate, nor for its interaction with sex (p’s = .10 and .38, respectively).

When conducting regression analyses separately for men and women, the pattern of results was similar to the results on trait tenderness. There was a negligible relation between desirability as a short-term mate and state tenderness among women (β = -.03, p = .70); but, among men, there was a significant negative relationship between desirability as a short-term mate and state tenderness (β = -.18, p = .04).³

³ All significant effects reported in Study 1 also held when relationship status (coded 1 = single, 2 = committed relationship, 3 = married) was included as a predictor in regression analyses.
Table 2-4. Results of Regression Analyses Predicting State Tenderness from Self-Perceived Desirability as a Short-Term Mate and as a Long-Term Partner, Conducted Separately for Men (n = 163) and Women (n = 140).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>t(159) p&lt;</td>
</tr>
<tr>
<td>Desirability as short-term mate</td>
<td>-.18 -2.03 .04</td>
<td></td>
</tr>
<tr>
<td>Desirability as long-term partner</td>
<td>.50 6.34 .001</td>
<td>.34 4.11 .001</td>
</tr>
<tr>
<td>Parenthood</td>
<td>.12 1.61 .11</td>
<td>.28 3.66 .001</td>
</tr>
<tr>
<td>Parenthood X Desirability as short-term mate</td>
<td>-.08 -0.97 .33</td>
<td>.07 0.94 .35</td>
</tr>
</tbody>
</table>

2.1.1 Study 1: Discussion

The primary results can be summarized as follows: Men who express a greater desire to engage in short-term mating behavior have a less intense tenderness response to infants. Similarly, men who perceive that they are more physically attractive—and thus have a greater ability to successful attract short-term mates—also have less intense tenderness responses. These effects were observed on a measure that assesses chronic dispositional tendencies (trait tenderness) and also, more weakly, on a measure assessing tender feelings triggered by the visual
perception of infants (state tenderness). These effects were observed only among men; no such effects emerged among women.

If indeed these effects are specific to men, why might this be? It could be dismissed simply as a statistical artifact if female responses varied less than male responses on the measures in question; but this was not the case. Although men and women did differ in mean values on all the key variables (women had lower mean values on STMO, and higher mean values on self-perceived desirability as a short-term mate, trait tenderness, and state tenderness; $p’s < .05$), they did not differ in the variability around those means (on all key variables, Levene’s test for equality of variances was nonsignificant, $p’s > .20$). Nor does it appear that the measurement of tenderness was uniquely problematic among women, given that their tenderness responses were predicted by other conceptually relevant variables (e.g., self-perceived desirability as a long-term mate). Possible sex differences are therefore worth considering in a follow-up study.

2.2 Study 2

The findings of Study 1 are intriguing, but rather preliminary. To more rigorously test the hypothesized negative relation between the mate acquisition and parental caring motivational systems—and to test whether this relation might differ meaningfully between men and women (and between parents and nonparents)—it will be useful to employ the methodological strategy used in Study 1 on a substantially larger sample of participants. In doing so, it will also be useful to employ a more comprehensive measure of parental care-giving motives—one that not only assesses tenderness responses but also assesses protective inclinations. Protective responses represent an important—and conceptually distinct—facet of the parenting motivational system (Buckels et al., 2015; Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014; Hahn-Holbrook,
Holt-Lunstad, Holbrook, Coyne, Lawson, 2011) that has not previously been examined in relation to STMO. Study 2 was designed to accomplish these objectives.

Study 2 provided a rigorous test of whether there is an inverse relationship between chronic activation of the parenting and mate acquisition motivational systems. Participants completed the full 25-item Parental Care and Tenderness questionnaire (PCAT; Buckels et al., 2015), which is comprised by five subscales assessing individual differences in different kinds of responses that people have to small children—including a subscale assessing protective inclinations toward children. Participants also completed the same self-report measure assessing individual differences in STMO (Jackson & Kirkpatrick, 2007) that was used in Study 1. (I also assessed and statistically controlled for additional variables—such as LTMO—which may correlate with both PCAT and STMO and so may produce spurious relations between them.) These measures were assessed on a large ($N = 2252$) demographically diverse sample, allowing me to test relations between PCAT subscales and STMO, and also to test whether those relations differed between men and women, and between parents and nonparents.

2.2.1 Study 2: Method

Participants

Participants were 2252 residents of the United States (972 men, 1280 women; 930 parents, 1322 non-parents; $M$ age = 35 years [$SD = 12.08$]) who completed the measures described below. (Subsamples of participants completed additional measures as well; these additional measures are not germane to the goals of this investigation, and so are not described below.) Participants were recruited through Amazon.com’s Mechanical Turk website in exchange for a modest monetary payment ($0.25-$0.50 USD depending on the subsample). Procedures were administered and completed online, on the SurveyMonkey.com website.
Dispositional Attitudes Towards Short-Term and Long-Term Mating

Participants completed 20 items from the revised Sociosexual Orientation Inventory (Jackson & Kirkpatrick, 2007). Participants responded to these items by indicating their agreement on a 7-point rating scale (1 = Strongly disagree; 7 = Strongly agree). I computed mean responses to each of the 2 sets of items, in order to create separate composite indices of STMO and LTMO (Cronbach’s alphas = .95 and .94, respectively).

Dispositional Tendency to Experience Tenderness Towards Infants (Trait Tenderness)

Participants also completed the 25-item Parental Care and Tenderness questionnaire (PCAT; Buckels et al., 2015). The PCAT questionnaire includes 10 items describing scenarios involving babies and to which participants respond by rating how much tenderness they feel in response to each scenario (1 = No tenderness at all; 5 = A lot of tenderness), as well as 15 additional self-descriptive items to which participants respond by rating their agreement on 5-point ratings scales (1 = Strongly disagree; 5 = Strongly agree).

In accordance with past research on the PCAT questionnaire (Buckels et al., 2015), I computed five different subscale scores, each of which was calculated as the mean response across 5 items. (Given the larger sample size and additional aims of Study 2, I analyze each of the five subscales separately; I did not feel it was necessary to compute the same 15-item nurturant parental responses composite as was used in Study 1). These subscales can be summarized as follows: (a) Tenderness aroused in situations involving generally positive stimuli (Tenderness-Positive; e.g., “A newborn baby curls its hand around your finger”); (b) tenderness aroused in situations involving negative stimuli (Tenderness-Negative; e.g., “You hear a child crying loudly on an airplane”); (c) liking of children (Liking; e.g., “I think that kids are annoying” [reverse-scored]; (d) caring responses toward children (Caring; e.g., “When I see
infants, I want to hold them”); and (e) protective responses regarding children (Protection; e.g., “I would hurt anyone who was a threat to a child”). Cronbach’s alphas for these five subscale scores ranged from .85 to .90.

Demographic Information

All participants also completed a brief questionnaire assessing demographic details, including their age, their sex, and whether or not they had any children.

2.2.2 Study 2: Results

Five preliminary regression analyses were conducted that included three demographic variables (sex, parenthood, age) as predictors of each of the PCAT subscale scores. Results revealed statistically significant effects of age on two subscale scores (Liking and Tenderness-Negative; both \( p’s < .01 \)). Results also revealed effects of sex and parenthood on all five subscale scores \( (p’s < .001) \). Therefore, in the primary analyses reported below, I statistically controlled for any effects of age, sex, and parenthood.

An additional preliminary analysis revealed a negative correlation between short-term and long-term mating orientation scores (STMO and LTMO; \( r = -.34, p < .001 \)). Therefore, in the primary analyses reported below, I also statistically controlled for LTMO.

These primary analyses were 5 regression analyses, each of which included a different PCAT subscale as the dependent variable. For each analysis, five variables were entered simultaneously as predictors: age, sex (binary coding: Males = -1; Females = 1), parenthood (binary coding: Non-parents = -1, Parents = 1), LTMO, and STMO. The unique effects associated with the first four of these predictor variables are not germane to the conceptual goals of the present investigation and so are not reported in detail here. (In general, results revealed higher PCAT subscale scores among older individuals, women, parents, and people with higher...
What is germane are the unique relations between STMO and each of the five PCAT subscale scores. These results are summarized in Table 2-5.

Table 2-5. Study 2: Relations between Short-Term Mating Orientation (STMO) and Each Subscale of the Parental Care and Tenderness Questionnaire (PCAT), as Indicated by Standardized Regression Coefficients (Controlling for Age, Sex, Parental Status, and Long-Term Mating Orientation).

<table>
<thead>
<tr>
<th>Relation with STMO</th>
<th>PCAT Subscale</th>
<th>β</th>
<th>[95% CI]</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenderness-Positive</td>
<td>-.01</td>
<td>-.05, +.04</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Tenderness-Negative</td>
<td>-.10</td>
<td>-.14, -.05</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Liking</td>
<td>-.14</td>
<td>-.19, -.10</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Caring</td>
<td>-.09</td>
<td>-.13, -.05</td>
<td>&lt; .001</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td>+.08</td>
<td>+.04, +.12</td>
<td>&lt; .001</td>
<td></td>
</tr>
</tbody>
</table>

Note: N = 2252.

These results reveal three things. First, there was no relation between STMO and the Tenderness-Positive subscale score ($β = -.01, p = .75$). Second, STMO was negatively related to the Tenderness-Negative, Liking, and Caring subscale scores ($β$'s = -.14, -.09, and -.10,
respectively; p’s < .001). Third, there was a positive relation between STMO and the Protection subscale (β = .08, p < .001).

In addition to statistically controlling for sex and parenthood (as was done in the analyses reported immediately above), it may also be illuminating to examine the relations between STMO and PCAT subscale scores separately among male parents (n = 316), male non-parents (n = 656), female parents (n = 614), and female non-parents (n = 666). Therefore, I conducted 5 follow-up regression analyses within each of these four demographic categories. Each regression analysis included age, LTMO, and STMO as predictor variables. Table 2-6 summarizes the unique relations between STMO and each PCAT subscale score separately among male parents, male non-parents, female parents, and female non-parents.
Table 2-6. Study 2: Relations between Short-Term Mating Orientation (STMO) and Each Subscale of the Parental Care and Tenderness Questionnaire (PCAT) within Subsamples Defined by Sex and Parental Status, as Indicated by Standardized Regression Coefficients (Controlling for Age and Long-Term Mating Orientation).

<table>
<thead>
<tr>
<th>PCAT Subscale</th>
<th>Male Participants</th>
<th></th>
<th>Female Participants</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parents</td>
<td>Non-parents</td>
<td>Parents</td>
<td>Non-parents</td>
</tr>
<tr>
<td>Tenderness-Positive</td>
<td>β</td>
<td>-.06</td>
<td>.00</td>
<td>+.03</td>
</tr>
<tr>
<td></td>
<td>[95% CI]</td>
<td>[-.18, +.05]</td>
<td>[-.07, +.08]</td>
<td>[-.06, +.11]</td>
</tr>
<tr>
<td>Tenderness-Negative</td>
<td>β</td>
<td>-.06</td>
<td>-11**</td>
<td>-.08†</td>
</tr>
<tr>
<td></td>
<td>[95% CI]</td>
<td>[-.18, +.06]</td>
<td>[-.18, -.03]</td>
<td>[-.17, .00]</td>
</tr>
<tr>
<td>Liking</td>
<td>β</td>
<td>-.18**</td>
<td>-.15***</td>
<td>-.13**</td>
</tr>
<tr>
<td></td>
<td>[95% CI]</td>
<td>[-.30, -.06]</td>
<td>[-.23, -.07]</td>
<td>[-.22, -.05]</td>
</tr>
<tr>
<td>Caring</td>
<td>β</td>
<td>-.19**</td>
<td>-.09*</td>
<td>-.11*</td>
</tr>
<tr>
<td></td>
<td>[95% CI]</td>
<td>[-.31, -.07]</td>
<td>[-.16, -.01]</td>
<td>[-.19, -.03]</td>
</tr>
<tr>
<td>Protection</td>
<td>β</td>
<td>+.07</td>
<td>+14***</td>
<td>+.05</td>
</tr>
<tr>
<td></td>
<td>[95% CI]</td>
<td>[-.05, +.19]</td>
<td>[+07, +.22]</td>
<td>[-.03, +.14]</td>
</tr>
</tbody>
</table>

*Note: *** p < .001. ** p < .01. * p < .05. † p < .10.

These results reveal that the pattern of relations described above (negative relations between STMO and Tenderness-Negative, Liking, and Caring; a positive relation between STMO and Protection) generally emerged among all 4 of these demographic categories; close
examination of confidence intervals offers no compelling evidence that the magnitudes of any of these effects differ meaningfully between any of these demographic categories.

**Ancillary Analyses on PCAT Protection Subscale Items**

Ancillary analyses were conducted to address whether the positive relationships noted between STMO and protective inclinations toward children were driven especially by a tendency towards physical aggression.

The PCAT Protection subscale is comprised by five individual items, each designed to capture inclinations towards the protection of infants; four of these items are aggressive in nature (e.g., “I would use any means necessary to protect a child, even if I had to hurt others”), however, one item, “I would sooner go to bed hungry than let a child go without food”, is not. Therefore 2 ancillary regression analyses were conducted, one of which included just the non-aggressive PCAT Protection item as the dependent variable and one of which included a composite of the four physically aggressive PCAT Protection items. (These two dependent variables were highly correlated, $r = .54, p < .001$).

For each of the two ancillary analyses, five variables were entered simultaneously as predictors: age, sex (binary coding: Males = -1; Females = 1), parenthood (binary coding: Non-parents = -1, Parents = 1), LTMO, and STMO. Results revealed no relation between STMO and the non-aggressive PCAT Protection item ($\beta = .021$, 95% CI [-.023, .065], $p = .35$) and a positive relation between STMO and a composite of the four physically aggressive PCAT Protection items ($\beta = .088$, 95% CI [.044, .13], $p < .001$). However, close examination of confidence intervals offers no compelling evidence that the magnitudes of the effects differ meaningfully between aggressive and non-aggressive PCAT Protection subscale items.
Next, I examined the relations between STMO and aggressive and non-aggressive PCAT Protection scores separately among male parents, male non-parents, female parents, and female non-parents. I conducted 2 follow-up regression analyses within each of these four demographic categories. Each regression analysis included age, LTMO, and STMO as predictor variables. Among male non-parents, results revealed no relation between STMO and the non-aggressive item ($\beta = .03, 95\% \text{ CI} [-.051, .10], p = .51$) and a positive relation between STMO and the physically aggressive items ($\beta = .16, 95\% \text{ CI} [.09, .24], p < .001$). Among male parents, results revealed no relation between STMO and the non-aggressive item ($\beta = .04, 95\% \text{ CI} [-.08, .15], p = .54$) and no relation between STMO and the physically aggressive items ($\beta = .07, 95\% \text{ CI} [-.05, .19], p = .25$). Among female non-parents, results revealed no relation between STMO and the non-aggressive item ($\beta = .02, 95\% \text{ CI} [-.06, .10], p = .61$) and no relation between STMO and the physically aggressive items ($\beta = .009, 95\% \text{ CI} [-.07, .09], p = .82$). Among female parents, results revealed no relation between STMO and the non-aggressive item ($\beta = -.01, 95\% \text{ CI} [-.10, .08], p = .82$) and no relation between STMO and the physically aggressive items ($\beta = .06, 95\% \text{ CI} [-.02, .14], p = .16$). Importantly, examination of confidence intervals offers no compelling evidence that the magnitudes of the effects differ meaningfully between aggressive and non-aggressive PCAT Protection subscale items within any of the four demographic categories.

Put together, these ancillary results suggest that a significant relationship with STMO only surfaces for the aggressive items of the PCAT Protection subscale (and not for the non-aggressive item); this appears most pronounced among male non-parents. Still, examination of the confidence intervals offers no support for the suggestion that the relationship between STMO and protective inclinations toward children can be explained entirely by a tendency towards physical aggression. Therefore, more work is needed before confident conclusions can be drawn.
regarding the role of dispositional aggressive tendencies in explaining the relationship between STMO and protective inclinations towards children.\footnote{All significant effects reported in Study 2 also held when relationship status (coded 1 = single, 2 = committed relationship, 3 = married) was included as a predictor in regression analyses.}

2.2.3 Study 2: Discussion

Study 2 used correlational methods to test whether there is an inverse relationship between chronic activation of the mate acquisition and parenting motivational systems. The results provide informative corroboration of results reported in Study 1 and in previous work (Neel et al., 2016), while also revealing novel findings that highlight important limitations associated with those prior results.

Corroboration is provided by results showing that (even when controlling for plausible confounding variables) individual differences in short-term mating orientation were inversely related to individual differences in liking for children, caring responses to children, and the tendency for tender emotions to be aroused by the presence of children in ostensibly unpleasant contexts. These new results emerged from a substantially larger sample, allowing for more confident conclusions about the nature of the effects and their generalizability across subsamples. This is important because, whereas previous studies either tested this inverse relationship only among parents (Neel et al., 2016) or obtained the inverse relationship only among men (Study 1), these new results reveal similar inverse relations among both parents and nonparents and among both men and women. Thus, at the level of chronic individual differences, neither sex nor parental status appears to meaningfully moderate the inverse relation between dispositional inclinations toward mate acquisition and nurturant care-giving.
In addition to assessing individual differences in *nurturant* responses, Study 2 also assessed individual differences in *protective* responses to children. No previous research attended directly to this conceptual distinction, and it is a distinction that appears to matter: Whereas short-term mating orientation was negatively correlated with nurturant responses, it was *positively* correlated with protective responses.

