

**Generosity as a Costly Signal**

by

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## ABSTRACT

### GENEROSITY AS A COSTLY SIGNAL

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Some researchers argue that generous behaviours, such as large charitable donations, may serve as costly signals to broadcast one's resources. Others, however, acknowledge that generosity may advertise one's physical ability (e.g., rescuing a person from danger) and/or honestly signal one's cooperative intent (e.g., volunteering at a homeless shelter). Although the evidence illustrates that generosity may be a costly signal of at least three fundamentally *different* qualities, researchers have not acknowledged the different forms of generosity and, instead, continue to treat generosity as a unidimensional construct. The aim of the current research was twofold: (1) assess the underlying qualities that may be signalled via generosity, and (2) explore female short-term and long-term mate preferences for generous acts that may signal different qualities. As hypothesized, generosity signalled three qualities: an individual's resources, physical abilities, and/or cooperative intent. Contrary to predictions, however, there was no difference between female short-term and long-term mate preferences.

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## 1. INTRODUCTION

Among humans, cooperation is not only ubiquitous, but also a fundamental aspect of culture and society. Broadly defined, cooperative acts refer to behaviours that bear a cost, in terms of time, energy, effort, and/or risk, on an individual to benefit another individual<sup>1</sup>. Whereas most social animals, such as honey bees (e.g., Seeley & Visscher, 1988), target the benefits of cooperation towards kin, humans are willingly cooperative towards individuals of relatively high, as well as near-zero, relatedness. For instance, people give money to panhandlers (Goldberg, 1995), volunteer their time at local charities (Clary & Snyder, 1999), and sometimes even risk their lives to save a near-zero related individual (Becker & Eagly, 2004). The existence, and maintenance, of extrafamilial cooperation presents an enigma for researchers in numerous fields, such as sociology, psychology, biology, and economics.

Proximate explanations for cooperation have focused on the exact psychological mechanisms that cause cooperative behaviour (e.g., empathy; Batson, Sager, Garst, Kang, Rubchinsky, & Dawson, 1997, and warm-glow; Andreoni, 1995), the developmental factors that have fostered cooperative behaviours, and the specific situational triggers of cooperative behaviour (e.g., sanctioning systems; Tenbrunsel & Messick, 1999). Although these explanations have shed much light on *how* cooperation occurs, the equally relevant and important complementary question of *why* cooperation exists is left unanswered. In order to answer ultimate or functional questions, such as why might such

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<sup>1</sup> Throughout this paper, numerous terms, such as generous acts, kind acts, nice acts, helpful acts, altruistic acts, and cooperative acts, will be used interchangeably to refer to the aforementioned definition.

underlying psychological mechanisms for cooperation evolve and/or be learned, numerous investigators have turned to evolutionary theories.

Darwin's theory of natural selection posits that individuals with certain phenotypic traits (i.e., behavioural, morphological, and/or psychological traits) will (a) be better suited to gain access to scarce resources, such as food, shelter, and mates, and (b) have higher lifetime reproductive success by leaving more viable offspring, who will be well adapted to their environment. Thus, through the lens of evolution, cooperative behaviours appear to be particularly puzzling: If natural selection acts upon variations in traits, one would expect that performing a helpful act at one's expense, to confer benefits on another, would put the cooperative individual at a relative disadvantage to other non-cooperative individuals. Given this knowledge, how might cooperative behaviours evolve in a world where being selfish puts an individual ahead?

Several evolutionary-based frameworks have been used to understand why individuals may engage in helping behaviours. In the following section, I will briefly discuss some prominent explanations for kin directed and reciprocal cooperation. I will then introduce costly signalling theory (Zahavi 1990; 1995) as a framework for understanding helping behaviour directed at people who are neither kin nor reciprocal. Next, I will use preliminary evidence to argue that generosity may be a costly signal of fundamentally different underlying traits such as physical abilities, resources, and/or cooperative intent. The methodology section will expand on the details of the experimental design, which will be used to test the idea that generosity may not be a unidimensional construct. The

results and discussion section of the current research will be presented; limitations, future directions, and implications will be discussed.

## **1.1 Ultimate Explanations for Cooperation: Being Nice Pays Off in the Long Run**

### *1.1.1 Blood Is Thicker Than Water: Inclusive Fitness and Nepotism*

According to Hamilton (1963), an individual can maximize reproductive fitness (i.e., the propagation of an individual's genes into subsequent generations) in two ways: (1) ensuring the survival and reproduction of an individual's own offspring (i.e., direct fitness), and/or (2) aiding the survival and reproduction of the offspring of closely genetically related individuals (i.e., indirect fitness). Collectively, one's direct fitness and indirect fitness are referred to as an individual's inclusive fitness (Hamilton, 1964). Given this notion of inclusive fitness, Hamilton claimed that although natural selection would select against cooperative behaviours towards others, natural selection would select for individuals who possess psychological mechanisms that favour nepotistic sentiment and/or behaviours. Several studies have supported the notion of inclusive fitness: For example, Burnstein, Crandall, and Kitayama (1994) showed that in life-or-death situations, people based decisions of aid on the degree of relatedness to the victim. Thus, the notion of inclusive fitness can be used to adequately explain helping behaviour directed at individuals of high genetic relatedness. As noted earlier, however, other forms of generosity are directed towards individuals of near-zero relatedness. For such accounts of cooperation, evolutionary psychologists have turned to models of reciprocity.

### *1.1.2 Reciprocity: You Scratch My Back, and I'll Scratch Yours*

Several investigators of the evolution of cooperative sentiment use reciprocity (Alexander, 1987; Trivers, 1971), which refers to individuals alternating between roles of donor and recipient, and directing helping behaviour towards individuals who are likely to return the favour in the future, to explain cooperation among non-kin. Reciprocity can occur through one of two systems: (1) Through a direct reciprocity system (Trivers, 1971), in which the donor is directly recompensed for an act of kindness by the recipient, or (2) through an indirect reciprocity system (Alexander, 1987), whereby the donor is repaid for an act of generosity by individuals other than the recipient. With such models, researchers can now understand why individuals may help others because even though such accounts of generosity may not pay off immediately, being nice pays off in the long run.

Although a majority of the pieces of the cooperation puzzle have been set in place, inclusive fitness (Hamilton, 1964) and reciprocity (Alexander, 1987; Trivers, 1971) cannot fully explain a fundamental portion of cooperative acts: Helping people who are neither kin nor reciprocal. This form of helping behaviour, which is the focus of this paper, has been termed “disinterested altruism”, coined by Dawkins (1976), and has received much attention by numerous researchers (e.g., Becker & Eagly, 2004; Clary & Snyder, 1999; Goldberg, 1995). How does one explain “disinterested altruism” through the eyes of evolution? A potential answer to this question lies in Zahavi’s costly signalling theory (1990; 1995).

## **1.2 Can Costly Signalling Theory Solve the Pickle of “Disinterested Altruism”?**

### *1.2.1 Costly Signalling Theory*

Costly signalling theory proposes that individuals use seemingly “wasteful” behavioural and/or morphological traits to signal honest information about themselves to other individuals (Zahavi, 1990; 1995). Sharing information through costly signals conveys a signaller’s underlying qualities (e.g., an individual’s cooperative intent, physical abilities, and/or access to resources), which might otherwise be difficult or impossible for observers to detect directly. Observers benefit from paying attention to signals because information from signals can be used to evaluate the payoffs of associating with the signaller as an ally, mate, and/or competitor. Signallers, in turn, benefit from the observers’ response to signals.

The evolutionary stability of such costly signalling behaviour is dependent on two key conditions. First, signals should communicate reliable information about the signaller’s underlying quality. And second, in order to fulfill the requirements of the first condition, signals should enforce a cost on the signaller that is linked to the signaller’s advertised quality such that the signals cannot be faked (i.e., either high quality signallers pay lower costs for signalling at a given level or high quality signallers gain more benefits from signalling than low quality signallers).

In order for a particular behaviour to be a signal of an underlying quality, the behaviour must meet four requirements: The behaviour must be (1) potentially costly to the signaller in terms of energy, time, and/or resources, (2) a reliable indicator of traits that is

easily observable by others, (3) beneficial for observers to pay attention to, and (4) provide benefits that are greater than the costs for honest signallers (Gintis, Smith, & Bowles, 2001; Zahavi, & Zahavi, 1997). Given these four criteria, do helpful behaviours qualify as costly signals?

### *1.2.2 Helping as a Costly Signal: The Case of the Meriam Turtle Hunters*

This section will examine the notion of helping behaviours as costly signals by reviewing the aforementioned criteria. An example of a form of helping behaviour, turtle hunting among Meriam men, will be used consistently to illustrate that generous behaviours can be explained in terms of costly signalling theory.

For any given behaviour to be a costly signal, the behaviour must be costly to perform in terms of time, energy, effort, and/or resources. Helpful acts are costly by definition, and there are several examples of costly generous behaviours. For example, Meriam men, who originate from the Torres Strait in Australia, engage in extravagant displays of food sharing and gift giving, without the expectation of being repaid with money, gifts, and/or a share of the food (reviewed in Jones et al., 2007; Smith & Bliege Bird, 2000). These generous displays occur approximately two to five years after the death of a member of the community. The family of the deceased host an elaborate feast (to announce the arrival of a permanent tombstone) for all community members, where the main food served is turtle meat. The turtle meat is supplied by turtle hunters. Turtle hunting is an extremely inefficient foraging strategy that is costly in terms of time, energy, and money, and can be exceptionally dangerous. For instance, turtle hunting involves a crew of three

to six men, each holding different roles (i.e., leaders lead the crew, jumpers leap into waters to capture turtles, and drivers drive the boat) that aid the capturing of a turtle. Most Meriam turtle hunters, especially jumpers, need to be in optimal physical condition because the foraging strategy entails a wide array of physical demands: Diving, swimming, and potentially wrestling with a hundred kilogram turtle. On top of the physical costs turtle hunters endure, turtle hunters are not repaid for the monetary costs of hunts (i.e., it costs approximately 60 Australian dollars (in the year 2000) to fuel a boat for a single hunt). Thus, it appears that turtle hunting fulfills the requirement of behaviour that is costly in terms of riskiness, time, energy, and resources.

Given that turtle hunting is costly to perform, is it also an easily observable behaviour that effectively advertises an individual's underlying quality? Four lines of evidence seem to show that this is the case. First, research shows that community members are acutely aware of the outcomes of turtle hunts: Meriams are not only able to distinguish hunters from non-hunters, but also differentiate hunters who are regularly successful in their hunt from hunters who are not successful (Smith & Bliege Bird, 2000). Secondly, at feasts, guests frequently gossip about the turtle suppliers' hunting ability. For instance, a hunter's ability is ridiculed if small male turtles, which have lower caloric value in comparison to female turtles, are served at the feast (Smith & Bliege Bird, 2000). Third, turtle hunters signal their ability by only hunting during non-nesting season, and not during nesting season when female turtles come to shore to lay eggs: Catching female turtles, and turtle eggs, during nesting season is of low cost and is easily performed by women, older men, and children (Smith & Bliege Bird, 2000). Fourth, turtle hunting is

only engaged in when hunters are giving away the captured turtle (Bliege Bird & Bird, 1997). Therefore, collectively, turtle hunting appears to be an easily observable and effective means of advertising quality.

Observers should benefit from paying attention to costly signals. According to a study by Smith, Bliege Bird, and Bird (2003), Meriam women gain benefits from paying attention to information about hunting success. Smith and colleagues (2003) show that partners of hunters and leaders of hunts have higher cumulative reproductive success than partners of non-hunters. Signallers also need to receive benefits from advertising traits. Smith et al. (2003) showed that hunters, indeed, receive benefits from engaging in costly turtle hunting. Compared to non-hunters, hunters show increased reproductive success: Hunters have earlier first mating experiences, gain access to higher quality mates (i.e., younger and more hard-working females), and have more offspring than age-matched non-hunters.

Hence, the evidence presented in this section illustrates that helping behaviours, such as turtle hunting, could be a costly signal of underlying qualities. The upcoming section will review different types of helping behaviours to illustrate that generous behaviours may be used to signal different qualities.

### *1.2.3 What Does Helping Behaviour Signal?*

Helpful and generous behaviours act as costly signals, but what might these behaviours signal? The literature seems to suggest that generosity could be used to signal three

underlying qualities: An individual's physical abilities, access to resources, and/or cooperative intent.

*1.2.3.1 "Look what I can do": Generosity as a signal of physical ability*

Generosity may be used to broadcast one's physical ability. For instance, as mentioned in previous sections, turtle hunting is a form of gift giving that signals the physical agility and strength of hunters who play the role of divers (Smith et al., 2003). Research has shown that several other forms of generous gift giving and food sharing may be used as signals of ability (e.g., Hawkes & Bliege Bird, 2002; Lyle, Smith, & Sullivan, 2009; Sosis, 2000).

Similar to the Meriam, the Ache Indians, a hunter-gatherer tribe in Paraguay, engage in a costly inefficient foraging strategy: Ache men regularly target their hunting efforts towards big game (reviewed in Hawkes & Bliege Bird, 2002). If an Ache man is successful at a big game hunt, for which acquisition is often costly, time consuming, unpredictable, and potentially dangerous, the meat is usually shared among members of the tribe. Hawkes and Bliege Bird argue that such big game hunting, and the sharing of meat, may be an example of the use of generosity to signal ability: Big game hunting requires physical skill, strength, and agility. Additionally, hunters benefit from this signalling as research has shown that Ache hunters have higher fertility and are more likely to be involved in extra-paired copulations (reviewed in Hawkes & Bliege Bird, 2002).

Lyle, Smith, and Sullivan (2009), further argue that donating blood may be a form of generous costly signalling of one's physical quality, health, and/or ability. Lyle and colleagues note that there are several perceived costs and risks associated with donating blood: fear of needles, fear of potential negative health-related side effects (e.g., weight loss, dizziness, pain, and convulsion; Hupfer, Taylor, & Letwin, 2005), and fear of staff making errors. In comparison to non-donors, however, donors perceive lower costs and risks associated with blood donation. Individuals also perceive blood donors as healthy and generous. Thus, with such results, Lyle and colleagues show that blood donations may be a costly signal to advertise a "donor's health, value as a reciprocal partner, and/or ability to endure what is perceived as an anxiety provoking and risky experience" (2009; p. 263).

#### *1.2.3.2 "Show me the money": Generosity as a signal of resources*

Large charitable donations or excessive forms of sharing may act as costly signals to broadcasts an individual's access to resources (Boone, 1998; Harbaugh, 1998). For example, several New Guinean tribes (e.g., Metlpa, Enga, Gawil) perform elaborate sharing ceremonies known as 'mokas' (Brown, 1978). These mokas usually consist of tribes exchanging pigs with neighbouring tribes as a ritualistic way to express a tribe's pride, wealth, and strength (Brown, 1978). Once a tribe has received pigs from a neighbouring tribe, the pigs are killed, cooked, and served in a large feast, whereby tribes take turns presenting each other with pork.

The moka may serve as a costly signal of a group's resources (reviewed in Brown, 1978; Strathern, 1979). Tribes that present too few pigs and/or too small pigs often risk humiliation and reputation loss. Presumably, this could be because pig raising is difficult (i.e., several pigs perish before reaching full adulthood; 'fattened' pigs, which are the most valuable in the moka ceremony, entail that tribes have access to copious amounts of food for the pigs), and thus, tribes with more well fed pigs could be reliably signalling to members of other tribes their access to valuable resources. Observers (members of other tribes) of such advertising might benefit from paying attention to these signals because other important ceremonies, such as marriage, and male initiation of marriage, are usually held simultaneously to moka feasts. In turn, tribes may benefit greatly from using the moka to signal resources as members of the tribe may gain access to mates from other tribes.

Potlatches are another example of lavish giving that may signal resources (Goldman, 1973; Piddocke, 1965). Potlatches, which are performed by the Kwakiutl of Vancouver Island, occur when the chiefs of tribes actively 'compete' with one another for prestige and status. During a potlatch, a chief hosts an elaborate and costly feast, in which several items such as food, boxes, and blankets are either given away or destroyed. A 'rival' chief must host a larger and more expensive feast in order not to lose status or prestige. Because potlatches are extremely costly to perform, such ceremonies may function as a reliable indicator of the chief's resources (Goldman, 1973; Piddocke, 1965).

Although both the New Guinean mokas and the Kwakiutl potlatches are examples of using generosity to signal resources, the latter of the two brings up an interesting issue: If an individual gives away resources to another, rather than destroys those resources, one may not only be signalling one's resources, but also one's cooperative intent. To illustrate this point, imagine two extremely wealthy individuals; the first individual decides to spend thousands of dollars on a Lamborghini, whereas the second individual decides to donate the same amount of money to a local charity. Both individuals would be signalling to numerous observers that they are wealthy and have access to resources. But, compared to the first individual, the second individual would be using generosity as a means to primarily signal resources, and secondarily signal a cooperative intent. Thus, there are numerous ways one may signal resources; generous donations and/or forms of sharing may be one way in which an individual can advertise access to resources.

### *1.2.3.3 "Nice guys finish first": Generosity as a signal of cooperative intent*

In the last two sections, I provided examples of how individuals, or groups, can use generosity to signal resources or physical abilities. The previous section, however, introduced a new important question: Why might one specifically chose to use generosity to signal a quality? This section aims to answer this question by reviewing the literature on cooperative acts.

First off, as mentioned before, being generous is costly for the signaller. For such a cost to be worthwhile, two assumptions must be true: (1) signallers should benefit from performing generous acts by gaining access to allies or mates because (2) observers

should be able to use these signals as reliable indicators of desirable underlying traits to evaluate the signaller as a potential ally or mate. Empirical evidence shows that signallers do gain benefits from engaging in costly behaviours.

Research has shown that people are more likely to act generously if they know others are watching. For instance, Hardy and Van Vugt (2006) showed that in a public goods game, public contributions to the group were significantly larger than contributions made in private. But how might behaving generously in public benefit both signallers and observers?

Less work has focused on generosity as a signal of cooperative intent, however, research has shown that acting generous in one situation reliably predicts an individual's likelihood to engage in future generous behaviours (Kurzban & Houser, 2005). Subsequently, if generosity is a reliable indicator of cooperative intent, signallers should benefit from gaining a generous reputation. For example, a study by Barclay (2004) showed that it pays to be generous in front of others: In a public goods game, individuals were more cooperative towards, and trusting of, generous individuals (also see Fehrler & Przepiorka, 2011). Additionally, in comparison to less generous individuals, generous individuals are preferred as interaction partners, and are more often perceived to have higher social status within a group (e.g., Barclay & Willer, 2007; Hardy & Van Vugt, 2006; Price, 2003; Van Vugt & Hardy, 2010).

Therefore, collectively, research shows that being generous in front of others may benefit signallers because observers perceive generous individuals to have desirable traits, such as high social status, trustworthiness, and agreeableness, and thus, are more likely to associate with the generous individual. This suggests that there may be added benefits to using generosity to signal an underlying quality, and that single acts may signal more than one quality: generosity may not only act as a signal of physical ability and resources, but also as a signal of cooperative intent.

