SEXUALLY SELECTED PREFERENCES FOR HUMAN ALTRUISM ACROSS SEXUAL ORIENTATION, GENDER, AGE, AND REPRODUCTIVE STATUS

by

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DEDICATION

"There is another kind of altruism that seems to go beyond that, a kind of super-altruism, which humans appear to have. And I think that does need a Darwinian explanation."

-Richard Dawkins

To those of you who plant trees under whose shade you do not expect to sit; you are the true altruists. It is you to whom I dedicate this thesis with heart-felt gratitude for your expressions of unconditional love, support, and encouragement throughout this journey of mine.

To my brother, Michael.

To my son, Hunter, and to my daughter, Anna.

To my dearest friends Elizabeth, Sue, and Meg.

and

To the memory of my mother, Lavada.

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ABSTRACT

Prior studies have attempted to establish how human altruism has evolved, including theories of kin selection, reciprocal altruism, and costly signaling. Recent investigations have explored the evolution of altruism as the result of sexual selection, where individuals may exhibit altruistic behavior because it is preferred by potential mates. In this study, I examine how altruistic behavior toward different people (family, friends, strangers, or general altruistic acts) is preferred when considering potential short-term and long-term mates. While previous research has examined this question using college-aged heterosexual participants, this study uses a more diverse sample, including individuals who identify as LGBTQ, those of varying ages, and those who identify as childfree. Seven hypotheses were tested to understand how preferences for altruistic behavior vary based on individual characteristics. An on-line survey was conducted and over 500 participants responded. Results show that women prefer potential mates who behave altruistically toward strangers more so than men; when examining long-term relationships, people prefer potential mates who behave altruistically toward family; and that an individual's self-reported altruistic behavior is positively correlated with an individual's preference for altruistic behavior in a mate. Surprisingly, some hypotheses were not confirmed. For instance, there is no difference between preferences for altruistic behavior in potential mates based on sexual orientation. When examining women's preferences for altruistic behavior in potential mates based on reproductive status, I found that post-reproductive women have a greater preference for altruistic behavior that is

directed toward strangers or general altruistic behavior as compared to reproductive aged women. The results of this thesis provide insights into the evolution of human altruism.

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LIST OF ABBREVIATIONS

LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer/Questioning, Plus		
CGS	Cultural Group Selection		
CST	Costly Signaling Theory		
SRAS-DR	Self-Report Altruism Scale Distinguished by the Recipient		
MPAT-DR	Mate Preference for Altruistic Traits Distinguished by the Recipient		
CA	California	MD	Maryland
CO	Colorado	MI	Michigan
CT	Connecticut	NC	North Carolina
DE	Delaware	NE	Nebraska
FL	Florida	NJ	New Jersey
GA	Georgia	NY	New York
IL	Illinois	OH	Ohio
IN	Indiana	VA	Virginia

INTRODUCTION

Explaining altruism from an evolutionary perspective has presented a challenge for theorists ever since Darwin struggled to explain the seemingly altruistic behavior of non-reproducing eusocial insects such as the honeybee. In such cases, one reproducing queen is supported by a limited male drone caste for mating and a larger sterile female worker caste for protecting and feeding the group and caring for the young. The problem is that altruistic actions, strictly defined, imply the actor incurs a fitness cost which makes altruistic behavior maladaptive to the theory of natural selection and compared with other species humans display an inordinate tendency for altruistic behavior. So, the question is, how has this altruism evolved? Hamilton (1964) provided a theoretical framework to support the evolution of altruism when he proposed his theory of kin selection. Hamilton's rule, $rB > C$, where r = coefficient of relatedness, B = benefit surrendered to the recipient, and C = fitness cost incurred by the actor, explains that if the reproductive cost incurred by the actor is less than the benefit surrendered to the recipient multiplied by the coefficient of genetic relatedness of the recipient to the actor, those altruistic genes shared between the actor and the recipient can subsequently increase in frequency. This frame of reference which has come to known as kin selection theory (Smith, 1964), demonstrates how sterile members of eusocial insect colonies that care for the offspring of a single reproducing colony member can evolve if their altruistic sterility sufficiently benefits relatives carrying the altruistic gene. Although, it should be noted that some have debated if eusociality is best represented as kin selection or multilevel selection (Nowak, Tarnita, & Wilson, 2010).

While kin selection explains how altruistic behavior toward genetically related individuals can evolve, the theory of reciprocity, or reciprocal altruism, (Axelrod, 2006; Trivers, 1971) explains how altruistic behavior toward genetically unrelated individuals may evolve. It posits a Tit-for-Tat, or you scratch my back, and I will scratch your back strategy. Since there is no guarantee that an altruistic act will be reciprocated, the benefits of reciprocal altruistic behavior are calculated on the unbalanced cost benefit ratio (without the coefficient of relatedness) of the altruistic action: benefits to the recipient must outweigh costs to the actor. As such, if a recipient chronically fails to reciprocate when an opportunity to do so presents itself, the altruist may withhold future altruistic acts from the recipient. Trivers (1971) explains that when the benefits of those withheld acts on behalf of the altruist outweigh the costs that the recipient would have incurred through altruistic reciprocation, those who practice reciprocity will be selected for over those who do not, increasing the number of altruists by comparison. For reciprocal altruism to work, it is necessary for participating individuals to interact with each other more than once, recognize with whom they interact, and reflect short periods of time between exchanges.

Some theorists argue that genetic evolutionary approaches to explain human altruistic behavior fail to account for the degree of prosociality observed in humans (Henrich, 2004). Humans are inherently prosocial individuals, outliers on the spectrum of altruistic behavior, and displays of altruism in humans are very complex. Kin selection and reciprocal altruism do not adequately address this complexity, especially in the case of human altruistic behavior toward strangers where inclusive fitness does not apply, and direct reciprocation cannot be anticipated. In this light, another theoretical framework addresses how the outcomes of individuals are affected by each other's actions and

interactions in a social environment. The theory of social interdependence examines the impact of cooperation and competition in dyadic and group interactions (Balliet, Tybur, & Van Lange, 2017; Johnson & Johnson, 2005; Van Lange & Balliet, 2015; Roberts, 1998; Tomasello *et al.*, 2012; Thibaut & Kelley, 1958). The theory posits that apparent altruistic behavior in groups may benefit the altruist as a secondary consequence in the context of group stability rather than from direct reciprocity, in part, through the social evolution of economic prosperity. Wang *et al.* (2013) explain that successful interdependence of interaction networks requires correlated cooperator clusters in networks that remain undisturbed. As such, the adherents to the interdependence theory suggest this explains how altruism may be favored by natural selection without the consideration of kin selection or reciprocal altruism.

While kin selection, reciprocal altruism, and interdependence theory attempt to explain how altruism may be selected for through constituent individuals in small networks, the cultural group selection hypothesis addresses human cooperation, or altruism, on a larger scale (Henrich, 2004). Cultural group selection (CGS) argues that it is possible for evolutionary and selection pressures to operate at the group level when large groups, made up largely of genetically unrelated individuals, display cultural features of significant variation that are heritable and adaptable (Richerson *et al.,* 2016). If this is the case, CGS posits that it may be possible for culturally transmitted social rules and biological markers that support altruistic behavior to evolve if it benefits the group overall but not necessarily particular individuals within the group. But West, Griffin, and Gardner (2007) caution how to interpret this theory in that empirical and theoretical evidence show that operational group selection requires extremely restrictive conditions in which only a

small number of individuals interact with each other consisting primarily of non-selfish individuals. Research evidence indicates groups consisting primarily of selfish individuals will become over exploited and face eventual extinction. In this light, as an evolutionary process, operational CGS may actually reflect combined elements of kin selection theory, reciprocal altruism theory, and interdependence theory.

Similarly, Dual Inheritance Theory (or gene-culture coevolution) outlined by Richerson and Boyd (1978) attempts to explain how both genes and culture evolve by way of natural selection. They base their reasoning on three working assumptions. One, both genes and culture are subject to natural selection; two, genes and culture are both different and interacting although subject to differentiated rules of inheritance; three, selection for genetic fitness is correlated with a genetic capacity for culture (as a function of the same qualitative trait). Darwin (1871) himself suggested it possible to apply the laws (competition, variation, inheritance) of natural selection to cultural traits, e.g., language and customs (Brown & Richerson, 2014).

Any one of the above theories, or combination of them, may provide some insight into how altruism has evolved in humans.

There is an additional growing body of theoretical work that suggests altruistic behavior toward non-kin and strangers can evolve under sexual selection as a display advertising desirable personal resources or qualities which may increase the likelihood of mating success (Barclay, 2010; Bereczkei, Birkas, & Kerekes, 2010; Grafen, 1990; Iredale *et al*., 2020; Farrelly, Lazarus, & Roberts, 2007; Smith & Bird, 2000; Sosis, 2000). The sexual selection of traits, particularly those altruistic in nature, has been described by costly signaling theory (CST) (Bliege Bird, Smith, & Bird, 2001) or the showoff hypothesis

(Hawkes *et al*., 1993; Hawkes and Bird, 2002) which explain how some human behaviors that appear altruistic may actually be socially productive in that they bestow social prestige upon the actor and serve to broadcast his or her inherent qualities (Grafen, 1990; Sosis, 2000). The CST/showoff hypothesis framework identifies four key conditions necessary for sexually selected costly displays to become evolutionarily stable. First, the display must effectively broadcast an underlying desirable trait or characteristic. Second, the display must impose a cost on the bearer's fitness, energy, or resources with no expectation of reciprocity. Third, the display must be a definitive indicator of some underlying trait or characteristic. And, finally, the actor of the costly display must realize some benefit or advantage as a result (Smith & Bird, 2000). Published research on several hunter-gatherer societies presents data suggesting that costly displays may be selected for through mate preference or sexual selection (Smith & Bird, 2000; Smith, 2004; Sosis, 2000; Tognetti *et al.*, 2012) and that these displays may become more important when ecological conditions inhibit the exchange of information by which potential mates are evaluated (Sosis, 2000). One study conducted with out-group observers and participants from rural Senegal consisting of sixty-nine groups each made up of four males and four females (Tognetti *et al*., 2012) produced data that suggests sexual selection impacts male altruistic behavior more so than female altruistic behavior which they determined was primarily influenced by nonsexual social selection. But the researchers also conclude that male altruistic behavior appears to be impacted by nonsexual social selection with the presence of in-group observers. The handicap principle (Zahavi, 1975) addresses costly displays, or "advertisements", of traits in non-human species such as the brilliantly colored plumage or complex songs in some avian species. Zahavi (1975) refers to these costly displays in

animals as handicaps since, although the traits may increase the animals' potential to acquire quality mates, the traits are often costly to their survival. This results in a variety of different terms being used to explain a similar concept, mainly that individual traits signal an inherent quality which may increase mating success and, therefore, reproductive success because of a preference by prospective mates for this inherent quality.

Oda *et al*. (2013) posit there is an inherent quality in individuals which enables them to act altruistically toward strangers. Iredale, Van Vugt, & Dunbar (2008) and Zahavi (1975) suggest altruism functions as a costly display that honestly signals the quality, character, and resources of an individual suggesting that people may be primed to display and recognize altruism. To the extent that altruistic behavior has been linked with mating success, researchers have discussed a variety of benefits that prospective mates may identify with altruistic displays in potential partners including those of good parent quality and good provisioner (Miller, 2007; Tessman, 1995; Tognetti *et al*., 2012), increased reputational benefits (associated with status) (Roberts, 1998; Sylwester & Roberts, 2013; Barclay, 2010, 2011), and honesty and good character (because altruism is difficult and costly to fake) (Barclay, 2010). Tognetti *et al.* (2012) report on an experiment conducted in Senegal which utilized a public goods games where afterward individuals could donate some of their proceeds to the village school. Men and women participated and after the experiment each participant was asked to evaluate the potential parental quality of those in his or her group. Those individuals who made larger donations to the village school were identified as having high parental quality. Roberts (1998) defines "competitive altruism" as the exercising of altruistic acts to increased reputational benefits over those who are not altruistic, or not as altruistic, to provide access to better quality mates. Barclay (2011)

presents a model that suggests competitive altruism, 1) is evolutionarily stable; 2) is contingent on the degree of mate choice; 3) should display correlated numbers of competitive altruistic actions and competitors; and 4) if individuals provided no-cost (expecting no reciprocity) help to others, populations of non-altruists can be invaded. Within this framework, Sylwester & Roberts (2013) argue that the increased reputation associated with status has most likely been affected by competitive altruism more so than reciprocity. Other research conducted among university populations in countries supporting higher incomes experimentally examined the motivational factors affecting altruistic behavior (Iredale *et al.*, 2008; McAndrew & Perilloux, 2012; Van Vugt & Iredale, 2013) and sex differences in the preferences for altruistic behavior toward family, friends, and strangers in potential mates (Barclay, 2010; Farrelly, Lazarus, & Roberts, 2007; Oda *et al*., 2013; Phillips *et al*., 2008). Some of these studies have documented that men are more likely to exhibit altruism toward strangers when potential mates are present, for example, men were found to contribute more to charity when being observed by an attractive woman as compared to when they were being observed by another man or no one at all (Bhogal, Galbraith, & Manktelow, 2016; Iredale, Van Vugt, & Dunbar, 2008; Tessman, 1995). But other research (Raihani, 2014) presents data that suggest individuals may prefer to remain anonymous when making generously high donations to charities if the behavior violates established social norms which raises a question about the relationship between competitive altruism and sexual selection. Another study found that women expressed a stronger preference for men who behaved altruistically toward strangers, as well as family and friends, in common daily activities (Oda *et al*., 2013).

My research advances from these previous studies by including a more diverse sample, including individuals who identify as LGBTQ+, childfree, and adults of all ages (including those of post-reproductive age). It is relatively recent that researchers have explored the differences in preferences for altruism in opposite-sex mate selection using a study population of reproductive age heterosexual university students (Barclay, 2010; Farrelly *et al.*, 2007; Oda *et al*., 2013). Oda *et al*. (2013) also examined how the preference for altruistic behavior in a potential mate varied based on whether a short-term or long-term relationship was being considered by the assessing individual. However, such research is limited in its generalizability because it focused on reproductive age (typically 18-24 years), heterosexual university students and on the selection of altruism as a consequence of female mate choice in heterosexual mating. To better understand mate preferences for altruism across humans, research should include individuals with same-sex sexual orientation, those who are of post-reproductive age, or those who choose to remain childfree and those who do not. Examining preferences for altruism across people with varying sexual orientations, ages, and reproductive statuses may help us better understand how personal circumstances influence altruistic preferences. It is also possible this inclusionary approach can provide insight into specific selection pressures that may have supported the evolution of altruism as a mechanism of sexual selection. For instance, by including women and men who choose to remain childfree, I can determine whether future parenting status influences an individual's preference for altruistic partners. If childfree individuals have a lower preference for altruistic partners compared to non-childfree individuals, then that may provide evidence that altruism is an important quality as a signal of parental investment.

Four related lines of inquiry in regard to altruism as a mechanism of sexual selection will be incorporated in this research. The first will evaluate mate preference for altruistic traits in regard to whether a short-term or long-term relationship is being considered by the assessing individual. Previous study outcomes (Farrelly, 2013; Farrelly, Clemson, & Guthrie, 2016; Oda *et al*., 2013) using reproductive age heterosexual university students as subjects suggest a preference for altruism toward family was higher for prospective long-term mates while, in contrast, a preference for altruism toward friends was higher for prospective short-term mates. Additionally, Oda *et al*. (2013) found that women expressed a greater preference for potential mates who behaved altruistically toward strangers more so than men. From an evolutionary perspective, this may represent a way in which women learn about men's resources supporting the hypothesis that altruism toward strangers functions as a display that the observer considers an honest signal of the quality, character, and potential resources of the actor (Buss, 1989; Geary, Vigil, & Bird-Craven, 2004). I expect my data will support this previous research indicating that women prefer potential mates who behave altruistically toward strangers in comparison to men (Hypothesis 1) and that individuals prefer potential mates who behave altruistically toward family when seeking a long-term relationship and altruistically toward friends when seeking a short-term relationship (Hypothesis 2). Additionally, I expect individuals with dependent children and individuals who do not currently have children but plan to will show a greater preference for potential mates who direct altruistic behavior toward strangers for both long-term and short-term relationships in comparison to childfree individuals (as a measure of a prospective partner's ability to provision offspring) (Butte & King, 2005; Jasienska, 2020) (Hypothesis 3).