Examination of confidence intervals in a set of ancillary analyses offered no compelling evidence that the relationship between STMO and protective inclinations toward children can be explained entirely by a tendency towards physical aggression. However, it is worth noting that in these ancillary analyses, a significant relationship with STMO only surfaced for a composite of the four aggressive items of the PCAT Protection subscale, and not for the non-aggressive item; this was most pronounced among male non-parents. Of course, there are some limitations associated with these analyses which should not be ignored and make interpretation of these ancillary findings difficult. For example, given the psychological complexity of “non-aggressive” protective inclinations toward children, this construct almost certainly cannot be entirely captured using a single-item response measure; a more reliable, four-item composite measure would have been more likely to uncover significant effects to the extent that a real relationship exists between “non-aggressive” protective inclinations toward children and STMO. Therefore, conclusions drawn regarding the relative strength of a single-item measure of “non-aggressive” protective responses versus the four-item composite measure of “aggressive” protective responses are subject to nontrivial inferential limitations. Future studies should employ more sophisticated methodological rigor when directly examining how dispositional aggression might moderate the noted effects, especially among male non-parents.
One possibility is that dispositional parental aggression shares significant overlap with dispositional aggression more broadly and may be the product of a different suite of physiological substrates than that of parental nurturance. Testosterone is associated with short-term mating behavior (van Anders, Hamilton, & Watson, 2007), and it is also associated with aggression toward sources of threat (Montoya, Terburg, Bos, & van Honk, 2012). If testosterone does underpin the link between mate acquisition motives and parental aggression, then this may help to explain why the relationship between STMO and aggressive items of the PCAT Protection subscale was most pronounced among male non-parents; this demographic subgroup is likely to have the highest levels of testosterone in comparison to women (e.g., Torjesen & Sandnes, 2004) as well as male parents (Gray, Yang, & Pope, 2006). I return to a discussion of underlying physiological mechanisms in Chapter 4.

2.3 Summary of Studies in Chapter Two

Studies 1, and 2 focused on individual differences in the chronic activation of the mate acquisition and parenting motivational systems.

The primary results of Study 1 suggest that men who express a greater dispositional desire to engage in short-term mating behavior have a less intense dispositional nurturant parental response to infants; Study 2 revealed similar inverse relations, this time among both men and women (as well as parents and nonparents). Study 2 additionally noted a positive correlation between dispositional short-term mating orientation and chronic protective parental tendencies. This unexpected finding suggests a possible overlap in the mechanisms associated with the mate acquisition motivational system and protective parental attitudes; this overlap does not appear to exist between the mate acquisition motivational system and nurturant parental attitudes.
Taken together, the studies in Chapter Two yield results consistent with psychological manifestations of the mating/parenting trade-off at an individual differences level; specifically, evidence was noted for an inverse relationship between the chronic activation of the mate acquisition and parenting motivational systems. However, the present research also yields additional results that pose a challenge to these seemingly straightforward hypotheses, suggesting that a more nuanced approach must be taken to understand how the mating/parenting trade-off might manifest psychologically. Findings from the studies in Chapter Two highlight the importance of the conceptual distinction between nurturant and protective responses to children in regards to dispositional parenting attitudes; mate acquisition motives may be negatively associated with nurturant parental responses but positively associated with protective parental responses. This discussion will be returned to in Chapter 4.

Just as motivational inclinations vary across individuals, they vary across situations too. Each motivational system may be temporarily activated more readily under some circumstances rather than others. With this in mind, rather than testing developmental processes and correlations between chronic individual differences, the experiments in Chapter 3 were designed to test whether temporary activation of the parenting motivational system causes temporary inhibition of the mate acquisition motivational system and vice versa.
Chapter 3: Temporary Activation and Inhibition of Motivational Systems

Life history theory draws upon principals of evolutionary biology to offer predictions regarding the developmental trajectory of organisms throughout the lifespan and how this may influence dispositional behavioral tendencies. However, just as motivational inclinations vary across individuals, they vary across situations too: Regardless of stable personality traits, situational factors during any given moment can influence behavior dramatically. Thus, an important question not addressed by the research in Chapter Two remains: Is there a mutually inhibitory relationship between the temporary activation of the mate acquisition and parenting motivational systems?

If, indeed, the temporary deployment of mating mechanisms occurs at the strategic expense of the temporary deployment of parental care mechanisms (and vice-versa) then this would suggest a straightforward implication for temporary differences in these motivational states: A mutually inhibitory relationship between the extent to which the mate acquisition and parental caring motivational systems are temporarily active.

Study 3 of this chapter tests whether activation of the parenting motivational system temporarily inhibits motivational inclinations toward mate acquisition. Studies 4 and 5 of this chapter test whether activation of the mate acquisition motivational system temporarily inhibits motivational inclinations to provide nurturant care to infants. Study 5 also provides an exploratory glimpse into whether nurturant parental responses are uniquely associated with mate acquisition motives by examining the extent to which these responses are also affected by the temporary activation of other motives (discussed later).
3.1 Study 3

The mere perceptual appraisal of functionally-relevant stimuli is often sufficient to activate a specific motivational system (and thus to elicit associated psychological responses); the parenting motivational system may be temporarily activated by the mere perception of infants or by events that connote the potential need to provide care (e.g., Eibach & Mock, 2011; Gilead & Liberman, 2014; Glocke et al., 2009; Sherman, Haidt, & Coan, 2009). For example, among parents, the perceptual salience of one’s child appears to facilitate activation of the parental caring motivational system, which has implications for cognition and behavior (e.g., increased risk-aversion; Eibach & Mock, 2011). Although the parenting motivational system may be activated at a relatively high level among actual parents, its physiological foundations are necessarily innate and its basic psychological architecture is likely to characterize all normally developing humans; both parents and non-parents automatically orient toward and attend to infant faces (Brosch, Sander, & Scherer, 2007; Cárdenas, Harris, & Becker, 2013), and even non-parents find interactions with children rewarding, as indicated by their willingness to expend effort to view infant faces (Parsons, Young, Kumari, Stein, & Kringelbach, 2011; Yamamoto, Ariely, Chi, Langleben, & Elman, 2009). Therefore, parental care motives may be temporarily activated, even among non-parents, in response to perceptual cues and events that simulate the presence of offspring.

Further, McDougall (1908, p. 63) suggested that the “parental instinct” (and the accompanying emotional experience of tenderness) is responsive not just to children, but also to “any other helpless and delicate thing.” Recent research (conducted with primarily non-parent samples) supports this: The emotion of tenderness is aroused more strongly in response to adults with infantile features or who otherwise appear more vulnerable (Lishner, Oceja, Stocks, &
Zaspel, 2008; Lishner, Batson, & Huss, 2011). People also report a stronger caretaking motivation toward children who have more prototypically infantile facial features (Glocker, Langleben, Ruparel, Loughead, Gur, & Sachser, 2009). Finally, following the visual perception of cute baby animals (with facial features mirroring those of human infants), even non-parents show an increased tendency toward behavioral caution and carefulness (Sherman, Haidt, & Coan, 2009). In sum, for both parents and non-parents, the parental care motivational system is activated, with predictable consequences, by the perception of not just children, but a host of functionally relevant (e.g., infant-like) stimuli.

Therefore, in Study 3, I attempted to experimentally activate the parenting motivational system (i.e., elicit tender emotional responses towards functionally relevant stimuli) using images of cute baby animals paired with phrases suggesting they were vulnerable and in need of care; I then noted whether my manipulation (versus a control manipulation) had an effect on participants’ short-term mating attitudes. While studies have used similar experimental manipulations that temporarily activate the parental care system using images of cute baby animals and tested behavioral implications (e.g., Sherman, Haidt, & Coan, 2009), no experiments have directly tested whether activation of parental care motives affects motivational inclinations toward mate acquisition.

3.1.1 Study 3: Method

Participants

Participants were 92 undergraduates at the University of British Columbia (42 men, 50 women; all non-parents; \(M\) age = 20 years \([SD = 2.08]\)) who were recruited through the university’s human subject pool in exchange for extra credit in a psychology course and who
completed the measures described below. Participants were randomly assigned to one of two experimental conditions.

*Experimental Manipulation: Activation of Parenting Motivational System*

After consenting to participate in the study, participants were presented with a set of ten photographs, each of which was accompanied by a brief caption. (The participant viewed these stimuli over the course of two minutes, while the experimenter waited in a separate room.) These stimuli differed across two experimental conditions—one (the *Abandoned Pets* condition) that was designed to activate the parenting motivational system, and the other (the *Abandoned Furniture* condition) that was designed to serve as a control condition. (See Appendix E for experimental stimuli).

Stimuli presented within the Abandoned Pets condition were informed by previous research indicating the parental care motivational system—and the emotional experience of tenderness that accompanies it—may be triggered by the visual perception of cute baby animals (Sherman et al., 2009). Therefore, participants in the Abandoned Pets condition were presented with photographs depicting cute puppies and kittens. (Stimulus photos were obtained from the internet on the basis of Google Images searches for “cute” or “adorable” puppies or kittens.) Each photo was accompanied by a caption suggesting that the animal was in need of nurturant care (e.g., “Found abandoned”; “Brown dog needs a home”).

Participants in the control condition (the Abandoned Furniture condition) were presented with photographs depicting pieces of household furniture (also obtained from the internet). Each photo was accompanied by a caption that was either identical (e.g., “Found abandoned”) or analogous to (e.g., “Brown couch needs a home”) the captions that were used in the Abandoned Pets condition.
**Measure of Short-term and Long-term Mating Orientation**

Immediately following the manipulation, participants completed 20 items from the revised Sociosexual Orientation Inventory (SOI, Jackson & Kirkpatrick, 2007; see Study 1 for details). As in Studies 1 and 2, I computed separate composite indices of *short-term mating orientation* (STMO; Cronbach’s alpha = .77) and *long-term mating orientation* (LTMO; Cronbach’s alpha = .86). The measure of STMO served as the primary dependent variable.

**Individual Difference Measures**

Participants then completed a set of questionnaires assessing individual differences. These included: a brief measure assessing demographic information (e.g., age, sex, parental status); an 18-item questionnaire assessing Need for Cognition (Cacioppo & Petty, 1982); and the full 25-item Parental Care and Tenderness questionnaire (PCAT; Buckels et al., 2015; see Study 2 for details). Analyses were conducted to test whether any of the primary results (reported below) were moderated by either Need for Cognition or PCAT. There was no evidence of meaningful moderating effects, and so these variables are not discussed further.

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5 The alpha coefficients of these scales in Study 3 were lower than those of Studies 1 and 2 (Cronbach’s alphas ranged from .94 to .97) and an explanation for this discrepancy is not readily apparent. Still, these alpha coefficients are not substantially lower than those noted for these scales in previous research using participants from the same population of University of British Columbia undergraduate students (e.g., .80; Murray, Jones, & Schaller, 2013). Though STMO was designed to be a trait measure (Jackson & Kirkpatrick, 2007), past research suggests that this measure is also sensitive to situational variation (e.g., Murray, Jones, & Schaller, 2013).

6 Participants completed the Need for Cognition questionnaire in order to allow for more time to pass in between the first and second presentation of the experimental manipulation materials; this was an attempt to ascertain an emotional response to the experimental stimuli during the manipulation check which would have more closely resembled a naïve viewing.

7 By assessing PCAT as well as STMO, LTMO, and demographic variables, I was able to conduct regression analyses that mimicked those reported in Study 2 and that assessed the unique relationship between STMO and each PCAT subscale. No statistically significant effects of STMO were observed on any of the five PCAT subscales ($\beta$’s ranged from -.19 to .04, $p$’s > .10). Given the relatively small sample employed in Study 2, as well as the inclusion of experimental procedures that influenced STMO (see Results, below), these particular results are probably less informative than those reported in Study 2.
Finally, over the course of two minutes, participants were again presented with the 10 photographs of pets/furniture that they had seen at the outset of the study (and which comprised the experimental manipulation). After viewing these stimuli, they were asked to “rate how much you experienced each of the following emotions while looking at the set of photographs.”

Participants provided ratings for: Tenderness, Caring, Responsibility, Anxiety, Sadness, Pride, Affection, Happiness, Compassion, Fear, and Disgust; ratings were made on 6-point scales (1 = Not at all; 6 = Very much). I computed the mean rating of Tenderness, Caring, Affection, and Compassion in order to create a composite index (Cronbach’s alpha = .93) of the extent to which a nurturant affective response was aroused in response to the slideshow. This measure served as a check on the success of the experimental manipulation. (Due to an experimenter error, one participant failed to complete this measure.)

I conducted a 2 (Experimental Condition) x 2 (Sex) ANOVA on the manipulation check measure in order to assess whether the experimental manipulation was successful in arousing nurturant affect, and to examine whether its effects might differ between men and women. Results revealed a significant main effect of condition: Compared to the Abandoned Furniture control condition (M = 2.47; SD = 1.13), greater nurturant affect was aroused in the Abandoned Pets condition, (M = 4.96; SD = 0.84), F(1,87) = 139.65, d = 2.56, p < .001. There was also a statistically significant interaction between experimental condition and sex, F(1,87) = 8.50, d = 0.63, p = .005. Examination of means indicates that the experimental manipulation was more effective in arousing nurturant affect among women (M’s = 2.20 and 5.20; SD’s = 1.00 and 0.87 in the Abandoned Furniture and Abandoned Pets conditions, respectively) than among men (M’s = 2.91 and 4.73; SD’s = 1.23 and 0.76). This apparent sex difference in the effectiveness of the
manipulation is worth keeping in mind when examining effects of the experimental manipulation on the primary dependent measures.

### 3.1.2 Study 3: Results

Did the experimental manipulation influence self-reported STMO? In order to most rigorously address this question, I statistically controlled for self-reported LTMO (which was negatively correlated with STMO; $r = -.36$, $p = .001$) by including LTMO as a covariate in a 2 (Experimental Condition) x 2 (Sex) ANOVA on STMO. Results revealed that, in addition to the significant effects of the covariate ($p = .001$) and of sex ($p = .041$; men report relatively higher levels of STMO), there was also a significant main effect of the experimental condition, $F(1, 87) = 4.22$, $d = 0.44$, $p = .043$.\(^9\) Compared to the Abandoned Furniture control condition, participants reported lower levels of STMO in the Abandoned Pets condition (see Table 3-1).

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\(^9\) When relationship status (coded 1 = single, 2 = in a committed relationship) was included as an additional covariate, this effect was reduced to marginal significance, $F(1, 83) = 2.88$, $d = 0.38$, $p = .09$. Notably, the effect size was not substantially reduced.
Table 3-1. Study 3: Mean Self-Reported Short-Term Mating Orientation within Each Experimental Condition.

<table>
<thead>
<tr>
<th></th>
<th>Abandoned Furniture Condition</th>
<th>Abandoned Pets Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>3.75 (1.47)</td>
<td>3.24 (1.52)</td>
</tr>
<tr>
<td>Male Participants</td>
<td>3.93 (1.26)</td>
<td>3.83 (1.66)</td>
</tr>
<tr>
<td>Female Participants</td>
<td>3.64 (1.60)</td>
<td>2.57 (1.02)</td>
</tr>
</tbody>
</table>

Note: Standard deviations are in parentheses.

Sex did not significantly moderate the main effect of experimental condition on STMO, $F(1,87) = 2.30, p = .133$. Nonetheless, given results on the manipulation check, it seemed prudent to examine the effects of the experimental manipulation on STMO separately for women and men. (Relevant descriptive statistics are presented in Table 3-1.) For each sex separately, I conducted an ANOVA on self-reported STMO, with the experimental manipulation as the sole independent variable and LTMO included as a covariate. For both women and men, the effect of the covariate was statistically significant (both $p$’s < .03). However, only among women was there also a statistically significant effect of the experimental manipulation, $F(1,47) = 13.30, d =$
0.81, \( p = .008 \). Among men, the effect of the experimental manipulation was negligible, \( F(1,39) = 0.15, d = 0.13, p = .704 \).

I conducted additional analyses to test whether the effects documented above generalized also to LTMO. To do so, I conducted a 2 (Experimental Condition) x 2 (Sex) ANOVA on LTMO, with STMO included as a covariate. Results revealed no evidence of any effect of the experimental manipulation on LTMO, \( F(1,87) = .587, d = 0.20, p = .446 \). Analogous analyses conducted on each sex separately also failed to reveal any effects of the experimental manipulation on LTMO (\( p \)'s = .541 and .613 for women and for men, respectively).^{10}

### 3.1.3 Study 3: Discussion

Study 3 represents the first rigorous empirical test of the hypothesis that temporary activation of the parental caring motivational system may inhibit activation of the mate acquisition motivational system: Compared to women in a control condition, women who had been presented with photographs depicting abandoned puppies and kittens (a set of stimuli that aroused a tenderness response that is emblematic of the parental care motivational system) consequently reported lower levels of short-term mating orientation.