### **1.3 Overview of the Current Research**

The aim of the current research was twofold. First, the primary goal of the current investigation was to provide empirical evidence that shows generosity can be broken into more than one factor. In order to investigate what generosity signals, participants were asked to rate vignettes of described individuals engaging in different types of acts that varied with respect to generosity. A three-mode parallel factor analysis (PARAFAC; Harshman & Lundy, 1984) was used to analyze participants' ratings on vignettes to look for an underlying structure of what generosity might signal.

The first investigation was used as an opportunity to conduct an exploratory pilot for a secondary research question of interest: How attractive are different types of generosity? Generosity may be used as a form of costly signalling of underlying qualities that female observers can use to assess signallers as mates, and thus, I was interested in exploring the different qualities that females pay attention to when assessing males as short-term and long-term mates. Participants were asked to rate described individuals on two additional

adjectives: Participants indicated their preferences for a short-term mate by rating how ‘lustworthy’ a described individual was, whereas long-term mate preferences were assessed by having participants rate how ‘marriageable’ a described individual was. In order to explore female short-term and long-term mate preferences for resources, physical abilities, and cooperative intent, two within-subjects two-way ANOVAs were used: (1) 2 (cooperative intent) X 2 (physical abilities), and (2) 2 (cooperative intent) X 2 (resources).

## **2. QUESTION 1: WHAT DOES GENEROSITY SIGNAL?**

Some researchers argue that generous behaviours, such as large charitable donations or excessive forms of sharing, may serve as costly signals to broadcast an individual’s access to resources, whereas others, however, acknowledge that generosity may be a tool to advertise one’s physical ability (e.g., rescuing a person from danger) and/or a way to honestly signal one’s cooperative intent (e.g., volunteering at a homeless shelter). Although the evidence illustrates that generosity may be an honest signal of at least three fundamentally *different* qualities, many researchers have not acknowledged the different forms of generosity and, instead, continue to treat generosity as a unidimensional construct (e.g., Van Vugt & Hardy, 2010; Zahavi & Zahavi, 1997).

The purpose of the current research was to investigate the following research question: What does generosity signal? I expected to find three different types of generous behaviours: (a) generous acts that may signal one’s physical abilities and cooperative intent, (b) generous acts that could be used to signal an individual’s access to resources

and cooperative intent, and (c) generous acts that solely signal a cooperative intent (Please refer to Table 1 for definitions of qualities signalled via generosity). As mentioned, PARAFAC analyses were used to analyze the data. Before addressing the detailed hypotheses, I would like to explain the methodology used and describe PARAFAC analysis.

## **2.1 Method**

### *2.1.1 Participants*

Participants were recruited from the psychology subject pool and consisted of first year psychology students from the University of Guelph. Female participants, who self-identified as heterosexual, between the ages of 18 and 25 were invited to participate because we sought to assess heterosexual female mate preferences. The study took about 45 minutes to complete. Participants were compensated: Students received 1% course credit to go towards any first year psychology course.

A total of 279 participants volunteered for the study, but only 237 participants completed the survey. Of the 237 participants, 31 participants (13%) reported having filled in responses without reading one or more questions, and were therefore discarded. Data from an additional 26 participants (11%) were also omitted from analyses for failure to follow instructions. Furthermore, because the study investigated heterosexual female mate preferences, participants who self-identified as non-heterosexual ( $n = 8$ ; 3.4%) were excluded from the analyses. Thus, after data cleaning, the total sample size was 172 participants.

Table 1

*Definitions Used For Qualities Signalled Via Generosity*

<b>Quality</b>	<b>Definition</b>
Physical Abilities	A person who is physically capable
Resources	A person who possesses or has access to abundant resources
Cooperative Intent	A person who performs a costly action (in terms of resources, energy, and/or time) to provide benefits to others without gaining any immediate or apparent benefits to himself/herself

The mean age of participants was 18.7 years ( $SD = 1.2$ ; range = 18-25). A majority of participants were either single ( $n = 106$ ; 60.9%) or in a dating relationship ( $n = 64$ ; 30.9%). The remainder of participants were married ( $n = 2$ ). Seventy-seven percent of participants were in their first year of university.

## 2.1.2 Stimuli

### 2.1.2.1 Vignettes: *Generous and Non-Generous Acts*

Participants saw a list of 52 vignettes, which contained descriptions of males, between the ages of 18 and 25, engaging in different generous and non-generous acts, and were asked to rate these individuals on several adjectives. Individuals in the vignettes only engaged in single acts that were designed to signal different qualities. In order to generate vignettes that would accurately reflect the qualities of interest, an extensive process was utilized.

First, I generated a definition for each of the qualities signalled via generosity. Definitions were carefully worded to fully capture the quality of interest (please refer to Table 1 for a list of definitions). Using these definitions, vignettes were generated to signal physical abilities, resources, and cooperative intent (see Table 2). Multiple vignettes of the same type were generated to ensure results were generalizable and not a product of idiosyncratic factors of individuals described in single vignettes. Three levels of cues of physical abilities, resources, and cooperative intent were used: cue of high quality, no cue of quality, and cue of low quality. A total of 27 types, or sets, were possible (each set comprised of combinations of each quality at varying levels: 3 qualities

Table 2. *Vignettes Used*

Category	Vignettes
Neutral (N)	In his spare time, Allan enjoys playing video games Edward likes watching horror movies Brad likes going to music festivals Bruce enjoys playing board games with his friends
High Physical Abilities (HPA)	Mark plays basketball for the University Varsity team Last summer, George completed the Guelph Lake Triathlon Doug enjoys outdoor rock climbing Lee biked from Guelph to Mississauga
Low Physical Abilities (LPA)	Justin dropped out of the intermural football team because he could not keep up with the other players Benjamin could not complete the 2 kilometer run Jerry lost a basketball game in the least competitive intramural division Calvin was mocked for throwing a ball 'like a girl'
High Resources (HR)	Eric enjoys going for long drives in his new Mercedes Benz Daniel flew to New York to attend the Kings of Leon concert Tony bought \$300 designer jeans Andrew bought himself an Xbox 360
Low Resources (LR)	Dale pawned his guitar so that he could pay for rent Jason had to get a second job so that he could pay for tuition Matt went to the food bank because he could not afford groceries Scott had to sell his second-hand car because he could not afford his insurance
High Cooperative Intent (HCI)	Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank Carl spends his free time volunteering for the disability centre Bryan volunteers for Big Brothers Big Sisters of Guelph Grant carried an old lady's groceries to her car
Low Cooperative Intent (LCI)	Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation Ian drove by a stranger who had his car stuck in the snowy and slippery ditch Chris drove by his roommate walking home in the rain Trevor did not give up his seat for a pregnant woman on the busy subway
High Resources + High Physical Abilities (HR+HPA)	David plays polo every weekend Steven flew to Whistler to go snowboarding for reading week Leon paid his way to climb Mount Kilimanjaro Kyle bought himself \$2,000 mountain bike
High Physical Abilities + High Cooperative Intent (HPA+HCI)	Kevin completed a 20 kilometer run to raise money for cancer awareness Cody rescued a 7-year-old girl from a burning apartment building Kieran spent his summer volunteering as a lifeguard at the public pool Isaac volunteers to coach youth soccer teams
High Resources + High Cooperative Intent (HR+HCI)	Taylor paid his friend's rent for two months Sam loaned his friend money to pay for tuition Jeremy bought his friend an iMac for his birthday Damon spent \$300 sponsoring his friends for November 2011
Other Generous Acts (O)	Ken volunteers as a Math tutor Greg went to the clinic to donate blood Todd fixed his neighbour's sink Jack spent the summer volunteering in Ghana Gabriel performed CPR on a 50-year-old man Robert sometimes puts on free music shows at the children's hospital Alex provided the tourist with directions to the Museum Fred trained his friend's new puppy Chad filed his friend's taxes
Tester vignettes	Hank just inherited 5 million dollars from his grandfather ( <i>T-HR</i> ) Paul was chosen to be on the Canadian Olympic skiing team ( <i>T-HPA</i> ) Jimmy beat up a 15 year old kid ( <i>T-LCI</i> )

X 3 levels X 3 combinations). All twenty-seven sets, however, were not realistic and/or feasible to generate. Out of the 27 possible sets, ten of the most realistic and feasible sets of vignettes were used. In addition to these ten sets, an exploratory set of vignettes was included, and another set of vignettes were included to ensure participants were attentive when completing the study. Thus, altogether, twelve sets of vignettes were used:

- (1) *Neutral*. Neutral vignettes included actions that did not signal resources, physical abilities, or cooperative intent. For example, the following neutral vignette was used: “*In his spare time, Allan enjoys playing video games*”.
- (2) *High Physical Abilities*. Vignettes included any action that signals an individual’s physical ability. For example, the following vignette was used: “*Mark plays basketball for the University Varsity team*”.
- (3) *Low Physical Abilities*. Vignettes included actions that signalled low physical ability (e.g., “*Jerry lost a basketball game in the least competitive intramural division*”).
- (4) *High Resources*. This set of vignettes included actions that solely signalled an individual’s access to resources (e.g., “*Eric enjoys going for long drives in his new Mercedes Benz*”).
- (5) *Low Resources*. In this category, individuals described engaged in acts that signalled low resources. For example, the following vignette was used: “*Dale pawned his guitar so that he could pay for rent*”.
- (6) *High Cooperative Intent*. This set of vignettes included descriptions of individuals engaging in actions that indicated cooperative intent (e.g., “*Carl spends his free time volunteering for the disability centre*”).

- (7) *Low Cooperative Intent*. This set of vignettes included descriptions of individuals engaging in acts that signalled low cooperative intent (e.g., “*Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation*”).
- (8) *High Resources + High Physical Abilities*. In this category, individuals described engaged in single acts that conveyed information about the individual’s access to resources and physical ability (e.g., “*Steven flew to Whistler to go snowboarding for reading week*”).
- (9) *High Physical Abilities + High Cooperative Intent*. Vignettes included actions that illustrated one’s physical ability and cooperative intent (e.g., “*Kevin completed a 20 kilometer run to raise money for cancer awareness*”).
- (10) *High Resources + High Cooperative Intent*. This set of vignettes contained descriptions of individuals engaging in actions that signalled resources and cooperative intent. For example, the following vignette was used: “*Sam loaned his friend money to pay for tuition*”.
- (11) *Other Generous Acts*. This was an exploratory category of generous acts. In this category, individuals engaged in generous acts that signalled cooperative intent as well as qualities other than resources and physical abilities. For example, the following vignette was used: “*Ken volunteers as a Math tutor*”.

(12) *Tester vignettes*. Tester vignettes were included to determine if participants were attentive when completing the study. Tester vignettes were generated to explicitly signal certain qualities. For example, the following tester vignette was used: “*Hank just inherited 5 million dollars from his grandfather*”. Data were not used if participants did not rate “Hank” high on adjectives used to measure the described individual’s access to resources.

I carefully generated descriptions of individuals engaging in single acts that advertised qualities for the first ten abovementioned categories. A total of 40 vignettes were generated for the ten categories (four vignettes for each category). The other generous acts category, which was included for exploratory purposes, solely contained acts from a preliminary study: Participants were asked to list generous acts that everybody could do and generous acts that only some people could do. The ‘other generous acts’ category contained nine vignettes of the most frequently listed generous acts that only some people could do. These vignettes did not clearly fit the definitions of qualities being signalled, and thus, these acts were categorized as ‘other generous acts’. In addition to the 49 vignettes, three tester vignettes were included. I generated these tester vignettes as a way to determine if data was usable: Tester vignettes were used to determine if participants were attentive when completing the study.

All vignettes were pilot tested. Participants were asked to rate how well vignettes reflected each of the definitions of the manipulated qualities: Physical abilities, resources, and cooperative intent. Three pieces of information were used from the pilot study:

(a) Pilot testing was used to ensure that vignettes were signalling the qualities they were generated to signal; (b) information from pilot testing was also used to examine the extent to which each vignette signalled each of the three qualities; and finally (c) pilot testing was used to formulate predictions of where vignettes may load on predicted factors. Pilot data was analyzed using a within-subjects ANOVA. Findings from the pilot study indicated that vignettes were signalling the qualities they were generated to signal, and, as intended, there was variability in the extent to which each vignette signalled each of the three qualities.

Therefore, the final list contained a total of 52 vignettes that described individuals engaging in different generous and non-generous acts: 3 tester vignettes, 9 ‘other generous acts’, and 4 acts from each of the ten categories (Please refer to Table 2 for a full list of vignettes used). Participants rated all 52 vignettes on several adjectives.

#### *2.1.2.2 Rating Scales: Adjectives*

Participants rated each of the 52 vignettes on 26 nine-point rating scales. Eighteen of the rating scales were adjectives of the three hypothesized qualities that generous acts may signal (i.e., 6 adjectives per quality: physical abilities, resources, and cooperative intent). Six of the 26 adjectives were included to explore other potential qualities that individuals may signal through generous acts. Two adjectives were included to investigate the secondary question of interest: How attractive are different types of generosity? In order to ensure that unambiguous ratings scales were chosen to effectively measure the

properties of interest (i.e., the qualities signalled through an individual's actions), the rating scales underwent a thorough selection process.

Much like the generation of vignettes, definitions for each of the qualities signalled via generosity were used (see Table 1). A single word that best reflected each of the definitions was chosen: (1) “*athletic*” was chosen to reflect one's physical abilities, (2) “*rich*” was chosen to reflect one's access to resources, and (3) “*kind*” was used to reflect one's cooperative inten. A word frequency dictionary (The Corpus of Contemporary American English [COCA], 2011) was then used to generate a list of the 10 most frequently used appropriate synonyms, for the years 2010 and 2011, for each word (Table 3).

Participants were asked to rate how well words reflected each definition to pilot test ratings scales. The pilot test ensured participants' perceptions of words accurately reflected definitions, and that participants understood the meanings of the adjectives used as rating scales. Information from pilot testing was also used to formulate predictions of where rating scales may load on predicted factors. A within-subjects ANOVA was used to analyze the pilot data. Based on findings from the pilot, six words were chosen for each definition or quality and were used as rating scales. An additional six miscellaneous rating scales were included to examine *other* potential traits that individuals may signal via generosity (i.e., ‘other generous acts’ category). Because costly behaviours, such as generosity, may be used to advertise underlying traits that observers can use to assess

Table 3.

*Rating Scales*

<b>Quality</b>	<b>Keyword</b>	<b>Rating scales used/ Synonyms (in order of frequency)</b>
Physical Abilities (PA)	Athletic	<b>Athletic</b> <b>Physically fit</b> Healthy <b>Strong</b> Robust Hardy <b>Muscular</b> <b>Sporty</b> Agile <b>Able-bodied</b>
Resources (R)	Rich	<b>Rich</b> <b>Wealthy</b> <b>Privileged</b> Affluent <b>Prosperous</b> <b>High status</b> Well-to-do <b>Well-off</b> Moneyed Financially stable
Cooperative Intent (CI)	Kind	<b>Kind</b> <b>Giving</b> <b>Helpful</b> <b>Generous</b> <b>Charitable</b> Gracious Benevolent Philanthropic Altruistic <b>Unselfish</b>
Miscellaneous qualities (included for exploratory purposes; M)		<b>Good genes</b> <b>Intelligent</b> <b>Knowledgeable</b> <b>Masculine</b> <b>Skilful</b> <b>Trustworthy</b> <b>Lustworthy*</b> <b>Marriageable*</b>

*Note.* Items in the main study are indicated in bold. Normal font indicate ten of the most frequently used synonyms, for the years 2010 and 2011, for each quality signalled via generosity (The Corpus of Contemporary American English [COCA], 2011).

signallers as potential mates, six traits that individuals across several cultures and countries deemed desirable and valuable in a romantic partner (Buss et al., 1990) were used as rating scales. The remaining two rating scales were solely included to explore female short-term and long-term mate preferences for different types of generosity.

Thus, the final list of rating scales consisted of six words to assess each of the three hypothesized traits that generosity may be used to signal (i.e., physical ability, access to resources, and/or cooperative intent), six traits that individuals deemed desirable in a romantic partner, and two adjectives that specifically assessed attractiveness of the individual as a short-term and long-term mate. Table 3 shows the final list of ratings scales used.

#### *2.1.2.3 Post-Task*

After rating 52 vignettes on the multiple rating scales, participants completed a post-task questionnaire. Each participant was asked to provide biographic information: Date of birth, sexual orientation, relationship status, and level of study at university. Additionally, participants were asked to report if they had filled in any questions on the first questionnaire without reading. Data from this question was used as a supplementary means to assess if data should not be used. Data from participants that responded affirmatively to this question were not included in the analyses ( $n = 31$ ).

### 2.1.3 Procedure

The study required about 45 minutes. The experiment was conducted entirely through an online survey. Participants were recruited from the psychology subject pool. Participants willing to participate contacted the experimenter via e-mail and received a link to the online survey. Because the study was conducted in the form of an online survey, participants indicated consent by clicking the next button to proceed with the study. Participants completed the questionnaire first, which included rating 52 vignettes on numerous adjectives, and then continued to the post-task questionnaire. Upon completion of the study, participants were presented with a debriefing form.

### **2.2 Analysis: Three-Mode Parallel Factor Analysis (PARAFAC)**

Factor analysis is often used to examine whether a group of variables are related to a number of unobservable factors. Conventional factor analysis (two-mode) typically organizes data according to two classifications. For example, if we asked participants to rate a certain type of generous behaviour (e.g., generous behaviours that may signal one's concern for others) on several adjectives (e.g., kind, rich, giving, selfish, etc.) the two modes of classification would be participant and adjective. Factors would be extracted based on correlations between participants and adjectives: particular adjectives tend to covary such that participants who rate a behaviour high/low on adjective A also tend to rate that behaviour high/low on adjective B. This analysis would provide data on observers' perceptions of individuals engaging in *a certain type* of generous behaviour, but would not allow us to distinguish *different types* of generous acts based on observers' perceptions. In order to assess and distinguish the different types of generous acts,

participants would need to rate different types of generous acts on the same set of adjectives. Such a study would provide data on three modes of classification (Participant X Adjective X Generous Act), and would require a three-mode factor analysis methodology.

For the purpose of this study, a particular type of three-mode factor analysis, PARAFAC, was used. PARAFAC relies on a concept known as system variation (i.e., variation in the magnitude of the variables of interest) to determine the correct orientation of axes to fit the data using *only* intrinsic characteristics of the data (as opposed to the use of intrinsic characteristics *as well as* extrinsic rotational strategies in two-mode factor analysis; Harshman & Lundy, 1984). In order to obtain system variation, we generated multiple vignettes of individuals engaging in single acts that varied in the level of physical abilities, resources, and cooperative intent signalled. As each participant rated vignettes on adjectives, the observed patterns of change for these ratings would reflect systematic differences between the vignettes. With the information from the change of the pattern of ratings from the vignettes, PARAFAC uses an iterative procedure to converge on the best-fitting axes.