The second line of inquiry seeks to expand our understanding of preference for altruistic traits in mates by expanding the scope of inquiry beyond heterosexual partner preference which has not been rigorously investigated in previous research. The proposed research will contribute to the theoretical discussions on altruism as a mechanism of sexual selection by considering that fitness benefits exist outside of reproduction associated with heterosexual mate choice (Weinrich, 1987). There is no significant research published on the preference for altruism in mates among those who have same-sex sexual orientation and what research is available explores the evolutionary viability of homosexuality through the lens of kin selection. Salais & Fischer (1995) reported that gay men scored significantly higher on an empathy scale than heterosexual men and given the close correlation between empathy and altruism (Batson *et al.*, 1991; FeldmanHall *et al*., 2015; Schroeder *et al.*, 2014) they claimed support for kin selection theory. Additionally, Barron and Hare (2020) argue that same-sex sexual attraction evolved in part as a selection for increased prosociality. Yet, in another study conducted by Bobrow and Bailey (2001) the data suggests that gay men are more estranged from their family members and less likely to provide resources for family members than their heterosexual conspecifics. This prior research is limited in its number of studies and may simply be reflecting a particular cultural context at a certain time and not necessarily an inherent indicator about someone's preference for altruism. My research will potentially provide foundational data on the preference for altruism in mates among those who have same-sex sexual orientation. Referencing the studies where data have shown higher rates of empathic and altruistic behavior among gay men and lesbian women (Cochran, Mays, & Corliss, 2009; Salais & Fischer, 1995), I expect the self-reported altruistic behavior scores will be higher among

those with same-sex sexual orientation (Hypothesis 4). I also expect these individuals will indicate a higher preference for altruistic behavior in friends given that their rates of estrangement from family may be higher (Hypothesis 5).

A third line of inquiry will examine the comprehensive impact altruistic behavior has on human mate selection by expanding the study sample to include not only reproductive age individuals, but also individuals of post-reproductive age. This additional category has not been included in previous research examining the relationship between a preference for altruistic behavior and sexual selection. My research will differentiate between women of reproductive age (45 and under) and post-reproductive women (over 45). I expect the data will indicate that women of reproductive age will show a greater preference for altruism toward family and strangers in comparison to post-reproductive women (Hypothesis 6). Because of the nature of internal fertilization, the paternal uncertainty hypothesis attempts to explain the differential investment in offspring between males and females (Colclasure, 2021). This hypothesis simplifies a very complex topic that other researchers argue is likely impacted by several biological fundamentals that do not support the hypothesis including anisogamy, operational sex ratios, hormonal changes associated with childbirth that have been documented in both females and males, and male-on-male competition (Alger and Cox, 2013; Kokko and Jennions, 2008). So, based on the paternity uncertainty hypothesis alone, from a female perspective, a mate who exhibits altruism toward strangers might appear to have more ability to invest in offspring. But, Oda, *et al.* (2013), argue that females are more likely to interpret male altruistic behavior toward family as an indicator of one who is *willing* to invest more in offspring while altruism displayed toward strangers may be viewed as a quality maker in a potential mate

as one who has the *ability* to invest in offspring. In either case, I expect the data to support Hypothesis 6 stating that women of reproductive age will display a greater preference for potential mates who direct altruistic behavior toward family and strangers more so than non-reproductive women as a measure of a prospective partner's willingness and/or ability to provision for offspring.

Previous research has hypothesized that altruistic behavior increases the perceived mate value of an individual and that altruistic people seek out other altruists (Pradel, Euler, and Fetchenhauer, 2009; Tognetti *et al*., 2014). Although this is not an investigation focused on the heritability of human mate preferences, several studies have suggested that assortative mating may only be partly due to social homogamy. Reynolds, Baker, and Pederson (1996) and Zietsch *et al.* (2011) suggest that phenotypic matching may be a significant factor in the process of assortative mating, also Leek and Smith (1989) suggest that individuals "detect" phenotypic and genotypic similarities in others that contribute to assortative mating. So, my fourth line of inquiry will contribute to this discussion of assortative mating preferences by exploring the relationship between the individual respondent's self-reported altruistic behavior and his or her preferences for altruism in potential partners (Tognetti *et al*., 2014). I expect my data will show that an individual's self-reported altruism score will positively correlate with his or her mate preference for altruistic traits score; in other words, that altruistic people seek out other altruists (Hypothesis 7).

This research extends prior research by examining the question of preference for altruism among more diverse groups of people, including those with same-sex sexual orientation and post-reproductive individuals, and explicitly is designed to compare

childfree and non-childfree individuals, all of which have not been researched before now. Understanding the pattern of preferences for these more diverse groups of people will provide a better sense of how sexual selection for altruism may have evolved.

METHODS

The study tests the relationship between sexual selection and the preference for human altruistic traits using quantitative data collected with a questionnaire (see Appendix A). The instrument consists of four sections: a questionnaire survey consisting of a Self-Report Altruism Scale Distinguished by the Recipient (SRAS-DR) (Arnocky *et al*., 2017; Oda *et al*., 2013), a Mate Preference for Altruistic Traits Scale Distinguished by the Recipient (MPAT-DR) (Bhogal, Galbraith, & Manktelow, 2019; Buss, 1989; Oda *et al*., 2013; Phillips *et al*., 2008; Phillips, Ferguson, & Rijsdijk, 2010) in two parts, one to investigate respondents' preferences for altruistic behavior in potential long-term mates and another to investigate respondents' preferences for altruistic behavior in potential short-term mates, and lastly, a section to collect demographic data from the respondents. The SRAS-DR measures the respondents' self-reported assessment of their altruistic behavior. Past research has employed similar methodology (Arnocky *et al*., 2017; Bhogal, Galbraith, & Manktelow, 2019; Buss *et al*., 1990; Caprara *et al.*, 2005; Farrelly, 2013; Oda *et al*., 2013; Phillips *et al.*, 2008; Phillips, Ferguson, & Rijsdijk, 2010; Rushton, Chrisjohn, & Fekken, 1981) and I have reviewed, expanded, and adapted these published SRAS-DR and MPAT-DR scales to reflect the greater scope of my inquiry. The MPAT-DR sections in the survey consist of 36 questions each anchored on a four-point Likert scale (very important, moderately important, slightly important, not important) and the SRAS-DR section consists of 36 dichotomous (yes, no) questions (see Appendix A).

Respondents were recruited via social media, LGBTQ+ organizations, and academic communities. Emails addressed to university professors across the United States and Canada invited professors to share the survey link with their students and academic cohort. LGBTQ+ organizations were contacted through social media accounts (e.g., Facebook, Twitter) with a request that they share the survey link with their followers. Additionally, professional organizations that cater to the LGBTQ+ community (e.g., National LGBT Bar Association, National Association of Gay and Lesbian Scientists and Technical Professionals) were contacted by email with a request the organizations share the survey link with their memberships. Respondents' names were not recorded, nor were respondents directly contacted by the principal investigators. To track responses regionally, postal codes were the only identifying data collected from the respondents.

Statistical Analysis

To analyze the survey results, I conducted a linear mixed-effects model with random intercepts for each participant to examine how gender, type of relationship (short-term vs. long-term), and recipient of altruistic action (family, friend, stranger, general) would influence preferences for altruistic behavior in potential mates. This also serves as a replication of prior studies (Oda *et al*., 2013). The dependent variable is the respondent's mate preference for altruistic traits (MPAT-DR). Each respondent has eight scores: preference for altruism toward a) family, b) friends, c) strangers, and d) general altruistic acts not directed toward any specific person (I will refer to this as "general altruistic behavior" for the rest of the thesis) for potential a) short-term and b) long-term relationships (4 x 2 design). The range of potential values are 0 to 3 (where responses of very important = 3 and not important = 0, summed across 36 MPAT questions). I examined

the distribution of responses and determined that the distribution is normal (see Appendix B). The independent variables in my analysis include a categorical variable that indicates to whom the altruism is directed (family, friend, stranger, or general), a categorical variable for short-term or long-term relationship, and their interaction. From this, I tested my first predictions that individuals prefer altruism toward family when seeking a long-term relationship and prefer altruism toward friends when seeking a short-term relationship. For other hypotheses, a variety of statistical tests were conducted. I utilized t-tests for hypotheses 3 and 5, the non-parametric Kruskal-Wallis test for hypothesis 4, linear mixed effects models for hypotheses 2 and 6, and correlation coefficients for hypothesis 7. I include sexual orientation with categories for other-sex sexual orientation (heterosexual or straight) and same-sex sexual orientation, (which includes people who identify as gay, lesbian, bisexual, and pansexual). I include a binary indicator of childfree. Those who have children or desire to have children in the future are categorized as "not-childfree". Those who have no children and do not want to have children in the future are categorized as "childfree". This allows me to test my prediction that women with children or who desire to have children will show a greater preference for altruism toward family and strangers in both long-term and short-term prospective mates, in comparison to childfree women. Finally, I include the continuous variable self-reported altruism as an independent variable for hypothesis 7. This variable results form a series of 36 yes-no questions about whether the respondent has engaged in altruistic behaviors. This variable ranges from 0-36 where 36 represents an individual who has responded "yes" to all 36 altruistic behaviors. Again, I examined the distribution of this data and determine that it was normal (see Appendix B).

I examined this variable to determine if those individuals with greater self-reported altruism have a higher preference for altruism in mates.

RESULTS

The descriptive statistics for the study participants are presented in Table 1 and Table 2. There were 516 individuals over the age of 18 who responded to the survey, and based on those who provided a zip code, the majority of respondents reported they live in Idaho. Respondents in other states provided zip codes from CA, CO, CT, DE, FL, GA, IL, IN, MD, MI, NC, NE, NJ, NY, OH, VA, and the District of Columbia. One respondent provided a zip code from Wallsend, England.

Table 1 **Descriptive Statistics of Sample**

Sociodemographic Characteristics of Study Participants		
Characteristic	N	%
Age		
18 - 29	77	23.69
30 - 45	80	24.62
Over 45	168	51.69
Gender Identity		
Woman	238	73.68
Man	71	21.98
Transgender Female	2	0.62
Transgender Male	2	0.62
Gender Variant/Non-Conforming	6	1.86
Other	4	1.24
Sexual Orientation		
Heterosexual or Straight	224	70.89
Gay	17	5.38
Lesbian	22	6.96
Bisexual	30	9.49
Pansexual	14	4.43
Asexual	3	0.95
Other	6	1.90
Relationship Status		
Single, never married or partnered	75	23.22

Married or domestic partnership	189	58.51
Widowed	14	4.33
Divorced	34	10.53
Separated	2	0.62
Other	9	2.79
Child Status		
Childfree	83	38.79
Not-Childfree	131	61.21

Table 2 Self-reported Altruism and Mate Preference for Altruistic Traits Scores of Sample

Altruism Scores									
	Overall			Women			Men		
Scale	N	Mean	SD	N	Mean	SD	N	Mean	SD
SRAS-DR (max 36)	312	32.07	4.97	226	32.41	4.52	70	30.51	5.86
MPAT Family Short Term	407	15.94	6.10	229	15.86	6.15	71	14.69	6.54
Friend Short Term	409	15.76	5.71	230	15.79	5.69	70	14.27	6.19
Stranger Short Term	404	14.37	6.15	227	14.81	5.93	69	11.91	6.10
General Short Term	404	13.74	6.25	232	14.26	6.10	69	11.77	6.56
Family Long Term	313	18.76	5.85	228	19.15	5.69	66	17.65	6.30
Friend Long Term	313	17.22	5.75	228	17.61	5.71	65	15.63	5.65
Stranger Long Term	310	15.26	6.21	224	16.15	6.04	66	12.52	6.10
General Long Term	308	14.98	6.37	222	15.56	6.28	66	13.17	6.23

Figure 1 (women respondents) and Figure 2 (men respondents) display the mean scores of the preference for altruistic behavior toward family, friend, stranger, and general altruistic acts for potential long-term and short-term relationships. Figure 1 shows that women have a greater desire for altruistic partners overall when considering a long-term relationship as compared to a short-term relationship. The desire for altruistic behavior in a potential mate toward family and friend was higher when considering both long-term and short-term relationships more so than altruistic behavior toward strangers or general altruistic behavior. Figure 2 also shows that men have a greater desire for altruistic partners

when considering a long-term relationship as compared to a short-term relationship. The difference in their preference for altruistic partners between long-term and short-term relationships is smaller than the comparable difference for women. Also, the MPAT-DR scores for men are lower across the table than those for women (see Table 2). Table 3 presents the estimate of fixed effects for MPAT-DR scores with random intercepts for both men and women where preference for altruistic behavior toward stranger and short-term relationship are the reference categories. The statistical results mirror the figures and we see that both men and women have a greater preference for altruistic behavior in potential mates, especially toward family, when considering a long-term relationship.

Table 3 shows the sample size of each set of questions the respondents answered.

Table 3 Sample Size for MPAT-DR (short-term), MPAT-DR (long-term), SRAS-DR

Sample Size Statistics

	N	
	Valid	Missing
Altuism score for family (short term)	407	132
Altruism score for friend (short term)	409	130
Altruism score for stranger (short term)	404	135
Altruism score general (short term)	404	135
Altruism score family (long term)	313	226
Altruism score friend (long term)	313	226
Altruism score stranger (long term)	310	229
Altruyism score general (long term)	308	231
Altruism score (self-evaluation)	312	227

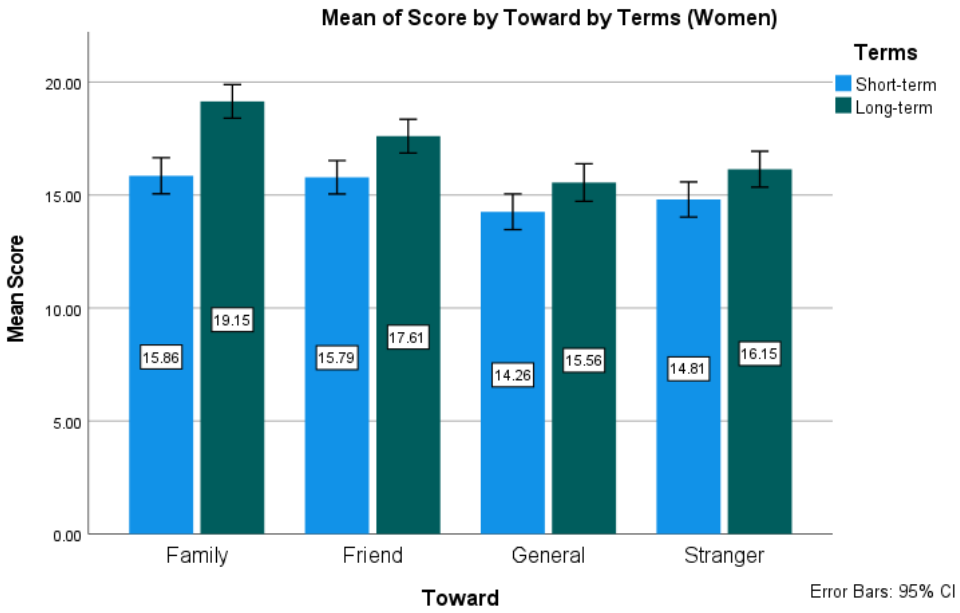

Figure 1 **Mean Scores of the Preference for Altruistic Behavior, Women**

Figure 2 **Mean Scores of the Preference for Altruistic Behavior, Men**

Table 4 Estimate of Fixed Effects for MPAT-DR Scores (reference categories: Stranger and Short-term Relationship)

Estimates of Fixed Effects[a]

Q13.0	Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Woman	Intercept	14.81	.39	457.26	38.23	<.001	14.05	15.57
	Long-term (Ref = Short-term)	1.38	.32	1585.52	4.35	<.001	.75	2.00
	Toward (Ref = Stranger)							
	Family	1.06	.31	1583.92	3.39	<.001	.45	1.68
	Friend	.96	.31	1584.13	3.05	.002	.34	1.57
	General	-.58	.31	1584.02	-1.84	.066	-1.19	.04
	Long-term * Family	1.99	.44	1583.69	4.47	<.001	1.11	2.86
	Long-term * Friend	.52	.44	1583.72	1.16	.245	-.35	1.39
	Long-term * General	.00	.45	1584.11	-.01	.995	-.88	.87
Man	Intercept	12.10	.74	138.18	16.28	<.001	10.63	13.57
	Long-term (Ref = Short-term)	.45	.62	472.09	.72	.472	-.77	1.66
	Toward (Ref = Stranger)							
	Family	2.59	.60	471.16	4.29	<.001	1.40	3.78
	Friend	2.16	.61	471.23	3.56	<.001	.97	3.35
	General	-.24	.61	471.29	-.40	.693	-1.44	.96
	Long-term * Family	2.54	.87	471.09	2.94	.003	.84	4.25
	Long-term * Friend	1.10	.87	471.25	1.26	.208	-.61	2.81
	Long-term * General	.89	.87	471.15	1.02	.306	-.82	2.60

Table Caption

a. Dependent Variable: Score.