It is worth noting that the conceptually interesting effect of the manipulation (among women) was specific to short-term mating orientation only; no such effect occurred on long-term mating orientation. Short-term mating orientation corresponds conceptually to the mate acquisition motivational system, as it is defined by an attitudinal interest in having sexual encounters with multiple mates. In contrast, long-term mating orientation reflects an attitudinal

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^{10} Except where noted, all significant effects reported in Study 3 held when relationship status (coded 1 = single, 2 = in a committed relationship) was included as a covariate in analyses.
interest in an enduring monogamous relationship. (In a sense, STMO reflects a motivational focus on the act of mating, whereas LTMO reflects a motivational focus on a relationship.) This result—the specificity of the effect to STMO—suggests that the activation of parenting motives did not subsequently inhibit pursuit of all other goals, but was specific to goal states most closely associated with mating effort. This intriguing result speaks to the potential uniqueness of the association between motivational states related to mating effort and parenting effort; this will become the subject of a more targeted investigation in Study 5.

In contrast to these results among women, no such effect was observed among men. One possible explanation for this is that the experimental manipulation was simply less effective in activating the parental care motivational system among men than among women. This interpretation is supported by results on the manipulation check (compared to men, women were more affectively responsive to the Abandoned Pets stimuli). Thus, while my procedures may have created the psychological conditions necessary to test the conceptual hypothesis among women, these same procedures appear to have been less effective in creating these same psychological conditions among men. Indeed, this apparent sex difference might be illusory (resulting from an experimental manipulation that was relatively less successful among men than among women); but I must also consider the possibility that this sex difference is real and meaningful and I do so in Chapter Four. Regardless, it will be useful to conduct further research to test whether these results (and the noted sex differences) replicate.

Additionally, the results of Study 3 cannot elucidate whether there is a mutually inhibitory effect of these systems; would this same pattern emerge in the reverse causal direction? To address this, Study 4 was intended to test whether temporary activation of the mate
acquisition motivational system temporarily inhibits activation of the parenting motivational system.

3.2 Study 4

The motivational mechanisms underlying mate acquisition may be temporarily activated by the mere perception of sexually attractive individuals or by events that connote potential opportunities for mating relationships (e.g., Baker & Maner, 2008; Griskevicius, Cialdini, & Kenrick, 2006; Maner et al., 2005). For instance, among heterosexual men, the perceptual salience of a sexually desirable woman facilitates activation of the mate acquisition system, with predictable consequences for cognition and behavior (e.g., increased risk-taking behavior; Baker & Maner, 2008; Ronay & von Hippel, 2010).

With this in mind, in Study 4, I attempted to experimentally activate the mate acquisition motivational system (i.e., elicit lustful emotional responses towards functionally relevant stimuli) using images of sexually attractive opposite-sex others paired with erotic narrative vignettes; I then noted whether this manipulation (versus a control manipulation) had a suppressive effect on participants’ tender emotional responses towards infants. The design of experimental stimuli was further informed by previous research suggesting that sexual arousal may be triggered, not only by the visual perception of attractive opposite-sex others (e.g., Roney, 2003), but also by imagining sexually provocative scenarios (e.g., Chivers, Bouchard, Timmers, 2015). Specifically, the erotic narrative vignettes used in Study 4 were adapted from scripts used by Chivers and Timmers (2012); auditory readings of these narratives were found to successfully elicit sexual arousal in both male and female participants.

Although many studies have used experimental manipulations to temporarily activate the mate acquisition motivational system and have documented consequences for a wide range of
psychological outcomes (e.g., Griskevicius et al., 2006; Li, Kenrick, Griskevicius, & Neuberg, 2012; Maner et al., 2005), I know of no published experiments that have directly tested whether activation of the mate acquisition motivational system consequently inhibits nurturant parental care responses.

3.2.1 Study 4: Method

Participants

Participants were 308 residents of the United States (144 men, 164 women; 133 parents, 175 non-parents; $M$ age = 37 years [$SD = 12.50$]) who fully completed the measures described below. Participants were recruited through Amazon.com’s Mechanical Turk website in exchange for a payment of $0.30 USD. Procedures were administered and completed online, on the SurveyMonkey.com website. During the demographic questionnaire, participants were asked to report their sexual orientation (1 – exclusively heterosexual, 4 – bisexual, 7 – exclusively homosexual); given my interest in studying the effects of sexual arousal on parental caring and tenderness responses, and because participants in the experimental condition viewed an opposite-sex target only, an additional 15 non-heterosexual participants (i.e., those who rated themselves 5 or above the continuous measure of sexual orientation) were removed from analyses.

Experimental Manipulation: Activation of Mate Acquisition Motivational System

After consenting to participate in the study, participants were presented with a photograph which was accompanied by a brief narrative vignette. (The participant viewed these stimuli until they indicated that they were ready to proceed.) These stimuli differed across two experimental conditions—one (the Attractive Stranger condition) that was designed to activate

11 These participants made up one of the subsamples included for analysis in Study 2 ($N = 2252$)
the mate acquisition motivational system through an imagined scenario involving a sexual encounter with an attractive, opposite-sex stranger and the other (the Neighborhood Walk condition) that was designed to serve as a control condition. (See Appendix F for experimental stimuli).

Male participants in the Attractive Stranger condition were presented with a photograph depicting an attractive woman and female participants in the Attractive Stranger condition were presented with a photograph depicting an attractive man. (Stimulus photos were obtained from the internet on the basis of Google Images searches for “hot” or “sexy” men or women.) Each photo was accompanied by a narrative describing a situation in which the participant meets the pictured opposite-sex stranger, flirts with them, and eventually engages in a sexual act with them. The exact wording of the erotic narratives in the Attractive Stranger condition necessarily differed between men and women but both were 178 words long and both described initial physical contact with the opposite-sex stranger at approximately the halfway point of the narrative (70 words before contact for female participants; 74 words before contact for male participants).

Participants in the control condition (the Neighborhood Walk condition) were presented with a photograph depicting a suburban neighborhood (also obtained from the internet). This photo was accompanied by a narrative that was identical in length to the narratives that were used in the Attractive Stranger condition (178 words) but differed dramatically in content: Participants in this condition were guided through a scenario in which they were taking a leisurely stroll through a neighborhood and noticing various things along the way.
Measure of Inclinations Towards Parental Care

Immediately following the manipulation, participants were presented, with a photograph depicting a human infant. (The photograph was one of the photographs used in Study 1 which had previously been rated by a separate sample of participants as high on “cuteness”—the subjective assessment expected to elicit caregiving responses [Sherman, Haidt, & Coan, 2009]). While viewing the photograph, participants were asked to “rate the extent to which you experience the following emotions while viewing the photograph of this baby (above)” On 6-point rating scales (1 = Not at all; 6 = Very much), participants provided ratings for: Tenderness, Caring, Responsibility, Anxiety, Sadness, Pride, Affection, Happiness, Compassion, Fear, and Disgust. I computed mean ratings of Tenderness, Caring, Affection, and Compassion in order to create a composite index of state tenderness (Cronbach’s alpha = .94). This measure of “state tenderness” served as the primary dependent variable.

Individual Difference Measures

Participants then completed a set of questionnaires assessing individual differences. These included: a brief measure assessing demographic information (e.g., age, sex, parental status); 20 items from the revised Sociosexual Orientation Inventory (Jackson & Kirkpatrick, 2007; see Study 1 for details); and the 25-item Parental Care and Tenderness questionnaire (PCAT; Buckels et al., 2015; see Study 2 for details).

Pre-Testing of Experimental Procedures’ Effectiveness in Activating Related Motives

In order to provide a rigorous check on the success of the experimental manipulation at arousing an emotional response characteristic of a temporarily heightened mate acquisition motives, a separate sample of 45 men and 63 women were recruited from the same population
(Amazon.com’s Mechanical Turk website)\textsuperscript{12} and paid $0.10 USD in exchange for their participation. Participants in this separate sample were randomly assigned to either the Neighborhood Walk or the Attractive Stranger condition and were asked to “rate the extent to which each of the following emotions described your experience during the scenario just presented to you.” Participants provided ratings for: \textit{Sexually aroused, Lustful, Grossed Out, Disgusted, Afraid, Scared, Happy, Sad, Anxious, and Nervous}; ratings were made on 6-point scales (1 = Not at all; 6 = Very much). I computed mean ratings of sexually aroused and lustful (Cronbach’s alpha = .96) in order to create a composite index of the extent to which mate acquisition motives had been temporarily activated. Participants in this separate sample completed a brief measure assessing demographic information (e.g., age, sex, parental status), but did not complete any other measures.

I conducted a 2 (Experimental Condition) x 2 (Sex) ANOVA in order to assess whether the experimental manipulation was successful in eliciting sexual arousal (versus control), and to examine whether its effects might differ between men and women. Results revealed a significant main effect of condition: Compared to the Neighborhood Walk control condition ($M = 1.42; SD = 0.96$), greater sexual arousal was elicited in the Attractive Stranger condition, ($M = 4.68; SD = 1.38$), $F(1,104) = 193.41, d = 2.76, p < .001$. There was no interaction between experimental condition and sex noted, $F(1,104) = 0.34, p = .56$.

\textsuperscript{12} This sample was a subset of a larger sample ($N = 254$) that was also used to pre-test additional experimental procedures used in Study 5.
The results of this pretest suggest that the Attractive Stranger manipulation was successful in eliciting emotional responses characteristic of a heightened activation of mate acquisition motives in both men and women.

3.2.2 Study 4: Results

Did the experimental manipulation influence self-reported state tenderness in response to the infant photograph? In order to most rigorously address this question, I statistically controlled for individual difference variables that past work has shown to be related to either a capacity for sexual arousal or state tenderness responses by including STMO, LTMO, PCAT (aggregated across all subscales), parenthood and age as covariates in a 2 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of state tenderness), there was also a significant main effect of the experimental condition, $F(1,306) = 13.80, d = 0.43, p < .001$. Compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Attractive Stranger condition. (See Table 3-2).
Table 3-2. Study 4: Mean Self-Reported State Tenderness within Each Experimental Condition.

<table>
<thead>
<tr>
<th></th>
<th>Neighborhood Walk Condition</th>
<th>Attractive Stranger Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Sample</strong></td>
<td>4.46 (1.19)</td>
<td>3.87 (1.57)</td>
</tr>
<tr>
<td><strong>Male Participants</strong></td>
<td>4.33 (1.27)</td>
<td>3.68 (1.57)</td>
</tr>
<tr>
<td><strong>Female Participants</strong></td>
<td>4.56 (1.13)</td>
<td>4.06 (1.56)</td>
</tr>
</tbody>
</table>

*Note:* Standard deviations are in parentheses.

Sex did not significantly moderate the main effect of experimental condition on state tenderness, \( F(1,306) = 1.44, p = .23 \). Nonetheless, given the inconsistent findings between men and women in Studies 1 and 3, it seemed prudent to examine the effects of the experimental manipulation on state tenderness separately for women and men.

For each sex separately, I conducted an ANOVA on state tenderness, with the experimental manipulation as the sole independent variable and PCAT (aggregated across all subscales), included as a covariate. (As STMO, LTMO, age, and parenthood had no effect on state tenderness in the primary analysis, they were not included as covariates in subsequent analyses; reported results are consistent whether these variables are included as covariates or not). For both women and men, the effect of the covariate was statistically significant (both \( p \)’s <
Among men there was also a statistically significant effect of the experimental manipulation, \( F(1,145) = 8.62, \ d = 0.49, \ p = .004 \). Among women, the effect of the experimental manipulation was marginally significant, \( F(1,169) = 3.87, \ d = 0.30, \ p = .051 \). These results suggest that for both men and (albeit more weakly) women, compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Attractive Stranger condition. (See Table 3-2).\(^{13}\)

### 3.2.3 Study 4: Discussion

Study 4 represents the first rigorous empirical test of the hypothesis that temporary activation of mate acquisition motives may inhibit nurturant parental caring responses. Results provide some support for the hypothesis, although it is somewhat unclear whether that support is qualified by a sex difference.

Support for the hypothesis was found most clearly among men: Compared to those in a control condition, men who had been presented with a photograph depicting an attractive opposite-sex individual and a narrative guiding them through an imagined sexual encounter (a set of stimuli that aroused a sexual arousal response that is emblematic of the mating motivational system) consequently reported lower levels of state tenderness in response to a photograph of a human infant. Similar effects were found among women, however, these effects were marginally significant (\( p = .051 \)); therefore, a potentially meaningful gender difference cannot be ruled out by the results of Study 4.

\(^{13}\) All significant effects reported in Study 4 also held when relationship status (coded 1 = single, 2 = committed relationship, 3 = married) was included as a covariate in analyses.
Study 5 provides an opportunity to a) replicate the findings of Study 4 and investigate whether there are any meaningful gender differences in the noted effects, and b) extend the scope of the current research by examining whether nurturant parental responses may also be temporarily inhibited by the activation of other motivational systems, and how the effects of these systems differ in magnitude from those of the mate acquisition system.

3.3 Study 5

Studies 3 and 4 are the first to note a mutually inhibitory relationship between the temporary activation of mate acquisition and parenting motives, however, it remains unclear as to whether this effect is *unique* to the relationship between mating and parenting motives, or simply reflects a broader psychological process involving momentary goal conflict of any kind (see Emmons, King, & Sheldon, 1993): At any given moment, an individual may have a number of goals that they wish to accomplish but they may have to prioritize just one due to limited bioenergetic resources (e.g., time, attention). For example, receiving a poor grade on an exam might make an achievement motivation temporarily salient (i.e., “I have to study harder for the next test”) which, in turn, might temporarily suppress motivational inclinations to affiliate with peers (i.e., “I don’t want to go to that party”). This broader process could potentially explain why the temporary salience of parenting goals inhibits mating goals, and vice-versa; this mutually inhibitory relationship might simply arise because individuals do not have the time, energy, or resources to strive toward multiple goals at once.

If this were the case, the findings of Studies 3 and 4 would still be empirically novel; no prior studies have provided evidence for an inhibitory relationship between mating and parenting goals, nor have any prior studies shown that a tenderness response towards infants is temporarily inhibited by activating *any* other motivational state. However, an evolutionary perspective
suggests that there is something uniquely fundamental about the tension between behavioral
effort devoted to mating and parenting: The benefits garnered through investment into short-term
mating (e.g., increased number of offspring) are directly balanced by the costs to potential
investment into parenting (e.g., decreased survivability and reproductive success of those
offspring), and vice-versa (Trivers, 1972). If this fundamental trade-off in behavioral effort
manifests in an inhibitory effect of the temporary deployment of motivational systems associated
with these different forms of reproductive effort, the activation of one of these systems (e.g. the
mate acquisition motivational system) should be associated with a unique inhibition of the other
system (e.g., the parenting motivational system): Relative to other motivational conflicts, the
activation of mate acquisition motives may have a particularly impactful inhibitory effect on
parenting motives, and vice-versa. Indeed, an important question becomes, is there anything
psychologically unique about the effect of temporarily activated mate acquisition motives on the
temporary inhibition of the parenting motivational system?

In addressing this question, it will be useful to compare the inhibitory effect of mate
acquisition motives to the inhibitory effects of other motives which could potentially suppress
nurturant parental responses. If the temporary activation of mate acquisition motives has a
relatively greater suppressive effect on nurturant parental responses than these other temporarily
activated motivational states, this would provide some evidence for the psychological uniqueness
of the relationship between motivational systems devoted to mating effort and parenting effort.

In order to most rigorously investigate this hypothesis, Study 5 seeks to: a) Compare the
effects of mate acquisition motives against those of particularly stringent comparison conditions
(for which there are theoretical bases to expect these conditions will share, at least, some
inhibitory relationship with nurturant parenting responses), and b) Activate the emotional
response associated with these comparison conditions to an equal, or greater, extent than that of the sexual arousal emotional response elicited by the mate acquisition experimental procedures. Meeting these conditions should provide an especially stringent test of the uniqueness of the inhibitory relationship between mate acquisition and parenting motives.

Activation of the parenting motivational system is associated with approach-oriented emotional responses (i.e., tenderness) toward infants (Buckels, et al., 2015); therefore, previous work showing that approach motives share an oppositional relationship with avoidance motives (e.g., Elliot & Thrash, 2002; Marsh, Ambady, & Kleck, 2005), suggests that nurturant emotional responses towards infants might also be suppressed by the temporary activation of avoidant motivational states. Aversive perceptions of threat are closely associated with activation of avoidant motivational inclinations (Marsh, Ambady, & Kleck, 2005), so the temporary presentation of particularly threatening stimuli may activate avoidant motivational systems and provide rigorous comparison conditions against which to test the relative magnitude of the effects noted for mate acquisition motives.