Suppose that, as hypothesized, generosity is a tri-dimensional construct, with physical abilities, resources, and cooperative intent qualifying as the latent variables underlying generosity. The vignettes and adjectives would serve as indicator variables of these latent variables. As such, different forms of generosity would be characterized by different varying contributions from each factor. For example, generous acts that signal one's

physical abilities and cooperative intent (e.g., “Kevin completed a 20 kilometer run to raise money for cancer awareness”) would be characterized by highly positive loadings on the physical abilities and cooperative intent dimensions, and neutral loadings on the resources dimension. Generous acts that signal resources as well as cooperative intent (e.g., “Taylor paid his friend’s rent for two months”), however, would be characterized by a different pattern of loadings: High positive loadings on the resources and cooperative intent dimensions, but neutral loadings on the physical abilities dimensions. On the other hand, acts such as volunteering at the disability center solely signal an individual’s cooperative intent, and would be characterized by high positive loadings on the cooperative intent dimension and neutral loadings on the resources and physical abilities dimension. Thus, in sum, when system variation is created by the vignettes varying with resources, cooperative intent, and physical abilities, the relative contribution of each factor (factor loadings) varies across the vignette mode. This variation of ratings for vignettes is consequently reflected in the ratings in the adjective mode. PARAFAC determines the factors that are responsible for the variation in the vignette mode.

PARAFAC offers two benefits. First, PARAFAC offers information from the third-mode of classification that can be extremely useful in determining the best fitting orientation of axis, whereas a two-mode factor analysis, on the other hand, relies on researchers’ rotational strategies to orientate the axis (Swartzman, Harshman, Burkell, & Lundy, 2002). This feature of PARAFAC is exceptionally beneficial because the axis orientation is based solely on the data collected and not based partially on a researchers’ subjective rotational strategy. With PARAFAC, the problem of different researchers using different

subjective rotational strategies to orientate the axis is eliminated, and thus, data can be interpreted consistently.

A second advantage of the PARAFAC analysis is that each factor has loadings for three modes instead of two (Swartzman et al., 2002). For example, in this study, PARAFAC enabled the interpretation of a factor by not only examining the loadings between adjectives and participants, but also the loadings between different types of generous acts. This additional mode can once again be used to guide interpretation of the dimensions found.

In summation, the beneficial features of PARAFAC have encouraged researchers to use the PARAFAC method to assess several phenomena. PARAFAC has been used to investigate beliefs about complementary and alternative medicine (e.g., Swartzman et al., 2002), the two dimensions of affective experiences (e.g., Stanley & Meyer, 2009), and peoples' perceptions of economic activities (Veldscholte, Kroonenberg, & Antonides, 1998). To our knowledge, this study is the first to use PARAFAC to investigate the different types of generous behaviours.

### *2.2.1 PARAFAC Calculations*

In order to assess the qualities that may be signalled via generosity, a three-mode factor analysis (PARAFAC) was used to analyze the data (see earlier section for a more in-depth description of PARAFAC). Three modes were used for PARAFAC to extract factors from: Participant (mode *a*) X Adjective (mode *b*) X Vignette (mode *c*). The

adjectives “*lustworthy*” and “*marriageable*” were not included in the current analyses because the inclusion of these variables was solely to explore female mate preferences (i.e., the secondary goal of the current research, see Question 2).

Much like a traditional two-mode factor analysis, data needed to be centred and scaled (this typically occurs when the correlation matrix is calculated; e.g., Stanley & Meyer, 2009; Swartzman et al., 2002). The data were centred, across vignettes, and scaled, within the participant and adjective mode. David Stanley created a PARAFAC program in MatLab to conduct the analyses which used the preprocessing routines from the N-way Toolbox (Andersson & Bro, 2000). PARAFAC converged on a solution when factor loadings in each mode did not exceed .00001% of the mean absolute factor loading for that mode (Stanley & Meyer, 2009). If a solution was not found, the PARAFAC program was designed to stop after 5,000 iterations.

## **2.3 Detailed Predictions**

### *2.3.1 Predicted Factors*

I expected to find three factors. I expected one factor to be representative of one’s physical abilities. Relative to the other rating scales, the six rating scales that were generated to reflect the physical abilities definition (i.e., athletic, physically fit, sporty, strong, muscular, and able-bodied) were expected to load highly and positively on this factor. Relative to other vignette categories, *High Physical Abilities*, *High Resources + High Physical Abilities*, and *High Physical Abilities + High Cooperative Intent* vignettes

were expected to load highly and positively on this factor. Vignettes in the *Low Physical Abilities* category were expected to anchor the negative pole of the factor.

A second expected factor should reflect one's resources. The six rating scales generated to reflect the resources definition (i.e., rich, wealthy, well-off, prosperous, high-status, and privileged) were expected to load highly and positively on this factor. Relative to other vignette categories, *High Resources*, *High Resources + High Cooperative Intent*, and *High Resources + High Physical Abilities* vignettes were expected to load highly and positively on this factor. On the negative pole, *Low Resources* vignettes were expected to load highly.

I expected a third factor to represent one's cooperative intent. In comparison to other rating scales, the six rating scales that were generated to reflect cooperative intent (i.e., kind, giving, helpful, generous, charitable, and unselfish) were expected to load highly and positively on this factor. Relative to other vignettes, *High Cooperative Intent*, *High Resources + High Cooperative Intent*, and *High Physical Abilities + High Cooperative Intent* vignettes were expected to load highly and positively on this factor. Also, because vignettes in the *Other Generous Acts* category included individuals engaging in generous acts that signalled cooperative intent as well as qualities other than resources and physical abilities, I expected vignettes in the *Other Generous Acts* category to load highly and positively on this factor. *Low Cooperative Intent* vignettes were expected to load highly and negatively on this factor.

### 2.3.2 Predicted Types of Generosity

I expected the data to support three distinct types of generosity based on differential factor loadings of vignettes on each predicted factor. First, generous acts that signal one's physical abilities (i.e., *High Physical Abilities + High Cooperative Intent* vignettes) were not expected to load on resources, but were expected to load highly and positively on cooperative intent and physical abilities. Second, I expected generous acts that could be used to signal an individual's resource endowment (i.e., *High Resources + High Cooperative Intent* vignettes) to load highly and positively on cooperative intent and resources. *High Resources + High Cooperative Intent* vignettes were not expected to load on physical abilities. And third, generous acts that solely signal cooperative intent (i.e., *High Cooperative Intent* vignette) were expected to load highly and positively on cooperative intent, but were not expected to load on physical abilities and resources.

## 2.4 Results

### 2.4.1 The PARAFAC Solution

PARAFAC analysis offered a one-factor solution (Appendix A and B), a two-factor solution (Appendix C, D, and E), and a three-factor solution (Table 4.0, 4.1, 4.2, and 4.3), but would not converge on a four-factor solution. Figure 1 illustrates the amount of variance explained by each solution provided by PARAFAC: the one-factor solution accounted for 26.15% of the total variance, whereas the two-factor solution accounted for 39.48% of the total variance; the three-factor solution accounted for 49.89% of the total variance. The three-factor solution accounted for 10% more of the total variance than the two-factor solution, and almost 25% more of the variance than the one-factor solution, so

Table 4.0

*Three-Factor Solution in the Adjective Mode*

FACTOR 1		FACTOR 2		FACTOR 3	
<b>Generous (CI)</b>	<b>.39</b>	<b>Physically Fit (PA)</b>	<b>.40</b>	<b>Well-off (R)</b>	<b>.36</b>
<b>Giving (CI)</b>	<b>.39</b>	<b>Sporty (PA)</b>	<b>.36</b>	<b>Wealthy (R)</b>	<b>.33</b>
<b>Kind (CI)</b>	<b>.37</b>	<b>Strong (PA)</b>	<b>.36</b>	<b>Rich (R)</b>	<b>.32</b>
<b>Helpful (CI)</b>	<b>.36</b>	<b>Muscular (PA)</b>	<b>.36</b>	<b>Prosperous (R)</b>	<b>.30</b>
<b>Charitable (CI)</b>	<b>.35</b>	<b>Athletic (PA)</b>	<b>.35</b>	<b>Privileged (R)</b>	<b>.30</b>
<b>Unselfish (CI)</b>	<b>.32</b>	<b>Able-bodied (PA)</b>	<b>.25</b>	<b>High-status (R)</b>	<b>.29</b>
<b>Trustworthy (M)</b>	<b>.25</b>	<b>Masculine (M)</b>	<b>.23</b>	<b>Generous (CI)</b>	<b>.23</b>
<b>Good Genes (M)</b>	<b>.21</b>	<b>Skilful (M)</b>	<b>.22</b>	<b>Giving (CI)</b>	<b>.23</b>
<i>Skilful (M)</i>	<i>.14</i>	<i>Good Genes (M)</i>	<i>.17</i>	<b>Kind (CI)</b>	<b>.20</b>
<i>Masculine (M)</i>	<i>.13</i>	<i>Generous (CI)</i>	<i>.15</i>	<i>Charitable (CI)</i>	<i>.19</i>
<i>Physically Fit (PA)</i>	<i>.13</i>	<i>Giving (CI)</i>	<i>.14</i>	<i>Physically Fit (PA)</i>	<i>.17</i>
<i>Muscular (PA)</i>	<i>.12</i>	<i>Charitable (CI)</i>	<i>.14</i>	<i>Helpful (CI)</i>	<i>.16</i>
<i>Strong (PA)</i>	<i>.09</i>	<i>Helpful (CI)</i>	<i>.11</i>	<i>Muscular (PA)</i>	<i>.15</i>
<i>High-status (R)</i>	<i>.08</i>	<i>Kind (CI)</i>	<i>.11</i>	<i>Good Genes (M)</i>	<i>.13</i>
<i>Knowledgeable (M)</i>	<i>.07</i>	<i>Trustworthy (M)</i>	<i>.10</i>	<i>Sporty (PA)</i>	<i>.13</i>
<i>Prosperous (R)</i>	<i>.07</i>	<i>High-status (R)</i>	<i>.09</i>	<i>Unselfish (CI)</i>	<i>.12</i>
<i>Sporty (PA)</i>	<i>.06</i>	<i>Unselfish (CI)</i>	<i>.09</i>	<i>Strong (PA)</i>	<i>.12</i>
<i>Intelligent (M)</i>	<i>.06</i>	<i>Prosperous (R)</i>	<i>.09</i>	<i>Masculine (M)</i>	<i>.11</i>
<i>Able-bodied (PA)</i>	<i>.06</i>	<i>Privileged (R)</i>	<i>.09</i>	<i>Skilful (M)</i>	<i>.10</i>
<i>Athletic (PA)</i>	<i>.05</i>	<i>Well-off (R)</i>	<i>.05</i>	<i>Athletic (PA)</i>	<i>.09</i>
<i>Well-off (R)</i>	<i>.05</i>	<i>Wealthy (R)</i>	<i>.00</i>	<i>Trustworthy (M)</i>	<i>.09</i>
<i>Privileged (R)</i>	<i>.03</i>	<i>Rich (R)</i>	<i>-.00</i>	<i>Able-bodied (PA)</i>	<i>.02</i>
<i>Wealthy (R)</i>	<i>.00</i>	<i>Knowledgeable (M)</i>	<i>-.08</i>	<i>Knowledgeable (M)</i>	<i>-.14</i>
<i>Rich (R)</i>	<i>-.00</i>	<i>Intelligent (M)</i>	<i>-.10</i>	<i>Intelligent (M)</i>	<i>-.14</i>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. CI = cooperative intent; PA = physical abilities; R = resources; M = miscellaneous.

Table 4.1

*Factor 1 of the Three-Factor Solution in the Vignette Mode*

FACTOR 1	
<b>*Carl spends his free time volunteering for the disability centre (HCI)</b>	<b>.23</b>
<i>*Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	<i>.19</i>
<i>*Grant carried an old lady's groceries to her car (HCI)</i>	<i>.19</i>
<i>*Chad filed his friend's taxes (O)</i>	<i>.19</i>
<i>*Ken volunteers as a Math tutor (O)</i>	<i>.19</i>
<i>*Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	<i>.18</i>
<i>*Robert sometimes puts on free music shows at the children's hospital (O)</i>	<i>.18</i>
<i>*Gabriel performed CPR on a 50-year-old man (O)</i>	<i>.18</i>
<i>*Jack spent the summer volunteering in Ghana (O)</i>	<i>.18</i>
<i>*Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</i>	<i>.17</i>
<i>*Greg went to the clinic to donate blood (O)</i>	<i>.16</i>
<i>*Todd fixed his neighbour's sink (O)</i>	<i>.14</i>
<i>*Sam loaned his friend money to pay for bills (HR+HCI)</i>	<i>.14</i>
<i>*Taylor paid his friend's rent for two months (HR+HCI)</i>	<i>.13</i>
<i>*Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</i>	<i>.13</i>
<i>*Fred trained his friend's new puppy (O)</i>	<i>.12</i>
<i>*Alex provided the tourist with directions to the Museum (O)</i>	<i>.12</i>
<i>*Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	<i>.11</i>
<i>*Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	<i>.10</i>
<i>*Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</i>	<i>.10</i>
<i>Scott had to sell his second-hand car because he could not afford his insurance (LR)</i>	<i>.02</i>
<i>Matt went to the food bank because he could not afford groceries (LR)</i>	<i>.02</i>
<i>Jason had to get a second job so that he could pay for bills (LR)</i>	<i>.02</i>
<i>*Jeremy bought his friend an iMac for his birthday (HR+HCI)</i>	<i>.01</i>
<i>Dale pawned his guitar so that he could pay for rent (LR)</i>	<i>.01</i>
<i>Benjamin could not complete the 1 kilometer run (LPA)</i>	<i>-.02</i>
<i>Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	<i>-.03</i>
<i>Bruce enjoys playing board games with his friends (N)</i>	<i>-.03</i>
<i>Justin dropped out of the intramural football team because he could not keep up with the other players (LPA)</i>	<i>-.05</i>
<i>Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	<i>-.06</i>
<i>Edward likes watching horror movies (N)</i>	<i>-.07</i>
<i>In his spare time, Allan enjoys playing video games (N)</i>	<i>-.08</i>
<i>Last summer, George completed the Guelph Lake Triathlon (HPA)</i>	<i>-.09</i>
<i>Lee biked from Guelph to Mississauga (HPA)</i>	<i>-.09</i>
<i>Doug enjoys outdoor rock climbing (HPA)</i>	<i>-.10</i>
<i>Andrew bought himself an Xbox 360 (HR)</i>	<i>-.11</i>
<i>Paul was chosen to be on the Canadian Olympic skiing team (T-HPA)</i>	<i>-.12</i>
<i>Mark plays basketball for the University Varsity team (HPA)</i>	<i>-.12</i>
<i>David plays polo every weekend (HR+HPA)</i>	<i>-.14</i>
<i>Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</i>	<i>-.14</i>
<i>Daniel flew to New York to attend the Kings of Leon concert (HR)</i>	<i>-.15</i>
<i>*Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</i>	<i>-.16</i>
<i>Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	<i>-.16</i>
<i>*Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</i>	<i>-.16</i>
<i>Hank just inherited 5 million dollars from his grandfather (T-HR)</i>	<i>-.17</i>
<i>Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	<i>-.17</i>
<i>Eric enjoys going for long drives in his new Mercedes Benz (HR)</i>	<i>-.18</i>
<i>*Chris drove by his roommate walking home in the rain (LCI)</i>	<i>-.18</i>
<b>*Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</b>	<b>-.21</b>
<b>*Jimmy beat up a 15 year old kid (T-LCI)</b>	<b>-.22</b>
<b>Tony bought \$300 designer jeans (HR)</b>	<b>-.23</b>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. Vignettes hypothesized to load highly on factor 1 are indicated with asterisks. N = Neutral; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.

Table 4.2

*Factor 2 of the Three-Factor Solution in the Vignette Mode*

FACTOR 2	
<b>*Paul was chosen to be on the Canadian Olympic skiing team (T-HPA)</b>	<b>.34</b>
<b>*Mark plays basketball for the University Varsity team (HPA)</b>	<b>.33</b>
<b>*Lee biked from Guelph to Mississauga (HPA)</b>	<b>.33</b>
<b>*Last summer, George completed the Guelph Lake Triathlon (HPA)</b>	<b>.28</b>
<b>*Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</b>	<b>.23</b>
<b>*David plays polo every weekend (HR+HPA)</b>	<b>.22</b>
<b>*Doug enjoys outdoor rock climbing (HPA)</b>	<b>.21</b>
<b>*Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</b>	<b>.20</b>
<i>*Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</i>	<i>.16</i>
<i>*Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	<i>.14</i>
<i>*Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	<i>.13</i>
<i>*Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</i>	<i>.13</i>
<i>*Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	<i>.11</i>
<i>Jimmy beat up a 15 year old kid (T-LCI)</i>	<i>.03</i>
<i>Gabriel performed CPR on a 50-year-old man (O)</i>	<i>.02</i>
<i>Grant carried an old lady's groceries to her car (HCI)</i>	<i>.01</i>
<i>Jason had to get a second job so that he could pay for bills (LR)</i>	<i>-.00</i>
<i>Jack spent the summer volunteering in Ghana (O)</i>	<i>-.01</i>
<i>Dale pawned his guitar so that he could pay for rent (LR)</i>	<i>-.02</i>
<i>Matt went to the food bank because he could not afford groceries (LR)</i>	<i>-.02</i>
<i>Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</i>	<i>-.02</i>
<i>Scott had to sell his second-hand car because he could not afford his insurance (LR)</i>	<i>-.02</i>
<i>Todd fixed his neighbour's sink (O)</i>	<i>-.03</i>
<i>*Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	<i>-.04</i>
<i>Chris drove by his roommate walking home in the rain (LCI)</i>	<i>-.04</i>
<i>Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</i>	<i>-.04</i>
<i>Edward likes watching horror movies (N)</i>	<i>-.05</i>
<i>Bruce enjoys playing board games with his friends (N)</i>	<i>-.05</i>
<i>Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</i>	<i>-.05</i>
<i>Fred trained his friend's new puppy (O)</i>	<i>-.06</i>
<i>Greg went to the clinic to donate blood (O)</i>	<i>-.07</i>
<i>*Justin dropped out of the intramural football team because he could not keep up with the other players (LPA)</i>	<i>-.08</i>
<i>Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	<i>-.08</i>
<i>Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	<i>-.08</i>
<i>Carl spends his free time volunteering for the disability centre (HCI)</i>	<i>-.09</i>
<i>Robert sometimes puts on free music shows at the children's hospital (O)</i>	<i>-.09</i>
<i>Alex provided the tourist with directions to the Museum (O)</i>	<i>-.09</i>
<i>In his spare time, Allan enjoys playing video games (N)</i>	<i>-.09</i>
<i>Andrew bought himself an Xbox 360 (HR)</i>	<i>-.10</i>
<i>Eric enjoys going for long drives in his new Mercedes Benz (HR)</i>	<i>-.11</i>
<i>Daniel flew to New York to attend the Kings of Leon concert (HR)</i>	<i>-.11</i>
<i>Ken volunteers as a Math tutor (O)</i>	<i>-.11</i>
<i>Chad filed his friend's taxes (O)</i>	<i>-.12</i>
<i>Tony bought \$300 designer jeans (HR)</i>	<i>-.13</i>
<i>*Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	<i>-.13</i>
<i>Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	<i>-.14</i>
<i>Sam loaned his friend money to pay for bills (HR+HCI)</i>	<i>-.15</i>
<i>Hank just inherited 5 million dollars from his grandfather (T-HR)</i>	<i>-.15</i>
<i>Taylor paid his friend's rent for two months (HR+HCI)</i>	<i>-.16</i>
<i>Jeremy bought his friend an iMac for his birthday (HR+HCI)</i>	<i>-.17</i>
<i>*Benjamin could not complete the 1 kilometer run (LPA)</i>	<i>-.17</i>