Hypothesis 1

Women will prefer potential mates who behave altruistically toward strangers more so than men.

Figure 3 shows that there is a difference between men and women in their preference for potential partners' altruistic behavior toward strangers for both long-term and short-term relationships. Women show a statistically significant greater desire for potential partners who behave altruistically toward strangers (M = 14.81, SD = 5.93) than men (M = 11.91, SD = 6.10) when considering a short-term relationships with a potential partner ($t(294) = 3.52$, $p < .001$, two-tailed). Women also show a statistically significantly greater desire for potential partners who behave altruistically toward strangers (M = 16.15, SD = 6.04) over men (M = 12.52, SD = 6.10) when considering a long-term relationship with a potential partner ($t(288) = 4.29$, $p < .001$, two-tailed). See Table 4 for the group statistics of the sample. The results of the independent t-tests are displayed in Table 5. This hypothesis is supported.

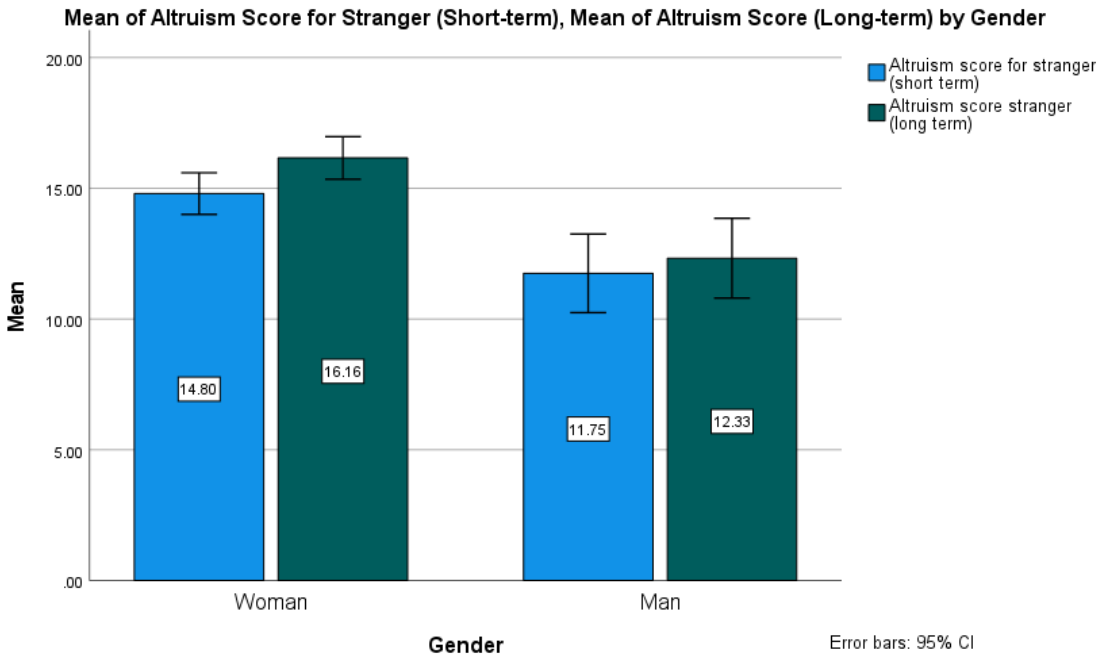

Figure 3 **Mean Preference for Potential Mates' Altruistic Behavior Toward Strangers by Gender**

Table 5 **Group Statistics of Sample**

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Altruism score for stranger (short term)	Woman	227	14.81	5.93	.39
	Man	69	11.91	6.10	.73
Altruism score stranger (long term)	Woman	224	16.15	6.04	.40
	Man	66	12.52	6.10	.75

Table 6 Results of the Independent Samples t-Test Comparing Men and Women's Preference for Short-term Relationships (top row) and Long-term Relationships (bottom row)

Independent Samples t-Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Significance Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Altruism score for stranger (short term)	Equal variances assumed	.84	.3604	3.52	294	<.001	2.89	.82	1.28	4.51
Altruism score stranger (long term)	Equal variances assumed	.21	.6437	4.29	288	<.001	3.63	.85	1.96	5.30

Hypothesis 2

Individuals will prefer potential mates who direct altruistic behavior toward family when seeking a long-term relationship and prefer potential mates who direct altruistic behavior toward friends when seeking a short-term relationship.

Figure 4 shows that the preference for potential mates' altruistic behavior toward family (M = 18.76, SD = 5.85) is significantly higher as compared to altruistic behavior toward friends (M = 17.22, SD = 5.75) when considering a long-term relationship, but there is no significant difference in preference for potential mates' altruistic behavior toward family (M = 15.94, SD = 6.10) or friends (M = 15.76, SD = 5.71) when considering a short-term relationship. This hypothesis is not supported.

Table 7 Descriptive Statistics of Sample

Descriptive Statistics

	N	Mean	Std. Deviation
Altuism score for family (short term)	407	15.94	6.10
Altruism score for friend (short term)	409	15.76	5.71
Altruism score for family (long term)	313	18.76	5.85
Altruism score for friend (long term)	313	17.22	5.75
Valid N (listwise)	297		

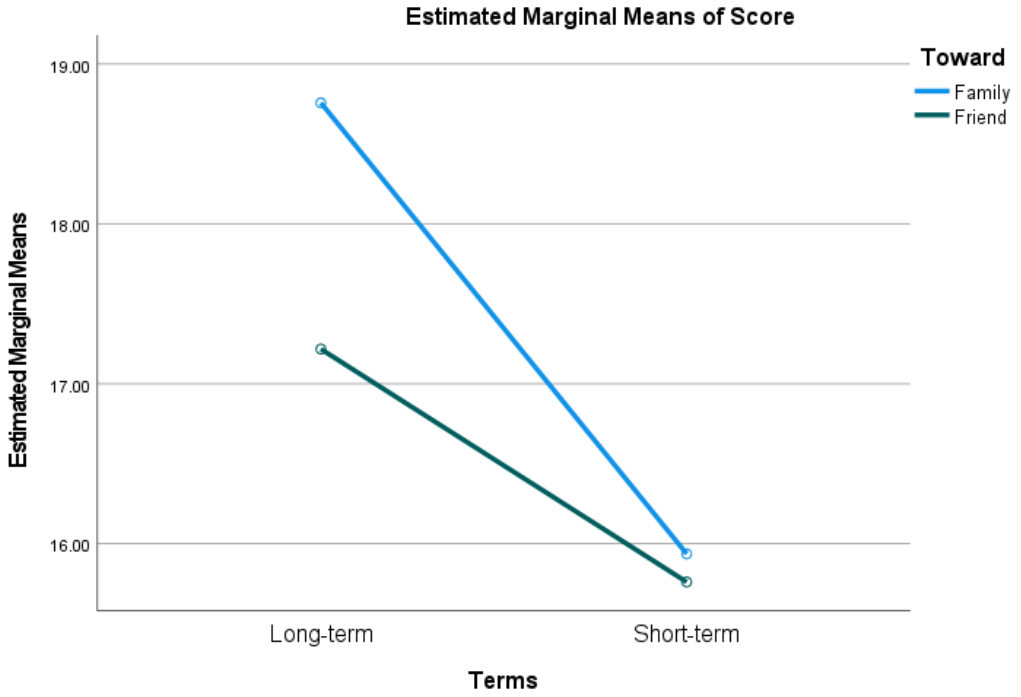

Figure 4 Preference for Altruistic Behavior Toward Family and Friends in Long-term and Short-term Relationships Based on the Model Presented in Table 7

Table 8 Estimates of Fixed Effects of Preference for Altruistic Behavior Toward Family and Friend in Long-term and Short-term Relationships from a Linear Mixed-effects Model with Random Intercepts for Each Participant

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	15.76	.29	1438	54.38	<.001	15.19	16.33
Long-tern (Ref=Short-term)	1.46	.44	1438	3.31	<.001	.59	2.32
Family (Ref=Friends)	.18	.41	1438	.43	.669	-.63	.98
Long-term*Family	1.36	.62	1438	2.19	.029	.14	2.59

a. Dependent Variable: Score.

Hypothesis 3

Individuals with dependent children and individuals who do not currently have children but plan to will show a greater preference for potential mates who direct altruistic behavior toward strangers for both long-term and short-term relationships in comparison to childfree individuals.

The group statistics are displayed in Tables 8 and 9, and the t-tests (see Tables 10 and 11) indicate that for both men and women, being childfree, or not, does not have an effect on one's preference for a potential mates' altruistic behavior toward strangers when considering a long-term (women: t(198) = -1.29, p = .198; men: t(52) = .88, p = .384) or a short-term (women: t(201) = -88, p = .381; men: t(55) = 1.62, p = .111) relationship (See Table 9 and Table 11). This hypothesis is not supported.

Table 9 Group Statistics of Childfree versus Non-Childfree (Short-term) of Sample

Group Statistics

To which gender identity do you most identify? - Selected Choice		Children Recoded	N	Mean	Std. Deviation	Std. Error Mean
Woman	Altruism score for stranger (short term)	Childfree	77	14.40	6.14	.70
		Not Childfree	126	15.17	5.94	.53
Man	Altruism score for stranger (short term)	Childfree	26	13.54	6.45	1.27
		Not Childfree	31	10.94	5.69	1.02

Table 10 Group Statistics of Childfree versus Non-Childfree (Long-term) of Sample

Group Statistics

To which gender identity do you most identify? - Selected Choice		Children Recoded	N	Mean	Std. Deviation	Std. Error Mean
Woman	Altruism score stranger (long term)	Childfree	75	15.40	6.60	.76
		Not Childfree	125	16.55	5.79	.52
Man	Altruism score stranger (long term)	Childfree	26	13.77	6.48	1.27
		Not Childfree	28	12.36	5.31	1.00

Table 11 Results of Independent Samples t-Test (Short-term)

Independent Samples Test

To which gender identity do you most identify? - Selected Choice			Levene's Test for Equality of Variances: F	Levene's Test for Equality of Variances: Sig.	t-test for Equality of Means: t	df	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference: Lower	95% Confidence Interval of the Difference: Upper
Woman	Altruism score for stranger (short term)	Equal variances assumed	.61	.437	-.88	201	.381	-.76	.87	-2.48	.95
Man	Altruism score for stranger (short term)	Equal variances assumed	1.83	.182	1.62	55	.111	2.60	1.61	-.62	5.83

Table 12 Results of Independent Samples t-Test (Long-term)

Independent Samples Test

To which gender identity do you most identify? - Selected Choice			Levene's Test for Equality of Variances: F	Levene's Test for Equality of Variances: Sig.	t-test for Equality of Means: t	df	Significance Two-Sided p	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference: Lower	95% Confidence Interval of the Difference: Upper
Woman	Altruism score stranger (long term)	Equal variances assumed	1.39	.240	-1.29	198	.198	-1.15	.89	-2.91	.61
Man	Altruism score stranger (long term)	Equal variances assumed	3.18	.080	.88	52	.384	1.41	1.61	-1.81	4.64

Hypothesis 4

The self-reported altruistic behavior scores will be higher among those who identify with same-sex sexual orientation (gay, lesbian, bisexual, pansexual) as compared to those who identify with other-sex sexual orientation (heterosexual or straight).

Figure 5 shows the mean scores of the self-reported altruism scores distinguished by the recipient (SRAS-DR) by sexual orientation and clearly illustrates that those who identify with same-sex sexual orientation do not self-report statistically significant higher altruistic behavior than those who identify with other-sex sexual orientation. The independent-samples Kruskal-Wallis concludes that there is no significant difference in self-reported altruism between various sexual orientations ($H(4) = 1.879$, $p = .758$) (see Table 12). This hypothesis is not supported.

Table 13 Group statistics of those who identify as sane sex sexual orientation and those identify as other sex sexual orientation

Group Statistics

	Other-Sex vs Same-Sex	N	Mean	Std. Deviation	Std. Error Mean
alt_self_eval	Other-Sex	1720	32.00	5.04	.12
	Same-Sex	640	32.16	4.57	.18

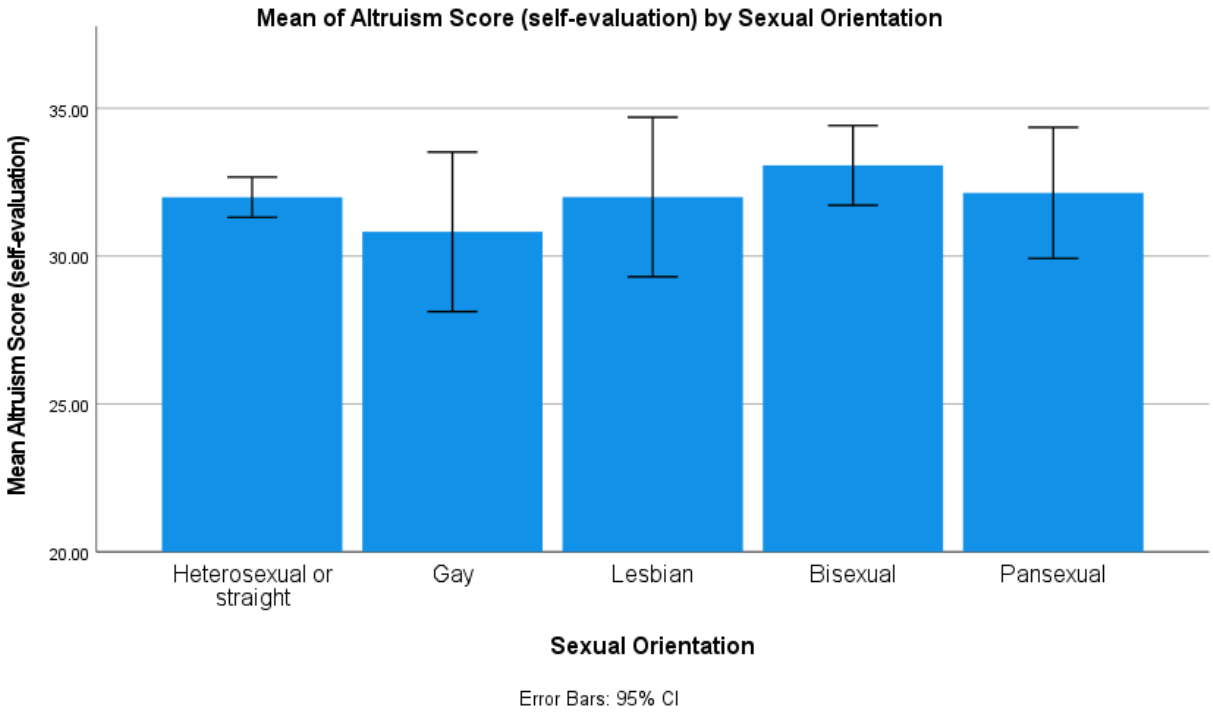

Figure 5 Mean Scores of Self-reported Altruism Scores by Sexual Orientation

Table 14 Independent Samples Test Summary

Independent-Samples Kruskal-Wallis Test Summary

Total N	295
Test Statistic	1.88[a]
Degree Of Freedom	4
Asymptotic Sig.(2-sided test)	.758

a. The test statistic is adjusted for ties.