One source of threat which has been shown to elicit avoidant inclinations is the perceived threat of pathogen infection; past work has shown that the temporary salience of infectious disease leads to avoidant motor responses and the inhibition of approach-oriented arm movements (Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010). Therefore, in Study 5, I attempted to experimentally activate disease-avoidance motives using an image of an unclean public restroom paired with a disgust-eliciting narrative vignette; the design of these experimental stimuli for use in the Filthy Restroom condition was informed by previous research indicating that disease avoidance motives—and the emotional experience of disgust that
accompanies them—may be triggered by the perception of feces (e.g., Tybur, Bryan, Lieberman, Hooper, & Merriman, 2011).

Another source of threat shown to elicit avoidant responses is the perceived threat to physical safety; past work has shown that the presentation of potentially harmful stimuli (spiders) also leads to enhanced rapidity of motor movements associated with an avoidant behavioral response (Rinck & Becker, 2007). Therefore, in an additional experimental condition of Study 5, I attempted to activate predator-avoidance motives using an image of a gun-wielding stranger paired with a fear-eliciting narrative vignette; the design of this experimental stimuli for use in the Scary Gunman condition was informed by previous research indicating that the predator-avoidance motivational system—and the emotional experience of fear that accompanies it—may be triggered by the perception of others who threaten their physical safety by brandishing weapons (Murray, Jones, & Schaller, 2012).

Past evidence consistent with the hypothesized psychological implications of avoidance motives on approach-oriented responses seems to suggest that the temporary activation of disease-avoidance, and predator-avoidance motives, may temporarily suppress approach-oriented responses (e.g., Mortensen, Becker, Ackerman, Neuberg, & Kenrick, 2010; Rinck & Becker, 2007); thus, these additional experimental procedures provide stringent comparison conditions against which to test the relative magnitude of the inhibitory effects of mate acquisition motives.

Importantly, in order to appropriately compare the relative magnitude of the effects of these motives, each experimental condition should, ideally, elicit its associated emotional response equally, versus control; that is, sexual arousal, disgust, and fear, should be elicited to an equivalent degree in the Attractive Stranger, Filthy Restroom, and Scary Gunman conditions respectively, versus the Neighborhood Walk condition. However, ensuring that each
experimental condition activates each associated motivational state *equally* may be an impossible procedural design challenge several reasons: First, the accuracy with which one reports one’s arousal of an emotional state is subject to entirely different reporting norms depending on the specific emotion. For example—despite both motivational states being equally elicited—participants may be perfectly willing to report that they are disgusted in response to a filthy restroom, but may be more hesitant to report that they are afraid of an armed gunman (i.e., they don’t want to appear weak). Second, research suggesting that negative emotional states are more impactful than positive emotional states (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) suggests that—even if highly motivating stimuli are presented to participants in all experimental conditions—those in the Filthy Restroom and Scary Gunman conditions may experience more intense negative emotional reactions (disgust and fear, respectively) than those in the Attractive Stranger condition might experience sexual arousal (a less negative emotional state).

For these reasons, rigorous pre-testing was conducted on the experimental procedures used in Study 5 to ensure that—at the very least—the Filthy Restroom and Scary Gunman conditions were not *less* effective at eliciting their associated emotions than the Attractive Stranger condition was at eliciting sexual arousal. By arousing a disease- and predator-avoidant motivational state that was equal to, *or greater than*, that of a mate acquisition motivational state, the additional comparison conditions included in Study 5 would provide a stringent (perhaps, especially stringent) test of the hypothesis that there is a particularly impactful inhibitory relationship between mate acquisition and parenting motives.

Put together, the experimental methods employed in Study 5 were designed to test a) whether the key results of Study 4 could be replicated, b) whether the temporary activation of
other motives might also temporarily suppress nurturant parental responses, and c) the relative magnitude of the mate acquisition system’s suppressive effects on nurturant parental responses versus the suppressive effects of other motives.

I know of no studies that examine the uniqueness of the relationship between temporarily activated mate acquisition motives on nurturant parental responses (versus other motivational systems), nor do I know of any studies that investigate whether the temporary activation of disease- or predator-avoidance motives has an inhibitory effect on nurturant emotional responses. Because Study 5 provides only an exploratory first test of these hypotheses, one must be cautious in drawing inferential conclusions from the results until more studies have been conducted. Still, if temporary activation of the mate acquisition motivational system is associated with weaker nurturant parental responses toward infants to an even greater extent than other theoretically opposing motives, this would provide some evidence for the unique psychological relationship between motivational systems devoted to mating and parenting effort.

3.3.1 Study 5: Method

Participants

Participants were 482 residents of the United States (218 men, 264 women; 191 parents, 291 non-parents; $M$ age = 35 years [$SD = 12.59$]) who fully completed the measures described below. Participants were recruited through Amazon.com’s Mechanical Turk website in exchange for a payment of $0.30 USD. Procedures were administered and completed online, on the SurveyMonkey.com website. Non-heterosexual participants ($n = 24$) were removed from analyses.

14 These participants made up one of the subsamples included for analysis in Study 2 ($N = 2252$)
**Experimental Manipulation: Activation of Motivational Systems**

After consenting to participate in the study, participants were presented with a photograph which was accompanied by a brief narrative. (The participant viewed these stimuli until they indicated that they were ready to proceed.) These stimuli differed across four experimental conditions—in addition to the Attractive Stranger and the Neighborhood Walk conditions that were identical to those used in the previous study, two new experimental conditions were included in Study 5: The Filthy Restroom condition that was designed to activate the disease-avoidance motivational system (by eliciting a disgust response) through an imagined scenario involving an unsanitary environment, and the Scary Gunman condition that was designed to activate the predator-avoidance motivational system (by eliciting a fear response) through an imagined scenario involving a violent encounter with a would-be mugger. (See Appendix G for stimuli used in the two new experimental conditions).

Participants in the Filthy Restroom condition were presented with a photograph depicting a public toilet spackled with fecal matter. (This stimulus photo was obtained from the internet on the basis of Google Images searches for “gross” or “disgusting” toilets). The photo was accompanied by a narrative describing a situation in which the participant enters a filthy restroom, observes its lack of cleanliness, and eventually physically interacts with fecal matter.

Participants in the Scary Gunman condition were presented with a photograph depicting a hooded man pointing a gun at the camera. (This stimulus photo was obtained from the internet on the basis of Google Images searches for a “scary” or “frightening” mugger holding a gun). The photo was accompanied by a narrative vignette describing a situation in which night has fallen and the participant is physically engaged by a man who attempts to rob him/her at gunpoint.
The wording of each of these additional narratives was similar in length to that of the Attractive Stranger and Neighborhood Walk conditions (174 and 173 words long in the Filthy Restroom and Scary Gunman conditions respectively). These additional experimental procedures were designed to be highly effective at eliciting their associated emotional response, in order to provide an especially stringent test of hypotheses.

**Measure of Inclinations Towards Parental Care**

Immediately following the manipulation, participants in Study 5 underwent an identical procedure to those in Study 4. Mean ratings of Tenderness, Caring, Affection, and Compassion in response to an infant photograph were again computed in order to create a composite index of state tenderness (Cronbach’s alpha = .93) and this measure served as the primary dependent variable.

**Individual Difference Measures**

Participants also completed the same set of additional questionnaires assessing individual differences as in Study 4: a brief measure assessing demographic information (e.g., age, sex, parental status; sexual orientation); 20 items from the revised Sociosexual Orientation Inventory (Jackson & Kirkpatrick, 2007); and the 25-item Parental Care and Tenderness questionnaire (PCAT; Buckels et al., 2015).

**Pre-Testing of Experimental Procedures’ Effectiveness in Activating Related Motives**

In order to provide a rigorous check on the success of the experimental manipulations at arousing emotional responses characteristic of the associated motives, a separate sample of 113 men and 141 women were recruited from the same population (Amazon.com’s Mechanical Turk...
website)\textsuperscript{15} and paid $0.10 USD in exchange for their participation. By conducting this pre-
testing, I was able to ascertain the extent to which each of the experimental conditions were
effective at activating the specific motivational state they were designed to activate. This pre-
testing also allowed for the comparison of the extent to which each specific affective signal
associated with each specific motivational system was activated in the Attractive Stranger, Filthy
Restroom, and Scary Gunman conditions; this was a necessary step in ensuring that, at the very
least, the Filthy Restroom and Scary Gunman conditions were not less effective at eliciting their
associated motivational state than the Attractive Stranger condition, suggesting that they provide
empirically stringent comparison conditions.

Participants in this separate sample were randomly assigned to either the Neighborhood
Walk, Attractive Stranger, Filthy Restroom, or Scary Gunman condition and were asked to “rate
the extent to which each of the following emotions described your experience during the scenario
just presented to you.” Participants provided ratings for: Sexually aroused, Lustful, Grossed
Out, Disgusted, Afraid, Scared, Happy, Sad, Anxious, and Nervous; ratings were made on 6-
point scales (1 = Not at all; 6 = Very much). I computed mean ratings of “grossed out” and
“disgusted” (Cronbach’s alpha = .92), to create a composite index of the extent to which disgust
was elicited in response to the Filthy Restroom experimental manipulation. I computed mean
ratings of “afraid” and “scared” (Cronbach’s alpha = .96) in order to create a composite index of
the extent to which fear was elicited in response to the Scary Gunman experimental
manipulation. Participants in this separate sample completed a brief measure assessing

\textsuperscript{15} Pre-test results from a subset of this sample were presented in Study 4.
demographic information (e.g., age, sex, parental status), but did not complete any other measures.

In an effort to provide a stringent comparison of the relative magnitude of the suppressive effects on nurturant parenting responses of the Attractive Stranger condition versus the Filthy Restroom and Scary Gunman conditions, this pre-test was conducted to ensure that the latter two conditions elicited their associated emotional response \textit{at least} equally to that of the Attractive Stranger condition. To examine this, I compared the effect sizes of each of the Attractive Stranger, Filthy Restroom, and Scary Gunman conditions on the relevant manipulation check measure (self-reported sexual arousal, disgust, and fear respectively) versus control.

Recall that key pre-test results for the Attractive Stranger condition were presented in the methods section of Study 4: Compared to the Neighborhood Walk control condition ($M = 1.42$; $SD = 0.96$), greater sexual arousal was elicited in the Attractive Stranger condition ($M = 4.68$; $SD = 1.38$), $d = 2.76$, 95% CI [2.54, 2.98]. This effect size, and confidence intervals surrounding this effect size can be compared to those of the Filthy Restroom and Scary Gunman conditions: Compared to the Neighborhood Walk control condition ($M = 1.03$; $SD = 0.12$), greater disgust was elicited in the Filthy Restroom condition ($M = 5.92$; $SD = 0.37$), $d = 17.36$, 95% CI [17.31, 17.42] and compared to the Neighborhood Walk control condition ($M = 1.10$; $SD = 0.39$), greater fear was elicited in the Scary Gunman condition ($M = 5.51$; $SD = 0.90$), $d = 16.90$, 95% CI [16.85, 16.94].

Examination of the confidence intervals around the effect sizes of each condition suggests that the Filthy Restroom and Scary Gunman conditions were far more effective at eliciting disgust and fear, respectively, than the Attractive Stranger condition was at eliciting sexual arousal. Because the Filthy Restroom and Scary Gunman conditions appear to have
activated their respective avoidant motivational inclinations much more strongly than the Attractive Stranger condition activated mate acquisition motives, these additional conditions seem to provide especially stringent comparison conditions for the relative magnitude of the relationship between mate acquisition motives and nurturant parental responses.

Ancillary Pre-Test Analyses

Ancillary pre-test analyses were conducted on the Filthy Restroom and Scary Gunman conditions to investigate whether there were any sex differences in the effectiveness of these manipulations: I first conducted a 2 (Experimental Condition) x 2 (Sex) ANOVA on the manipulation check measure completed by this separate sample in order to assess whether the Filthy Restroom experimental manipulation was successful in eliciting disgust (versus control), and to examine whether its effects might differ between men and women. Results revealed a significant main effect of condition: Compared to the Neighborhood Walk control condition ($M = 1.03; SD = 0.12$), greater disgust was elicited in the Filthy Restroom condition, ($M = 5.92; SD = 0.37$), $F(1,105) = 7608.16, d = 17.36, p < .001$. No interaction between experimental condition and sex noted, $F(1,112) = 0.60, p = .44$. Next, I conducted a 2 (Experimental Condition) x 2 (Sex) ANOVA on the manipulation check measure in order to assess whether the Scary Gunman experimental manipulation was successful in eliciting fear (versus control), and to examine whether its effects might differ between men and women. Results revealed a significant main effect of condition: Compared to the Neighborhood Walk control condition ($M = 1.10; SD = 0.39$), greater fear was elicited in the Scary gunman condition, ($M = 5.51; SD = 0.90$), $F(1,118) = 1016.05, d = 16.90, p < .001$. No interaction between experimental condition and sex noted, $F(1,126) = 0.19, p = .67$. 

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Put together, the results of these ancillary pre-test analyses suggest that the Filthy Restroom and Scary Gunman manipulations were successful in eliciting emotional responses characteristic of a heightened activation of disease-avoidance and self-protection motives among both men and women.

### 3.3.2 Study 5: Results

To test whether condition affected nurturant parental responses, I first conducted a 4 (condition) x 2 (Sex) ANOVA on state tenderness to an infant photograph, which included PCAT (aggregated across all subscales) as a covariate. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of state tenderness), there was also a significant main effect of the experimental condition, $F(3,477) = 6.54$, $p < .001$. No significant effects were found for sex or the condition x sex interaction (both $p$’s > .83).

In the next set of analyses, I examined a) whether, as in Study 4, temporarily activating a mate acquisition motive temporarily inhibited a parental nurturance response, b) whether temporarily activating other motives temporarily inhibited a parental nurturance response, and c) whether the inhibitory effect of the mate acquisition motive differed from that of the other motives.

**Mate Acquisition Motives**

Did the Attractive Stranger experimental manipulation influence self-reported state tenderness in response to the infant photograph? I again statistically controlled for PCAT (aggregated across all subscales), by including it as a covariate in a 2 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively
higher levels of state tenderness), there was also a significant main effect of the experimental condition, $F(1,241) = 13.10$, $d = 0.46$, $p < .001$. Compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Attractive Stranger condition. (See Table 3-3)

Sex did not significantly moderate the main effect of experimental condition on state tenderness, $F(1,241) = 0.001$, $p = .97$. Nonetheless, given the results of Study 4 and the aims of the current investigation, it seemed prudent to examine the effects of the experimental manipulation on state tenderness separately for women and men. For each sex separately, I conducted an ANOVA on state tenderness, with the experimental manipulation as the sole independent variable and PCAT (aggregated across all subscales), included as a covariate. For both women and men, the effect of the covariate was statistically significant (both $p$’s < .001). In contrast to the results of Study 4 though, there was a statistically significant effect of the experimental manipulation among both women, $F(1,137) = 7.48$, $d = 0.47$, $p = .007$ and men, $F(1,103) = 4.19$, $d = 0.40$, $p = .04$. These results suggest that for both women and men, compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Attractive Stranger condition. (See Table 3-3).

Given that the relevant experimental methodology employed in each of these studies was identical, it may be informative to combine the samples in Studies 4 and 5 who were in the Neighborhood Walk and Attractive Stranger conditions and re-run these same analyses.

On the combined sample ($N = 566$), I statistically controlled for PCAT (aggregated across all subscales), by including it as a covariate in a 2 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of
state tenderness), there was also a significant main effect of the experimental condition, $F(1,561) = 26.53, d = 0.43, p < .001$. Compared to the Neighborhood Walk control condition, participants in the combined sample reported lower levels of state tenderness in the Attractive Stranger condition.

Sex did not moderate the main effect of experimental condition on state tenderness in the combined sample, $F(1,561) = 1.12, p = .29$. Still, for each sex separately, I conducted an ANOVA on state tenderness, with the experimental manipulation as the sole independent variable and PCAT (aggregated across all subscales), included as a covariate. For both women and men, the effect of the covariate was statistically significant (both $p$’s < .001). Among women in the combined sample there was a statistically significant effect of the experimental manipulation, $F(1,309) = 10.77, d = 0.38, p = .001$; among men, a significant effect of the experimental manipulation was also noted, $F(1,251) = 14.00, d = 0.47, p < .001$. These results suggest, across Studies 4 and 5, compared to the Neighborhood Walk control condition, both men and women reported lower levels of state tenderness in the Attractive Stranger condition.

Other Motives

Did the Filthy Restroom experimental manipulation influence self-reported state tenderness in response to the infant photograph? I statistically controlled for PCAT (aggregated across all subscales), by including it as a covariate in a 2 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of state tenderness), there was also a significant main effect of the experimental condition, $F(1,250) = 15.92, d = 0.50, p < .001$. Compared to the Neighborhood Walk control condition,
participants reported lower levels of state tenderness in the Filthy Restroom condition. (See Table 3-3).