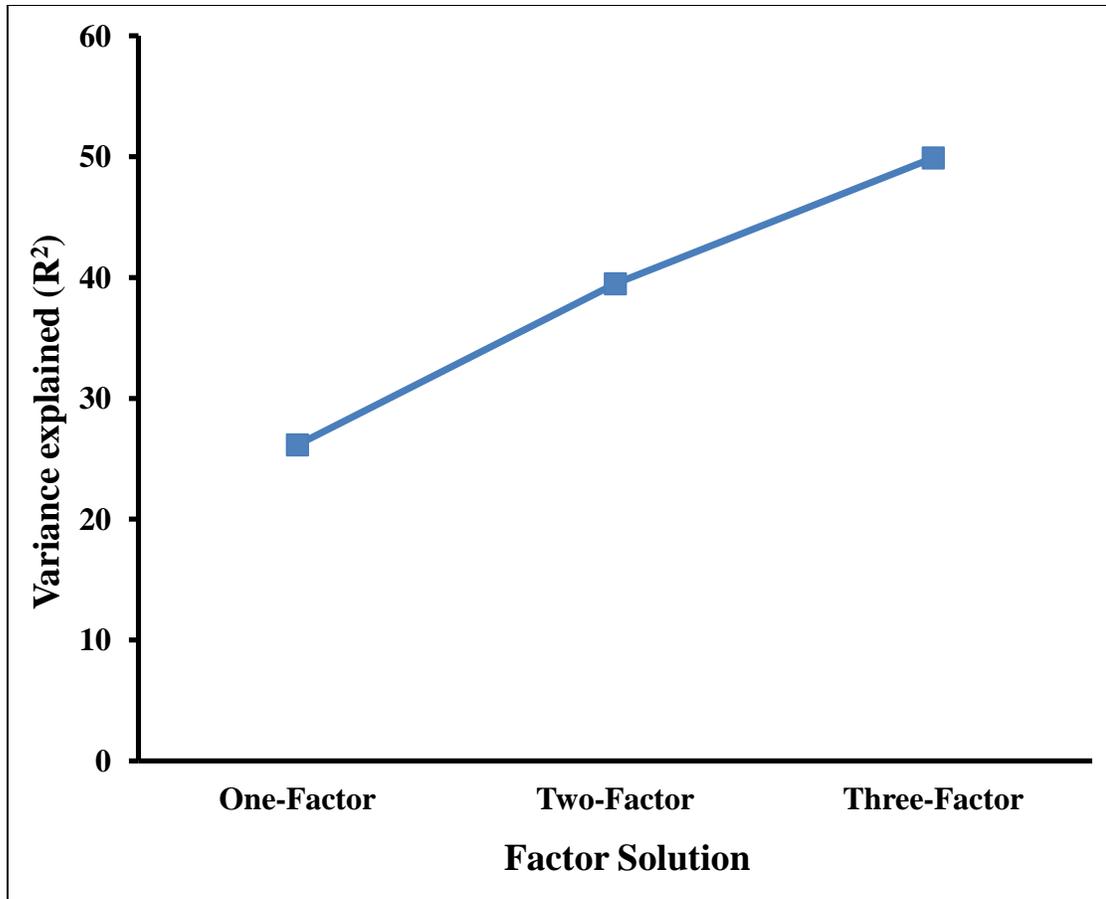
Note. Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. Vignettes hypothesized to load highly on factor 2 are indicated with asterisks. N = Neutral; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.

Table 4.3

*Factor 3 of the Three-Factor Solution in the Vignette Mode*

FACTOR 3	
<b>*Hank just inherited 5 million dollars from his grandfather (T-HR)</b>	<b>.40</b>
<b>*Tony bought \$300 designer jeans (HR)</b>	<b>.35</b>
<b>*Eric enjoys going for long drives in his new Mercedes Benz (HR)</b>	<b>.31</b>
<b>*Jeremy bought his friend an iMac for his birthday (HR+HCI)</b>	<b>.28</b>
<b>*Daniel flew to New York to attend the Kings of Leon concert (HR)</b>	<b>.24</b>
<i>*Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	<i>.18</i>
<i>*Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	<i>.16</i>
<i>*Taylor paid his friend's rent for two months (HR+HCI)</i>	<i>.15</i>
<i>*Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</i>	<i>.12</i>
<i>*Sam loaned his friend money to pay for bills (HR+HCI)</i>	<i>.12</i>
<i>*Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	<i>.12</i>
<i>*Andrew bought himself an Xbox 360 (HR)</i>	<i>.08</i>
<i>*David plays polo every weekend (HR+HPA)</i>	<i>.07</i>
<i>Jack spent the summer volunteering in Ghana (O)</i>	<i>.03</i>
<i>Paul was chosen to be on the Canadian Olympic skiing team (T-HPA)</i>	<i>.03</i>
<i>Chris drove by his roommate walking home in the rain (LCI)</i>	<i>-.00</i>
<i>Doug enjoys outdoor rock climbing (HPA)</i>	<i>-.01</i>
<i>Robert sometimes puts on free music shows at the children's hospital (O)</i>	<i>-.01</i>
<i>In his spare time, Allan enjoys playing video games (N)</i>	<i>-.01</i>
<i>Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	<i>-.02</i>
<i>Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	<i>-.02</i>
<i>Mark plays basketball for the University Varsity team (HPA)</i>	<i>-.02</i>
<i>Greg went to the clinic to donate blood (O)</i>	<i>-.02</i>
<i>Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</i>	<i>-.03</i>
<i>Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</i>	<i>-.04</i>
<i>Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	<i>-.04</i>
<i>Last summer, George completed the Guelph Lake Triathlon (HPA)</i>	<i>-.04</i>
<i>Fred trained his friend's new puppy (O)</i>	<i>-.05</i>
<i>Carl spends his free time volunteering for the disability centre (HCI)</i>	<i>-.05</i>
<i>Alex provided the tourist with directions to the Museum (O)</i>	<i>-.05</i>
<i>Bruce enjoys playing board games with his friends (N)</i>	<i>-.06</i>
<i>Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</i>	<i>-.06</i>
<i>Edward likes watching horror movies (N)</i>	<i>-.06</i>
<i>Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	<i>-.06</i>
<i>Justin dropped out of the intramural football team because he could not keep up with the other players (LPA)</i>	<i>-.06</i>
<i>Todd fixed his neighbour's sink (O)</i>	<i>-.06</i>
<i>Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</i>	<i>-.06</i>
<i>Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	<i>-.07</i>
<i>Benjamin could not complete the 1 kilometer run (LPA)</i>	<i>-.07</i>
<i>Chad filed his friend's taxes (O)</i>	<i>-.07</i>
<i>Grant carried an old lady's groceries to her car (HCI)</i>	<i>-.07</i>
<i>Ken volunteers as a Math tutor (O)</i>	<i>-.07</i>
<i>Gabriel performed CPR on a 50-year-old man (O)</i>	<i>-.09</i>
<i>Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</i>	<i>-.09</i>
<i>Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</i>	<i>-.10</i>
<i>Lee biked from Guelph to Mississauga (HPA)</i>	<i>-.10</i>
<i>Jimmy beat up a 15 year old kid (T-LCI)</i>	<i>-.12</i>
<b>*Jason had to get a second job so that he could pay for bills (LR)</b>	<b>-.21</b>
<b>*Dale pawned his guitar so that he could pay for rent (LR)</b>	<b>-.22</b>
<b>*Scott had to sell his second-hand car because he could not afford his insurance (LR)</b>	<b>-.27</b>
<b>*Matt went to the food bank because he could not afford groceries (LR)</b>	<b>-.28</b>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. Vignettes hypothesized to load highly on factor 3 are indicated with asterisks. N = Neutral; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.



*Figure 1.* The variance explained ( $R^2$ ) by the one-factor, two-factor, and three-factor solutions.

I will focus on it. Within the three-factor solution, the first of these factors accounted for 43.65% of the explained variance (i.e., 21.78% of the total variance). The second and third factors accounted for 30.42% (i.e., 15.17%) and 25.93% (i.e., 12.94%) of the explained variance, respectively. When looking at the vignette mode, Factor 1 (Cooperative Intent) correlated  $-.22$  with Factor 2 (Physical Abilities), and  $-.33$  with Factor 3 (Resources); Factor 2 (Physical Abilities) correlated  $-.20$  with Factor 3 (Resources). When looking at participant sensitivities (i.e., participant mode), Factor 1 (Cooperative Intent) correlated  $.40$  with Factor 2 (Physical Abilities), and  $.25$  with Factor 3 (Resources); Factor 2 (Physical Abilities) correlated  $.26$  with Factor 3 (Resources). When looking at the adjective mode, none of the factors correlated.

#### *2.4.1.1 Factor 1: Cooperative intent*

The first factor was labelled cooperative intent. Table 4.0 and 4.1 demonstrate the first factor loadings for the adjective and vignette modes, respectively, and were used to interpret factor 1. Factor loadings above  $.20$  in magnitude were emphasized by labelling these ratings scales and vignettes in bold. The  $.20$  criterion was chosen based on Stanley and Meyer (2009). The adjective mode was positively anchored by all six of the adjectives that were generated to reflect the definition of cooperative intent (i.e., a person who performs a costly action (in terms of resources, energy, and/or time) to provide benefits to others without gaining any immediate or apparent benefits to himself/herself): generous, giving, kind, helpful, charitable, and unselfish (in order of largest magnitude of factor loadings).

For the vignettes mode, the positive pole was anchored by *High Cooperative Intent* vignettes as well as some vignettes in the *Other Generous Acts* category. Interestingly, vignettes in the *Other Generous Acts* tended to load higher on this factor than *High Cooperative Intent* combination vignettes (i.e., vignettes in the *High Resources + High Cooperative Intent* and *High Physical Abilities + High Cooperative Intent* categories). Relative to the other vignettes, however, *High Cooperative Intent* combination vignettes (i.e., vignettes in the *High Resources + High Cooperative Intent* and *High Physical Abilities + High Cooperative Intent* categories) all loaded highly (loadings were equal to or higher than .14) and positively on this factor. The negative pole was anchored by many *Low Cooperative Intent* vignettes (all *Low Cooperative Intent* vignettes received negative loadings of magnitudes equal to or higher than .15). Notably, however, the most negative factor loading on was not a *Low Cooperative Intent* vignette, but instead, a *High Resources* vignette: ‘Tony bought \$300 designer jeans’ (factor loading of -.23).

#### 2.4.1.2 Factor 2: Physical Abilities

The second factor (illustrated in Table 4.0 for the adjective mode, and Table 4.2 for the vignette mode) appeared to capture one’s physical abilities. The adjective mode was positively anchored by six of the adjectives generated to reflect the definition of physical abilities (i.e., a person who is physically capable): physically fit, sporty, strong, muscular, athletic, and able-bodied (in order of largest magnitude of factor loadings). Intelligent and knowledgeable anchored the negative pole: intelligent had a factor loading of -.10 and knowledgeable had a factor loading of -.08. The magnitudes of these loadings were

within .15 from 0, and were therefore relatively neutral. Thus, the second factor for the adjective mode was also unipolar.

The vignette mode was positively anchored mainly by *High Physical Abilities* vignettes such as ‘Paul was chosen to be on the Olympic skiing team’, ‘Mark plays basketball for the University Varsity team’, ‘Lee biked from Guelph to Mississauga’, and ‘Last summer, George completed the Guelph Lake Triathlon’. Vignettes from the *High Physical Abilities* combination categories (i.e., *High Physical Abilities + High Cooperative Intent* and *High Resources + High Physical Abilities*) also had relatively higher positive loadings (factor loading magnitudes ranged from .34 to .11) than vignettes in other categories. Relative to *High Cooperative Intent* and *High Resources + High Cooperative Intent* vignettes, vignettes in the *High Physical Abilities + High Cooperative Intent* categories received high positive loadings on the second factor.

The magnitudes of loadings at the negative pole for the second factor of the vignette mode were much smaller in magnitude than the first and third factor. The vignette mode for the second factor was negatively anchored by a *Low Physical Abilities* vignette (i.e., ‘Benjamin could not complete the 1 kilometer run’) that had a factor loading of -.17, which was not as large as the loadings at the negative pole for factor 1 (anchored by a factor loading of -.23) and factor 3 (anchored by a factor loading of -.28). The vignette mode was also negatively anchored by *High Resources* and *High Resources + High Cooperative Intent* vignettes.

#### 2.4.1.3 Factor 3: Resources

The third factor clearly reflected one's access to resources. The adjective mode (Table 4.0) was positively anchored by well-off, wealthy, rich, prosperous, privileged, and high-status (in order of largest magnitude of factor loadings). These six adjectives were generated to capture the definition of resources (i.e., a person who possesses or has access to abundant resources). Similar to the second factor, intelligent (factor loading of -.14) and knowledgeable (-.14) anchored the other end of the pole on the adjective mode.

Numerous *High Resources* vignettes positively anchored the vignette mode (Table 4.3). In comparison to other vignettes, *High Resources* vignettes and *High Resources* combination vignettes (i.e., *High Resources + High Physical Abilities* and *High Resources + High Cooperative Intent*) had relatively high positive factor loadings. Relative to *High Cooperative Intent* and combination vignettes including *High Cooperative Intent* (i.e., vignettes in the *High Resources + High Cooperative Intent* and *High Physical Abilities + High Cooperative Intent* categories), vignettes in the *High Resources + High Cooperative Intent* categories received high positive loadings on the third factor. The vignette mode was negatively anchored by *Low Resources* vignettes.

## 2.4.2 Types of Generosity

### 2.4.2.1 Generous Acts Signalling Cooperative Intent

As expected, the four *High Cooperative Intent* vignettes loaded highly and positively on the cooperative intent dimension, and neutrally on the resources and physical abilities dimensions (see Table 5).

### 2.4.2.2 Generous Acts Signalling Physical Abilities and Cooperative Intent

As expected, the four *High Physical Abilities + High Cooperative Intent* vignettes loaded highly and positively on the physical abilities and cooperative intent dimensions, and neutrally on the resources dimension (see Table 6). Getting into the specifics, some vignettes such as “Kevin completed a 20 kilometer run to raise money for cancer awareness” had higher loadings on the physical abilities dimension than the cooperative intent dimension, and neutral loadings on the resources dimension. Other vignettes, such as “Cody rescued a 7-year-old girl from a burning apartment building”, had slightly higher loadings on the cooperative intent dimension than the physical abilities dimension and relatively neutral loadings on the resources dimension.

### 2.4.2.3 Generous Acts Signalling Resources and Cooperative Intent

As expected, the four *High Resources + High Cooperative Intent* vignettes loaded highly and positively on the resources and cooperative intent dimensions (see Table 7). Instead of these vignettes loading neutrally on the physical abilities dimension, however, *High Resources + High Cooperative Intent* vignettes loaded highly and negatively on the physical abilities dimension (Table 7). A majority of the *High Resources + High*

Table 5

*Factor Loadings for High Cooperative Intent vignettes on Cooperative Intent (CI),*

*Physical Abilities (PA), and Resources (R) Dimensions*

<b>Vignettes</b>	<b>CI</b>	<b>PA</b>	<b>R</b>
Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank	.19	-.08	-.02
Carl spends his free time volunteering at the disability centre	.23	-.09	-.05
Bryan volunteers for Big Brothers Big Sisters of Guelph	.18	-.08	-.02
Grant carried an old lady's groceries to her car	.19	.01	-.07

Table 6

*Factor Loadings for High Physical Abilities + High Cooperative Intent Vignettes on Cooperative Intent (CI), Physical Abilities (PA), and Resources (R) Dimensions*

<b>Vignettes</b>	<b>CI</b>	<b>PA</b>	<b>R</b>
Kevin completed a 20 kilometer run to raise money for cancer awareness	.13	.23	-.04
Cody rescued a 7-year-old girl from a burning apartment building	.17	.13	-.06
Kieran spent his summer volunteering as a lifeguard at the public pool	.10	.20	-.09
Isaac volunteers to coach youth soccer teams	.10	.11	-.04

Table 7

*Factor Loadings for High Resources + High Cooperative Intent Vignettes on Cooperative Intent (CI), Physical Abilities (PA), and Resources (R) Dimensions*

<b>Vignettes</b>	<b>CI</b>	<b>PA</b>	<b>R</b>
Sam loaned his friend money to pay for tuition	.14	-.15	.12
Damon spent \$300 sponsoring his friends for Movember 2011	.11	-.14	.12
Jeremy bought his friend an iMac for his birthday	.01	-.17	.28
Taylor paid his friend's rent for two months	.13	-.16	.15

*Cooperative Intent* vignettes had slightly higher loadings on the resources dimension than the cooperative intent dimensions. One specific vignette (i.e., Sam loaned his friend money to pay for tuition) had the opposite patterns of loadings: Higher loadings on the cooperative intent dimension than the resources dimension.

## **2.5 Discussion**

### *2.5.1 What Does Generosity Signal?*

Previous researchers have used a costly signaling framework to understand *specific forms* of generosity. For instance, Smith and Bliege Bird (2000) argue that Meriam turtle hunting is a form of generosity that publicly displays one's physical abilities and cooperative intent. Strathern (1979), on the other hand, contends that New Guinean sharing ceremonies, which are referred to as 'mokas', are a credible signal of a tribe's resources and cooperative intent. Yet others, such as Fehrler and Przepiorka (2011), have reasoned that charitable giving are honest showings of trustworthiness or cooperative intent.

Although the assessment of *specific forms* of generosity can provide insight into why various individuals engage in specific forms of generosity, an equally relevant research question has been left unanswered: How many *different forms* of generosity exist, and how does each form of generosity differ from another? The answer to this question can aid researchers in understanding the specific situational triggers of different types of generosity, the individuals that are most likely to engage in different types of generosity, and the underlying motives that foster and promote seeming costly generous behaviours.

To my knowledge, this is the first study to attempt to answer this question by assessing *several forms* of generosity. Three-mode PARAFAC analysis was used to empirically determine the true constructs underlying various forms of generous behaviours. As such, this is the first study to provide empirical evidence that generosity can be broken down into more than one factor, specifically, three distinctly different forms: (a) generous acts that signal one's physical abilities and cooperative intent, (b) generous acts that signal an individual's access to resources and cooperative intent, and (c) generous acts that solely signal one's cooperative intent.

#### *2.5.1.1 Generosity as an Honest Signal of Physical Ability and Cooperative Intent*

Based on previous research, generosity was expected to be a costly signal of one's physical abilities as well as cooperative intent. Support for this hypothesis was obtained: The second factor clearly tapped the quality of physical abilities. Additionally, *High Physical Abilities + High Cooperative Intent* vignettes loaded highly and positively on the physical abilities and cooperative intent dimensions, and neutrally on the resources dimensions.

These results are consistent with findings from other studies. Smith and Bliege Bird (2000) found evidence of turtle hunting as a form of gift giving that signals the physical agility and strength of hunters. Findings from Hawkes (1991), and Hawkes and Bliege Bird (2002) show big game hunters signalling athleticism and having more mates and high reproductive fitness. Furthermore, Kelly and Dunbar (2001) found that females gave higher attractiveness ratings to males who were required to take risks to help others as

part of their jobs (e.g., firemen), as compared to males who take voluntary risks (e.g., volunteer lifeboat crew member).