Hypothesis 5

Individuals who identify as same-sex sexual orientation (gay, lesbian, bisexual, pansexual) will indicate a higher preference for potential mates who direct altruistic behavior toward friends as compared to those who identify with other-sex sexual orientation (heterosexual or straight).

Figure 6 shows that there is no statistically significant difference between the preference for potential mates' altruistic behavior toward family and friends for both those of same-sex orientation and those of other-sex orientation. The independent samples t-test (Table 14) supports this conclusion (t(331.64) = -1.29, p = .199). The group statistics are displayed in Table 13. This hypothesis is not supported.

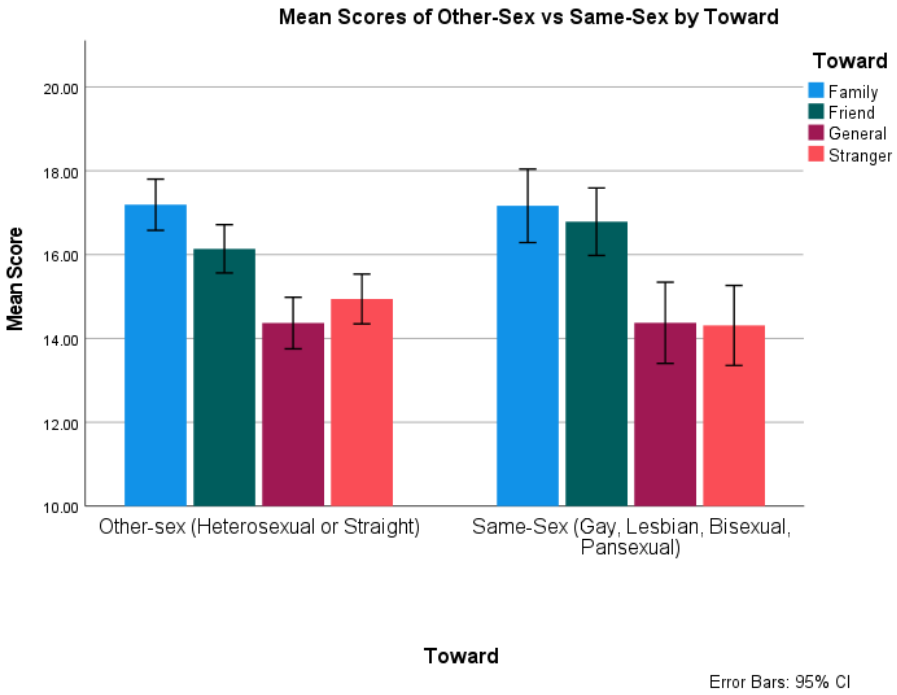

Figure 6 Mean Scores of Mate Preference for Altruistic Behavior Toward Family, Friends, Stranger, and General Altruistic Behavior by Sexual Orientation

Table 15 Group Statistics of Those Who Identify with Other-Sex Sexual Orientation and those Who Identify with Same-Sex Sexual Orientation

Group Statistics

	Other-Sex vs Same-Sex	N	Mean	Std. Deviation	Std. Error Mean
alt_self_eval	Other-Sex	1720	32.00	5.04	.12
	Same-Sex	640	32.16	4.57	.18

Table 16 Independent Samples t-Test Comparing the Preference for Potential Mates' Altruistic Behavior Toward Friends of Those Who Identify with Other-Sex Orientation to Those Who Identify with Same-Sex Orientation

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Significance Two-Sided p	Mean Difference	Std. Error Difference	Lower	Upper
Score	Equal variances assumed	5.61	.018	-1.2	588	.234	-.65	.54	-1.71	.42
	Equal variances not assumed			-1.3	331.64	.199	-.65	.50	-1.63	.34

Hypothesis 6

Women of reproductive age will indicate a greater preference for potential mates who behave altruistically toward family and strangers more so than post-reproductive women.

Women of reproductive age (45 and under) and women of post-reproductive age (over 45) show no statistically significant difference in their preference for potential mates' altruistic behavior toward family and friends. But Figure 7 clearly illustrates that there is a statistically significant difference between women of reproductive age and women of post-reproductive age in their preference for potential mates' altruistic behavior toward strangers or general altruistic behavior. Other than the preference for potential mates' altruistic behavior toward friends, women of post-reproductive age show a greater preference for altruistic mates more so than women of reproductive age. This effect is

significant and large for altruistic behavior toward strangers and general altruistic behavior (see Table 15). This hypothesis is not supported.

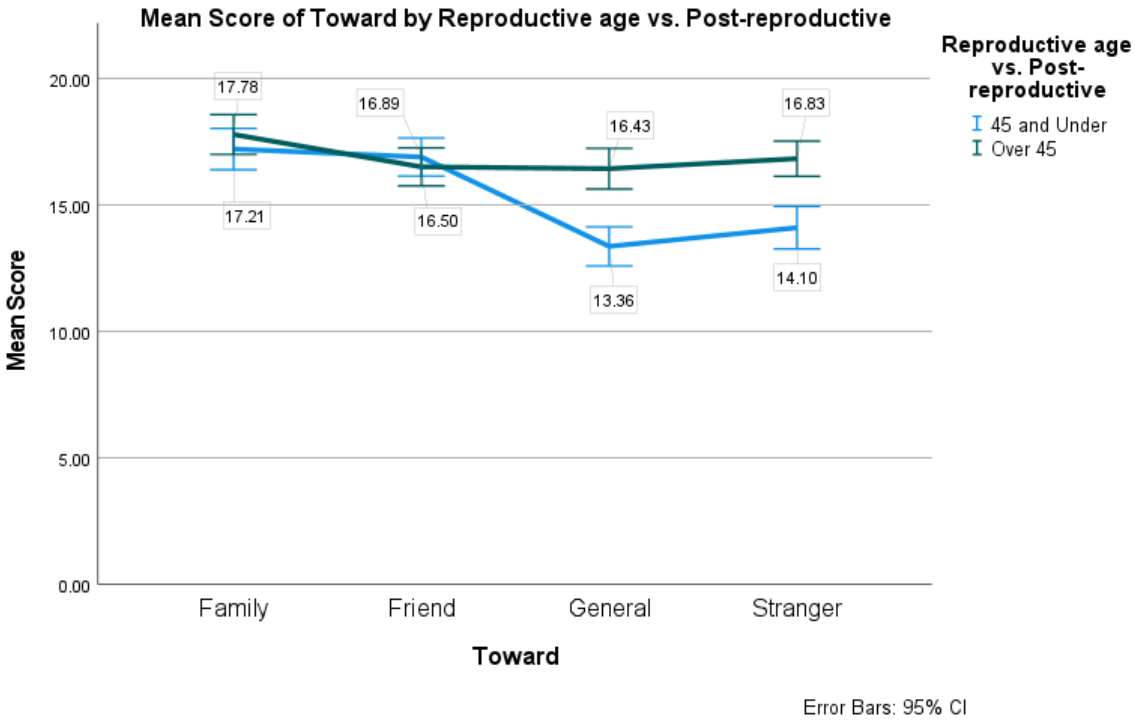

Figure 7 **Mean Score of Preference for Altruistic Mates Comparing Women of Reproductive Age and Women of Post-reproductive Age**

Table 17 Estimates of Fixed Effects of Preference for Altruistic Mates for Women of Reproductive Age and Women of Post-reproductive Age

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	14.03	.51	328.92	27.75	<.001	13.03	15.02
Ref = 45 and Under							
Over 45	2.86	.71	332.53	4.04	<.001	1.47	4.25
Ref = Stranger							
Family	3.21	.33	1578.32	9.85	<.001	2.57	3.85
Friend	2.82	.33	1578.17	8.65	<.001	2.18	3.46
General	-.71	.33	1578.25	-2.19	.029	-1.35	-.08
Over 45 * Family	-2.29	.46	1578.59	-4.98	<.001	-3.19	-1.39
Over 45 * Friend	-3.18	.46	1578.62	-6.93	<.001	-4.08	-2.28
Over 45 * General	.26	.46	1578.70	.57	.569	-.64	1.16

a. Dependent Variable: Score.

Hypothesis 7

A respondent's self-reported altruism score will positively correlate with his or her preference for altruistic traits in potential mates.

The correlations between the self-reported altruism scores distinguished by the recipient (SRAS-DR) and the mate preference for altruistic traits scores distinguished by the recipient (MPAT-DR) when considering both long-term and short-term relationships for both men and women show a moderate to strong significant positive correlation across all eight categories (see Table 18). In all cases, respondents (both men and women) who reported higher altruistic behavior toward others are more likely to want partners who behave altruistically.

I also examined whether the correlation varied by gender. Figure 8 is representative of the trend in seven of the eight categories (see Appendix C) where men consistently had higher correlations in comparison to women with the exception for the correlation between self-reported altruism scores and the preference for general altruistic behavior when

considering a long-term relationship (Figure 9). This data suggests that men have a higher expectation for an altruistic mate relative to their own altruism scores or, put another way, when men have low self-reported altruistic behavior, they tend to desire a less altruistic partner. In contrast, the correlation between women's self-reported altruistic behavior and desired altruistic behavior in potential mates is flatter (less positive correlation), suggesting that one's self-reported altruistic behavior score is less predictive of one's desired altruistic behavior in a potential mate, or put another way, regardless of one's self-reported altruistic behavior score, it appears women indicate the desire for a high level of altruistic behavior in potential mates. This hypothesis is supported.

A table of the hypotheses presented in this discussion, the corresponding theoretical framework, and the findings are shown in Table 19.

Table 18 Correlation Scores Between Self-Reported Altruism Scores Distinguished by Recipient (SRAS-DR) and the Preference for Altruistic Traits (MPAT) Scores for Men and Women

Correlations

Gender			Altuism score for family (short term)	Altruism score for friend (short term)	Altruism score for stranger (short term)	Altruism score general (short term)	Altruism score family (long term)	Altruism score friend (long term)	Altruism score stranger (long term)	Altruyism score general (long term)
Woman	Altruism score (self-evaluation)	Pearson Correlation	.309	.296	.395	.350	.303	.272	.405	.444
		Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
		N	219	220	217	221	218	218	214	212
Man	Altruism score (self-evaluation)	Pearson Correlation	.500	.503	.583	.457	.540	.518	.510	.426
		Sig. (2-tailed)	<.001	<.001	<.001	<.001	<.001	<.001	<.001	<.001
		N	70	69	69	68	65	65	65	65

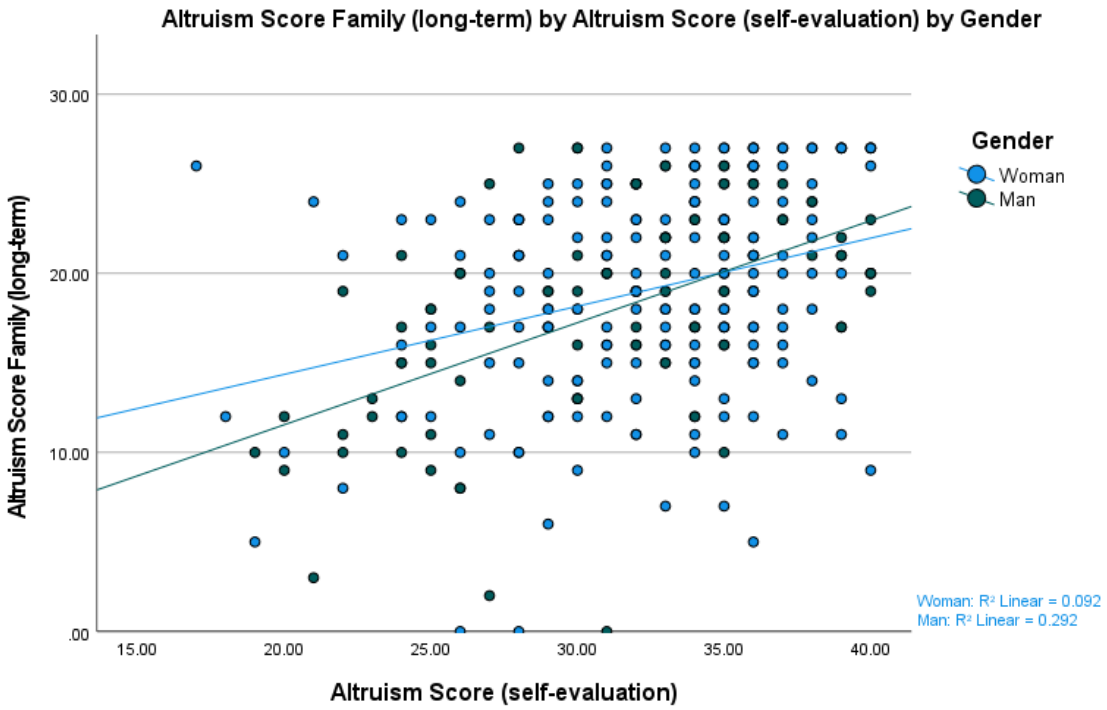

Figure 8 Correlation of Self-Reported Altruism Score and Preference for Altruistic Behavior Toward Family in a Long-term Relationship by Gender

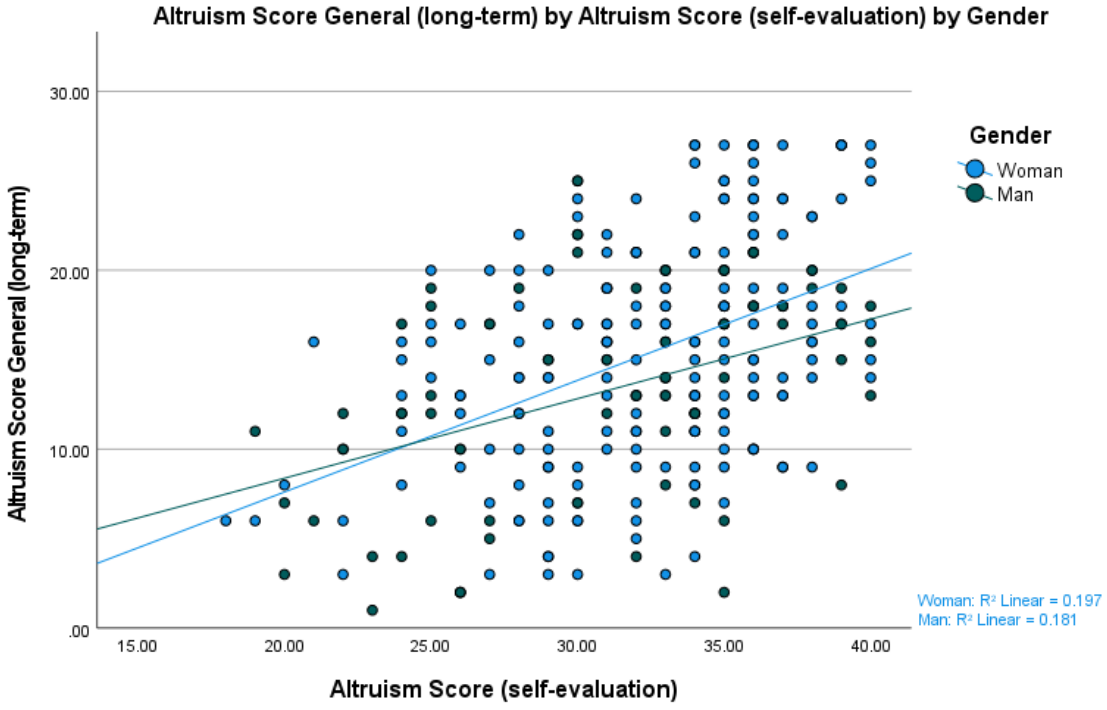

Figure 9 Correlation of Self-Reported Altruism Score and Preference for General Altruistic Acts Not Directed Toward Any Specific Person