Sex did not significantly moderate the main effect of experimental condition on state tenderness, $F(1,249) = 0.65, p = .42$. Nonetheless, given the aims of the current investigation, it seemed prudent to examine the effects of the experimental manipulation on state tenderness separately for women and men. For each sex separately, I conducted an ANOVA on state tenderness, with the experimental manipulation as the sole independent variable and PCAT (aggregated across all subscales), included as a covariate. For both women and men, the effect of the covariate was statistically significant (both $p$’s < .001). Among women there was a statistically significant effect of the experimental manipulation, $F(1,141) = 7.25, d = 0.45, p = .008$. Among men the effect of the experimental manipulation was also significant, $F(1,108) = 7.93, d = 0.54, p = .006$. These results suggest that for both men and women, compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Filthy Restroom condition. (See Table 3-3).

Did the Scary Gunman experimental manipulation influence self-reported state tenderness in response to the infant photograph? I statistically controlled for PCAT (aggregated across all subscales), by including it as a covariate in a 2 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed that, in addition to a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of state tenderness), there was also a significant main effect of the experimental condition, $F(1,236) = 4.00, d = 0.26, p = .047$. Compared to the Neighborhood Walk control condition, participants reported lower levels of state tenderness in the Scary Gunman condition. (See Table 3-3).
Sex did not significantly moderate the main effect of experimental condition on state
tenderness, $F(1,234) = 0.02, p = .90$. Nonetheless, for each sex separately, I conducted an
ANOVA on state tenderness, with the experimental manipulation as the sole independent
variable and PCAT (aggregated across all subscales), included as a covariate. For both women
and men, the effect of the covariate was statistically significant (both $p$’s < .001), however, there
was no statistically significant effect of the experimental manipulation among women, $F(1,132)$
$= 2.21, d = 0.26, p = .14$ or men, $F(1,103) = 1.66, d = 0.26, p = .20$. These results suggest that,
when analyzed separately, neither men nor women, reported lower levels of state tenderness in
the Scary Gunman condition, compared to the Neighborhood Walk control condition (See Table
3-3).
Table 3-3. Study 5: Mean Self-Reported State Tenderness within Each Experimental Condition.

<table>
<thead>
<tr>
<th></th>
<th>Neighborhood Walk</th>
<th>Attractive Stranger Condition</th>
<th>Filthy Restroom Condition</th>
<th>Scary Gunman Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Sample</strong></td>
<td>4.65 (1.18)</td>
<td>4.11 (1.34)</td>
<td>4.12 (1.56)</td>
<td>4.28 (1.49)</td>
</tr>
<tr>
<td><strong>Male Participants</strong></td>
<td>4.29 (1.26)</td>
<td>3.97 (1.37)</td>
<td>3.71 (1.58)</td>
<td>4.02 (1.58)</td>
</tr>
<tr>
<td><strong>Female Participants</strong></td>
<td>4.90 (1.07)</td>
<td>4.25 (1.30)</td>
<td>4.49 (1.45)</td>
<td>4.56 (1.31)</td>
</tr>
</tbody>
</table>

*Note:* Standard deviations are in parentheses.

*Comparing the Relative Magnitude of Effects*

Did the inhibitory effect on nurturant parental responses toward infants differ depending on whether mate acquisition or other motives were activated? When examining this question, it is worth keeping in mind the results of the manipulation check which suggested an apparent difference in the effectiveness of the manipulations: The Attractive Stranger condition was far less effective at eliciting its associated emotional response (versus control) than the other two experimental conditions.

Still, I examined whether state tenderness in response to the infant photograph differed between each of the Attractive Stranger, Filthy Restroom, and Scary Gunman conditions. I statistically controlled for PCAT (aggregated across all subscales), by including it as a covariate.
in a 3 (Experimental Condition) x 2 (Sex) ANOVA on state tenderness in response to the infant photograph. Results revealed a significant effect of PCAT ($p < .001$; those higher in PCAT report relatively higher levels of state tenderness) but, no main effect of the experimental condition, $F(2,348) = 2.37, p = .10$. No difference in nurturant parental responses towards infants was found between the Attractive Stranger (estimated marginal $M = 4.16$), Filthy Restroom (estimated marginal $M = 4.04$), and Scary Gunman (estimated marginal $M = 4.35$) conditions. No interaction was found between sex and experimental condition on state tenderness, $F(2,348) = 0.29, p = .75$.\(^{16}\)

### 3.3.3 Study 5: Discussion

Study 5 represents, a) a follow-up test of the hypothesis that temporary activation of mate acquisition motives inhibits parenting motives, b) the first empirical test of whether temporary activation of disease- and predator-avoidance motives inhibits parenting motives, and c) a comparison of the relative magnitudes of these inhibitory effects.

In the previous study (Study 4), support for the hypothesis that temporary activation of the mate acquisition motivational system temporarily suppresses inclinations toward parental care was found among men and (albeit more weakly) women. In Study 5, effects were replicated, but this time support for the hypothesis emerged in both men and women. In both Studies 4 and 5, participants in the Attractive Stranger and Neighborhood Walk conditions underwent identical methodological procedures, allowing for the ability to combine across samples and re-run analyses. Results from analyses on the combined sample suggest that the temporary activation of

\(^{16}\) All significant effects reported in Study 5 also held when relationship status (coded 1 = single, 2 = committed relationship, 3 = married) was included as a covariate in analyses.
mate acquisition motives is associated with a temporary suppression of inclinations toward parental care in both men and women; no meaningful gender differences emerged.

Study 5 also examined whether temporary activation of other (avoidance-oriented) motivational systems also temporarily inhibit parenting motives. Results suggest that the temporary activation of disease-avoidance motives (through the elicitation of disgust) is associated with an inhibition of motivational inclinations toward parental care. A similar effect was noted for the temporary activation of predator-avoidance motives (through the elicitation of fear) on the inhibition of the parenting motivational system. Similar effects emerged among both men and women. These results provide evidence that the temporary activation of avoidance-related motives temporarily inhibit nurturant parental responses towards infants.

Finally, Study 5 investigated the uniqueness of the relationship between the mate acquisition and parenting motivational systems at the level of temporary activation; Study 5 sought to compare the relative magnitude of the inhibitory effects of other motives on nurturant parental responses with those of temporarily activated mate acquisition motives. In order to test this in an empirically rigorous manner, care was taken to ensure that these other motives would provide an especially stringent test of hypotheses; results of pre-testing analyses suggested that the disease- and predator-avoidance motives conditions were far more effective at eliciting their respective associated emotions (disgust and fear) than the mate acquisition motives condition was at eliciting sexual arousal. Thus, my procedures appear to have elicited activation of mate acquisition motives to a far lesser extent than they elicited activation of disease- and predator avoidance motives, making a test of the relative magnitude of the relationship between the parenting and mate acquisition motivational systems an especially stringent one.
Even though mate acquisition motives in Study 5 were activated relatively weakly compared to disease- and predator-avoidance motives, there was no evidence that their inhibitory effect on nurturant parental responses was meaningfully different from that of the other two motives. These results can be interpreted in two ways.

First, temporary activation of mate acquisition motives did not have a stronger inhibitory effect on nurturant parental responses than other motives so, the results of Study 5 could be interpreted as evidence against the contention that there is a particularly impactful, psychologically unique relationship between the mating and parenting systems. If this were the case, these results (and perhaps, by extension, the results of Studies 3 and 4) may just be an empirically novel manifestation of previously documented psychological processes involving goal conflict (e.g., Emmons, King, & Sheldon, 1993): The temporary activation of mate acquisition motives may temporarily suppress the activation of parenting motives, simply because it is difficult to focus on multiple goals at once. This conclusion would be important on its own, because it contributes to our understanding of broader motivational processes and goal conflict as it relates to mating and parenting behavior: Though mating and parenting both serve an ultimate goal of enhancing reproductive success (through the proliferation of genetic material), the temporary salience of one reproductive goal, temporarily inhibits the other.

Alternatively, the results of Study 5 might also be interpreted as supportive evidence for the particularly impactful, psychologically unique relationship between temporary activation and inhibition of the mate acquisition and parenting motivational systems: Even a relatively subtle manipulation of mate acquisition motives produced inhibitory effects on nurturant parental responses that were no different in magnitude to much more powerful manipulations of other motives. This interpretation implies that—though goal conflicts may arise between parenting and
other incongruent motivational states—there is a particularly impactful tension between the activation of a motivational system facilitating short-term mating that inhibits activation of one which facilitates parental nurturance. Admittedly, this second interpretation appears less likely given the results of Study 5, however, its possibility is enough to leave the question of psychological uniqueness an open one for future research. Both of these interpretations, and their implications will be returned to in Chapter 4.

3.4 Summary of Studies in Chapter Three

Just as motivational inclinations vary across individuals, they vary across situations too and the perceptual appraisal of functionally-relevant stimuli is often sufficient to activate a specific motivational system (and thus to elicit associated physiological and psychological responses). With this in mind, rather than testing developmental processes and correlations between chronic individual differences, the experiments in Chapter 3 were designed to test hypothesized mutually inhibitory relations between the temporary activation of the mate acquisition and parenting motivational systems.

In Study 3, I experimentally activated the parenting motivational system by eliciting tender emotional responses towards images of cute baby animals which were paired with phrases suggesting they were vulnerable and in need of care; results indicated that the temporary arousal of a parental care-giving motivational state consequently inhibited self-reported inclinations toward short-term mating. This inhibitory effect was only found in women, however, this apparent sex difference might be illusory, resulting from an experimental manipulation that was relatively less successful among men than among women; more work is needed to investigate whether this possible sex difference is meaningful.
In Studies 4 and 5, I experimentally activated the mate acquisition motivational system by eliciting sexual arousal towards images of sexually attractive opposite-sex others which were paired with erotic narrative vignettes; results of these studies indicated that temporary arousal of a mate acquisition motivational state consequently inhibited self-reported tender emotional responses towards a human infant. No consistent sex differences were noted in this result. These results, along with those of Study 3, suggest that temporary activation of the mate acquisition and parenting motivational systems are mutually inhibitory.

Study 5 also examined the uniqueness of the relationship between the mate acquisition and parenting motivational systems by comparing the relative magnitude of the inhibitory effects of other (avoidance-related) motives on nurturant parental responses. Results indicated that temporary arousal of a disease-avoidance motivational state consequently inhibited self-reported tender emotional responses towards a human infant; similar (but somewhat weaker) results were found for activation of a predator-avoidance motivational state. Temporary activation of these additional motives had an inhibitory effect on nurturant parental responses which did not differ from that of mate acquisition motives; however, a direct comparison of the magnitude of the effects in Study 5 may be misleading given that the disease- and predator-avoidance manipulations were much more effective at eliciting disgust and fear (respectively) than the mate acquisition manipulation was at eliciting sexual arousal. More work is needed to examine whether the results of Studies 3, 4, and 5, are specific to the conflict between mating and parenting motives, or are the consequence of broader psychological processes.

Taken together, the studies in Chapter Three yield results consistent with psychological manifestations of the trade-off between investment into mating effort and parenting effort at a temporary activation level; specifically, evidence was noted for a mutually inhibitory
relationship between the temporary activation of the mate acquisition and parenting motivational systems.
Chapter 4: General Discussion

4.1 Summary of Findings

According to the biological principles of life history theory, there is a fundamental trade-off between mating effort and parenting effort. The five studies reported here tested two conceptually distinct ways in which that trade-off might manifest at a psychological level of analysis. Studies 1 and 2 focused on developmental processes and a hypothesized inverse relationship between the chronic activation of the mate acquisition and parenting motivational systems. Studies 3, 4, and 5 focused on momentary deployment and a hypothesized mutually inhibitory relationship between the temporary activation of the mate acquisition and parenting motivational systems. The present research yielded results consistent with both of these hypothesized manifestations. But the present research also yielded additional results that pose a challenge to these seemingly straightforward hypotheses, suggesting that a more nuanced approach must be taken to understand how the mating/parenting trade-off might manifest psychologically.

The primary results of Study 1 suggest that men who express a greater desire to engage in short-term mating behavior have a less intense nurturant parental response to infants. Similarly, men who perceive that they are more physically attractive—and thus have a greater ability to successfully attract short-term mates—also have less intense tenderness responses to infants. These effects were observed on a measure that assesses chronic dispositional nurturant tendencies (trait tenderness) and also, more weakly, on a measure assessing tender feelings triggered by the visual perception of infants (state tenderness). These effects were observed only among men; no such effects emerged among women.
Results of Study 2 revealed similar findings to the key set of results in Study 1: Even after statistically controlling for potential confounding variables, there was an inverse relationship between short-term mating orientation and dispositional inclinations to experience tender, caring responses to young children. However, results from Study 2 also extend findings from Study 1 in several ways. First, Study 2 took advantage of a substantially larger sample, allowing for more confident conclusions about the nature of the effects and their generalizability across subsamples: Whereas Study 1 obtained the inverse relationship only among men, results of Study 2 reveal similar inverse relations among both men and women (as well as parents and nonparents).

Study 2 also assessed individual differences in protective responses toward children and, whereas short-term mating orientation was negatively correlated with nurturant responses, it was positively correlated with protective responses. Ancillary analyses suggest that this relationship with protective responses did not differ in magnitude depending on whether the responses were physically aggressive or non-aggressive in nature; however, due to inferential limitations of these analyses, more work is needed on the role of dispositional aggression on the noted effects. Still, this intriguing finding suggests that while the abstract concept of a mating/parenting trade-off is relatively simple and straightforward at a purely logical level, it is more complicated when applied to actual psychological processes. The provision of parental care involves a wide range of behavioral responses that are psychologically distinct. Nurturant behaviors tend to be directed toward children themselves, whereas protective behaviors may often be directed toward potentially-dangerous objects within a child’s environment. Nurturant behaviors are typically associated with tender emotions (which are experienced as affectively rewarding) and may be the product of physiological substrates that evolved specifically because of their implications for
offspring survival. In contrast, protective behaviors are often associated with more negative emotions (e.g., fear, disgust, anger) and may be the product of a different suite of physiological substrates that had rather different evolutionary origins. I return to a discussion of these potential underlying physiological mechanisms in the Limitations and Future Directions section of this chapter.

It is important to note that, though statistically significant, the effect sizes of many key findings in Study 2 were relatively small (lowest $\beta = 1.08$), even when compared to what is typically considered a “small” effect size in social psychological research ($\beta = .20$; see Cohen, 1992). Therefore, even though these results are corroborated across other studies in this thesis, some of the effects in Study 2 may have achieved statistical significance, in part, by virtue of the large sample size ($N = 2252$). Still, given the potential impact of these results for many branches of psychological study and their generativity for future research (discussed later), these findings should still be considered practically significant, even though they are relatively weak.

Whereas the studies in Chapter Two focused on chronic individual differences, the studies in Chapter Three focused on temporary activation and inhibition.

In Study 3, I attempted to experimentally activate the parenting motivational system (i.e., elicit tender emotional responses towards functionally relevant stimuli) using images of cute baby animals paired with phrases suggesting they were vulnerable and in need of care; I then noted whether my manipulation (versus a control manipulation) had a suppressive effect on participants’ self-reported unrestricted mating attitudes. Results from Study 3 indicated that the temporary arousal of a parental care-giving motivational state consequently inhibits self-reported inclinations toward short-term mating in women, but not men.
In Studies 4 and 5, I attempted to experimentally activate the mate acquisition motivational system (i.e., elicit lustful emotional responses towards functionally relevant stimuli) using images of sexually attractive opposite-sex others paired with erotic narrative vignettes; I then noted whether my manipulation (versus a control manipulation) had a suppressive effect on participants’ self-reported tender emotional responses towards infants. Results of Studies 4 and 5 suggest that temporary arousal of a mate acquisition motivational state consequently inhibits self-reported tender emotional responses towards infants. No consistent sex differences were noted in this result.

Study 5 also sought to examine the uniqueness of the relationship between the mate acquisition and parenting motivational systems by comparing the relative magnitude of the inhibitory effects of other (avoidance-related) motives on nurturant parental responses. Results of Study 5 suggest that the temporary arousal of disease- and predator-avoidance motivational states also consequently inhibits self-reported nurturant emotional responses towards infants. No consistent sex differences were noted in these effects. Temporary activation of these motives had an inhibitory effect on nurturant parental responses which did not differ from that of mate acquisition motives; however, the experimental procedures designed to elicit disease- and predator-avoidance motives in Study 5 were much more effective at eliciting disgust and fear (respectively) than the mate acquisition manipulation was at eliciting sexual arousal. Given this, a direct comparison of the magnitude of the effects in Study 5 may be misleading, and more work is needed.
4.2 Limitations and Future Directions

Methodological Limitations

Participants in Studies 1, 2, 4, and 5 of this dissertation were Americans recruited from Amazon Mechanical Turk and participated online for modest monetary compensation. This population of participants tends to be more educated and less wealthy than the U.S. general population (Paolacci, Chandler, & Ipeirotis, 2010), thus one potential limitation of findings from these studies is their lack of generalizability to other populations; indeed, this remains an open limitation for future research to address. Still, past work suggests that the recruitment method employed in these studies is effective at enlisting samples which are more demographically diverse than other typically used participant pools (e.g., undergraduate samples, other internet samples), while obtaining data which is at least as reliable as those obtained via traditional social psychological recruitment methods (Buhrmester, Kwang, & Gosling, 2011); therefore the use of Amazon Mechanical Turk workers (coupled with the use of Canadian undergraduate students in Study 3) also presented several advantages.