Lyle, Smith, and Sullivan (2009) take this notion further by arguing that blood donations may be a generous costly signal of one's physical abilities and/or health. Lyle and colleagues found that compared to non-donors, donors perceived lower risks and costs associated with donating blood (e.g., anxiety, fear of potential negative side-effects), and were perceived by others as more generous and healthy. In the current study, however, blood donation was not found to be a signal of physical abilities: The vignette "*Greg went to the clinic to donate blood*" loaded neutrally on the physical abilities and resources dimension, but highly and positively on the cooperative intent dimension. It is possible that participants perceived physical fitness and health as qualities that are not perfectly correlated: One may not necessarily need to be extremely physically fit and muscular to be healthy. In fact, Lyle and colleagues (2009) found that participants strongly believed that donors must be disease-free, but were uncertain as to whether or not donors needed to be physically fit. Thus, because the current study was primarily focused on assessing generosity as a costly signal of physical abilities (physical fitness/strength) as opposed to health, it is possible that blood donors are still perceived as healthy individuals, but they may not necessarily be perceived as physically fit.

Overall, there seems to be evidence that generosity is a costly signal of one's physical abilities. Previous research, as well as findings from the current study, provides empirical support for physical abilities as an underlying quality signalled via generous behaviours.

### *2.5.1.2 Generosity as a Public Display of Resources and Cooperative Intent*

As expected, support for the notion of individuals using generosity to advertise one's resources and cooperative intent was found. Specifically, the third factor reflected one's access to resources, and *High Resources + High Cooperative Intent* vignettes loaded positively and highly on the resources and cooperative intent dimensions.

These findings are consistent with previous literature. For instance, the Kwakiutl of Vancouver Island engage in potlatches, which are elaborate and costly feasts where chiefs of tribes either give away or destroy material goods. Additionally, New Guinean tribes exchange pigs with neighbouring tribes as a means to signal a tribe's pride, wealth, and strength (Brown, 1978).

Collectively, the findings from the current study are consistent with previous literature: Generosity can be used to broadcast one's access to resources, as well as signal one's cooperative intent or willingness to help others.

### *2.5.1.3 Generosity as a Signal of Cooperative Intent*

Generosity was also expected to be a costly signal of one's cooperative intent, and/or willingness to help others. Findings from the current study supported this hypothesis: The first factor appeared to reflect one's cooperative intent. Also, *High Cooperative Intent* vignettes loaded positively and highly on the cooperative intent dimension, and neutrally on the resources and physical abilities dimensions. A limited number of empirical studies have tested the notion of generosity as a signal of cooperative intent. Two lines of

evidence, however, provide support for the notion of generosity as a signal of cooperative intent.

First, in order for the cost of generosity to be worthwhile, signallers should benefit from engaging in generous behaviours. Research has shown that signallers gain a beneficial reputation from acting generously. For example, observers are more trusting of individuals who have acted generously in the past (e.g., Barclay, 2004; Fehrler & Przepiorka, 2011). Additionally, Hardy and Van Vugt (2006) and Willer (2009) showed that those who were more generous in a public goods game were considered to be more respectable and associated with high social status. Barclay and Willer (2007), as well as others (e.g., Hardy & Van Vugt, 2006), also showed that generous individuals were preferred as interaction partners in comparison to less generous individuals.

For generosity to be a costly signal of cooperative intent, a second premise should be fulfilled: Observers should be able to use signals as reliable indicators of desirable underlying traits to evaluate signallers. Kurzban and Houser (2005) showed that acting generously in one situation reliably predicts an individual's likelihood of engaging in future generous behaviours. Thus, observers may be able to use information about an individual's past cooperative behaviours to predict future cooperation, and with such information, observers can then evaluate signallers as allies or mates.

Therefore, collectively, previous research suggests that in addition to displaying physical abilities and resources, public generosity could signal one's cooperative intent.

Furthermore, findings from the current study provide empirical evidence for generosity signalling an individual's cooperative intent.

### 2.5.2 Summary: Strengths, Limitations, and Future Research Directions

In summation, the current study provides the first line of evidence that generosity signals *at least* three underlying qualities: One's physical abilities, resources, and/or cooperative intent. PARAFAC was used to analyze and determine these results. Two main issues with conventional two-mode factor analysis have been combated with the use of PARAFAC. Specifically, a notable strength of PARAFAC is that extrinsic subjective rotational strategies are neither necessary nor applicable because information from the third mode determines the best-fitting axes. Additionally, the issue of determining the correct number of factors, which is usually problematic with other factor analyses, has not been a challenge with the current study: PARAFAC would not converge on a fourth factor, and the amount of variance explained by the three-factor solution (49.89%) was substantially larger than the variance explained by two-factor (39.48%) and one-factor solution (26.15%; refer to Figure 1).

Another asset of the current research was the use of multiple vignettes of the same type to ensure results were generalizable and not a product of idiosyncratic factors of individuals described in single vignettes. Despite this strength, however, the use of vignettes presents a noticeable limitation: Although vignettes enable researchers to tightly control for the presence or absence of variables of interest, vignettes are *hypothetical* scenarios. Given the hypothetical nature of this methodology, it is possible that participant responses are

also based on hypothetical decisions. The use of real-life examples of individuals engaging in different forms of generous and non-generous acts could have altered and perhaps strengthened the results presented above.

### **3. QUESTION 2: HOW ATTRACTIVE ARE DIFFERENT TYPES OF GENEROSITY?**

#### **3.1 Introduction**

As mentioned, I used the first investigation as an opportunity to conduct an exploratory pilot for a secondary research question of interest: How attractive are different types of generosity? Given that individuals can use generosity to signal resources, physical abilities, and cooperative intent, observers can use honest signals to make decisions on whom to avoid (competitor) and whom to associate with (allies and mates). I am interested in female observers' evaluations of a signaller's use of generosity to signal resources, ability, and/or cooperative intent as a potential mate. The following sections will address this interest.

##### *3.1.1 Is Generosity Attractive?*

Given that generosity can be used to signal several underlying qualities, do females and males find generous individuals attractive? Across thirty-seven countries worldwide, females and males rated kindness, which is signalled through generosity, as the most desired trait in a romantic partner (Buss et al., 1990). Other studies have confirmed this finding. For example, as mentioned earlier, individuals perceive generous individuals to possess attractive traits such as trustworthiness, agreeableness, and high social status

(Barclay, 2004; Hardy & Van Vugt, 2006). Furthermore, Barclay (2010) tested the idea that altruistic individuals are more attractive as romantic partners than neutral individuals (i.e., individuals who do not engage in altruistic acts). There were two main findings: (1) altruistic individuals were rated as more desirable long-term romantic partners than neutral individuals, and (2) for a single date, females showed higher preferences for altruistic individuals, whereas males showed no preference (Barclay, 2010). Hence, generosity appears to be highly desirable for both sexes, however, Barclay (2010) showed females and males seem to place more importance on different traits in romantic partners.

### *3.1.2 Sex Differences in Mate Preferences*

Although both sexes value kindness (Buss et al., 1990), males and females place emphasis on different traits in romantic partners, and have different mate choice decisions. In comparison to males, females have a much more complex decision-making process for mate choice (reviewed in Grammar, 1989). Females are not only more discriminatory, they are also more demanding, and often consider numerous different traits when choosing a mate (reviewed in Grammar, 1989). For instance, females place more importance on indicators of wealth, status, and commitment (Kenrick & Keefe, 1992; Greenlees & McGrew, 1994; Waynforth & Dunbar, 1995). Analyses of lonely heart advertisements, which refer to personal dating advertisements in newspapers, have revealed that females also emphasize a male's social skills and level of attractiveness when choosing a mate (Kenrick & Keefe, 1992). Additional studies have found that females prefer males who obtained a similar or higher level of education than themselves (Bereczkei & Dunbar, 1997). Furthermore, females prefer males who are relatively older,

as opposed to younger or males of similar age, than them, presumably because qualities such as wealth and status are usually positively correlated with age (Kenrick & Keefe, 1992; Greenlees & McCrew, 1994; Waynforth & Dunbar, 1995).

Males have different preferences for traits than females do, and thus have different patterns for choosing mates. Research has shown that in comparison to females, males are more concerned with indicators of fertility when choosing a mate. For instance, youthful features, attractiveness, and an optimal waist-to-hip ratio all reliably indicate fertility, and thus, males pay more attention to such cues (Buss & Barnes, 1986). Given that fertility can be indicated by youthfulness, it is not surprising that males prefer females that are relatively younger than themselves (Kenrick & Keefe, 1992; Greenlees & McCrew, 1994; Waynforth & Dunbar, 1995). Males, in comparison to females, are also less concerned with commitment (Pawlowski & Dunbar, 1999; 2001). Moreover, males are less choosy when searching for mates: In comparison to women, men included significantly fewer traits in their 'demand' section of lonely heart advertisements (Pawlowski & Dunbar, 1999; 2001).

Given these differences in preferences for traits, do females signal male preferred traits, such as attractiveness, when searching for a mate? And do males signal female preferred traits, such as wealth, status, and commitment, when searching for a mate? Studies using lonely heart advertisements seem to suggest that this is the case. For instance, amongst several traits, females regularly 'advertise' themselves to be highly attractive individuals who are not particularly concerned with commitment (Pawlowski & Dunbar, 1999;

2001). In comparison to females, males offer higher levels of resources and commitment, and similar levels of attractiveness when searching for a mate (Pawlowski & Dunbar, 1999; 2001).

Thus, not only do females and males have different preferences, each sex also appears to be aware of the other's preferences for certain traits. But why do these differences exist at all? Why might males and females place more emphasis on differential traits when searching for a mate? In the upcoming section, this question will be addressed using parental investment theory (Trivers, 1972) and sexual selection theory (as cited by Dawkins, 1976).

### *3.1.3 Parental Investment and Sexual Selection*

Darwin's sexual selection theory (1871, as cited by Dawkins, 1976) purports that natural selection will not only opt for the propagation of traits that increase an individual's likelihood to survive, but also the proliferation of traits that increases an individual's likelihood to reproduce. A gene can ensure propagation through reproduction if the possessor of the gene (i.e., the individual) is successful at one of two sexual competitions: (1) Intrasexual competition, whereby the individual is able to out-compete other same-sex individuals over access to opposite-sex mates, and/or (2) intersexual competition, whereby the individual is able to attract high quality opposite-sex mates by possessing desirable and attractive qualities and/or traits. Individuals possessing traits that foster a sexual competitive advantage will gain higher reproductive benefits than individuals lacking such traits.

There are several traits and qualities that enable individuals to out-compete same-sex rivals, and/or better able individuals to be perceived as attractive by opposite-sex mates. As mentioned in the previous section, such traits and qualities, however, are not the same for males and females. Why might this be? Parental investment theory proposes an answer to this question: Sexually selected traits, which enable an individual to gain a reproductive advantage over others, may differ for males and females because of a fundamental asymmetry in minimal parental investment (Trivers, 1972). Parental investment refers to any action or behaviour, which parents engage in, that increases the reproductive success of offspring while reducing the parents' ability to invest time, energy, and/or resources elsewhere. Females bear a greater minimal parental investment for each offspring than males. At minimum, a male's contribution to reproducing a single offspring includes a mere ejaculation. For females, however, reproducing a single offspring entails much more: After a nine month period of gestation, which occurs within the female, a female may spend up to 4 years lactating and nursing the infant (e.g., many women in tribal societies nurse their infants for up to 4 years; Shostak, 1981).

The different minimal parental investment of the sexes can explain two main differences in males and females: (1) The different reproductive constraints on each sex, and (2) the underlying rationale behind the well-known evolutionary-based notions of 'choosy females' and 'competitive males' (Trivers, 1972).

### *3.1.3.1 When it comes to mate selection, why are females choosier than males?*

Because females bear the cost of gestation and lactation, which can take up to several years after the birth of the child, an investment in a single offspring constrains any sort of investment in producing another child. Additionally, because females are born with all the gametes they have for a lifetime and have a limited number of reproductive years (a female cannot reproduce after menopause), females are limited in the number of children they can produce. Consequently, given optimal environmental conditions, females, on average, will only be able to produce twelve offspring within her child-bearing years (Buss & Schmitt, 1993). With such a reproductive constraint on the number of children a female can bear, a female ought to be choosy about who to mate with in order to maximize her, as well as her offspring's, reproductive success and survival (i.e., a female is concerned with finding a mate who will help her reproduce as many healthy offspring as possible that will be able to survive to have offspring themselves). And thus, a female should have preferences for males who possess traits that could increase her reproductive fitness.

As noted earlier, women appear to be concerned with three main traits in a potential mate: Resources, attractiveness, and commitment. A female might prefer a male with access to resources and a willingness to share such resources (Buss & Schmitt, 1993; Buss et al., 1990; Greenlees & McGrew, 1994) presumably because a man's resources can directly be converted to a greater survival of offspring, and/or an enhanced rate of reproduction (i.e., resources could also be expended on the provisioning of any additional children from such a reproductive union). Females also show preferences for attractive

males (Kenrick & Keefe, 1992). Attractiveness is highly associated with symmetry (Gangestad, Thornhill, & Yeo, 1994) and is likely to be an indicator of quality: Apart from attractiveness, symmetry has been highly correlated with an upbringing of low developmental perturbations and low stress (reviewed in Leung & Forbes, 1996), intelligence (Furlow, Armijo-Prewitt, Gangestad, & Thornhill, 1997), health (Milne, Belsky, Poulton, Thomson, Caspi, & Kieser, 2003), and resistance to disease (Thornhill & Gangestad, 1993). Thus, for a female, gaining an attractive and high quality male as a mate would be a fitness benefit because her offspring would possess the ‘good genes’ of this male. Women are also primarily concerned with a man’s willingness to commit to her: Commitment is desirable for a woman because this, presumably, would indicate that a man is willing to invest any resources, time, and energy, only in her and any potential offspring he should sire.

### *3.1.3.2 When it comes to finding mates, males compete for females*

In comparison to females, males do not experience the same limitations on lifetime reproductive success. In fact, it is quite a different playing field for males. Males have a much lower minimal investment for each offspring, and they continue to produce gametes throughout their entire lifespan. Thus, a male has a higher potential upper bound on reproduction, given he is able to gain access to numerous reproductive females. This leads to high variability in reproductive success for males: Males who possess the means to gain access to numerous reproductive females could sire hundreds of offspring (e.g., Moulay Ismail, the emperor of Morocco from 1672-1727, had a harem of hundreds of women and was able to sire a total of 888 children; Betzig, 1986), whereas males who are

unable to attract females could never gain the opportunity to reproduce. Given this high variability in reproductive success, males are more likely to engage in vigorous intrasexual competition to gain mating opportunities (Trivers, 1972). Therefore, instead of being choosy when picking a mate, males benefit more from being less discriminatory than females (at least in a short-term mating context, see Kenrick et al., 1992) and are better off gaining access to as many females as possible (presumably by out-competing other males) because having multiple mating partners is the key to increasing a male's reproductive fitness (The Bateman Principle; Bateman, 1948).<sup>2</sup>

In the previous section, I noted that relative to females, males are more concerned with cues of fertility, such as attractiveness and youthfulness, when looking for a mate (e.g., Pawlowski & Dunbar, 1999; 2001). Males are also less concerned with commitment (e.g., Pawlowski & Dunbar, 1999; 2001). Such preferences can be explained through sexual selection theory (as cited by Dawkins, 1976) and parental investment theory (Trivers, 1972): In order to maximize reproductive fitness, males need to gain mating opportunities with as many reproductive females as possible, and thus, males would prefer females with a higher reproductive value (i.e., females with more indicators of fertility such as youth and attractiveness, which is also associated with health; Shackelford & Larsen, 1999 ) because such reproductive females would be able to bear children; males would also be less concerned with commitment than females because

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<sup>2</sup> Please note that the ideas in this section are generalizations, and for every generalization, there are many exceptions: Males often engage in parental care, primarily in the form of provisioning and protecting. The above argument merely suggests that on average, males and females are likely to have differential mating strategies due to dissimilar levels of minimal parental investment.

committing to a female could potentially take time, energy, and resources away from gaining additional mating opportunities with other females.

Hence, parental investment theory (Trivers, 1972) and sexual selection theory (as cited by Dawkins, 1976) can help explain the prominent sex differences in preferences for traits in mates. The following section will address short-term and long-term mating strategies.

### *3.1.4 Short-Term and Long-Term Mating Strategies*

As explained in the previous section, the asymmetry in minimal parental investment between the sexes has affected female and male mating psychologies. Because I am solely interested in female mate preferences, the following section will discuss when females might be willing to take on a long-term partner or a short-term partner and under what circumstances.

#### *3.1.4.1 Female mate preferences in long-term and short-term mating contexts*

In comparison to males, there are much higher costs for females to engage in short-term partnerships. Females also risk obtaining a sexually transmitted disease, and a gaining a promiscuous reputation (Buss & Schmitt, 1993). The latter of these two, however, is more likely and costly for a female than a male because such a reputation would more harmfully affect her long-term mate value: Males can never be fully certain of the paternity of a child, and thus, males are more likely than females to be concerned with a mate's sexual history to provide males with insights to potential problems with paternity uncertainty (Buss & Schmitt, 1993). Engaging in several short-term partnerships also put

women at risk of potentially encountering physical and/or sexual abuse by males. Such abuse may occur because males are generally larger and physically stronger than females, and sometimes use this physical advantage to control the reproduction of females (Daly & Wilson, 1988).

Despite these costs, females may also benefit from short-term relationships. For instance, females may be able to use short-term partnerships to reliably assess a male's value as a long-term mate (Buss & Schmitt, 1993). Females may also gain protection from short-term mates (Buss & Schmitt, 1993). But perhaps a key benefit of short-term mating is that females may be able to gain access to higher quality mates with better genes to be passed on to offspring; this idea is a part of the good gene sexual selection theory and several studies have provided evidence for this theory (e.g., DeBruine, Jones, Crawford, Welling, & Little, 2010; Gangestad, Garver-Apgar, Simpson, & Cousins, 2004; Roberts & Little, 2008).

The good genes sexual selection theory suggests that females will prefer males with qualities that would be indirectly beneficial to the female (i.e., a male with qualities that would benefit her offspring, but not necessary the female directly) as short-term mates (Gangestad et al., 2004). Such preferences would arise because in a short-term mating context females would be unable to reap certain benefits: Because of the short nature of the relationship, it is unlikely that a woman will gain access to a male's resources, or expect a man to commit to her. Given the greater minimal parental investment of females, short-term relationships place females at a risk of being abandoned and

receiving no parental care from males if such a reproductive union should produce an offspring. As such, one would expect females to be particularly choosy in a short-term mating context. But what traits might females prefer in short-term mates?

In a short-term mating context, females are likely to be primarily concerned with attractiveness because attractiveness has been linked with health and good genes, and thus, mating with such a partner could contribute to the production high quality offspring (Gangestad et al., 1994). Whether or not a male has access to resources, and is willing to share such resources, might not be a major concern for females when looking for a short-term mate because, as mentioned earlier, it is unlikely that females will be able to use these resources to increase their reproductive fitness. Similarly, females should not be concerned with commitment because the nature of a short-lived relationship reduces the chances of using such a trait to maximize a female's reproductive fitness: Under other mating circumstances, females may desire a committable male because such commitment would presumably signal that the male's resources, time, and energy would solely be directed at his partner and any offspring they may have.