Table 19 Hypotheses, Theory, and Statistical Results of Evidence

Hypothesis	Theory	Evidence
Women will prefer potential mates who behave altruistically toward strangers more so than men.	Costly Signaling Theory	Supported
Individuals will prefer potential mates who direct altruistic behavior toward family when seeking a long-term relationship and prefer potential mates who direct altruistic behavior toward friends when seeking a short-term relationship.	Kin Selection Theory	Not Supported
Individuals with dependent children and individuals who do not currently have children but plan to will show a greater preference for potential mates who direct altruistic behavior toward strangers for both long-term and short-term relationships in comparison to childfree individuals.	Costly Signaling Theory	Not Supported
The self-reported altruistic behavior scores will be higher among those who identify with same-sex sexual orientation (gay, lesbian, bisexual, pansexual) as compared to those who identify with other-sex sexual orientation (heterosexual or straight).	Derived from previous empirical studies	Not Supported
Individuals who identify as same-sex sexual orientation (gay, lesbian, bisexual, pansexual) will indicate a higher preference for potential mates who direct altruistic behavior toward friends as	Derived from previous empirical studies	Not Supported

compared to those who identify with other-sex sexual orientation (heterosexual or straight).		
Women of reproductive age will indicate a greater preference for potential mates who behave altruistically toward family and strangers more so than post-reproductive women.	Costly Signaling Theory	Not Supported
A respondent's self-reported altruism score will positively correlate with his or her preference for altruistic traits in potential mates.	Assortative Mating Theory	Supported

DISCUSSION

Previous research by Oda *et al*. (2013) exploring the preference for altruistic behavior in potential mates of the opposite sex found that preferences differed according to the gender of the participant, the relationship type being considered (long-term versus short-term), and to whom (family, friend, or stranger) the altruistic behavior was being directed. The study sample consisted of 288 Japanese heterosexual undergraduate students (mean age, 19.1 ± 1.0 years). The published findings on their research indicate that when considering a long-term relationship the preference for altruistic behavior in potential mates toward family was higher and the preference for altruistic behavior toward friends was lower. When the study participants were considering a short-term relationship, the preference in potential mates for altruistic behavior toward friends was higher than the preference for altruistic behavior toward family. My research, using a sample of individuals predominantly living in the United States, has a different finding. For both long-term and short-term relationships, my data indicates that both women and men have a statistically significant preference for potential mates who direct altruistic behavior toward family over friends, strangers, and general altruistic behavior. There may be several reasons for the different outcomes between the two studies. First, Oda *et al*. (2013) limited their research to Japanese heterosexual university students. My research examined preferences for altruistic behavior according to recipient across people with varying sexual orientations, ages, and reproductive statuses providing a broader base on which to examine human preferences for altruistic behavior in potential mates. This research design difference is a

consideration, but a second contributing factor to the varying outcomes of the two investigations may reflect the cultural differences between the United States and Japan. In Japan, culture is more formal, society is more homogeneous, and the 2012 Global Gender Gap Report – measuring women's equality - suggests gender roles are less flexible than in the United States ranking the United States at 22, while Japan was ranked 101 (Hausmann, Tyson, & Zahidi, 2012, August). Research published by Cooke, Klopf, and Ishii (1991) also indicates there are compelling gender differences between the two countries as well as within the United States. As a collectivist culture, the Japanese place importance on communities over individual accomplishments which is valued in the United States. These differences, along with the fact that Japanese adults more often live with their parents until they get married and often with one or the other partner's parents until they can acquire a home of their own, may contribute to the differentiated outcomes of the two studies. A third variable that could have impacted the studies is the difference in the number of study participants: Oda *et al*. (2013) cited 288 respondents as compared to my 513 respondents. Although it was my intention to attempt in part to reproduce the published results of Oda *et al*. (2013), the above mentioned conditions may make the reproducibility of Japanese produced research challenging considering the differences between our two cultures until a cross-cultural version of the SRAS–DR and MPAT-DR can be developed.

In an effort to more closely replicate the study published by Oda *et al.* (2013), I conducted a linear mixed-effects model with random intercepts for each participant using the data for those respondents to my survey who indicated they were aged 18-29 to examine how gender, type of relationship (short-term vs. long-term), and recipient of altruistic action (family, friend, stranger, general) would influence preferences for altruistic behavior

in potential mates. The dependent variable is the respondent's MPAT-DR. Table 20 displays the frequency and valid percent of the respondents aged 18-29. The results displayed in Figure 10 and Figure 11 show that the analysis performed on respondents aged 18-29 more closely replicate those published by Oda *et al.* (2013). We see that there is no difference in preference for altruistic behavior displayed toward family or friends by a potential mate when considering a short-term relationship by both men and women. When considering a long-term relationship, both men and women prefer potential mates who display altruistic behavior toward family over friends. This suggests that the results published by Oda *et al.* (2013) reflect data at least partially driven by the age (mean age, 19.1 ± 1.0 years) of their respondents.

Table 20 Frequency and Valid Percent of Respondents Aged conducted18-29 Years

18 - 29 Years of Age

Terms			Frequency	Percent	Valid Percent	Cumulative Percent
Short Term	Valid	Woman	232	80.6	80.6	80.6
		Man	56	19.4	19.4	100.0
		Total	288	100.0	100.0	
Long Term	Valid	Woman	232	80.6	80.6	80.6
		Man	56	19.4	19.4	100.0
		Total	288	100.0	100.0	

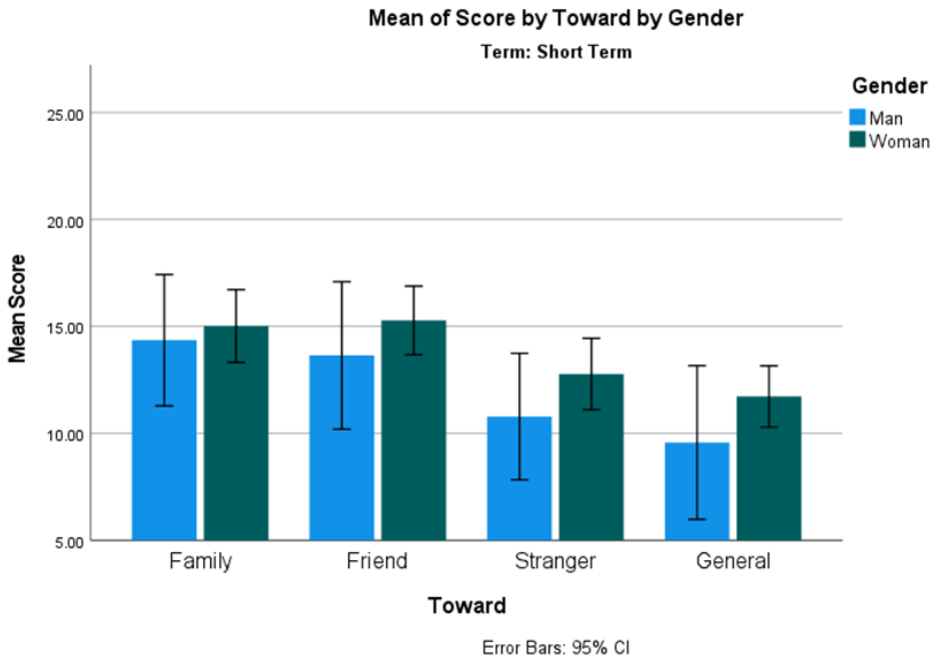

Figure 10 **Mean of Score by Toward by Gender (Short-term)**

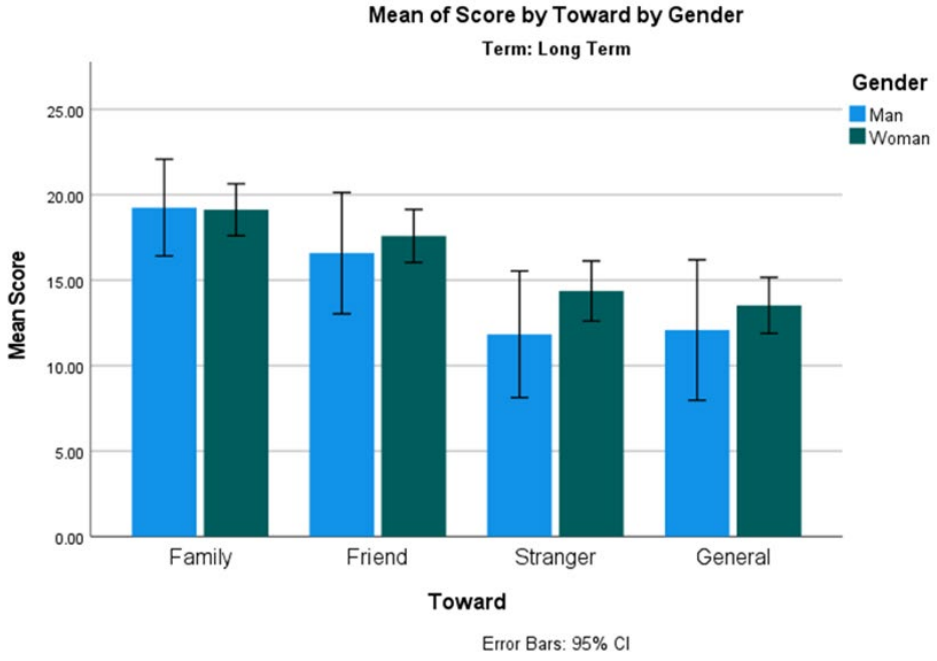

Figure 11 **Mean of Score by Toward by Gender (Long-term)**

My results indicate women have a statistically significant preference for potential mates who display altruistic behavior toward strangers when considering a long-term or short-term relationship (with preference slightly higher when considering a long-term relationship) by comparison to men. In contrast, men reported no significant difference in their preference in a potential mates' altruistic behavior toward strangers when considering either a long-term or a short-term relationship. This supports my first hypothesis that states women will prefer mates who behave altruistically toward strangers more so than men. There are three possible explanations that may support this finding. Women may perceive altruistic behavior toward strangers as a marker of an inherent quality, such as good access to resources outlined in the costly signaling theory (CST) (Bird, Smith, & Bird, 2001). As well as a reflection of resource-holding potential, the altruistic behavior toward strangers by a potential mate may also be interpreted as an honest indicator of generosity, or someone who has the ability to allocate resources toward future family (e.g., provisioning for offspring or helping extended family members in need). It is also possible that altruistic behavior toward strangers serves to broadcast an elevated social status or reputation. Women may see such a potential mate as someone who will receive favors and benefits in the future based on his elevated social position which could benefit her and her future family. However, as appealing as women may find potential mates' altruistic behavior toward strangers, the data in my research clearly show that women prefer potential mates' altruistic behavior toward family over friends, strangers, and general altruistic behavior for both long-term and short-term relationships suggesting a desire to secure allocation of resources toward family.

Oda *et al*. (2013) reported that both men and women prefer potential mates who direct altruistic behavior toward family when considering a long-term relationship and prefer potential mates who direct altruistic behavior toward friends when considering a short-term relationship. My data present different results. Although my data clearly indicate that men and women both prefer potential long-term mates who behave altruistically toward family, the same pattern of preference for altruistic behavior toward family is indicated for potential short-term relationships. There is no significant difference for preference in potential mates' altruistic behavior toward family or friend in potential short-term relationships. Both studies reflect that inclusive fitness benefits are important for long-term relationships that may result in marriage and offspring, but the difference between the two studies on the preference for altruistic behavior distinguished by the recipient when considering a short-term relationship may warrant further testing to try to understand this divergence. It is possible that the stretch between the mean age of the two study samples contributed to this difference, as well as cultural differences mentioned above.

Considering that Oda *et al*. (2013) reported women preferred altruism directed toward strangers more so than men regardless of relationship type, possibly identifying a potential mate who has the ability to allocate resources toward future family, I predicted that non-childfree individuals would prefer potential mates who direct altruistic behavior toward strangers more so than childfree individuals. My data indicate that for both men and women, being childfree, or not, does not have an effect on an individual's preference for a potential mates' altruistic behavior toward strangers when considering a long-term or a short-term relationship. Women's preference for a potential mates' altruistic behavior

toward strangers may be important as an indicator of an inherent quality but when considering a long-term relationship (for both men and women) altruism directed toward family is more important.

Examining preferences for altruism across people with same-sex sexual orientation may help us understand how personal circumstances influence altruistic preferences. While no significant research has been published on the preference for altruism in mates among individuals who identify with same-sex sexual orientation, Salais and Fischer (1995) reported that gay men scored higher on an empathy scale than heterosexual men. Another study conducted by Bobrow and Bailey (2001) suggests that gay men are more estranged from their family members and less likely to provide resources for family members than their heterosexual conspecifics. Based on these findings I predicted that the self-reported altruistic behavior scores would be higher among those who identify with same-sex sexual orientation as compared to other-sex sexually oriented individuals. My data clearly show that there is no significant difference in the self-reported altruism scores based on sexual orientation. On average, individual respondents who completed the self-report altruism scale (SRAS) scored 33.4 out of a possible 36, suggesting that regardless of sexual orientation, humans generally consider themselves altruistic. Considering this, self-selection bias cannot be ruled out since the survey was presented as a study on human cooperation and most likely attracted individuals interested in the concept or who are inherently altruistic, willing to fill out a survey to help a graduate student, so the findings from the sample may not reflect the overall population. Additionally, it is possible that response bias, in the form of recall bias and prestige bias, could be responsible for the high SRAS-DR scores. This is an area of research that warrants further focused investigation.

My next inquiry explored the relationship between the preference for altruistic behavior in potential mates and same-sex oriented individuals. As mentioned above, a study conducted by Bobrow and Bailey (2001) suggests that gay men are more estranged from their family members and less likely to provide resources for family members than their heterosexual conspecifics. Based on this, I predicted that individuals who identify with same-sex sexual orientation would indicate a higher preference for potential mates who direct altruistic behavior toward friends as compared to those individuals who identify as other-sex sexual orientation. Again, my data show there is no statistically significant difference between the preference for potential mates' altruistic behavior toward family and friends for both those who identify with same-sex sexual orientation and those who identify with other-se sexual orientation. In both cases, preference for altruistic behavior toward family is higher than preference for altruistic behavior toward friends which are both significantly higher than a preference for altruistic behavior toward strangers or general altruistic behavior. This supports the overall concept emerging from this study that altruistic behavior directed toward family is the most significant consideration when evaluating a potential mate supporting the value humans place on inclusive fitness benefits. Also, in hindsight, it is worth recognizing that the Bobrow and Bailey (2001) study was conducted nearly a generation ago and it is worth considering that the family dynamics between other-sex sexually oriented parents and same-sex sexually oriented offspring have changed over time.

Other missing components in published research on the comprehensive impact altruistic behavior has on human mate selection are study samples that include not only reproductive age individuals (45 and under) differentiated by those who have children or

plan to have children and those who plan to remain childfree, but also individuals of post-reproductive age (over 45). I tried to include these life histories in my survey questionnaire. Respondents were asked to respond to questions regarding their desire to remain childfree or not and whether or not they currently had offspring or planned to have offspring in the future. I predicted that women of reproductive age would show a greater preference for potential mates who behave altruistically toward family and strangers more so than post-reproductive women. The data show that there is not a statistically significant difference between reproductive and post-reproductive women in their preference for potential mates who display altruistic behavior toward family and friends. In contrast, women of post-reproductive age show a significantly greater preference for potential mates who display altruistic behavior toward strangers and general altruistic behavior. The data represented here seem to somewhat align with the data presented in the discussion on hypothesis 3 which I interpreted to suggest that an individuals' preference for a potential mates' altruistic behavior toward strangers may be important as an indicator of an inherent quality or the ability to provision for offspring, while long-term relationship considerations focus on altruistic behavior directed toward family which may indicate a willingness to provide. This may suggest that post-reproductive women are not focused on altruistic behavior biased toward family as much as they are on the overall quality of potential mates, while reproductive women are more focused on potential mates who are willing to invest in offspring and provide the support of inclusive fitness. Another explanation for this outcome may be related to the descendent-leaving strategy, or ancestor descendent conflict theory, which posits the study of kinship altruism cannot be limited to Hamilton's rule of kinship. One argument supporting ancestor descent conflict theory explains that resource (words,

actions, traditions, social and ecological skills, etc.) transference from parent to child over many, many generations may create individuals who extend altruism to other individuals with whom they perceive a shared descent even though their relationship is outside any measurable degree of relatedness (Palmer & Steadman, 1997; Coe *et al.*, 2010). It may be that post-reproductive women (over 45) have life experience that aligns their sensibilities to the descendent-leaving strategy of their ancestors more so than women or reproductive age. The results from this query warrant further investigation.