Another potential methodological limitation was the use of pictures of cute baby animals (rather than actual infants) to temporarily activate parenting motives in Study 3. Why not use photographs of actual human infants rather than animals? Participants were drawn from the University of British Columbia human subject pool and were all relatively young non-parents for whom evoking a genuine emotional reaction to human infants in need of parental care may have proved a difficult task; presumably, these students are not currently in a life stage at which the possibility of adopting a human child is a realistic one. Adopting an abandoned pet, however, seemed to be a more realistic scenario for this particular group of participants and therefore more likely to effectively elicit the tender emotions associated with the parenting motivational system.
Regardless, past work has shown that cute baby animals also elicit emotional responses characteristic of an activation of the parenting motivational system (Sherman, Haidt, & Coan, 2009), therefore, the methods in Study 3 still provide a test of relevant hypotheses.

In addition to activating parenting motives using non-infant stimuli in Study 3, I assessed nurturant emotional responses to pictures of infants who were unrelated to participants in Studies 1, 4, and 5; these methodological strategies point to a broader question that warrants some discussion and may pose additional challenges for the current findings: Should the parenting motivational system be activated by stimuli other than one’s own children (and if so, why)? Evolutionary perspectives on motivational systems would contend that activation of parenting motives should be elicited most strongly by the perception of one’s own offspring, especially when those offspring are in particular need of care (Kenrick et al., 2010). However, there may have been adaptive benefits to an overgeneralized parenting motivational system with nurturant emotional responses that extended to those other than individuals’ actual offspring; throughout evolutionary history, humans lived in small tribal bands of individuals who likely shared some degree of genetic relation. Therefore, a motivation to nurture and protect babies other than one’s own may have increased reproductive fitness by ensuring the survival of related (but not directly related) others. McDougall (1908, p. 63) suggested that this cognitive generalization may extend, not just to unrelated children but also to “any other helpless and delicate thing.” In support of this, tenderness is also elicited in response to unrelated adults with infantile features or who appear particularly vulnerable (Lishner et al., 2011; Lishner, Oceja, Stocks, & Zaspel, 2008), and greater dispositional tenderness is associated with higher perceived warmth ratings of unrelated baby-faced adults (Buckels et al., 2015). This previous research suggests that the procedures used in this dissertation may have provided a particularly stringent test of hypotheses and future
studies should seek to test whether the effects noted in the current research are stronger (among parents) when pictures of one’s own offspring are used to elicit or assess activation of the parenting motivational system.

Underlying Physiological Mechanisms?

Although the evolutionary logic of the mating/parenting trade-off may explain why mate acquisition motives are inversely related to nurturant parenting motives, it cannot explain how this occurs. Nor do the results of this thesis provide answers to questions about physiological processes that might provide a mechanistic account of these inverse relations. If the trade-off between resources devoted to mating effort versus parenting effort is fundamental to all humans, then it should be associated with uniquely characteristic events at a deep, physiological level of analysis. Development of the mate acquisition motivational system may thus be associated with physiological processes which are inversely related to the development of the parenting motivational system; and vice versa. One avenue for future research is to investigate the relation between testosterone and oxytocin as a possible neurochemical basis for the inverse relationship between mate acquisition and parenting motives.

For men and women, the abundance and balance of sex-specific gonadal steroid hormones are critical to the regulation and expression of human mating effort (Sisk & Foster, 2004). Testosterone is one steroid hormone found in all mammals that has been correlated with a number of behaviors and character traits related to mate acquisition (e.g., van Anders, Hamilton, & Watson, 2007; Sisk & Foster, 2004; Wallen, 2001; Goldey & van Anders, 2011; Pirke, Kockott & Dittmar, 1974). Therefore, if the development and deployment of mating mechanisms occurs at the strategic expense of the development and deployment of parental care mechanisms—as implied by the mating/parenting trade-off—there may be an inverse
relationship between testosterone and parental care. Indeed, past work suggests that there is some support for this hypothesis (while also suggesting an additional nuance consistent with findings regarding protective parental inclinations noted in Study 2).

Women—who generally hold stronger dispositional parenting motives than men (Buckels, et al., 2015)—have a baseline level of testosterone which is significantly lower than that of men (Torjesen & Sandnes, 2004). Also, a host of cross-sectional and longitudinal evidence suggests that testosterone levels are lower among parents than nonparents (Muller, Marlowe, Bugumba, & Ellison, 2009; Gray, Kahlenberg, Barrett, Lipson, & Ellison, 2002; Gray, 2003; Gray, Yang, & Pope, 2006; Gettler, McDade, Feranil, & Kuzawa, 2011; Storey, Walsh, Quinton, & Wynne-Edwards, 2000) and generally lower among those who are in committed relationships, married, or expecting the birth of a child than those who are not (Marazziti & Canale, 2003; Booth & Dabbs, 1993; Mazur & Michalek, 1998; Burnham et al., 2003; Gray et al., 2004; van Anders & Watson, 2006). Testosterone is also associated with lower parental investment (in fathers) and less sympathetic responding to infants (Gray et al., 2002; Fleming, Corter, Stallings, & Steiner, 2002). Finally, a recent study suggests that men who report higher interest in babies (i.e., liking for babies, infant-directed prosocial behavior) show lower testosterone reactivity in response to erotic stimuli; this same study found no correlation between interest in babies and baseline levels of circulating testosterone (Zillioli et al., 2015).

Though somewhat mixed, past research suggests that adult levels of circulating testosterone and testosterone reactivity may be inversely related to behaviors and attitudinal orientations associated with activation of the parenting motivational system, however, some parental cues—baby cries—have actually been shown to increase testosterone (e.g., Fleming et al., 2002; Storey et al., 2000; see Bos et al., 2010 for similar findings). Importantly, testosterone
is not only associated with short-term mating behavior (e.g., van Anders, Hamilton, & Watson, 2007), but it is also associated with self-protective behavior (e.g., aggression toward sources of threat; Montoya, Terburg, Bos, & van Honk, 2012) and this link between testosterone and self-protection also appears to extend to the protection of children: One study on men showed that, in the absence of the opportunity to provide nurturant care, the sound of a crying baby was associated with temporarily increased levels of testosterone (van Anders, Tolman, & Völling, 2012). Additional findings with women have been interpreted as “consistent with the proposal that increases in testosterone level may increase women’s motivation to engage in protective behaviors” (Hahn, DeBruine, Fisher, & Jones, 2015, p. 18). Thus, there appears to be some overlap in the hormonal substrates associated with the mate acquisition motivational system and protective parental responses; this neurochemical overlap does not appear to exist between the mate acquisition motivational system and nurturant parental responses.

These past findings are consistent with findings from Study 2: Whereas short-term mating orientation is negatively correlated with nurturant parental attitudes, it is positively correlated with protective parental attitudes. Thus, the motivational psychology of parental care may be comprised by two distinct physiological mechanisms, one of which corresponds to nurturant parental responses (and is inhibited by testosterone), and the other that corresponds to protective parental responses (and is facilitated by testosterone). This implies that when bioenergetic resources are allocated to the development of physiological mechanisms involved in mate-acquisition, development of mechanisms involved in nurturant parenting may be constrained; but development of mechanisms involved in protective parenting may actually be facilitated. Though past work has failed to note an association between circulating testosterone and interest in babies (Zilioli, et al., 2015), no previous hormonal research has attended directly
to the conceptual distinction between nurturant and protective responses to children in regards to dispositional parenting attitudes; future studies should seek to examine the relationship between levels of circulating testosterone and inclinations toward nurturant as well as protective parental responses.

Additionally, life history research on physiological resource allocation decisions in psychology has paid much attention to adult and adolescent stages of development while largely ignoring other important stages in the life course—such as the prenatal period (see Del Giudice & Belsky, 2011). Steroid hormones (such as testosterone) in utero have organizing effects on tissues mediating the expression of behavior; the abundance of prenatal testosterone can alter the development of stable physiological systems which have predictable implications for “male-typical” behavior later in life (see Wallen, 2009). Thus one early developmental process which may influence the chronic activation of the mate acquisition and parenting motivational systems is prenatal exposure to testosterone.

Though fetal testosterone levels are measured most accurately using sophisticated radioimmunoassay techniques, past research also suggests that a reliable indicator of prenatal testosterone is the ratio of the 2nd (the “index” finger) to the 4th (the “ring” finger) digit (e.g., Lutchmaya, Baron-Cohen, Raggatt, Knickmeyer, & Manning, 2004). This ratio is referred to as 2D:4D, with a lower ratio being characteristic of higher testosterone in utero. This indicator of prenatal testosterone does not appear to be related to circulating levels of testosterone in adults (see Neave, Laing, Fink, & Manning, 2003), and appears to share associations with certain adult behavioral traits which are unique from that of circulating testosterone (e.g., aggression; see Hönekopp, Bartholdt, Beier, & Liebert, 2007).
A negative link with 2D:4D has been found for a number of male-typical character traits including dominance and aggression (Hönekopp, & Watson, 2011; Neave, Laing, Fink, & Manning, 2003), indicating that these behaviors are linked to higher prenatal testosterone. Importantly, behaviors and traits related to short-term mating also share a negative association with 2D:4D. Specifically, past work suggests that 2D:4D is inversely related to courtship behavior and number of lifetime sexual partners in adult men (Roney & Mastripieri, 2004; Hönekopp, Voracek, Manning, 2006), as well as unrestricted sexual attitudes in women (Clark, 2004). No studies have yet investigated the organizational effects of prenatal testosterone on parenting inclinations; therefore, future studies may wish to investigate the hypothesis that 2D:4D (indicative of lower prenatal testosterone) is positively associated with dispositional nurturant parental responses and negatively associated with protective parental responses towards infants. Doing so will provide an important exploratory glimpse into the physiological processes governing the early development of mechanisms devoted to mating and parenting effort. Of course, fetal development is only one of several life history stages which may affect the development of physiological systems devoted to mating and/or parenting effort. Indeed, environmental input at other key points in development might shift individuals’ developmental trajectory along alternative pathways which may mediate the development of alternative mating/parenting strategies (Del Giudice et al., 2016). Human puberty is an example of another major transition point which is key to the development of reproductive strategies (Ellis, 2013) and future work may wish to investigate how testosterone production during this life stage might also affect parenting inclinations later in life.

Finally, just as testosterone is indicative of investment into systems facilitating mating effort, past research suggests that the neuropeptide oxytocin shares a strong link with nurturant
parental care (see Feldman, 2012). Oxytocin is involved in lactation in nursing mothers but is also active in processes involving affiliation among mammals, and stable preferences for stimuli (including conspecifics) (see Diamond, 2003; Bale & Dorsa, 1995). Emerging literature in non-human species suggests that oxytocin is strongly associated with social bonding and attachment-forming behaviors (Johnson, Coirini, Insel, & McEwen, 1991; Lee, Macbeth, Pagani, & Young, 2009) and also more recently, parenting behavior in humans (Feldman, 2012). Therefore, another important question for future research is: Does oxytocin inhibit the development or deployment of the mate acquisition motivational system?

Existing evidence at a categorical level of analysis suggests that females of related species typically have higher baseline levels of oxytocin (Kramer, Cushing, Carter, Wu, & Ottinger, 2004; Zingg & Laporte, 2003; Zingg, 2002) and, in humans, parents typically show higher levels of oxytocin than nonparents (e.g., Gordon, Zagoory-Sharon, Orna, Leckman, & Feldman, 2010; Leuner, Glasper, & Gould, 2010). However, research on individual differences in oxytocin as it relates to mate acquisition motives is less studied. One study by Scheele and colleagues (2013) found that increased oxytocin enhanced activation in reward systems of the brain in response to one’s own long-term romantic partner, more so than for unfamiliar opposite-sex others. These results imply that oxytocin may reduce short term mating motives by contributing to the positive experience and reward value of one’s pair-bonded partner versus other potential sexual partners. However, more work is needed to directly investigate the hypothesized inverse association between oxytocin and mate acquisition motives.

**Other Factors Moderating the Mating/Parenting Trade-Off?**

At the level of chronic individual differences, neither sex nor parental status appears to meaningfully moderate the inverse relation between dispositional inclinations toward mate
acquisition and nurturant care-giving. However, it will be useful for future research on this topic to continue to be attentive of possible gender differences and also consider other potential moderating factors which were not assessed in this thesis.

Life-history theory identifies several key moderating factors for the expression of individual differences in allocation of bioenergetic resources to the development of mating and parenting systems (see Del Giudice et al., 2016 for a review). For example, recent work suggests that developmental differences in resource scarcity may affect reproductive strategies (Griskevicius, Delton, Robertson, & Tybur, 2011). According to one of the key assumptions of life history theory, the availability of energetic resources in one’s environment can lead to positive covariation among traits because those with more resources can potentially invest more than others (with lower total energy budgets) into both mating and parenting systems (see Reznick, Nunney, & Tessier, 2000). One possible implication is that socioeconomic status, particularly during early development (e.g., childhood, adolescence), may partially moderate the effects that mating attitudes (and/or aptitudes) might have on parental tenderness. For example, individuals who grew up in resource scarce environments may have had smaller reproductive energy budgets (i.e., lower calorie input; poorer diet; greater need for devotion of resources to somatic systems) from which to allocate resources to the development of either mate acquisition and/or nurturant parenting systems. These individuals might be especially subject to a developmental trade-off in the investment of limited resources in comparison to those who grew up in resource rich environments and possess ample resources to devote to both reproductive systems. In future studies, it may be useful to assess socioeconomic status and other variables indicative of resource availability which might moderate the relationship between mate acquisition and nurturant emotional responses toward infants.
Important Additional Nuances in Operationalizing Mating and Parenting Effort

The results of Study 2 imply that the motivational psychology of parental care may be composed of two distinct psychological mechanisms, one of which corresponds to nurturant parental responses, and the other that corresponds to protective parental responses; each may have important, distinct associations with psychological mechanisms facilitating mate acquisition.

This important conceptual distinction will help to guide future research on the psychological implications of the mating/parenting trade-off and also highlights the often muddied distinction between mate acquisition and parenting behavior. Indeed, in some animal species, protection of breeding grounds, mates, and offspring is essential to mate acquisition; in these cases, investment into mating effort is investment into parenting effort (Stiver & Alonso, 2009). In humans, the dispositional willingness and ability to protect offspring (and mates) may also be an attractive quality in a potential short-term mate (see Li & Kenrick, 2006), therefore, the protection of offspring may be a form of both mating and parenting effort. This line of reasoning may help elucidate whether the differential effects of testosterone on nurturant and protective parenting are a design feature of evolution or simply a non-functional byproduct; if exhibiting protective parenting behavior is an effective means through which individuals attract and acquire short-term mates, then evolutionary pressures may have led to the development of shared physiological substrates underlying both protective parenting and short-term mating.

Future work exploring the psychological implications of the mating/parenting trade-off should seek to clearly operationalize the behaviors associated with “mating effort” and “parenting effort”. As more data is collected and more investigations are conducted, additional nuances in the nature of this hypothesized trade-off may continue to be discovered; indeed, some
forms of mating effort may share an inverse relationship with some forms of parenting effort, but others may not.

With this in mind, the results of Studies 3, 4, and 5 must be interpreted with caution as they focused largely on the activation and assessment of nurturant parental care motives—not those involving inclinations to protect offspring. For example, in Study 3, though my manipulation check suggested that my experimental stimuli successfully aroused feelings of nurturant parental care, I did not assess whether my participants felt increased protective emotional responses. My stimuli were designed with both the nurturant and protective components of the parenting motivational system in mind (abandoned animals require both tenderness and protection), however, future studies directly manipulating either nurturant or protective parental motives may uncover different results: If protective inclinations toward children are positively associated with mate acquisition motives (as implied by the results of Study 2), then temporarily activating protective parental motives (in the absence of nurturant motives) may also heighten short-term mating desires. Similarly, in Studies 4 and 5, my measure of the temporary activation of the parenting motivational system was a composite of self-reported tender responses (e.g., tenderness, affection); given the results of Study 2, it is entirely possible that the arousal of mate acquisition motives could have inspired greater feelings of protective responses (e.g., protective and vigilant emotional responses) towards the infant photograph that I did not measure. It is also possible that differential effects on protective parenting responses may have been noted for the elicitation of disease- and predator avoidance motives than for mate acquisition motives; therefore, examining this protective component of the parenting motivational system may help to elucidate some questions regarding psychological uniqueness that were left largely unanswered in Study 5. More broadly, future studies examining
the temporary activation and inhibition of parenting motives will benefit from bearing in mind a conceptual distinction between protective and nurturant parental responses.