Female mate preferences change when searching for long-term mates (Gangestad & Simpson, 2000). Like males, because a long-term relationship would require enough investment to be removed from the mating pool, females are likely to be exceedingly discriminatory when looking for long-term partners. As such, in addition to indicators of good genes, females are likely to show preferences for resources and commitment because a mate who possesses such qualities would presumably be able to use these

qualities for provisioning and parental care; this, in turn, could contribute to the survival and reproduction of offspring, and thus, improve a female's reproductive success (see Buss & Schmitt, 1993; Schmitt, 2005).

### 3.2 Methods

Because this second question was done as an exploratory pilot, the current investigation involved simply adding two additional rating scales to the study in Question 1. The rating scale 'lustworthy' was used to capture short-term mate preferences and the rating scale 'marriageable' was used to assess long-term mate preferences. To analyze the data, two within-subjects two-way ANOVAs were used: (a) 2 (cooperative intent) X 2 (physical abilities), and (b) 2 (cooperative intent) X 2 (resources).

#### 3.2.1 Data Preparation

As mentioned, multiple vignettes of the same type were generated to ensure results were generalizable and not a product of idiosyncratic factors of individuals described in single vignettes. As such, before beginning analyses, lustworthy ratings for vignettes of the same type were averaged to generate new variables. Marriageable ratings for vignettes of the same type were also averaged. Altogether, six categories of vignettes had ratings for lustworthy and marriageable averaged: *Neutral*, *High Cooperative Intent*, *High Physical Abilities*, *High Physical Abilities + High Cooperative Intent*, *High Resources*, and *High Resources + High Cooperative Intent*.

### 3.3 Detailed Predictions

#### *3.3.1 Female Mate Preferences for Cooperative Intent and Physical Abilities*

In a short-term mating context, I expected three findings. First, I expected a main effect of physical abilities. As shown in Figure 2, females were expected to show higher preferences for vignettes that have a signal of physical abilities because this could indicate a male's good genes. A female stands the chance of conceiving a child in a short-term partnership but is unlikely to be able to use a male's resources, and/or cooperative intent to benefit her and her offspring. Given these circumstances, a female is better having a short-term partnership with a high quality male than a low quality male because a high quality mate could at least pass his good genes on to a potential offspring (Penton-Voak, Perrett, Castles, Burt, Koyabashi, & Murray, 1999). Second, I predicted a small main effect of cooperative intent because, as mentioned, a female stands a chance of getting pregnant in any partnership, but because of the short nature of the relationship, a female is unlikely to be able to use a male's resources and cooperative intent to her benefit and her offspring. Females, therefore, were expected to prefer mates who signalled cooperative intent because such an individual may be more willing to stay and help raise any offspring that result from a short-term partnership. Lastly, no interaction between physical abilities and cooperative intent was predicted (see Figure 2).

In a long-term mating context, I predicted a larger main effect of cooperative intent, a larger main effect of physical abilities, and no interaction between the two variables (see Figure 2). Females were expected to have higher preferences for cooperative intent and physical abilities in a long-term mating context because a long-term investment would

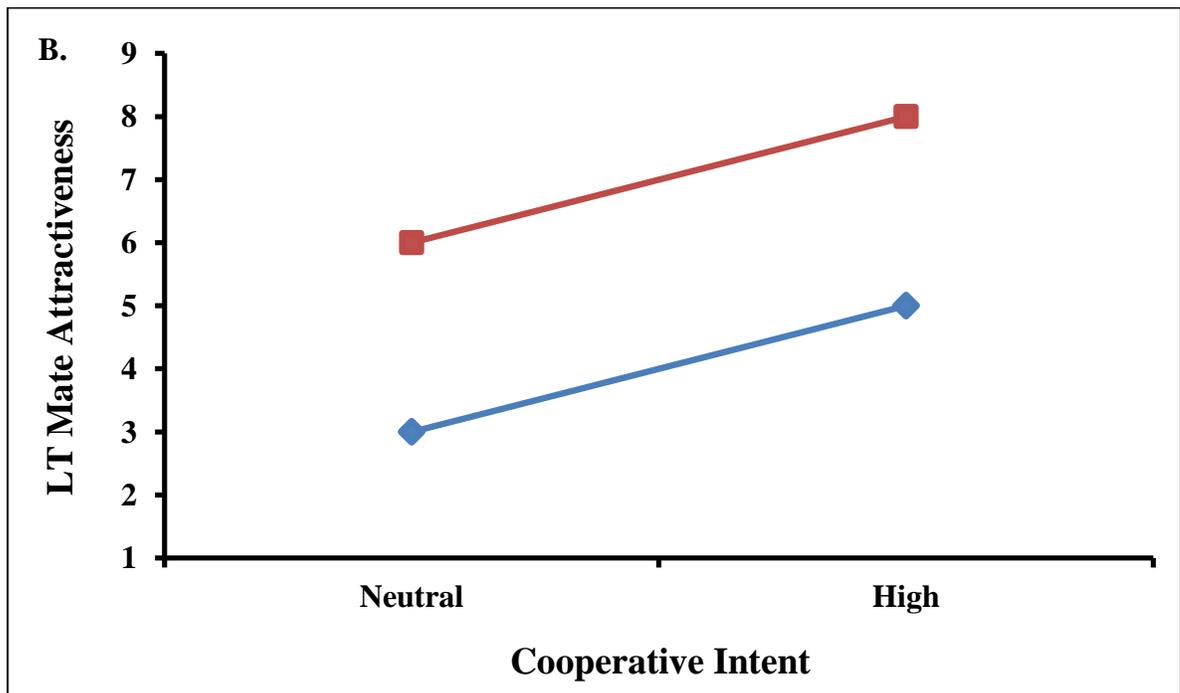
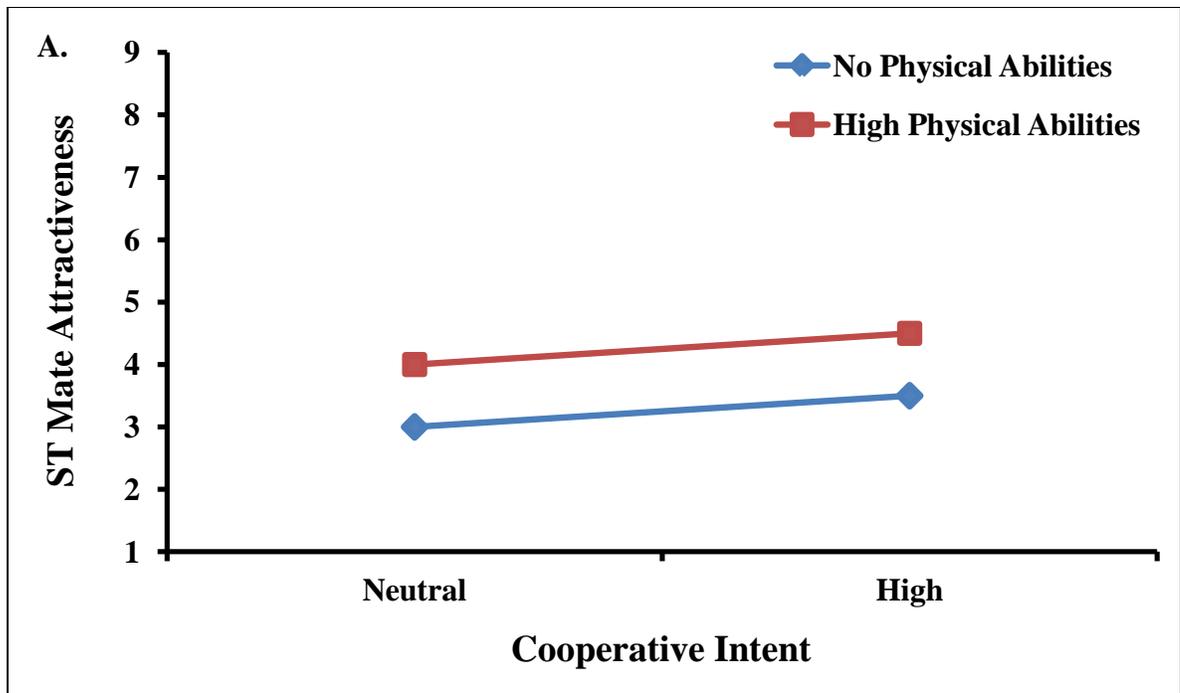


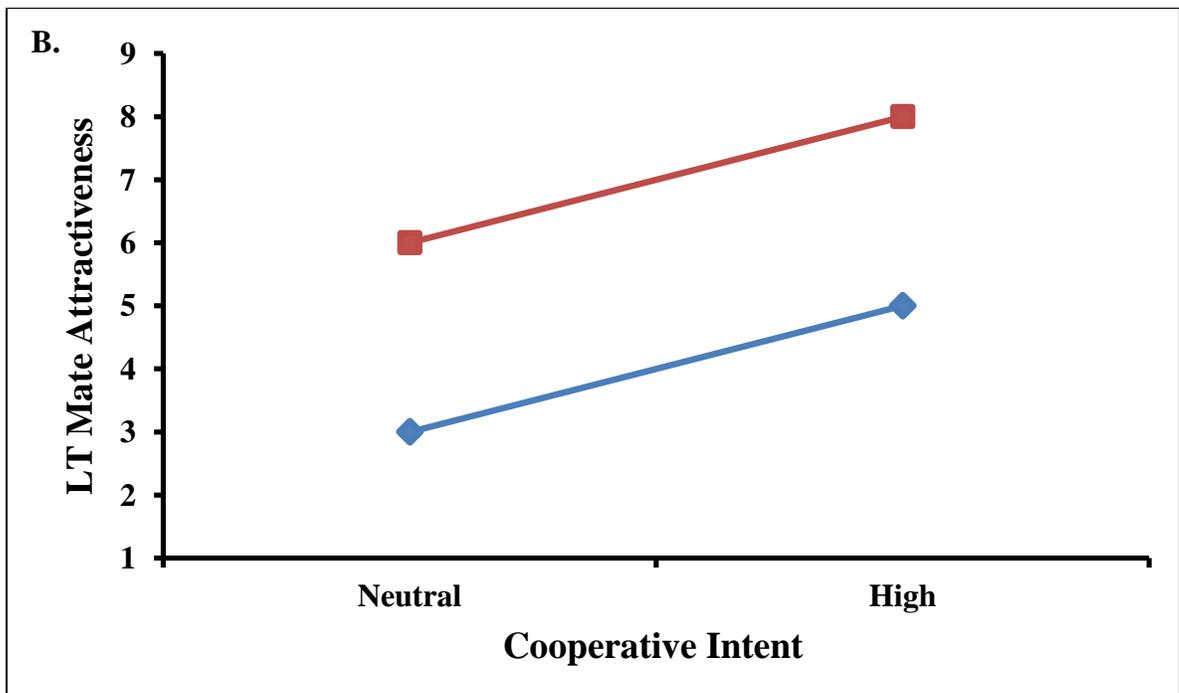
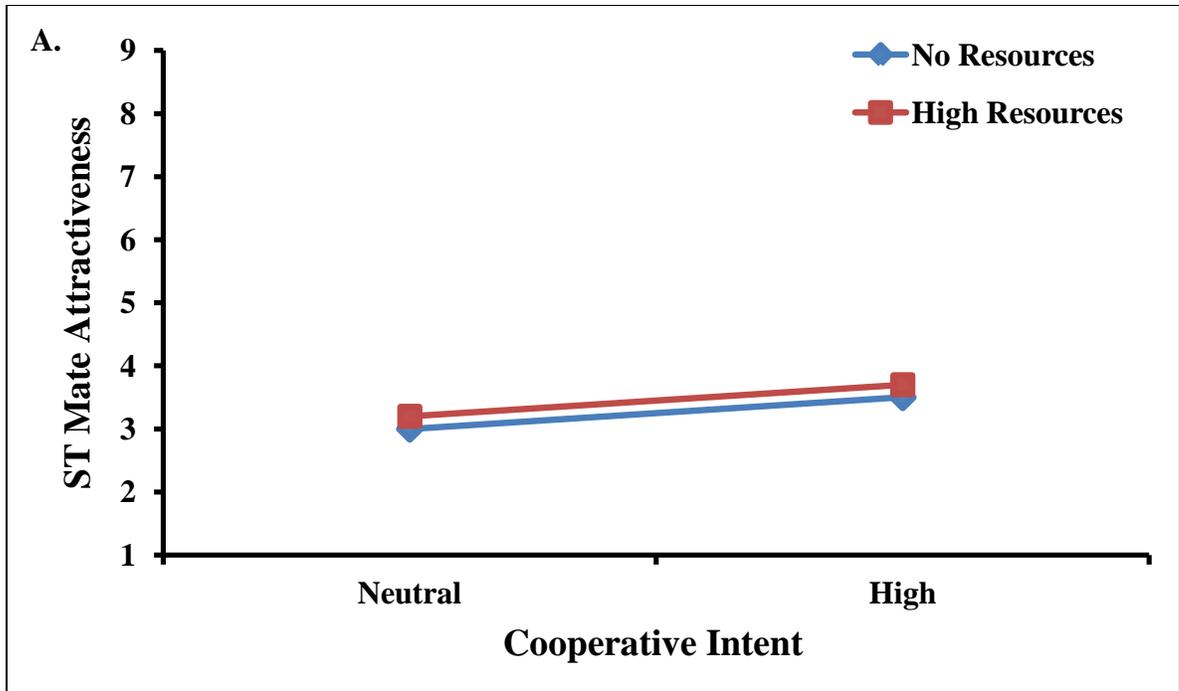
Figure 2. Predicted female preferences for cooperative intent and physical abilities in a short-term (A) and long-term (B) mating context.

ultimately remove a female, as well as male, from the mating pool. As such, cooperative intent is a desirable trait, especially in a long-term partner, because cooperative intent reliably indicates a mate's willingness to act cooperatively in raising potential offspring (Barclay, 2010; Buss & Schmitt, 1993). Partners with physical abilities were expected to be preferred to those without physical abilities because mating with a high quality individual could result in higher quality offspring (Penton-Voak et al., 1999).

### *3.3.2 Female Mate Preferences for Cooperative Intent and Resources*

In a short-term mating context, I predicted a small main effect of resources (see Figure 3): Females were expected to prefer a mate with access to resources because if a female were to get pregnant, a rich male may be more likely to use his resources to invest in the female and offspring. Additionally, I predicted a small main effect of cooperative intent because a cooperative male may be more likely to provide help in raising any potential offspring that may result from a reproductive union. No interaction between resources and cooperative intent was predicted (see Figure 3).

Figure 3 shows a main effect of cooperative intent was predicted in a long-term mating context. As mentioned, cooperative intent could indicate a mate's willingness to act cooperatively in rearing offspring, and thus, cooperative intent would be a desirable trait (Barclay, 2010; Buss & Schmitt, 1993). A main effect of resources was also predicted because a mate with resources could presumably use such resources for provisioning and parental care, which could contribute to the fitness of the offspring and thus,



*Figure 3.* Predicted female preferences for cooperative intent and resources in a short-term (A) and long-term (B) mating context.

improve the female's reproductive success (Buss & Schmitt, 1993; Schmitt, 2005; see Figure 3). No interaction was predicted.

### **3.4 Results**

#### *3.4.1 Female Mate Preferences for Cooperative Intent and Physical Abilities*

In a short-term and long-term mating context, three main effects were found (for significance tests, see Table 8.0, Table 8.1, and Figure 4). First, cooperative males were preferred over less cooperative males. Second, physically abled males were preferred over less physically abled men. And third, a significant interaction was found: Cooperative intent had a larger effect if there was no cue of physical abilities; and physical abilities had a larger effect if there was no cue of cooperative intent.

Taking a closer look at the results for a short-term mating context, males who were cooperative and physically abled were preferred over males who were only physically abled (Table 8.0; Figure 4A). Cooperative and physically abled males were also significantly preferred over cooperative-only males. No difference was found for cooperatives-only males and males who were only physically abled.

Further inspection of the results for a long-term mating context revealed participants had equal preferences for cooperative-only males and males who were both cooperative and physically abled (Table 8.0; Figure 4B). Cooperative-only males, as well as males who were both cooperative and physically abled, were significantly preferred over males who were only physically abled.

Table 8.0

*Two-Way Analysis of Variance of Female Mate Preferences for Cooperative Intent and Physical Abilities with Paired T-Test Multiple Comparisons*

	Short-Term Mating Context				Long-Term Mating Context			
	<i>df</i>	MS	F	$\eta_p^2$	<i>df</i>	MS	F	$\eta_p^2$
CI	1	134.84	124.99**	.42	1	69.29	76.3**	.31
PA	1	165.64	134.27**	.44	1	331.87	198.31**	.54
CI X PA	1	26.92	59.27**	.26	1	51.83	117.68**	.41
	<i>df</i>	MD	<i>t</i>	<i>d</i>	<i>df</i>	MD	<i>t</i>	<i>d</i>
N vs HCI	171	-1.38	-11.52**	-.70	171	-1.94	-14.91**	-1.06
N vs HPA	171	-1.28	-11.42**	-.66	171	-1.18	-11.23**	-.63
N vs HPA+HCI	171	-1.87	-12.85**	-.91	171	-2.02	-13.95**	-1.05
HCI vs HPA	171	.09	1.26	.05	171	.75	7.97**	.38
HCI vs HPA+HCI	171	-.49	-6.76**	-.22	171	-.09	-1.27	-.04
HPA vs HPA+HCI	171	-.59	-8.02**	2.67	171	-.84	-9.58**	.41

*Note.* \*\*  $p < .000$ . CI = Cooperative Intent; PA = Physical Abilities; N = Neutral; HCI = High Cooperative Intent; HPA = High Physical Abilities; HPA+HCI = High Physical Abilities + High Cooperative Intent; MS = Mean Square; MD = Mean Difference.

Table 8.1

*The Effect of Cooperative Intent and Physical Abilities in a Short-Term and Long-Term*

*Mating Context*

	Short-Term Mating Context					Long-Term Mating Context				
	<i>M</i>	<i>SD</i>	<i>df</i>	<i>MD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>df</i>	<i>MD</i>	<i>t</i>
HCI on:										
N	1.38	1.57	} 171	.79	7.7**	1.94	1.7	} 171	1.1	10.85**
HPA	.59	.96				.84	1.15			
HPA on:										
N	1.28	1.47	} 171	.79	7.7**	1.18	1.38	} 171	1.1	10.85**
HCI	.49	.95				.08	.89			

*Note.* \*\*  $p < .000$ . HCI = High Cooperative Intent; HPA = High Physical Abilities; N = Neutral; MD = Mean Difference.