Pradel, Euler, and Fetchenhauer (2008) and Tognetti et al. (2014) published research indicating altruistic behavior increases the perceived value of a potential mate and that altruistic people seek out other altruistic individuals as mates. To explore assortative mating preferences regarding preferences for altruistic behavior, I analyzed the correlation between the individual respondent's self-reported altruistic scores distinguished by recipient and his or her preferences for altruistic traits in potential mates. My data clearly show moderate to strong significant positive correlations across all eight categories for both men and women when considering both a long-term and a short-term relationship but are more correlated for men than women. Women with low self-reported altruistic behavior desire altruistic mates at a higher rate than men with low self-reported altruistic behavior. The data suggests that women care more about signals of altruistic behavior than men which is supported by the predictions from female choice models which have focused on the benefits women receive from selecting individuals who provide costly displays. The only correlation that was higher for women was the correlation between self-reported altruistic behavior scores and the preference for general altruistic behavior when considering a long-term relationship.

CONCLUSION

In an attempt to provide insight into specific selection pressures that may have supported the evolution of human altruism as a mechanism of sexual selection, my research adopted an inclusionary approach to explore preferences across individuals with varying sexual orientations, gender identities, ages, and reproductive statuses. The body of research that addresses the role of altruistic behavior in regard to mate preferences suggests altruism can function as a costly signal or display of quality preferred by potential mates. The research presented here supports those findings. And although research has shown that altruistic behavior-overall is preferred more so for long-term relationships, this research supports more recent studies that suggest mate preferences for altruistic displays can vary according to whom the altruistic action is being directed and the type of relationship being considered. Altruistic behavior directed toward family is still preferred when considering a long-term relationship but, depending on the age of the assessing individual, altruism directed toward friends appears to be preferred when considering a short-term relationship as published by Oda *et al.* (2013). While little or no research has been published on mate preference for altruistic behavior in same-sex sexually oriented individuals, my research suggests that there is no difference in mate preference for altruism between those of same-sex sexual orientation and those of other-sex sexual orientation which may suggest an invariant aspect of human nature. The results of women's preferences for altruistic behavior in potential mates based on reproductive status was surprising. The fact that there is such a significant difference in preference for altruism displayed toward strangers and

altruistic behavior in general between women of reproductive age and women of post-reproductive age suggests that there may be theories outside of those that support the evolution of human altruism as a mechanism of sexual selection impacting this observation.

The SRAS-DR and the MPAT-DR have been used numerous times to explore the evolution of human altruism, but there are limitations to both scales reflected in those that collect too little information and those that collect too much. I attempted to present a broad range of altruistic behavior examples in each scale for respondents to consider but it may not have served the good purpose I was intending since up to forty percent of those who started my survey did not complete it. Designing a SRAS-DR and MPAT-DR that can collect the best information from the respondents without being too mentally cumbersome and time consuming is the challenge to be addressed in future studies that employ the scales. As mentioned earlier and also addressed by Oda *et al.* (2013), the development of a cross-cultural version of the SRAS-DR and MPAT-DR would expand research capabilities to study the sexually-selective forcers that impact the evolution of human altruism.

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APPENDIX A

Cooperative Behavior Research

Start of Block: SURVEY INSTRUCTION

Start of Block: Informed Consent

Welcome to the research study! I am interested in understanding the relationship between human cooperative behavior and mate choice. You will be presented with information relevant to human cooperation and asked to answer some questions about it. Please be assured that your responses will be kept completely confidential and there is no possibility of your responses being directly linked to you if you choose to participate in the survey. The survey should take about 15 minutes to complete. Your participation in this research is voluntary. You have the right to withdraw at any point during the study, for any reason, and without any prejudice. If you would like to contact the Principal Investigator in the study to discuss this research, or if you have questions regarding this research, please e-mail Katherine Kappelman at katherinekappelm@u.boisestate.edu, Dr. Kristin Snopkowski at krisitnsnopkowski@boisestate.edu, or the Institutional Review Board compliance office at humansubjects@boisestate.edu. By clicking the button below, you acknowledge that your participation in the study is voluntary, that you are at least 18 years of age, and that you are aware you may choose to terminate your participation in the study at any time and for any reason. Please note that this survey will be best displayed on a laptop or desktop computer. Some features may be less compatible for use on a mobile device.

- ○ I consent and confirm that I am at least 18 years of age, begin the study
- ○ I do not consent, I do not wish to participate

Page Break

You are considering causally dating someone for a limited time (a short-term relationship). How important is it to you that someone you want to date exhibits each of the following behaviors?

Please mark the response that best represents how important it is to you that the listed behavior is displayed by someone you want to date.

	Very important	Moderately important	Slightly important	Not important
Offers to babysit for a family member without being paid for it	○	○	○	○
Offers to help a friend with household chores	○	○	○	○
Helps push a stranger's car that has run out of gas	○	○	○	○
Turns in a found item to the lost-and-found	○	○	○	○
Donates food to the local food bank	○	○	○	○
Shares a meal with an unexpected family member who arrives during a mealtime	○	○	○	○
Allows a friend to borrow an item of some value	○	○	○	○

Helps a family member to move households	○	○	○	○
Donates blood	○	○	○	○
Offers to accompany a family member to an event who is uncomfortable going alone	○	○	○	○
Spends time with a friend who is feeling lonely	○	○	○	○
Allows a stranger to move ahead in a lineup at the store, bank, fast-food service, etc.	○	○	○	○
Donates money to non-profits	○	○	○	○

Makes change for a stranger who asks	○	○	○	○
Cares for an elderly family member who would otherwise need to be in a care facility	○	○	○	○
Loans money to a friend in need	○	○	○	○
Offers to pet sit for a friend without being paid for it	○	○	○	○
Points out a clerk's error when undercharged for an item	○	○	○	○
Offers a ride to a stranger who is stranded without transportation	○	○	○	○

Sometimes makes a purchase simply because it supports a good cause	○	○	○	○
Opens home to a family member who is in need of a place to stay	○	○	○	○
Helps a classmate who is struggling with an assignment	○	○	○	○
Provides care for a family member who is ill	○	○	○	○
Donates goods to charities	○	○	○	○
Offers to help a stranger who is searching for a lost item in a public place	○	○	○	○

Helps a friend move households	○	○	○	○
Takes time to help someone who needs assistance to cross an intersection	○	○	○	○
Helps a family member with household chores without being asked	○	○	○	○
Offers to accompany a friend to an event who is uncomfortable going alone	○	○	○	○
Has marked driver's license as an organ donor	○	○	○	○
Assists a stranger who has tripped or fallen	○	○	○	○

Volunteers personal time to a charity	○	○	○	○
Offers financial support to a family member in need	○	○	○	○
Delays an elevator by holding the door for a stranger	○	○	○	○
Attempts to unite a lost pet with its owner	○	○	○	○
Gives up a seat to a stranger who is standing	○	○	○	○
Offers to pet sit for a family member without being paid for it	○	○	○	○
Changes personal plans to accommodate the immediate needs of a family member	○	○	○	○

Offers money to a stranger in need	○	○	○	○
Listens to a friends who need to talk about troubles	○	○	○	○

Page Break

You are considering a long-term relationship with someone (e.g.; marriage, co-habitation). How important is it to you that someone with whom you want a long-term relationship exhibits each of the following behaviors?

Please mark the response that best represents how important it is to you that the listed behavior is displayed by someone with whom you desire a long-term relationship.

	Very important	Moderately important	Slightly important	Not important
Offers to babysit for a family member without being paid for it	○	○	○	○
Offers to help a friend with household chores	○	○	○	○
Helps push a stranger's car that has run out of gas	○	○	○	○
Turns in a found item to the lost-and-found	○	○	○	○
Donates food to the local food bank	○	○	○	○
Shares a meal with an unexpected family member who arrives during a mealtime	○	○	○	○
Allows a friend to borrow an item of some value	○	○	○	○

Helps a family member to move households	○	○	○	○
Donates blood	○	○	○	○
Offers to accompany a family member to an event who is uncomfortable going alone	○	○	○	○
Spends time with a friend who is feeling lonely	○	○	○	○
Allows a stranger to move ahead in a lineup at the store, bank, fast-food service, etc.	○	○	○	○
Donates money to non-profits	○	○	○	○
Makes change for a stranger who asks	○	○	○	○

Cares for an elderly family member who would otherwise need to be in a care facility	○	○	○	○
Loans money to a friend in need	○	○	○	○
Offers to pet sit for a friend without being paid for it	○	○	○	○
Points out a clerk's error when undercharged for an item	○	○	○	○
Offers a ride to a stranger who is stranded without transportation	○	○	○	○
Sometimes makes a purchase simply because it supports a good cause	○	○	○	○
Opens home to a family member who is in need of a place to stay	○	○	○	○

Helps a classmate who is struggling with an assignment	○	○	○	○
Provides care for a family member who is ill	○	○	○	○
Donates goods to charities	○	○	○	○
Offers to help a stranger who is searching for a lost item in a public place	○	○	○	○
Helps a friend move households	○	○	○	○
Takes time to help someone who needs assistance to cross an intersection	○	○	○	○
Helps a family member with household chores without being asked	○	○	○	○
Offers to accompany a friend to an event who is uncomfortable going alone	○	○	○	○

Has marked driver's license as an organ donor	○	○	○	○
Assists a stranger who has tripped or fallen	○	○	○	○
Volunteers personal time to a charity	○	○	○	○
Offers financial support to a family member in need	○	○	○	○
Delays an elevator by holding the door for a stranger	○	○	○	○
Attempts to unite a lost pet with its owner	○	○	○	○
Gives up a seat to a stranger who is standing	○	○	○	○
Offers to pet sit for a family member without being paid for it	○	○	○	○

Changes personal plans to accommodate the immediate needs of a family member	○	○	○	○
Offers money to a stranger in need	○	○	○	○
Listens to a friends who need to talk about troubles	○	○	○	○

Please consider the following statements.

Mark the appropriate response for each statement as it relates to you.

I have offered to babysit for a family member without being paid for it	○ Yes	○ No
I have offered to help a friend with household chores without being asked	○ Yes	○ No
I have helped push a stranger's car that has broken down or run out of gas	○ Yes	○ No
I have turned in a found item to the lost-and-found	○ Yes	○ No
I donate food or money to the local food bank	○ Yes	○ No

I have shared a meal with an unexpected family member who arrived during a mealtime	○ Yes	○ No
I have allowed friends to borrow items of some value to me	○ Yes	○ No
I have helped a family member to move households	○ Yes	○ No
I donate my blood	○ Yes	○ No
I have accompanied a family member to an event when he or she was uncomfortable going alone	○ Yes	○ No
I spend time with friends who are feeling lonely	○ Yes	○ No

I have allowed a stranger to move ahead of me in a lineup at the store, bank, fast-food service, etc.	○ Yes	○ No
I donate money to charities or non-profit organizations	○ Yes	○ No
I have made change for a stranger who asked	○ Yes	○ No
I have cared for an elderly family member who would otherwise have been in a care facility	○ Yes	○ No
I have loaned money to a friend in need	○ Yes	○ No
I have offered to pet sit for a friend without being paid for it	○ Yes	○ No

I have pointed out a clerk's error when I was undercharged for an item	○ Yes	○ No
I have offered a ride to a stranger who was stranded without transportation	○ Yes	○ No
I sometimes make a purchase even if it is overpriced simply because it supports a good cause	○ Yes	○ No
I open my home to family members who are in need of a place to stay	○ Yes	○ No
I have helped a classmate who was struggling with an assignment	○ Yes	○ No

I have provide care for family members when they were ill	○ Yes	○ No
I donate goods to charities	○ Yes	○ No
I have offered to help a stranger who was searching for a lost item in a public place	○ Yes	○ No
I have helped a friend move households	○ Yes	○ No
I have taken the time to help someone who needed assistance to cross an intersection	○ Yes	○ No
I listen to friends who need to talk about their concerns or troubles	○ Yes	○ No

I have helped a family member with household chores without being asked	○ Yes	○ No
I have offered to accompany a friend to an event when he or she was uncomfortable going alone	○ Yes	○ No
I am listed as an organ donor on my driver's license or ID card	○ Yes	○ No
I have assisted a stranger who has tripped or fallen	○ Yes	○ No
I volunteer my time for a charity or non-profit organization	○ Yes	○ No
I have offered financial support to a family member in need	○ Yes	○ No

I delay an elevator by holding the door for a stranger when I can	○ Yes	○ No
I attempt to unite lost pets with their owners	○ Yes	○ No
I have given up a seat to a stranger who was standing	○ Yes	○ No
I offer to pet sit for family members without being paid for it	○ Yes	○ No
I have changed my personal plans to accommodate the immediate needs of a family member	○ Yes	○ No
I have offered money to a stranger in need	○ Yes	○ No

Page Break

What is your age?

- ○ 18 - 29
- ○ 30 - 45
- ○ over 45

Do you have children?

- ○ Yes, dependent children living in my home all of the time or part of the time
- ○ Yes, but they do not live with me
- ○ Yes, but they are adults
- ○ No

If you answered "yes" for dependent children living with you all of the time or part of the time, please indicate their relationship to you (mark all that apply).

- [ ] Biological
- [ ] Step-child
- [ ] Adopted (non-relative)
- [ ] Relative adoption

If you answered "yes" for dependent children, do you desire to have more children in the future?

- ○ Yes
- ○ No
- ○ Undecided

If you do not have children, do you desire to have children sometime in the future?

- ○ Yes
- ○ No
- ○ Undecided

To which gender identity do you most identify?

- ○ Woman
- ○ Man
- ○ Transgender Female
- ○ Transgender Male
- ○ Gender Variant/Non-Conforming
- ○ Other _____
- ○ Prefer Not to Answer

Which is your sexual orientation?

- ○ Heterosexual or straight
- ○ Gay
- ○ Lesbian
- ○ Bisexual
- ○ Pansexual
- ○ Asexual
- ○ Other _____
- ○ Prefer not to answer

With which ethnicity do you identify?

- ○ Asian / Pacific Islander
- ○ Black or African American
- ○ Hispanic or Latino
- ○ Native American or American Indian
- ○ White
- ○ Other

What is the highest degree or level of school you have completed?

- ○ No schooling completed
- ○ Nursery school to 8th grade
- ○ Some high school, no diploma
- ○ High school graduate, diploma or the equivalent (for example: GED)
- ○ Some college credit, no degree
- ○ Trade/technical/vocational training
- ○ Associate degree
- ○ Bachelor’s degree
- ○ Master’s degree
- ○ Professional degree
- ○ Doctorate degree

What is your relationship status?

- ○ Single, never married or partnered
- ○ Married or domestic partnership
- ○ Widowed
- ○ Divorced
- ○ Separated
- ○ Other

What is your current employment status?

- ○ Employed for wages
- ○ Self-employed
- ○ Out of work and looking for work
- ○ Out of work but not currently looking for work
- ○ A homemaker
- ○ A student
- ○ Military
- ○ Retired
- ○ Unable to work
- ○ Other

What is your zip code?

_____

APPENDIX B

Hypothesis 2

Model Dimension[a]

		Number of Levels	Number of Parameters
Fixed Effects	Intercept	1	1
	Terms	2	1
	Towards	2	1
	Terms * Towards	4	1
Residual			1
Total		9	5

a. Dependent Variable: Score.

Information Criteria[a]

-2 Restricted Log Likelihood	9190.37
Akaike's Information Criterion (AIC)	9192.37
Hurvich and Tsai's Criterion (AICC)	9192.38
Bozdogan's Criterion (CAIC)	9198.65
Schwarz's Bayesian Criterion (BIC)	9197.65

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: Score.