**Gender Differences in Temporary Activation?**

Results from Study 3 indicated that the temporary arousal of a parental care-giving motivational state consequently inhibits self-reported inclinations toward short-term mating in women, but not men. Indeed, this apparent sex difference might be illusory (resulting from an experimental manipulation that was relatively less successful among men than among women); but I must also consider the possibility that this sex difference is real and meaningful.

There are plausible reasons to suspect that this particular inhibitory effect might truly occur more readily among women than among men. One line of reasoning draws upon the same evolutionary cost/benefit logic that is commonly used to explain the sex difference in chronic inclinations toward short-term mating. Compared to men, women are anatomically constrained in the sheer number of offspring that they can produce in their lifetime; and so, historically, the reproductive benefits associated with short-term mating strategies were lower for women than for men. These (relatively modest) benefits that accrued to women might have been readily outweighed by temporary increases in either (a) the costs associated with short-term mating or (b) the benefits associated with alternative reproductive strategies. In contrast, the (larger) benefits that accrued to men would have been less readily outweighed by temporary changes in circumstances. If the regulatory mechanisms that govern mate-seeking behavior evolved to be responsive to these costs and benefits, the implication is that women’s inclinations toward short-term mating may be readily inhibited in response to temporary circumstances that activate other motivational systems, whereas men’s inclinations toward short-term mating may be more resistant to such inhibition (see Ellison, 2003).
A sex difference of this sort has been documented in research linking the perceived threat of infectious disease to individuals’ short-term mating orientation (increased disease threat is associated with reduced inclinations toward short-term mating among women, but not among men; Murray, Jones, & Schaller, 2013; Schaller & Murray, 2008). It is plausible that the results of Study 3 reflect an analogous phenomenon: Among women, the mate acquisition motivational system may be easily inhibited when the parental caring motivational system is activated; but among men (potentially even those for whom the parental caring motivational system has been activated to an equivalent degree) the mate acquisition motivational system may be relatively resistant to temporary inhibition. More work is needed investigating possible sex differences in the effects noted in Study 3.

The lack of consistent sex differences across Studies 4 and 5 is somewhat useful for elucidating the meaningfulness of the sex difference noted in Study 3. Indeed, a nuanced cost/benefit analysis (of the sort summarized in the paragraph addressing a possible evolutionary explanation for the sex difference in Study 3) suggests that men—not women—might actually be more susceptible to this particular inhibitory effect. The reasoning runs parallel to that which was elaborated previously and is as follows: Historically, the reproductive benefits associated with parental care-giving were lower for men than for women. These (relatively modest) benefits that accrued to men might have been readily outweighed by temporary increases in costs associated with parental care-giving or benefits associated with other behavioral strategies; whereas the (larger) benefits that accrued to women would have been less readily outweighed by temporary changes in circumstances. The implication is that mens’ inclinations toward parental care-giving may be readily inhibited in response to the activation of other motivational systems, whereas womens’ inclinations toward parental care-giving may be more resistant to such
inhibition. However, across Studies 4 and 5, the temporary inhibition of nurturant parental responses towards infants in response to the activation of other motives was not consistently weaker among women than men; still, more studies are needed before confident conclusions can be drawn.

Are these Effects Unique to Mating and Parenting Motives?

Past research offers no compelling empirical evidence to suggest that the chronic activation of any motivational system should, as a general rule, inhibit the activation of all other systems. For example, Neel et al. (2016) assessed individual differences in the chronic activation of a variety of evolutionarily fundamental motives and examined the correlations among them. Some were positively correlated, others were negatively correlated, and others were not correlated at all. Instead, this past work highlights the importance of evolutionary perspectives on motivation in yielding hypotheses regarding specific relations between the chronic activation of certain specific motivational systems. Adopting this perspective may speak to the uniqueness of the inverse relationship between mate acquisition and nurturant parenting motives when locating the findings of the current research within the broader psychological literature on motivation.

Psychological perspectives regarding approach and avoidance motives suggests that these oppositional motivational systems are the primary motivational systems governing complex emotional and psychological responding (e.g., Elliot & Thrash, 2002; Marsh, Ambady, & Kleck, 2005). The mate acquisition motivational system facilitates approach-oriented responses toward potential short-term mating opportunities (Impett, Peplau, & Gable, 2005) but, importantly, the parenting motivational system also facilitates approach-oriented responses toward cute, vulnerable, infants (Buckels, et al., 2015). If these responses were simply manifestations of a
more general difference in the chronic activation of the behavioral approach system (Carver & White, 1994; Sutton & Davidson, 1997), one might expect a facilitative relationship between the mate acquisition and parenting motivational systems: The chronic activation of approach-oriented mate acquisition motives would be associated with stronger approach-oriented tenderness response towards infants. The results of this thesis found no evidence for this more general approach-avoidance hypothesis, and suggest that the relationship between motivational systems facilitating short-term mating and nurturant parental responses is psychologically unique and important.

More work is needed to investigate whether this holds true for the temporary activation and inhibition of these specific motivational systems: Whether the temporary activation of any one motive inhibits the activation of all other conceptually incongruent motives remains an open question. According to the evolutionary logic of the mating/parenting trade-off, benefits garnered through investment into short-term mating (e.g., increased number of offspring) are directly balanced by costs to potential investment into parenting (e.g., decreased survivability and reproductive success of those offspring), and vice-versa (Trivers, 1972). Thus, an evolutionary perspective suggests that there is something uniquely fundamental about the tension between behavioral effort devoted to either mating or parenting effort. This implies that—even though both contribute to reproductive success—the temporary activation mate acquisition motives may have a unique and particularly impactful inhibitory effect on parenting motives (and vice-versa). Study 5 sought to provide an exploratory first test of this hypothesis by examining the extent to which nurturant parental responses are also affected by the temporary activation of other motives in addition to mate acquisition motives.
Results of Study 5 showed that temporary activation of mate acquisition motives did not have a stronger inhibitory effect on nurturant parental responses than activation of other motives. However, care was taken to ensure that the experimental procedures in Study 5 elicited activation of disease- and predator avoidance motives more strongly than they elicited activation of mate acquisition motives; doing so made a test of the relative magnitude of the relationship between the parenting and mate acquisition motivational systems an especially stringent one. Given this, it is intriguing that even a relatively subtle manipulation of mate acquisition motives produced inhibitory effects on nurturant parental responses that were no different in magnitude to much more powerful manipulations of other motives; this could be considered supportive evidence for the contention that there is unique, inhibitory relationship between the mating and parenting systems, however, much more work is needed.

Future work should seek to design experimental stimuli which elicit comparable levels of emotional arousal between conditions in order to test the relative magnitude of mate acquisition motives on nurturant parental responses; these studies should be attentive to previous research suggesting that negative emotional states are more impactful than positive emotional states (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001) and may wish to test conceptual hypotheses by activating different motivational states which are not as negatively valenced as the ones used in Study 5. Additional evidence that the comparison conditions in Study 5 provided a particularly stringent test of hypotheses comes from much past work showing that approach motives share an oppositional relationship with avoidance motives (e.g., Elliot & Thrash, 2002; Marsh, Ambady, & Kleck, 2005). The inclusion of disease- and predator avoidance motives in Study 5 may therefore not have provided an ideal test for whether any other motives might temporarily suppress approach-oriented nurturant parental responses (Buckels et al., 2015); instead, the
inhibitory effects of these motives noted in Study 5 may have been specific to disease- and predator-avoidance motives in particular. In fact, some past researchers have suggested that these survival-relevant motives may also share a unique inhibitory relationship with inclinations toward nurturant parental caregiving that is rooted in our evolutionary past (Del Giudice, Gangestad, & Kaplan, 2016).

According to evolutionary perspectives on motivational systems, emotions are specialized for solving recurrent adaptive problems; feelings of disgust and fear enact a cascade of psychological and physiological responses designed to respond to immediate threats of disease and predation which would have arose during early hominid evolution (Tooby & Cosmides, 1990). This perspective contends that confronting these kinds of survival-threatening triggering conditions or disgusting/fearful situations may deactivate less immediately relevant psychological or physiological systems, “so that the whole system operates in a particularly harmonious and efficacious way” (Cosmides & Tooby, 2000, p. 2). Put differently, if you’re about to die, nothing else really matters. With this in mind, future studies in this area may wish to include different control and comparison conditions activating different motives. For example, temporarily eliciting an approach-oriented affiliation motive (e.g., by presenting participants with an imagined social gathering scenario) should not, theoretically, inhibit inclinations toward nurturant parental care; if it did, it may lend support to the suggestion that the effects of Studies 3, 4, and 5 are due to a broader psychological process involving goal conflict (i.e., people simply cannot focus on more than one goal at a time and this affects their emotional responses toward functionally relevant stimuli). If the results of the current research are potentially explained by more general working memory constraints or a depletion of cognitive resources, then future research should seek to investigate whether individuals under conditions of high cognitive load
(e.g., those asked to memorize a series of abstract art pieces for a later recognition task; Ward & Mann, 2000) might also exhibit weaker tenderness responses toward infant photographs.

However, if working memory constraints lead to a temporary suppression of any motive when any other motive is activated, you might expect to see temporary inhibition of long-term mating goals when parenting motives are made salient; results from Study 3 offer no support for this suggestion. Specifically, Study 3 included a measure of self-reported long-term mating orientation—a psychological response indicative of activation of another conceptually distinct motivational system (the mate retention motivational system; Kenrick, et al., 2010); despite having an inhibitory effect on women’s short-term mating orientation, temporary activation of the parenting motivational system in this study had no effect on self-reported long-term mating orientation. This finding from Study 3 supports the suggestion that there is merit in studying the unique, mutually inhibitory relations between mate acquisition and parenting motives in particular.

More work is needed to determine whether the effects noted in Studies 3, 4, and 5 represent a unique psychological manifestation of the fundamental conflict between mating effort and parenting effort, or whether they are the product of broader psychological processes involving goal conflict. Regardless, these results are still empirically novel and contribute to our understanding of motivational processes as they relate to mating and parenting behavior. They are the first to provide evidence for an inhibitory relationship between mating and parenting goals, and the first to show that a tenderness response towards human infants may be temporarily inhibited by activating other motivational states. Together with the findings from Studies 1 and 2, these results may have important implications that permeate throughout several major branches of psychological science.
4.3 Broader Implications

Life history theory weaves together basic principles of genetic evolution, developmental biology, and behavioral ecology. It has been highly influential across the biological sciences, and is a conceptual cornerstone of evolutionary psychology (Del Giudice et al., 2016). A burgeoning body of research has begun to apply life history theory to a wide range of social psychological phenomena (e.g., Griskevicius, Tybur, Delton, & Robertson, 2011; Neuberg & Sng, 2013; Simpson, Griskevicius, & Kim, 2011; White, Li, Griskevicius, Neuberg, & Kenrick, 2013; Williams, Sng, & Neuberg, 2016). The research reported here contributes to this burgeoning body of research and may have implications for other areas psychological study.

Highly germane to the research presented in this thesis is work pertaining to the study of mate preferences: Bi-parental caring is crucial (but not obligate) to offspring survival and reproductive success (Geary, 2000), therefore, mate acquisition strategies may depend heavily on the anticipated parental investment of a potential partner. One logical derivation from an evolutionary cost/benefit analysis of ensuring offspring survival while simultaneously maximizing short-term mating opportunities suggests that those who are less inclined to invest heavily into nurturant parenting, should seek mates who are more inclined to do so. For example, if an individual is predisposed to a dispositional life history strategy which favors offspring neglect (characterized by weak parenting motives, strong short-term mating motives), then mating with a sexual partner who has strong parenting motives facilitates this strategy (the offspring will still have a fighting chance at survival and reproduction as a result of care from one highly devoted parent).

Conversely, those who find parenting of offspring highly rewarding and have a strong activation of their parenting motivational system, may also reap benefits from mating with
someone who has the opposite mating/parenting style: Those who invest heavily into mating
effort are typically those who possess qualities, such as sexual attractiveness, which make them
successful at gaining access to receptive, high-quality mates (Jokela, 2009; Boothroyd, Jones,
Burt, DeBruine, & Perrett, 2008). Possessing subjectively attractive physical qualities may also
serve as an implicit signal of health, immunocompetence, and genetic fitness more broadly,
which may be passed on to offspring (Grammer & Thornhill, 1994; Thornhill & Gangestad,
1993; Tybur & Gangestad, 2011). Thus, an individual highly motivated to provide parental care
may benefit from mating with an individual oriented towards (and successful at) short-term
mating by gaining indirect, inherited benefits to offspring resilience and reproductive success
(Langlois et al., 2000). Indeed, the optimal resolution of the mating/parenting trade-off hinges
upon an evolutionary costs/benefits analysis regarding the enhancement of one’s own
reproductive success, thus seeking sexual partners with opposing reproductive motivational
strategies (who facilitate and maximize this) may be adaptive. However, existing research in
support of this is mixed.

One attribute which may be associated with mate acquisition is an ability to provide
protection and material resources through social dominance. Indeed, social dominance is a trait
that is consistently found to positively influence men’s mate value to women and may thus be
associated with stronger mate acquisition motives (Sadalla, Kenrick, & Vershure, 1987). In
support of the notion that parental caring motivation increases preferences for partners with
opposing reproductive strategies, experimental work has shown that women adopt a stronger
preference for socially dominant men when parenting has been primed (Millar & Ostlund, 2006).
However, existing research also seems to offer some support for hypotheses in the opposite
direction (i.e., similar reproductive strategies may be preferred): Other personality characteristics
such as responsibility and kindness are indicative of high levels of potential parental investment. Correlational work has shown that men and women who exhibit higher dispositional parental caring and tenderness towards infants value these types of “good parent” qualities (but not other qualities such as sexual attractiveness) more strongly in potential romantic partners (Buckels et al., 2015). Results of this work suggest that the parental caring motivational system is associated with preferences for long-term partners who are capable of high levels of parental investment. Regardless, future research in the study of mate preferences may benefit from a comprehensive understanding of the mating/parenting trade-off and the findings of this thesis.

Increased understanding of the variables influencing nurturant care devoted towards infants may also contribute to advances in health psychology. Receiving warm and nurturant parental investment during infancy can lead to a multitude of positive survival outcomes for offspring (e.g., Francis, Caldji, Champagne, Plotsky, & Meaney, 1999). For example, parents may play an essential role in helping children deal with stressors early in life which can help buffer against physical illness later in life (Field, 1985). Children who receive higher levels of parental care (especially from fathers) have lower mortality rates in small-scale, preindustrial, and industrial societies (Hurtado & Hill, 1992; Hed, 1987; Reid, 1997). Young adults who have poor relationships with parents, or who have lost a parent, are at an elevated risk for high blood pressure and unhealthy physiological responses to acute stressors (Luecken, 1998). The absence of a parent during childhood is related to decreased or highly fluctuating cortisol levels, higher levels of stress and lower weight in boys and adult men (Flinn & England, 1995, 1997; Flinn, Quinlan, Decker, Turner, & England, 1996). Lack of parental warmth has been associated with a higher incidence of cancer, coronary artery disease, hypertension, duodenal ulcers, and alcoholism (Thomas, et al., 1979; Russek & Schwartz, 1997). Indeed, parental investment is
associated with numerous positive survival and health-related outcomes for offspring both in youth and later in adult life; careful consideration of processes which could potentially inhibit parents’ desires to invest in their children (e.g., heightened activation of mate acquisition motives), may therefore be useful in avoiding negative child health outcomes.

In addition to the survival and physical health benefits parental care brings to children, parenting may also contribute to the mental well-being and psychological adjustment of offspring as well. For example, past research suggests that early positive interactions with parents translate to more positive interaction with others later in life (Bretherton, Golby, & Cho, 1997) and juvenile parent-child attachment styles are related to romantic relationships later in life. Specifically, those whose caregiver(s) successfully provided a secure base during infancy tend to be more committed to and satisfied with their romantic relationships in adulthood (Simpson, 1990). Additionally, the loss of one parent early in life, combined with a poor relationship with the surviving parent has been associated with long-term negative mental health outcomes such as depression (e.g., Saler & Skolnick, 1992) and lower perceived parental caring in childhood has been associated with psychiatric and personality disorders including depression and anorexia (Nordahl & Stiles, 1997; Haudek, Rorty, & Henker, 1999). Conversely, a higher level of parental investment (especially from fathers), is associated with enhanced social competence/mobility, intelligence, and higher socioeconomic status in adulthood (Amato, 1998; Kaplan, Lancaster, & Anderson, 1998; Pleck, 1997; Black, 1998). Finally, parenting behavior of adults is predicted by the parental investment they received in childhood (Frew, 2014), suggesting that parents who invest more heavily in their offspring will raise children who are heavily invested parents themselves. Indeed, past research seems to suggest that parental investment contributes to offspring mental well-being and psychological adjustment in later life.
It is therefore possible that attitudes toward, and (in men) aptitudes for, short-term mating might have indirect, but considerable long-term ramifications for their children’s own actual physical and mental health-related developmental outcomes. Specifically, special attention to some of the correlates of decreased investment into parental care as those discussed in this thesis (e.g., short-term mating orientation, men’s self-rated attractiveness, the temporary presence of attractive opposite-sex others), can aid psychologists in identifying children who may be at risk for abuse or neglect. These children may require additional support and nurturance from outside sources such as teachers or counselors and increased support for these at-risk children could benefit their overall well-being later in life. Further, increased mating effort is correlated with some behaviors which could be detrimental to an individual’s own health and well-being (e.g., risky-decision making; Baker & Maner, 2008), therefore interventions directed towards the promotion of a more parental mindset may be of further use to branches of psychology concerned with physical and mental health.