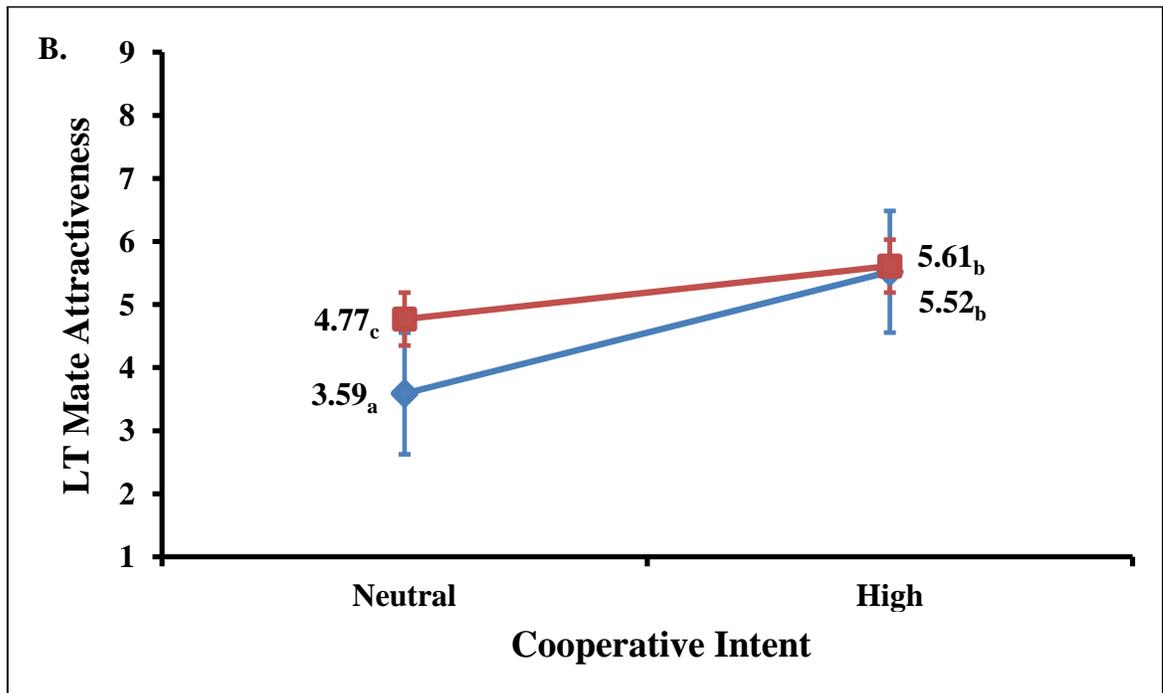
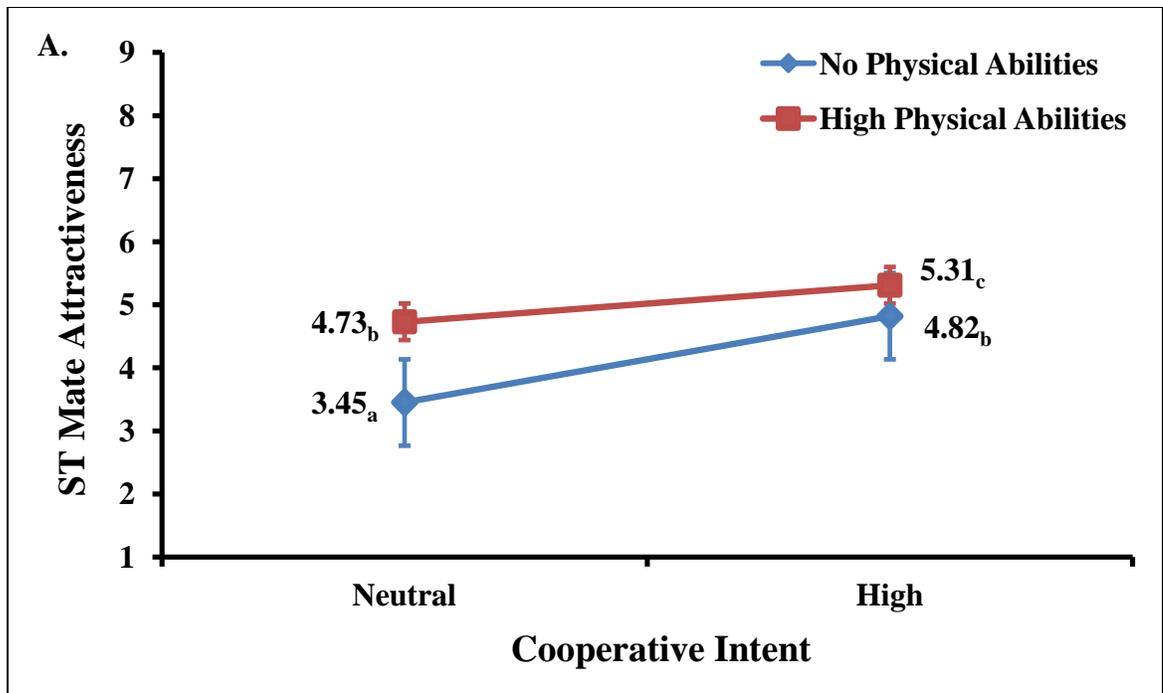


Figure 4. Female preferences for cooperative intent and physical abilities in a short-term (A) and long-term (B) mating context.

Note. Means with different subscripts are significantly different from each other.

### *3.4.2 Female Mate Preferences for Cooperative Intent and Resources*

In a short-term and long-term mating context, two main effects were found (for means and significance tests, see Table 9.0, Table 9.1, and Figure 5). First, rich males were preferred over less rich males. Second, a significant interaction was found: Cooperative intent had a larger effect if there was no cue of resources; and resources had a larger effect if there was no cue of cooperative intent.

Closer examination of the results revealed cooperative males were preferred over less cooperative males in a long-term mating context, but not in a short-term mating context (Table 9.0; Figure 5). Additionally, across the mating context two simple effects were found: (1) Cooperative-only males were preferred males who were both cooperative and rich, as well as males who were only rich; (2) males who were both cooperative and rich were preferred over males who were only rich.

Table 9.0

*Two-Way Analysis of Variance of Female Mate Preferences for Cooperative Intent and Resources with Paired T-Test Multiple Comparisons*

	Short-Term Mating Context				Long-Term Mating Context			
	<i>df</i>	MS	F	$\eta_p^2$	<i>df</i>	MS	F	$\eta_p^2$
CI	1	.32	.54	.00	1	14.88	21.77**	.11
R	1	168.85	101.13**	.37	1	353.75	184.45**	.52
CI X R	1	25.65	96.90**	.36	1	43.67	103.71**	.38
	<i>df</i>	MD	<i>t</i>	<i>d</i>	<i>df</i>	MD	<i>t</i>	<i>d</i>
N vs HCI	171	-1.38	-11.52**	-.70	171	-1.94	-14.91**	-1.06
N vs HR	171	-.43	-5.99**	-.24	171	-.210	-3.22*	-.12
N vs HR+HCI	171	-1.03	-10.11**	-.53	171	-1.14	-10.83**	-.60
HCI vs HR	171	.95	7.55**	.47	171	1.73	12.48**	.91
HCI vs HR+HCI	171	-.60	-6.68**	.16	171	.80	8.60**	.40
HR vs HR+HCI	171	.34	4.97**	-.30	171	-.93	-9.16**	-.48

*Note.* \*  $p < .00$ ; \*\*  $p < .000$ . CI = Cooperative Intent; PA = Physical Abilities; N = Neutral; HCI = High Cooperative Intent; HPA = High Physical Abilities; HPA+HCI = High Physical Abilities + High Cooperative Intent; MS = Mean Square; MD = Mean Difference.

Table 9.1

*The Effect of Cooperative Intent and Resources in a Short-Term and Long-Term Mating*

*Context*

	<b>Short-Term Mating Context</b>					<b>Long-Term Mating Context</b>				
	<i>M</i>	<i>SD</i>	<i>df</i>	<i>MD</i>	<i>t</i>	<i>M</i>	<i>SD</i>	<i>df</i>	<i>MD</i>	<i>t</i>
HCI on:										
N	1.38	1.57	} 171	.79	9.85**	1.94	1.7	} 171	1.01	10.18**
HR	.60	1.18				.93	1.33			
HR on:										
N	.43	.94	} 171	.77	9.85**	.21	.85	} 171	1.01	10.18**
HCI	-.34	.91				-.80	1.22			

*Note.* \*\*  $p < .000$ . HCI = High Cooperative Intent; HR = High Resources; N = Neutral;

MD = Mean Difference.

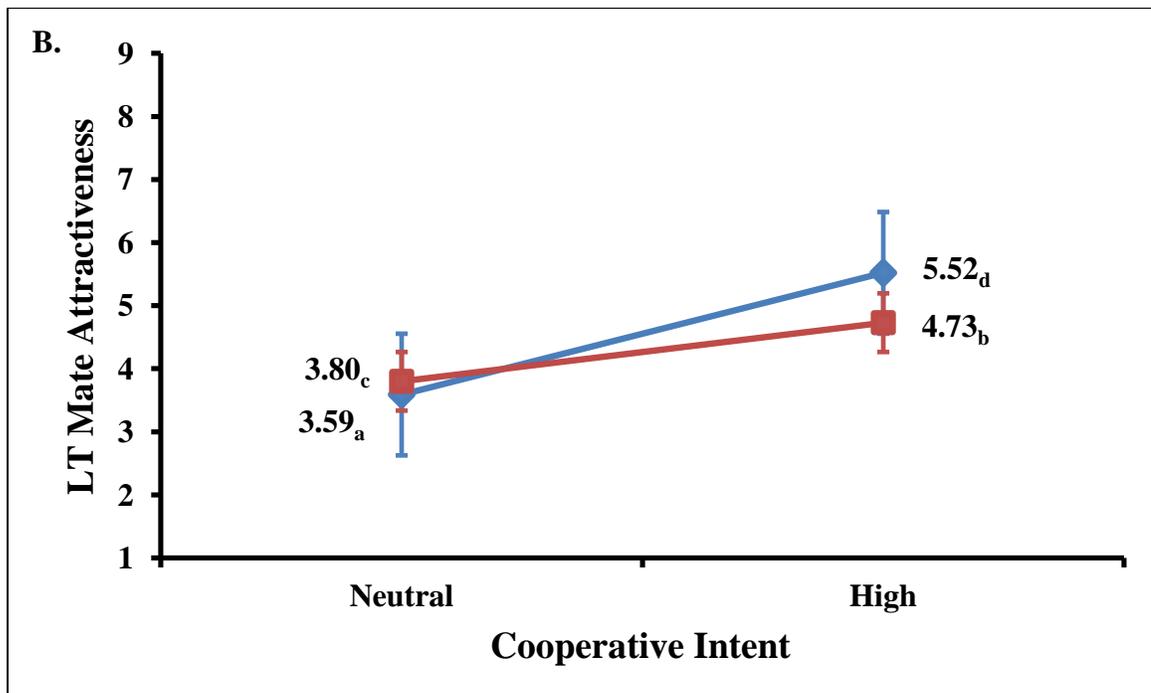
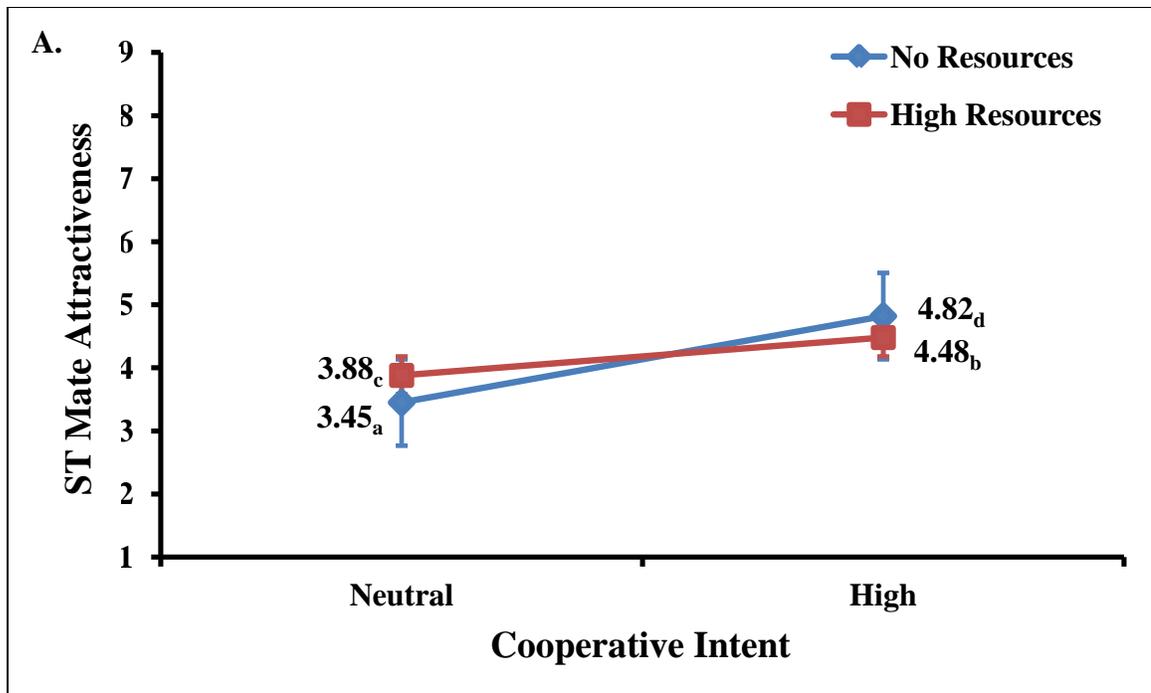


Figure 5. Female preferences for cooperative intent and resources in a short-term (A) and long-term (B) mating context.

Note. Means with different subscripts are significantly different from each other.

### 3.5 Discussion

#### 3.5.1 Female Mate Preferences for Cooperative Intent and Physical Abilities

Females were expected to have high preferences for physical abilities in a short-term mating context because one's physical abilities could signal quality (e.g., health), and thus, mating with such a partner could result in higher quality offspring (Gangestad et al., 1994). Contrary to predictions, however, men with high physical abilities were rated as equally attractive as a short-term mates as men who were cooperative. Additionally, compared to all groups, males who were both cooperative and physically abled were considered the most desirable as short-term mates.

In comparison to short-term preferences, females were expected to show significantly higher long-term preferences for *High Physical Abilities*, *High Cooperative Intent*, and *High Physical Abilities + High Cooperative Intent* vignettes. These findings were expected because females, as well as males, should be choosier when searching for long-term mates because such a relationship would ultimately remove them from the mating pool. As such, females should show high preferences for physical abilities because gaining a long-term mate with physical abilities could result in higher quality offspring (Penton-Voak et al., 1999). Additionally, cooperative intent is a desirable trait, especially in a long-term partner, because cooperative intent could reliably indicate a mate's willingness to act cooperatively in raising potential offspring (Barclay, 2010; Buss & Schmitt, 1993).

Unexpectedly, there were similar patterns across the mating context. Also, instead of females having the highest long-term preferences for males who were both cooperative and physically abled, females had equal long-term preferences for cooperative-only males and males who were both cooperative and physically abled. Furthermore, cooperative-only and males who were both cooperative and physically abled were more attractive as long-term mates than males who were only physically abled.

Notably, a significant interaction between cooperative intent and physical abilities was found for short-term and long-term ratings. Cooperative intent was found to have a larger effect on a male's desirability if no cue of physical abilities was present. These findings interestingly suggest that although the presence of cooperative intent increases the short-term attractiveness of a male, a male with lower physical abilities may be able to raise his short-term attractiveness to the level of a male with physical abilities by being kind. As such, these findings suggest that lower quality individuals may be able to compensate by behaving cooperatively.

### *3.5.2 Female Mate Preferences for Cooperative Intent and Resources*

In a short-term mating context, a female is unlikely to be able to use a male's resources to increase her reproductive fitness because of the ephemeral relationship. With that being said, however, females may show minor preferences for males with resources because if a female were to get pregnant, a rich male may be more likely than a less rich male to use his resources to invest in the female and offspring. On the other hand, females in search of a long-term mate should show much stronger preferences for cooperative intent and

resources: Males with resources could presumably use such resources for provisioning and parental care, which could contribute to the fitness of the offspring and improve the female's reproductive success (Buss & Schmitt, 1993; Schmitt, 2005); cooperative intent could indicate a mate's willingness to act cooperatively in rearing offspring (Barclay, 2010; Buss & Schmitt, 1993).

Contrary to predictions, there were similar patterns across the mating context. Interestingly, cooperative-only males were more attractive as short-term and long-term mates than cooperative-and-rich males. Also, cooperative-and-rich males were preferred over males who were only rich.

### *3.5.3 Methodological Constraints and Future Research Directions*

As mentioned, assessing female mate preferences for cooperative intent, physical abilities, and resources, was a secondary exploratory goal of the current research. Accordingly, the inconsistency of findings from this exploratory pilot with previous research could be due to several methodological factors. For example, it is possible that participants were not primed to think in terms of the mating context: Participants may not have understood the terms used to assess long-term and short-term preferences (i.e., “marriageable” versus “lustworthy”) and the task might have been too abstract. Previous studies that have assessed mate preferences based on the mating context have utilized different and more reliable methodologies: Participants are often given a longer and more in-depth vignette about opposite-sex individuals (e.g., Barclay, 2010), and received a paragraph describing how a short-term partnership differs from a long-term partnership

(e.g., Little, Cohen, Jones, & Belsky, 2007). Instead of explicitly defining long-term and short-term partnerships to participants, the terms “lustworthy” and “marriageable” were used to capture relationship type: The use of these terms made it convenient to add two additional rating scales for participants to rate different types of generosity.

Additionally, the use of extra methodological measures could have helped better assess female mate preferences. For instance, many studies have examined female short-term and long-term mate preferences in relation to the menstrual cycle (of women who do not use hormonal contraception) because female mate preferences have been found to differ depending on whether or not females are at the most fertile stage of their cycle (e.g., Gangestad et al., 2007; Jones, DeBruine, Perrett, Little, Feinberg, & Law Smith, 2008). Moreover, assessing for self-perceived attractiveness might have been useful: Research has shown that female preferences for masculinity, a trait which is usually associated with short-term mate preferences, can be influenced by self-rated attractiveness (e.g., Vukovic, Feinberg, Jones, DeBruine, Welling, Little, & Smith, 2008). Moreover, as with all studies, there is always the possibility that the results represent demand characteristics.

Thus, the exploratory pilot has several limitations that should be considered when interpreting the results. Future research that assesses female mate preferences for cooperative intent, physical abilities, and resources should explicitly define long-term and short-term partnerships to participants. Supplementary methodological measures, such as where females are in their menstrual cycle, and self-perceived attractiveness, may also be advantageous and helpful in determining female mate preferences.

## **4. GENERAL DISCUSSION**

The aim of the current research was twofold: (1) assess the underlying qualities that may be signalled via generosity and (2) explore female short-term and long-term mate preferences for generous acts that may signal different qualities. As expected, generosity was found to signal three qualities: An individual's physical abilities, access to resources, and/or cooperative intent. Contrary to predictions, however, there was no difference between short-term and long-term mate preferences for different types of generosity.

### **4.1 Applications and New Domains**

This study did not include vignettes of individuals engaging in pro-environmental, or 'green', behaviours because generous behaviours were of prime interest. Griskevicius, Van den Bergh, and Tybur (2010), however, argue that the purchasing of pro-environmental, or 'green', products may be viewed as generous or altruistic, because such products are generally more expensive, yet are of lower quality than other similarly-priced products. Griskevicius and colleagues present compelling evidence for this: people were more willing to purchase green products, as opposed to similarly-priced non-green products, when primed with status motives. If green behaviours can, indeed, be construed as generosity, then identifying the different forms of green behaviours may be a crucial step in understanding the motivations behind engaging in pro-environmental behaviour and the situational triggers that may promote environmentalism. As such, future studies should investigate if the constructs underlying generosity are similar to those underlying environmental acts.