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	1438.00	11803.41	<.001
Terms	1	1438	47.17	<.001
Towards	1	1438.00	7.59	.006
Terms * Towards	1	1438.00	4.80	.029

a. Dependent Variable: Score.

Estimates of Covariance Parameters[a]

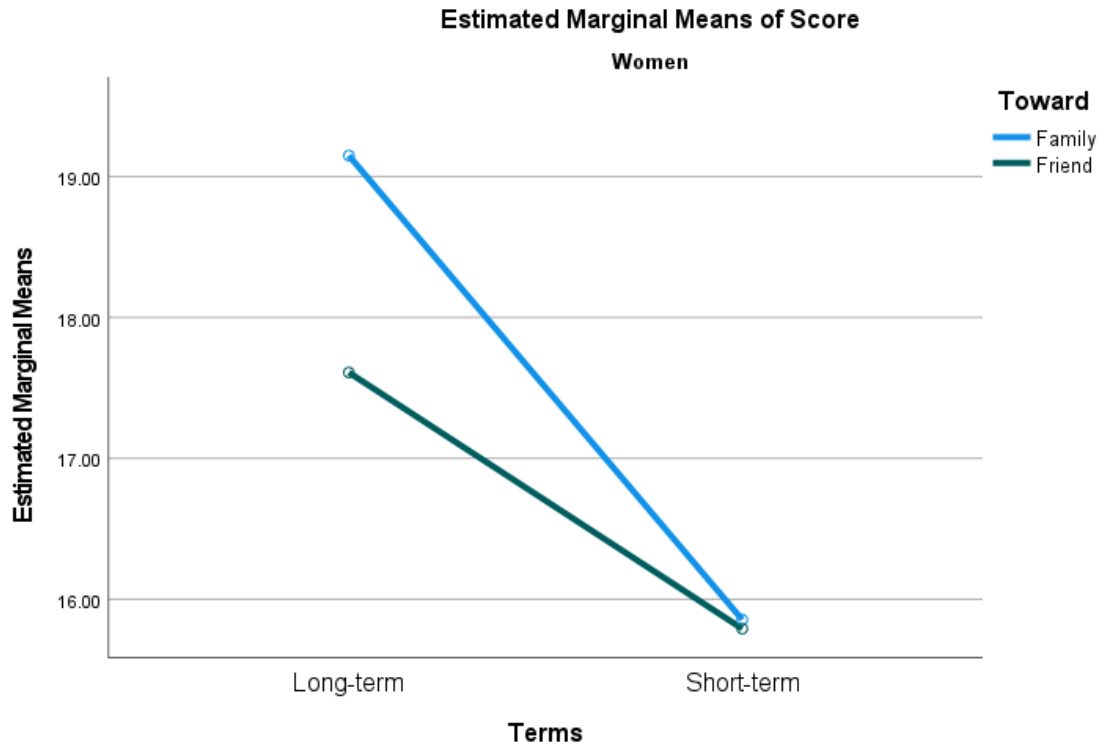
Parameter	Estimate	Std. Error
Residual	34.36	1.28

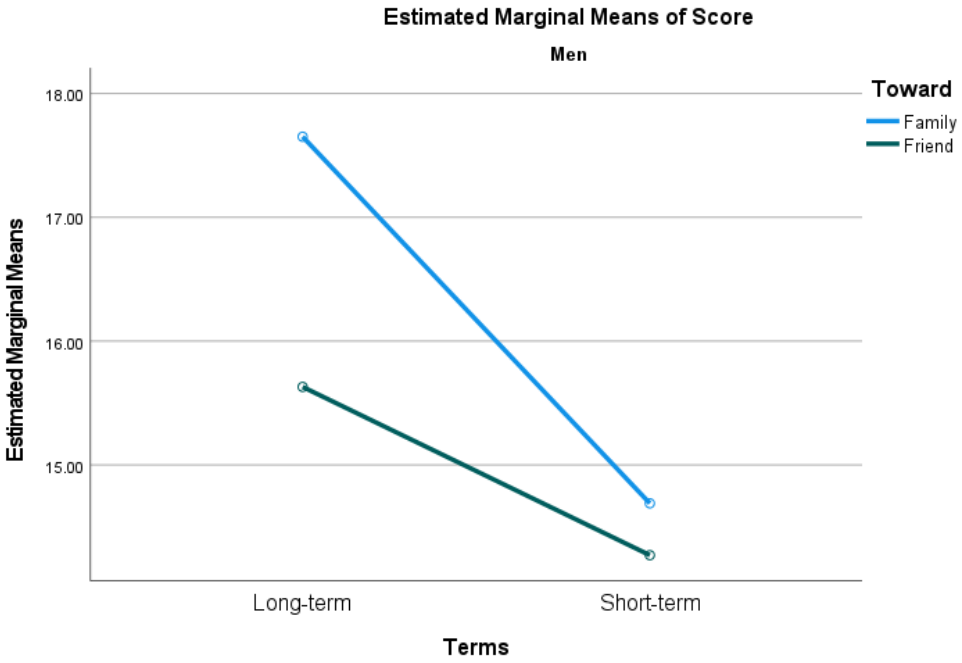
a. Dependent Variable: Score.

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Family	Friends	Type III Sum of Squares	df	Mean Square	F	Sig.
Family	Linear		191.52	1	191.52	21.74	<.001
Error(Family)	Linear		2607.73	296	8.81		
Friends		Linear	2045.86	1	2045.86	154.90	<.001
Error(Friends)		Linear	3909.39	296	13.21		
Family * Friends	Linear	Linear	138.07	1	138.07	70.93	<.001
Error(Family*Friends)	Linear	Linear	576.18	296	1.95		



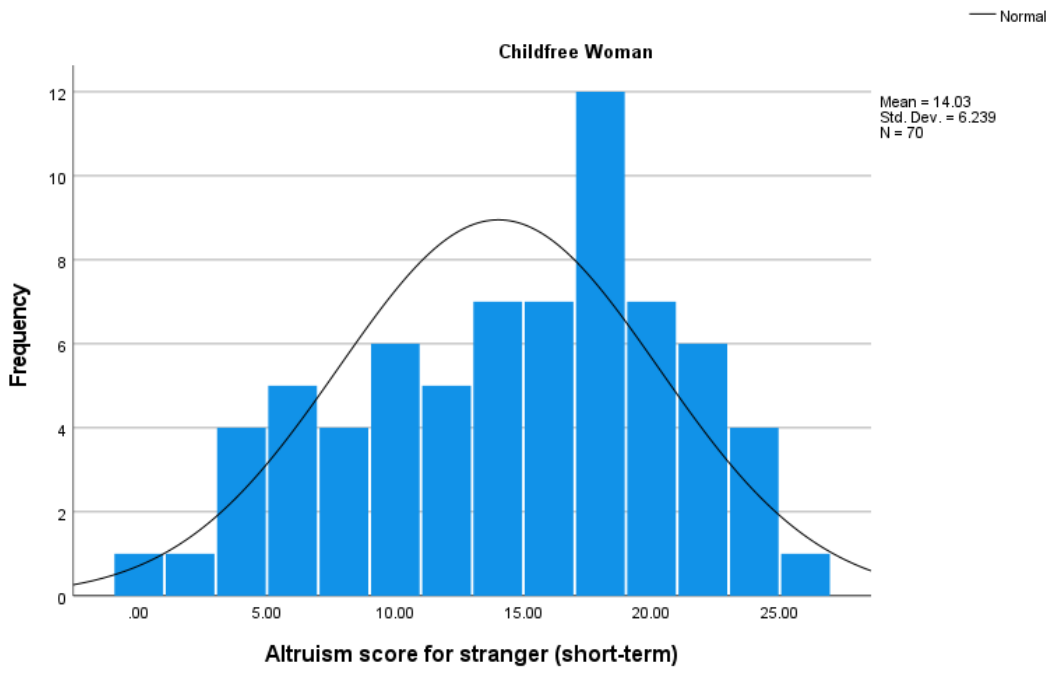

Estimated Marginal Means of Score
Men
Toward
Family
Friend
18.00
17.00
16.00
15.00
Estimated Marginal Means
Long-term
Short-term
Terms

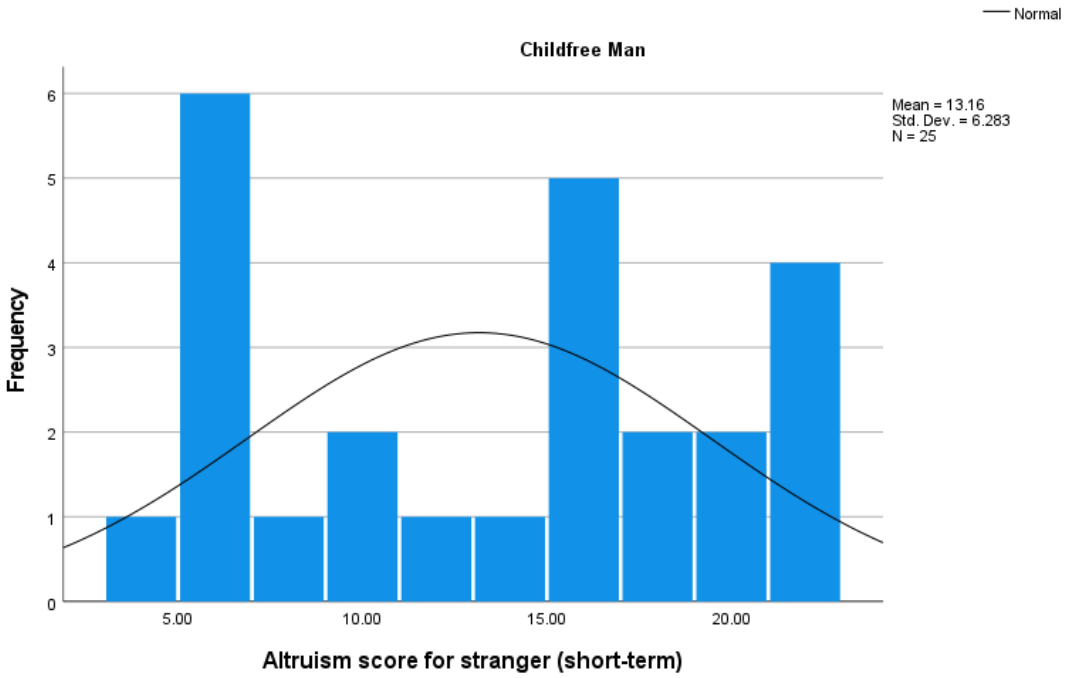
Hypothesis 3

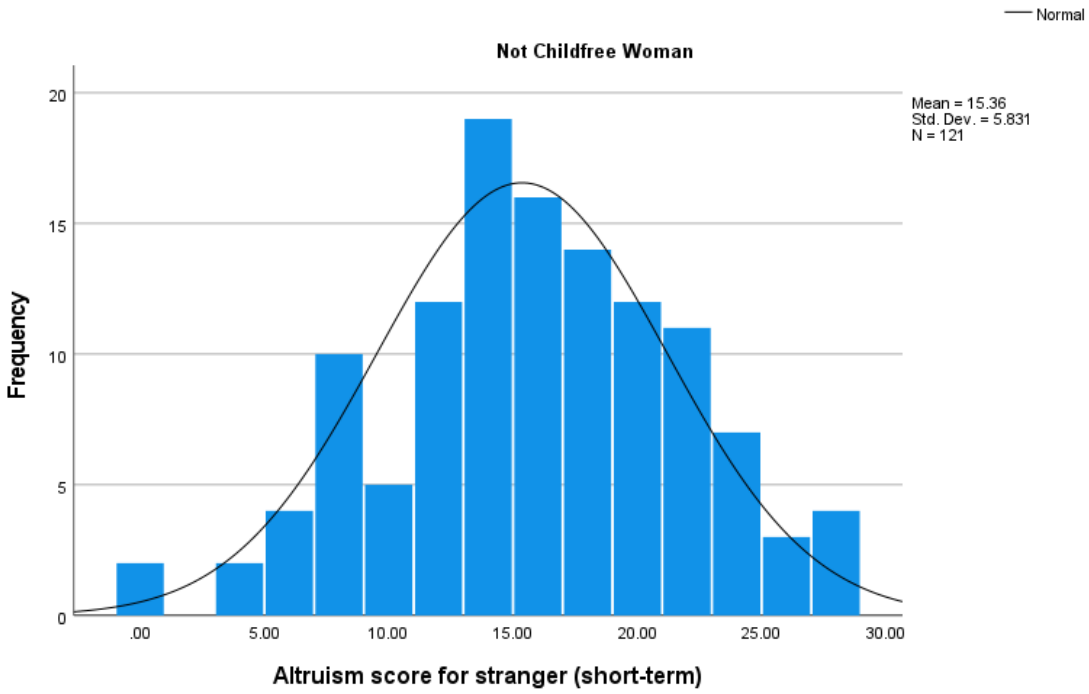
Tests of Normality

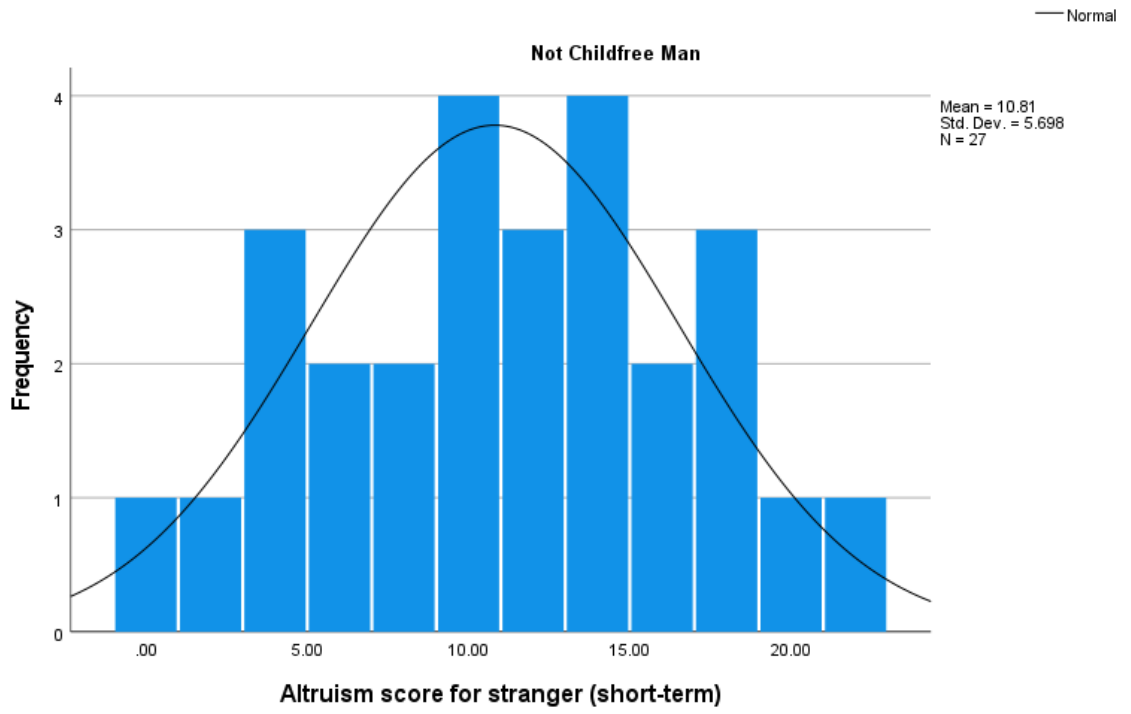
Children Recoded		To which gender identity do you most identify? - Selected Choice	Kolmogorov-Smirnov[a] Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Childfree	Altruism score for stranger (short term)	Woman	.112	70	.031	.966	70	.051
		Man	.154	25	.127	.899	25	.018
	Altruism score stranger (long term)	Woman	.079	70	.200	.975	70	.166
		Man	.126	25	.200	.944	25	.181
Not Childfree	Altruism score for stranger (short term)	Woman	.053	121	.200	.987	121	.302
		Man	.078	27	.200	.979	27	.850
	Altruism score stranger (long term)	Woman	.084	121	.036	.980	121	.073
		Man	.156	27	.093	.960	27	.367