Psychologists who study consumer behavior may also benefit from the current research (and an understanding of the trade-off between mating and parenting effort more broadly). One explanation for why people (particularly men) engage in conspicuous consumption (i.e., attaining and exhibiting costly items in order to advertise wealth or status; Veblen, 1899), suggests that it is a form of investment into mating effort (see Sundie et al., 2011). Understanding and exploring the influence of parental care motivation on incidence of conspicuous consumption as well as the purchasing of other attractiveness-enhancing products may therefore be beneficial to both marketers and thrifty consumers alike; if conspicuous consumption is associated with mate acquisition, then heightened chronic or temporary activation of the parenting motivational system might reduce the practice. One easily testable hypothesis derived from this logical
argument is that keeping a photograph of one’s children in one’s wallet might decrease spending on non-essential goods by sporadically activating one’s parenting motivation system.

Much research in another branch of psychology suggests that encounters with ethnic out-group members evoke both anxiety and fear of physical injury and that commonly held negative stereotypes and attitudes are consistent with those responses (Blascovich, Mendes, Hunter, Lickel, & Kowai-Bell, 2001; Phelps et al., 2000; Stephan, Diaz-Loving, & Duran, 2000; Stephan, Ybarra, Marinez, Schwarzwald, & Tur-Kaspa, 1988). Indeed, babies are extremely vulnerable and parenthood is associated with behavioral risk-aversion, caution, and carefulness (Chaulk, Johnson, & Bulcroft, 2003; Cameron, Deshazo, & Johnson, 2010; Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014), thus parents may be hyper-vigilant to the presence of others whom they perceive as dangerous. Recently, Gilead and Lieberman (2014) found that the temporary activation of parental care motives led to increased bias against out-group members (e.g., rating them as more cold and unfavorable). Another recent investigation found that temporarily boosting oxytocin lead to greater in-group favoritism and out-group derogation, suggesting a similar effect of the parenting motivational system’s relationship with out-group prejudice (De Dreu, Greer, Van Kleef, Shalvi, & Handgraaf, 2011). Given this evidence, a comprehensive understanding of the mating/parenting trade-off as it relates to differences in the activation of the parental caring motivational system would be highly beneficial to those who study (and wish to reduce) stereotypes and prejudice.

Psychologists who study politics, religion, and justice may also benefit by informing hypotheses and policies based on the functional logic of the mating/parenting trade-off. Activation of the parenting motivational system is associated with an increased vigilance to environmental hazards and outside threat (e.g., Eibach & Mock, 2011). As a result, parenthood is
associated with a suite of cognitive changes geared toward infant protection and safety (e.g., Chaulk, Johnson, & Bulcroft, 2003; Cameron, Deshazo, & Johnson, 2010; Fessler, Holbrook, Pollack, & Hahn-Holbrook, 2014). Recent research suggests that these ideals permeate into parent’s advocacy of typically conservative government funding policies for issues relevant to supporting and raising a child (Elder & Greene, 2007; 2012). In addition, a parental mindset is associated with more punitive condemnation of harmless but offensive acts (among parents) and greater religious involvement (Eibach, Libby, & Ehrlinger, 2009; Hill, Burdette, Regnerus, & Angel, 2008). Put together with findings from the current research, this work suggests that activation of short-term mating motives (and the associated de-activation of parenting motives) may suppress political conservatism, reduce harsh sentencing of social transgressors, and even attenuate religiosity. In fact, one experiment may offer some support for the latter prediction: Exposure to a dating pool of attractive opposite-sex (versus same-sex) peers was associated with decreased religious beliefs in men and women (Li, Cohen, Weeden, & Kenrick, 2010).

Finally, mate acquisition (especially in men) is associated with same-sex competition, and this can often take the form of physical confrontation; the findings of this thesis and the mating/parenting trade-off argument more broadly may also be relevant in the study and reduction of aggression and criminality. Incidence of aggression and criminality tends to decrease after people become married (Sampson & Laub, 1993; Bersani, Laub, & Nieuwbeerta, 2009), and especially after they become parents (Monsbakken, Lyngstad, & Skardhamar, 2013). Thus, the activation of a parental caring mindset (and de-activation of short-term mating motives) may be helpful in developing intervention strategies for violent criminal offenders and reducing recidivism. Interestingly, at least one American prison has instituted a program in which inmates are given the opportunity to care for and look after abandoned dogs in the hopes
that it may aid in rehabilitation (http://metro.co.uk/2015/11/07/prisoners-have-been-given-dogs-for-cell-mates-and-the-results-are-beautiful-5486148/#ixzz4KYRQaTyh).

The functional logic of the mating/parenting trade-off posits an abundance of testable predictions for all aspects of human functioning. Much empirical work has already provided evidence that the implications of this inexorable conflict permeate throughout several major branches of psychological study, however, many questions are yet to be answered. Devoting further investigative attention to predictions informed by the hypothesized trade-off between mating and parenting effort may benefit psychological science greatly.

4.4 Conclusions

Although recent research has applied the principles of life history theory to the prediction of human individual differences (e.g., Ellis, 2004; Figueredo, et al., 2005; Neel et al., 2016), the work presented in this thesis provides the first rigorous empirical investigation into the psychological implications of a hypothesized tension between internal motivational systems facilitating mating and parenting effort derived from the evolutionary logic of the mating/parenting trade-off. Evidence of these implications was noted in an inverse relationship between chronic inclinations toward short-term mating and nurturant parental care. Further evidence was noted in a mutually inhibitory relationship between the temporary activation of these two systems: Temporarily eliciting parental care motives led to a temporary suppression of short-term mating desires, and temporarily eliciting mate acquisition motives led to a temporary suppression of a nurturant parental care response.

This thesis, however, also provides additional results that pose a challenge to the somewhat simplistic categorization of behaviors contributing to either mating effort or parenting effort, suggesting that a more nuanced approach must be taken to understand how the
mating/parenting trade-off might manifest psychologically. This work highlights the importance of the conceptual distinction between nurturant and protective responses to children in regards to parenting effort; mate acquisition motives may be negatively associated with nurturant parental responses but positively associated with protective parental responses.

More broadly, in addition to providing advances to the burgeoning body of research which has begun to apply evolutionary perspectives to a wide range of social psychological phenomena (e.g., Griskevicius, Tybur, Delton, & Robertson, 2011; Neuberg & Sng, 2013; Simpson, Griskevicius, & Kim, 2011; White, Li, Griskevicius, Neuberg, & Kenrick, 2013; Williams, Sng, & Neuberg, 2016), this thesis provides important intellectual advances to the logical foundations of a theory which has become a conceptual cornerstone of evolutionary psychology; it implores researchers to acknowledge important nuances in some of the seemingly straightforward hypotheses which are key features of life history theory.
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Appendices

Appendix A  Sociosexual Orientation Inventory (SOI)

SOI 2007: Listed below are 20 statements. For each statement, rate the extent to which you agree or disagree with it. Indicate your rating by circling the number between 1 and 7 which best reflects your opinion (1 = strongly disagree, 7 = strongly agree).

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can easily imagine myself being comfortable and enjoying “casual”</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>sex with different partners.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2. I can imagine myself enjoying a brief sexual encounter with someone I</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>find very attractive.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3. I could easily imagine myself enjoying one night of sex with someone I</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>would never see again.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4. Sex without love is OK.</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>5. I could enjoy sex with someone I find highly desirable even if that</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>person does not have long-term potential.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6. I would consider having sex with a stranger if I could be assured that</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>it was safe and he/she was attractive to me.</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>7. I would never consider having a brief sexual relationship with someone.</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>8. Sometimes I would rather have sex with someone I did not care about.</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>
9. I believe in taking sexual opportunities when I find them.

10. I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her.

11. I am interested in maintaining a long-term romantic relationship with someone special.

12. I hope to have a romantic relationship that lasts the rest of my life.

13. I would like to have a romantic relationship that lasts forever.

14. Long-term romantic relationships are not for me.

15. Finding a long-term romantic partner is not important to me.

16. I can easily see myself engaging in a long-term romantic Relationship with someone special.

17. I cannot imagine spending the rest of my life with one sex partner.

18. I can see myself settling down romantically with one special person.

19. If I never settled down with
one romantic partner, that would be OK.

20. I would like to have at least one long-term committed relationship during my lifetime.
### Appendix B  Self-Perceived Traits Questionnaire

#### Self-Perceived Traits Questionnaire:

Please rate yourself on the extent to which you possess the following qualities:

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable personality</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Faithfulness/Loyalty</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Sex appeal</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Physical attractiveness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Qualities of a good parent</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Responsibility</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Kindness and understanding</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Health</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Physical fitness</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix C  Photographs of Cute Babies Used in Study 1

Photographs of cute babies used in Study 1 (the eight photograph was also used in Studies 5 & 6)
Appendix D  Parental Caring and Tenderness (PCAT) Questionnaire

PCAT Questionnaire - Part A
Instructions: The first part of this questionnaire relates to your personality and personal preferences. Please rate how much you agree with the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I see infants, I want to hold them.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. (R) When I hear a baby crying, my first thought is &quot;shut up!&quot;</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. When I see a young child in someone's arms, I feel warm inside.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. I would feel compelled to punish anyone who tried to harm a child.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. (R) I think that kids are annoying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Babies melt my heart.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. I would hurt anyone who was a threat to a child.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. (R) I can't stand how children whine all the time.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. I would sooner go to bed hungry than let a child go without food.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
10. A baby's tiny fingers and toes are so adorable.
11. (R) I don't like to be around babies. 1 2 3 4 5
12. I would show no mercy to someone who was a danger to a child. 1 2 3 4 5
13. Babies generally smell great. 1 2 3 4 5
14. I would use any means necessary to protect a child, even if I had to hurt others. 1 2 3 4 5
15. (R) If I could, I would hire a nanny to take care of my children. 1 2 3 4 5

Subscales:

1. “Liking” subscale computed by reverse coding and then aggregating items 2, 5, 8, 11, and 15.
2. “Protection” subscale computed by aggregating items 4, 7, 9, 12, and 14.
3. “Caring” subscale computed by aggregating items 1, 3, 6, 10, and 13.
**PCAT Questionnaire - Part B**

Instructions: TENDERNESS describes a "warm, gentle feeling of sympathetic affection."

Below are various hypothetical scenarios that may or may not evoke this feeling. Please rate how much TENDERNESS you would feel in each situation. If you are unsure, go with your gut reaction.

<table>
<thead>
<tr>
<th></th>
<th>No tenderness at all</th>
<th>A lot of tenderness</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. A newborn baby curls its hand around your finger.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>17. You hear a young child trip and fall, and begin to cry.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>18. You hear a child crying loudly on an airplane.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>19. You watch as a toddler takes their first step and tumbles gently back down.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>20. You make a baby laugh over and over again by making silly faces.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>21. You need to change a baby's soiled diaper.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>22. A child blows you kisses to say goodbye.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>23. You see that a baby is sick.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>24. You see a child slip and fall onto the pavement.</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
25. You see a father tossing his giggling
baby up into the air as a game.

Subscales:

1. “Tenderness in positive situations” subscale computed by aggregating items 16, 19, 20, 22,
and 25.

2. “Tenderness in negative situations” subscale computed by aggregating items 17, 18, 21, 23,
and 24.
Appendix E  Experimental Manipulations Used in Study 3

Abandoned Furniture Manipulation:

YOURS TO PICK
UP TODAY

FOUND BY
THE HIGHWAY
SOFA NEEDS A HOME

FOUND ABANDONED
FREE TO A GOOD HOME

YOURS TO PICK UP TODAY
FOUND BY THE HIGHWAY

RED COUCH NEEDS A HOME
FOUND ABANDONED

FREE TO A GOOD HOME
Abandoned Pets Manipulation:

FOUND BY THE HIGHWAY

TABBY NEEDS A HOME
FOUND
ABANDONED

FREE TO A
GOOD HOME
YOURS TO PICK
UP TODAY

FOUND BY
THE HIGHWAY
BROWN DOG NEEDS A HOME

FOUND ABANDONED
FREE TO A GOOD HOME

YOURS TO PICK UP TODAY
Appendix F  Experimental Materials Used in Studies 4 & 5

Neighborhood Walk Manipulation:

Total word count: 178

You look at the neighborhood in front of you and take a moment to admire what a beautiful day it is. The sun is shining down on the rooftops and you hear some birds chirping in the trees which line the streets. It is a warm day, but not unpleasantly so. This would be a fine day to go for a bike ride around the park or to simply laze about in the grass. There is a slight breeze which rustles the bushes and creates a calming ambient sound.

You notice that there are one or two white fluffy clouds overhead that remind you of cotton candy or the whip cream on top of an ice cream sundae. The sun is bright today and is illuminating every nook and cranny of this beautiful neighborhood. As you walk by one of the houses, you notice a tire swing hanging from the branch of a large tree in someone’s front yard.
Strolling through this neighborhood really reminds you to stop and appreciate just how much
difference the weather can make.
Attractive Stranger Manipulation (For Men):

Total word count: 178

74 words before first contact

You are at your friend’s party. You notice a woman wearing a clinging white dress watching you. You make eye contact and she smiles. You admire her figure for a moment, and then leave the room. She follows you, beckoning to join her in another room. You are curious and enter. She closes the door and locks it. She reaches out and brushes a stray hair from your face, tracing a line down your cheek. You kiss her fingers, caught up in this moment. Her eyes close and her lips part slightly. “You’re so sexy”, she murmurs.

You look up and kiss her, slipping your tongue between her full lips, and she pulls you closer. She kisses you passionately, pushing her ample cleavage against you. You bury your face in her velvety breasts and reach around to hold her hips close to yours. She is breathing hard. She
takes your hand in hers and strokes her pussy, her panties damp with her arousal. You touch her gently, then faster as she pushes her hips toward your hand.
Attractive Stranger Manipulation (For Women):

Total word count: 178

70 words before contact

Your friend’s cottage party has ended and everyone has gone to bed. You are relaxing alone in the hot tub. A handsome man from the party joins you in the hot tub. “Is everyone else asleep?” you ask, and he nods. You chat about mutual friends. He is funny and pleasant. You find it hard not to look at his impressive physique, and you notice he is also admiring you. He reaches forward and cups your cheek and kisses you, very gently at first. You hesitate then move forward to kiss him deeper. He pulls you closer to him, kissing you intensely.

You run your hands through his hair then over his muscular shoulders as you kiss his neck and ear lobes. He guides you onto his lap and you can feel his hot erection between your legs, barely contained by his swim shorts. You press your breasts against his strong chest and feel his...
hardened nipples touch yours. You put your hand in the water and find his hard cock between your legs. You stroke him gently, at first, then move faster.
Appendix G  Experimental Materials Used in Study 5

Filthy Restroom Manipulation:

Total word count: 174

You are out running errands in a poor part of town when you suddenly feel an uncontrollable need to use the restroom. Your only option is to use a public restroom in a nearby dirty fast food restaurant. It is the only one available for blocks and you simply can’t hold it. You open the restroom door and are immediately struck by the overwhelming stench of feces. The restroom walls and floor are spackled with chunky, liquefied shit. You gaze over to the toilet and it is covered in diarrhea.

The stench is unbearable. As you release the doorknob, you feel a slimy substance cover your fingers. You look down to see a brownish-red smear and realize that your hand is covered in shit.
You quickly turn around to exit the restroom but slip in some of the feces and fall to your hands and knees. Some of the liquid shit splashes off the floor and onto your lips. You unwittingly taste the putrid, salty, feces in your mouth and are overcome with nausea.
Scary Gunman Manipulation:

Total word count: 173

After a day of running errands, you have found yourself in an unfamiliar and dangerous urban area. Night has fallen and it has gotten very dark. Just in front of you, you see a group of three intoxicated men yelling and shouting over top of each other on the street corner. They seem aggressive and you try not to make eye contact as you pass them. One of them shouts, “you better not look at me motherfucker! Where do you think you’re going?” The man runs up to you from behind, grabs you by the arm, and spins you around. He points a gun at you and shouts, “give me your money or I’ll fucking kill you!”

The man covers your mouth, and holds the gun to your throat. You search frantically for your valuables to give to the man as you struggle to breathe. The man is becoming furious with you
and shouts, “don’t make me kill you!” You can feel the gun pressing against your throat as you
gasp for air.