Similarly, other forms of activist behaviours could be construed as generosity. For instance, individuals involved in animal rights, human rights, women's right, and political protests. Although all these behaviours appear to be different, a fundamental element may underlie these acts: Individuals engaging in such activism are willing to incur a personal cost (i.e., time, energy, and effort put in to standing up and protesting for what they believe in) to benefit others (i.e., other animals for animal activists; other humans for other human rights activists, etc.). As such, examining various activist acts by focusing on the commonalities of these behaviours could provide supplementary insight to the understanding of prosocial behaviours.

Furthermore, studying the past experiences of individuals who regularly engage in generous behaviours could help increase our understanding of personal motivations to be generous. For example, some researchers have disputed the idea that generosity originates from positive life experiences, and have, instead, proposed the notion of "altruism born of suffering": Individuals who have encountered traumatic experiences or adversity in their lives may be more motivated help others avoid such situations or better deal with adversity (reviewed in Vollhardt, 2009). Supplementary research of this notion could allow researchers to investigate if there may be different motivations behind individuals engaging in "one-shot" generous acts (e.g., rescuing an individual from danger) and those who frequently engaging in generosity (e.g., regular volunteers of local charities, regular donors to religious institutions). Additionally, such research could also provide information on whether or not certain personality traits predict a general engagement in generous behaviours.

## 5. CONCLUSION

Much of the previous research on generosity has focused on investigating the psychological and emotional mechanisms that may cause generous behaviours (e.g., warm-glow, Andreoni, 1995; and empathy, Batson et al., 1997). In order to gain a well-rounded understanding of a specific type of behaviour, however, proximate *and* ultimate questions must be asked: Mechanism, ontogeny, phylogeny, and function need to be assessed (Tinbergen, 1963). The current research focused on the equally important and relevant question of the function of generous behaviours.

The primary goal of this study was to investigate the underlying qualities that may be signalled via generous behaviours. Generosity was found to signal three fundamentally different qualities: physical abilities, resources, and cooperative intent. Findings from this study can help researchers understand the benefits of acting generously and the incentives for helping others. With this knowledge, researchers can attempt to promote prosocial behaviours by fostering situations in which individuals are likely to act cooperatively and generously.

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## 7. APPENDICES

### 7.1 Appendix A

#### *One-Factor Solution in the Adjective Mode*

FACTOR 1	
<b>Helpful (CI)</b>	<b>.34</b>
<b>Generous (CI)</b>	<b>.34</b>
<b>Giving (CI)</b>	<b>.33</b>
<b>Kind (CI)</b>	<b>.33</b>
<b>Charitable (CI)</b>	<b>.32</b>
<b>Unselfish (CI)</b>	<b>.32</b>
<b>Trustworthy (M)</b>	<b>.27</b>
<b>Good Genes (M)</b>	<b>.23</b>
<b>Knowledgeable (M)</b>	<b>.21</b>
<b>Intelligent (M)</b>	<b>.20</b>
<i>Skilful (M)</i>	<i>.17</i>
<i>Masculine (M)</i>	<i>.16</i>
<i>Muscular (PA)</i>	<i>.13</i>
<i>Physically Fit (PA)</i>	<i>.12</i>
<i>Able-bodied (PA)</i>	<i>.12</i>
<i>Strong (PA)</i>	<i>.11</i>
<i>Athletic (PA)</i>	<i>.09</i>
<i>Sporty (PA)</i>	<i>.08</i>
<i>High-status (R)</i>	<i>.02</i>
<i>Prosperous (R)</i>	<i>.00</i>
<i>Privileged (R)</i>	<i>-.04</i>
<i>Well-off (R)</i>	<i>-.05</i>
<i>Wealthy (R)</i>	<i>-.08</i>
<i>Rich (R)</i>	<i>-.09</i>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. CI = cooperative intent; PA = physical abilities; R = resources; M = miscellaneous.

## 7.2 Appendix B

### One-Factor Solution in the Vignette Mode

FACTOR 1	
<b>Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</b>	<b>.24</b>
<b>Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</b>	<b>.22</b>
<i>Jack spent the summer volunteering in Ghana (O)</i>	.19
<i>Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</i>	.18
<i>Gabriel performed CPR on a 50-year-old man (O)</i>	.18
<i>Carl spends his free time volunteering for the disability centre (HCI)</i>	.17
<i>Grant carried an old lady's groceries to her car (HCI)</i>	.17
<i>Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	.16
<i>Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	.15
<i>Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	.14
<i>Robert sometimes puts on free music shows at the children's hospital (O)</i>	.14
<i>Ken volunteers as a Math tutor (O)</i>	.13
<i>Greg went to the clinic to donate blood (O)</i>	.13
<i>Todd fixed his neighbour's sink (O)</i>	.12
<i>Chad filed his friend's taxes (O)</i>	.12
<i>Taylor paid his friend's rent for two months (HR+HCI)</i>	.11
<i>Sam loaned his friend money to pay for bills (HR+HCI)</i>	.11
<i>Fred trained his friend's new puppy (O)</i>	.09
<i>Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	.08
<i>Paul was chosen to be on the Canadian Olympic skiing team (HPA)</i>	.08
<i>Alex provided the tourist with directions to the Museum (O)</i>	.07
<i>Last summer, George completed the Guelph Lake Triathlon (HPA)</i>	.05
<i>Lee biked from Guelph to Mississauga (HPA)</i>	.05
<i>Mark plays basketball for the University Varsity team (HPA)</i>	.05
<i>Jeremy bought his friend an iMac for his birthday (HR+HCI)</i>	.03
<i>Doug enjoys outdoor rock climbing (HPA)</i>	.01
<i>David plays polo every weekend (HR+HPA)</i>	-.00
<i>Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</i>	-.01
<i>Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	-.03
<i>Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	-.05
<i>Jason had to get a second job so that he could pay for bills (LR)</i>	-.06
<i>Bruce enjoys playing board games with his friends (N)</i>	-.07
<i>Dale pawned his guitar so that he could pay for rent (LR)</i>	-.08
<i>Scott had to sell his second-hand car because he could not afford his insurance (LR)</i>	-.09
<i>Matt went to the food bank because he could not afford groceries (LR)</i>	-.10
<i>Hank just inherited 5 million dollars from his grandfather (HR)</i>	-.11
<i>Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	-.11
<i>Justin dropped out of the intramural football team because he could not keep up with the rest of the players (LPA)</i>	-.12
<i>Daniel flew to New York to attend the Kings of Leon concert (HR)</i>	-.12
<i>Edward likes watching horror movies (N)</i>	-.13
<i>Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	-.13
<i>Eric enjoys going for long drives in his new Mercedes Benz (HR)</i>	-.13
<i>Andrew bought himself an Xbox 360 (HR)</i>	-.14
<i>In his spare time, Allan enjoys playing video games (N)</i>	-.14
<i>Benjamin could not complete the 1 kilometer run (LPA)</i>	-.15
<i>Tony bought \$300 designer jeans (HR)</i>	-.19
<b>Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</b>	<b>-.21</b>
<b>Chris drove by his roommate walking home in the rain (LCI)</b>	<b>-.22</b>
<b>Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</b>	<b>-.22</b>
<b>Jimmy beat up a 15 year old kid (LCI)</b>	<b>-.28</b>
<b>Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</b>	<b>-.28</b>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. N = Neut.; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.

### 7.3 Appendix C

#### *Two-Factor Solution in the Adjective Mode*

FACTOR 1		FACTOR 2	
<b>Helpful (CI)</b>	<b>.35</b>	<b>Physically Fit (PA)</b>	<b>.39</b>
<b>Generous (CI)</b>	<b>.34</b>	<b>Athletic (PA)</b>	<b>.39</b>
<b>Giving (CI)</b>	<b>.34</b>	<b>Sporty (PA)</b>	<b>.39</b>
<b>Kind (CI)</b>	<b>.34</b>	<b>Strong (PA)</b>	<b>.37</b>
<b>Unselfish (CI)</b>	<b>.32</b>	<b>Muscular (PA)</b>	<b>.36</b>
<b>Charitable (CI)</b>	<b>.32</b>	<b>Able-bodied (PA)</b>	<b>.31</b>
<b>Trustworthy (M)</b>	<b>.27</b>	<b>Masculine (M)</b>	<b>.24</b>
<b>Good Genes (M)</b>	<b>.21</b>	<b>Skilful (M)</b>	<b>.24</b>
<b>Knowledgeable (M)</b>	<b>.21</b>	<i>Good Genes (M)</i>	<i>.15</i>
<i>Intelligent (M)</i>	<i>.19</i>	<i>Trustworthy (M)</i>	<i>.09</i>
<i>Skilful (M)</i>	<i>.16</i>	<i>Charitable (CI)</i>	<i>.07</i>
<i>Masculine (M)</i>	<i>.14</i>	<i>Unselfish (CI)</i>	<i>.06</i>
<i>Able-bodied (PA)</i>	<i>.11</i>	<i>Helpful (CI)</i>	<i>.06</i>
<i>Muscular (PA)</i>	<i>.10</i>	<i>Generous (CI)</i>	<i>.05</i>
<i>Physically Fit (PA)</i>	<i>.10</i>	<i>Giving (CI)</i>	<i>.05</i>
<i>Strong (PA)</i>	<i>.09</i>	<i>Knowledgeable (M)</i>	<i>.04</i>
<i>Athletic (PA)</i>	<i>.07</i>	<i>Kind (CI)</i>	<i>.04</i>
<i>Sporty (PA)</i>	<i>.06</i>	<i>High-status (R)</i>	<i>.04</i>
<i>High-status (R)</i>	<i>-.00</i>	<i>Privileged (R)</i>	<i>.03</i>
<i>Prosperous (R)</i>	<i>-.02</i>	<i>Prosperous (R)</i>	<i>.02</i>
<i>Privileged (R)</i>	<i>-.06</i>	<i>Intelligent (M)</i>	<i>.02</i>
<i>Well-off (R)</i>	<i>-.07</i>	<i>Well-off (R)</i>	<i>-.03</i>
<i>Wealthy (R)</i>	<i>-.10</i>	<i>Rich (R)</i>	<i>-.06</i>
<i>Rich (R)</i>	<i>-.11</i>	<i>Wealthy (R)</i>	<i>-.06</i>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. CI = cooperative intent; PA = physical abilities; R = resources; M = miscellaneous.

## 7.4 Appendix D

### *Factor 1 of the Two-Factor Solution in the Vignette Mode*

FACTOR 1	
<b>Carl spends his free time volunteering for the disability centre (HCI)</b>	<b>.23</b>
<i>Jack spent the summer volunteering in Ghana (O)</i>	.19
<i>Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	.19
<i>Grant carried an old lady's groceries to her car (HCI)</i>	.19
<i>Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	.18
<i>Robert sometimes puts on free music shows at the children's hospital (O)</i>	.18
<i>Chad filed his friend's taxes (O)</i>	.18
<i>Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</i>	.18
<i>Ken volunteers as a Math tutor (O)</i>	.18
<i>Gabriel performed CPR on a 50-year-old man (O)</i>	.18
<i>Greg went to the clinic to donate blood (O)</i>	.16
<i>Sam loaned his friend money to pay for bills (HR+HCI)</i>	.16
<i>Taylor paid his friend's rent for two months (HR+HCI)</i>	.16
<i>Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</i>	.15
<i>Todd fixed his neighbour's sink (O)</i>	.14
<i>Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	.13
<i>Fred trained his friend's new puppy (O)</i>	.12
<i>Alex provided the tourist with directions to the Museum (O)</i>	.11
<i>Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	.11
<i>Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</i>	.11
<i>Jeremy bought his friend an iMac for his birthday (HR+HCI)</i>	.06
<i>Jason had to get a second job so that he could pay for bills (LR)</i>	-.03
<i>Scott had to sell his second-hand car because he could not afford his insurance (LR)</i>	-.03
<i>Dale pawned his guitar so that he could pay for rent (LR)</i>	-.04
<i>Matt went to the food bank because he could not afford groceries (LR)</i>	-.04
<i>Bruce enjoys playing board games with his friends (N)</i>	-.05
<i>Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	-.06
<i>Benjamin could not complete the 1 kilometer run (LPA)</i>	-.06
<i>Justin dropped out of the intramural football team because he could not keep up with the rest of the players (LPA)</i>	-.07
<i>Last summer, George completed the Guelph Lake Triathlon (HPA)</i>	-.07
<i>Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	-.08
<i>Lee biked from Guelph to Mississauga (HPA)</i>	-.08
<i>Paul was chosen to be on the Canadian Olympic skiing team (HPA)</i>	-.08
<i>Doug enjoys outdoor rock climbing (HPA)</i>	-.09
<i>In his spare time, Allan enjoys playing video games (N)</i>	-.10
<i>Edward likes watching horror movies (N)</i>	-.10
<i>Mark plays basketball for the University Varsity team (HPA)</i>	-.10
<i>Andrew bought himself an Xbox 360 (HR)</i>	-.11
<i>Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</i>	-.11
<i>Hank just inherited 5 million dollars from his grandfather (HR)</i>	-.11
<i>David plays polo every weekend (HR+HPA)</i>	-.11
<i>Daniel flew to New York to attend the Kings of Leon concert (HR)</i>	-.12
<i>Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	-.12
<i>Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	-.14
<i>Eric enjoys going for long drives in his new Mercedes Benz (HR)</i>	-.14
<i>Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</i>	-.18
<i>Tony bought \$300 designer jeans (HR)</i>	-.19
<i>Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</i>	-.19
<b>Chris drove by his roommate walking home in the rain (LCI)</b>	<b>-.20</b>
<b>Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</b>	<b>-.24</b>
<b>Jimmy beat up a 15 year old kid (LCI)</b>	<b>-.26</b>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. N = Neut.; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.

## 7.5 Appendix E

### *Factor 2 of the Two-Factor Solution in the Vignette Mode*

FACTOR 2	
<b>Paul was chosen to be on the Canadian Olympic skiing team (HPA)</b>	<b>.36</b>
<b>Mark plays basketball for the University Varsity team (HPA)</b>	<b>.33</b>
<b>Lee biked from Guelph to Mississauga (HPA)</b>	<b>.30</b>
<b>Last summer, George completed the Guelph Lake Triathlon (HPA)</b>	<b>.28</b>
<b>David plays polo every weekend (HR+HPA)</b>	<b>.23</b>
<b>Kevin completed a 20 kilometer run to raise money for cancer awareness (HPA+HCI)</b>	<b>.22</b>
<b>Doug enjoys outdoor rock climbing (HPA)</b>	<b>.21</b>
<b>Leon paid his way to climb Mount Kilimanjaro (HR+HPA)</b>	<b>.20</b>
<i>Steven flew to Whistler to go snowboarding for reading week (HR+HPA)</i>	<i>.19</i>
<i>Kieran spent his summer volunteering as a lifeguard at the public pool (HPA+HCI)</i>	<i>.18</i>
<i>Kyle bought himself \$2,000 mountain bike (HR+HPA)</i>	<i>.18</i>
<i>Cody rescued a 7-year-old girl from a burning apartment building (HPA+HCI)</i>	<i>.12</i>
<i>Isaac volunteers to coach youth soccer teams (HPA+ HCI)</i>	<i>.11</i>
<i>Gabriel performed CPR on a 50-year-old man (O)</i>	<i>.01</i>
<i>Jack spent the summer volunteering in Ghana (O)</i>	<i>.00</i>
<i>Grant carried an old lady's groceries to her car (HCI)</i>	<i>-.01</i>
<i>Eric enjoys going for long drives in his new Mercedes Benz (HR)</i>	<i>-.03</i>
<i>Jimmy beat up a 15 year old kid (LCI)</i>	<i>-.03</i>
<i>Todd fixed his neighbour's sink (O)</i>	<i>-.04</i>
<i>Hank just inherited 5 million dollars from his grandfather (HR)</i>	<i>-.04</i>
<i>Tony bought \$300 designer jeans (HR)</i>	<i>-.04</i>
<i>Daniel flew to New York to attend the Kings of Leon concert (HR)</i>	<i>-.05</i>
<i>Chris drove by his roommate walking home in the rain (LCI)</i>	<i>-.05</i>
<i>Tom refused to donate \$2 to the Ontario Wetland and Wildlife Conservation (LCI)</i>	<i>-.06</i>
<i>Fred trained his friend's new puppy (O)</i>	<i>-.06</i>
<i>Ian drove by a stranger who had his car stuck in the snowy and slippery ditch (LCI)</i>	<i>-.06</i>
<i>Jerry lost a basketball game in the least competitive intramural division (LPA)</i>	<i>-.06</i>
<i>Bruce enjoys playing board games with his friends (N)</i>	<i>-.06</i>
<i>Jason had to get a second job so that he could pay for bills (LR)</i>	<i>-.06</i>
<i>Edward likes watching horror movies (N)</i>	<i>-.07</i>
<i>Greg went to the clinic to donate blood (O)</i>	<i>-.08</i>
<i>Andrew bought himself an Xbox 360 (HR)</i>	<i>-.08</i>
<i>Dale pawned his guitar so that he could pay for rent (LR)</i>	<i>-.08</i>
<i>Martin spent 5 hours collecting canned food from his neighbourhood to donate to the local food bank (HCI)</i>	<i>-.08</i>
<i>Trevor did not give up his seat for a pregnant woman on the busy subway (LCI)</i>	<i>-.08</i>
<i>Bryan volunteers for Big Brothers Big Sisters of Guelph (HCI)</i>	<i>-.09</i>
<i>Jeremy bought his friend an iMac for his birthday (HR+HCI)</i>	<i>-.09</i>
<i>Robert sometimes puts on free music shows at the children's hospital (O)</i>	<i>-.09</i>
<i>Alex provided the tourist with directions to the Museum (O)</i>	<i>-.10</i>
<i>Scott had to sell his second-hand car because he could not afford his insurance (LR)</i>	<i>-.10</i>
<i>In his spare time, Allan enjoys playing video games (N)</i>	<i>-.10</i>
<i>Justin dropped out of the intramural football team because he could not keep up with the rest of the players (LPA)</i>	<i>-.10</i>
<i>Matt went to the food bank because he could not afford groceries (LR)</i>	<i>-.10</i>
<i>Carl spends his free time volunteering for the disability centre (HCI)</i>	<i>-.10</i>
<i>Damon spent \$300 sponsoring his friends for "Movember 2011" (HR+HCI)</i>	<i>-.10</i>
<i>Ken volunteers as a Math tutor (O)</i>	<i>-.11</i>
<i>Taylor paid his friend's rent for two months (HR+HCI)</i>	<i>-.12</i>
<i>Sam loaned his friend money to pay for bills (HR+HCI)</i>	<i>-.12</i>
<i>Chad filed his friend's taxes (O)</i>	<i>-.13</i>
<i>Calvin was mocked for throwing a ball 'like a girl' (LPA)</i>	<i>-.16</i>
<b>Benjamin could not Complete the 1 kilometer run(LPA)</b>	<b>-.20</b>

*Note.* Loadings equal to or higher than .20 in magnitude are in bold. Loadings less than .20 in magnitude are in italic. N = Neutral; H/LCI = High/Low Coop. Int.; H/LPA = High/Low Phys. Abil.; H/LR = High/Low Res.; O = Other gen.; HR+HPA = High Res. + High Phys. Abil.; HR+HCI = High Res. + High Coop. Int.; HPA+HCI = High Phys. Abil. + High Coop. Int.