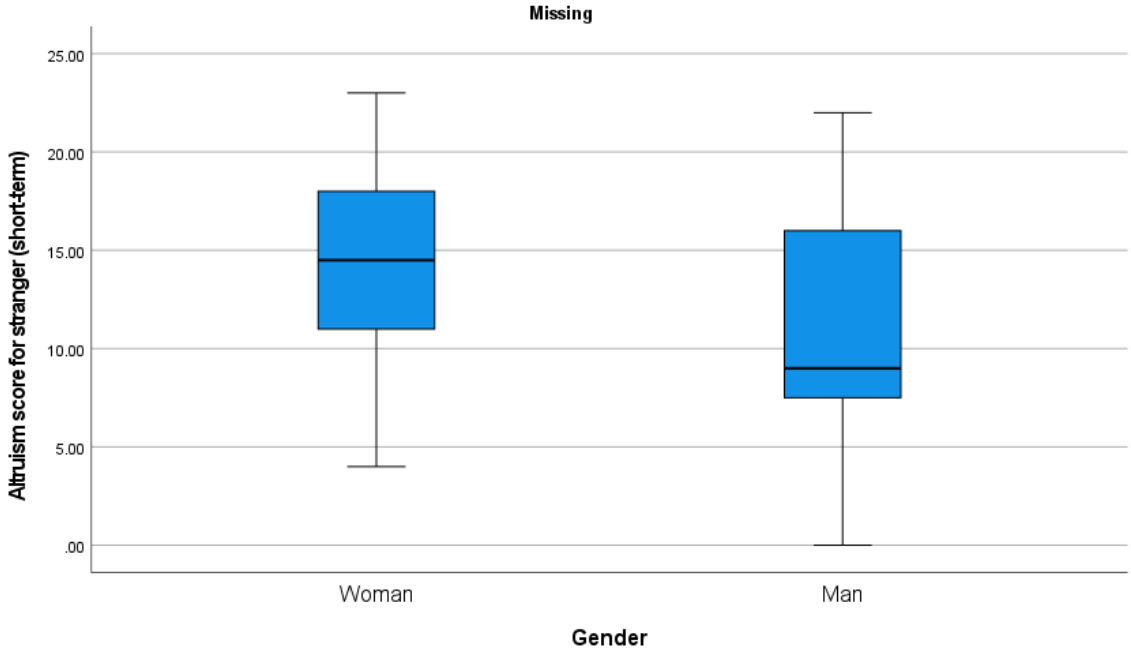
a. Lilliefors Significance Correction

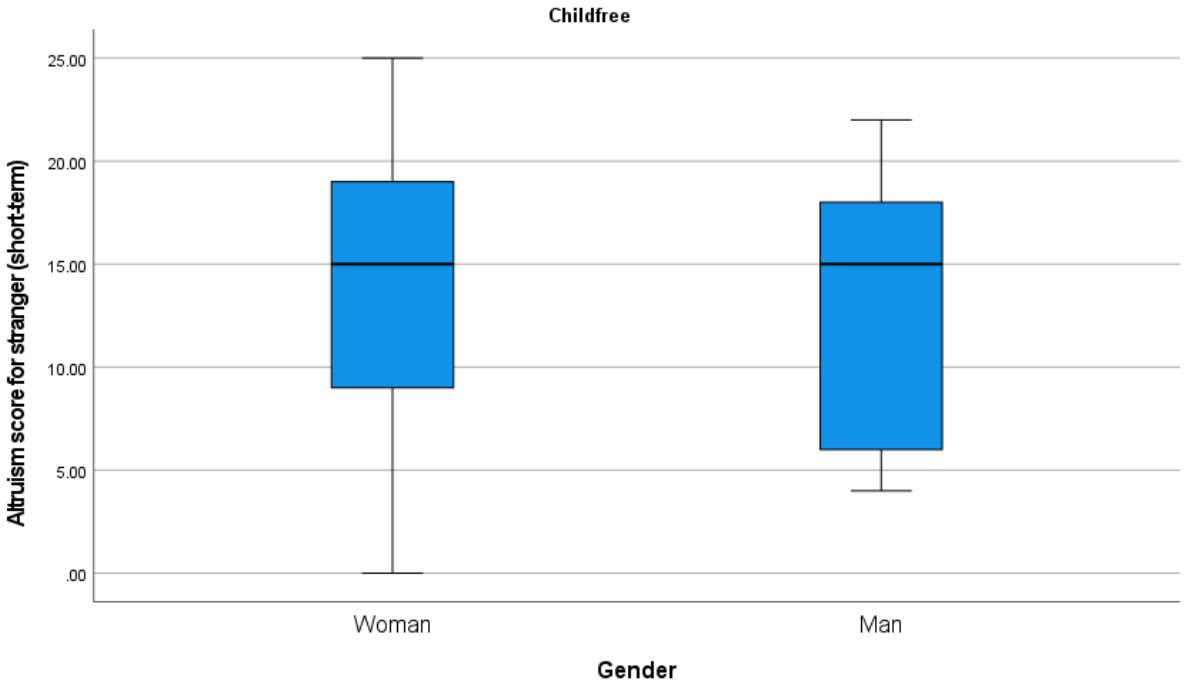


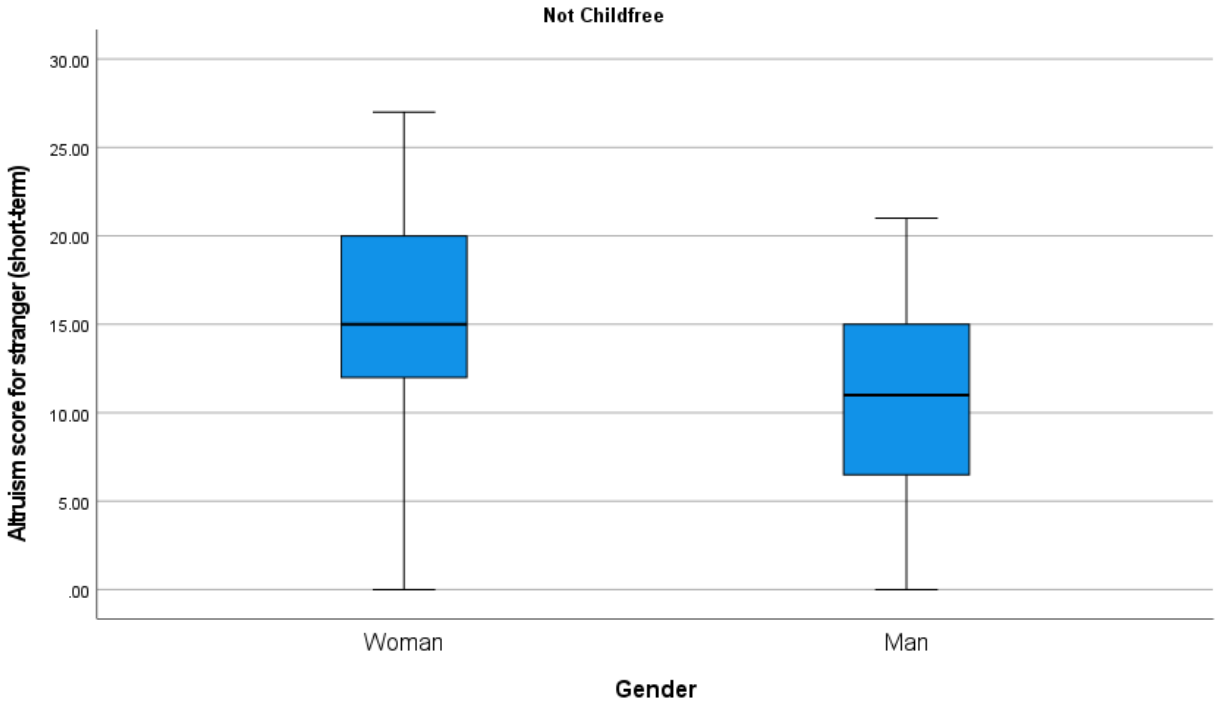

Normal
Childfree Man
Mean = 13.16
Std. Dev. = 6.283
N = 25
Frequency
0
1
2
3
4
5
6
5.00
10.00
15.00
20.00
Altruism score for stranger (short-term)

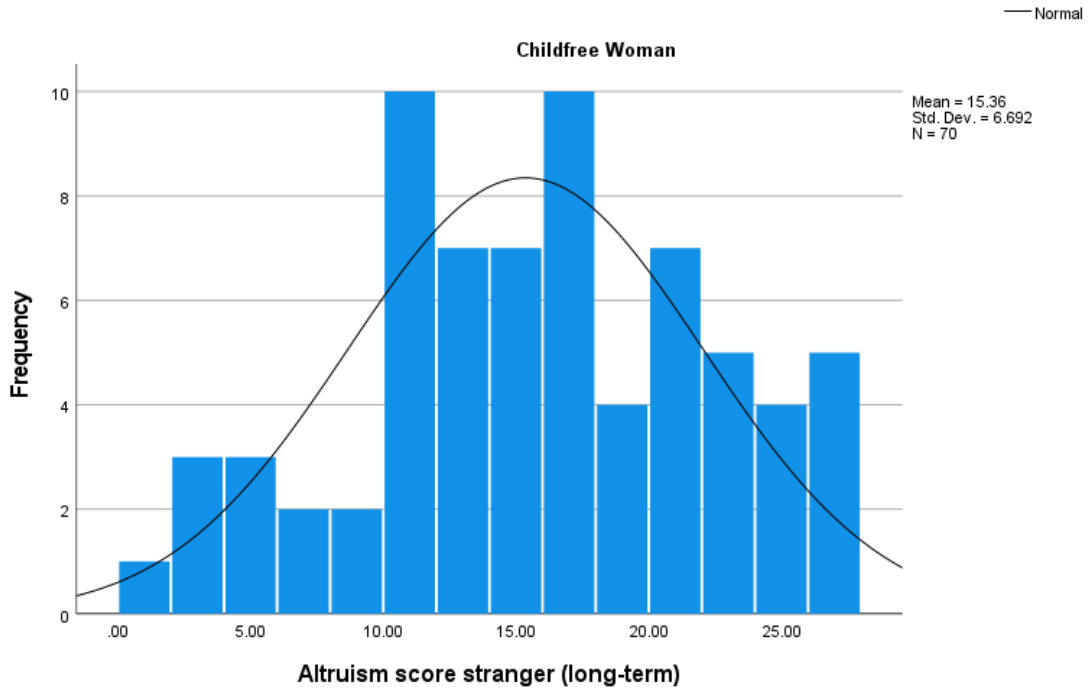

Normal
Not Childfree Woman
Mean = 15.36
Std. Dev. = 5.831
N = 121
Frequency
0
5
10
15
20
.00
5.00
10.00
15.00
20.00
25.00
30.00
Altruism score for stranger (short-term)

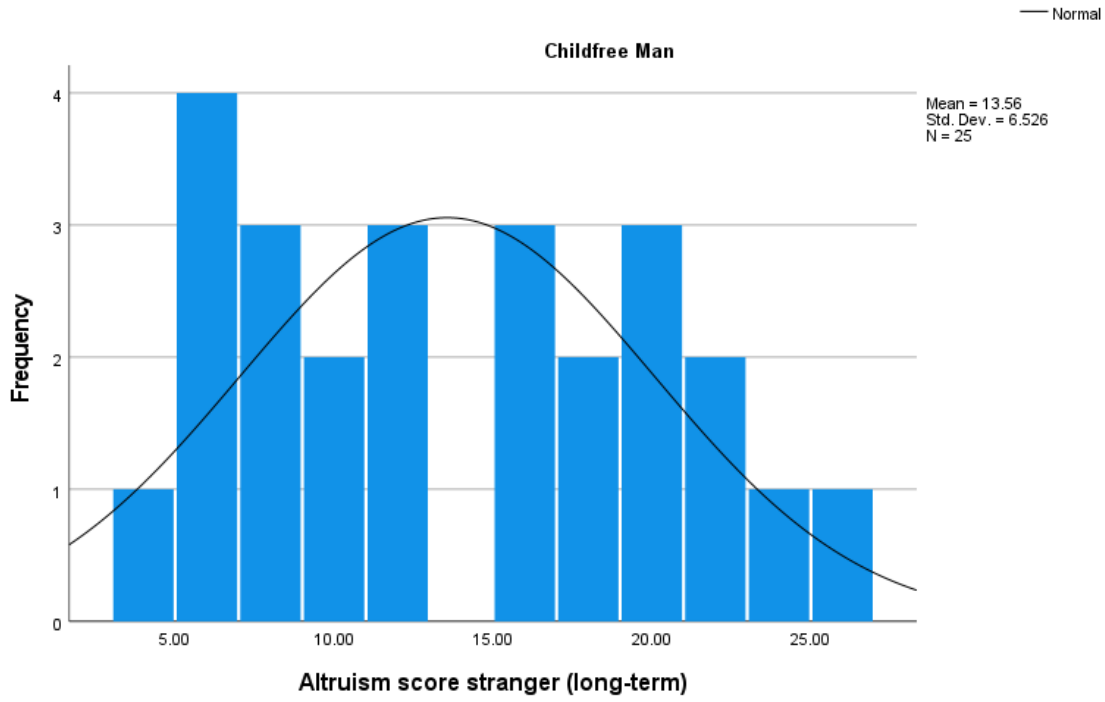

Normal
Not Childfree Man
Mean = 10.81
Std. Dev. = 5.698
N = 27
Frequency
0
1
2
3
4
.00
5.00
10.00
15.00
20.00
Altruism score for stranger (short-term)

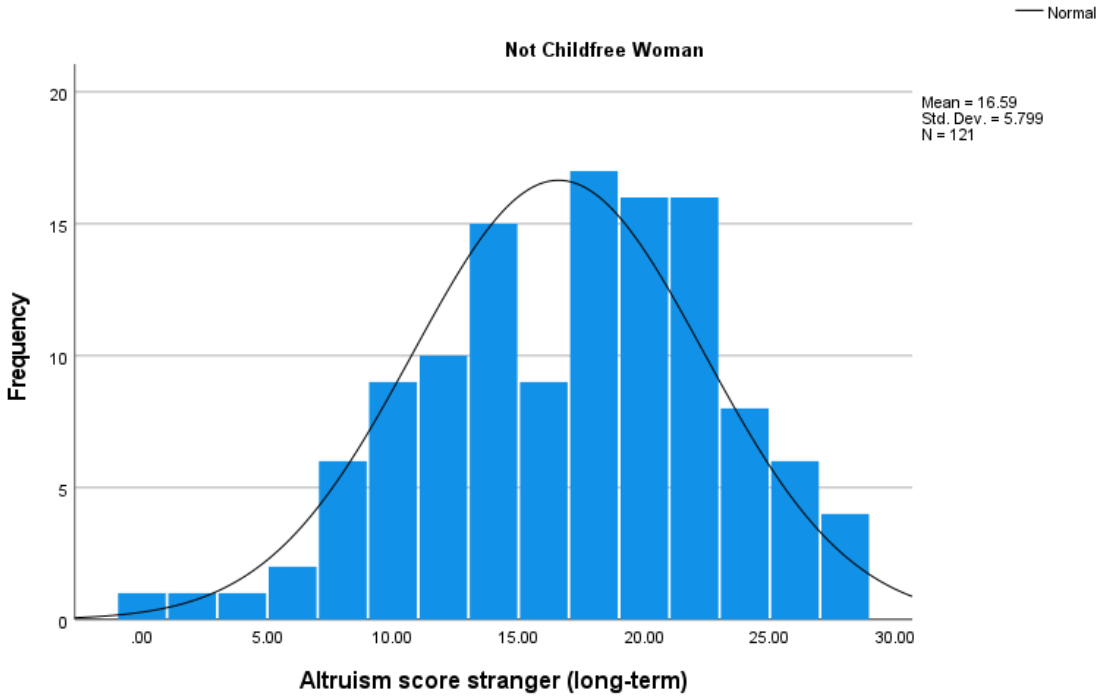

Missing
Altruism score for stranger (short-term)
.00
5.00
10.00
15.00
20.00
25.00
Woman
Man
Gender

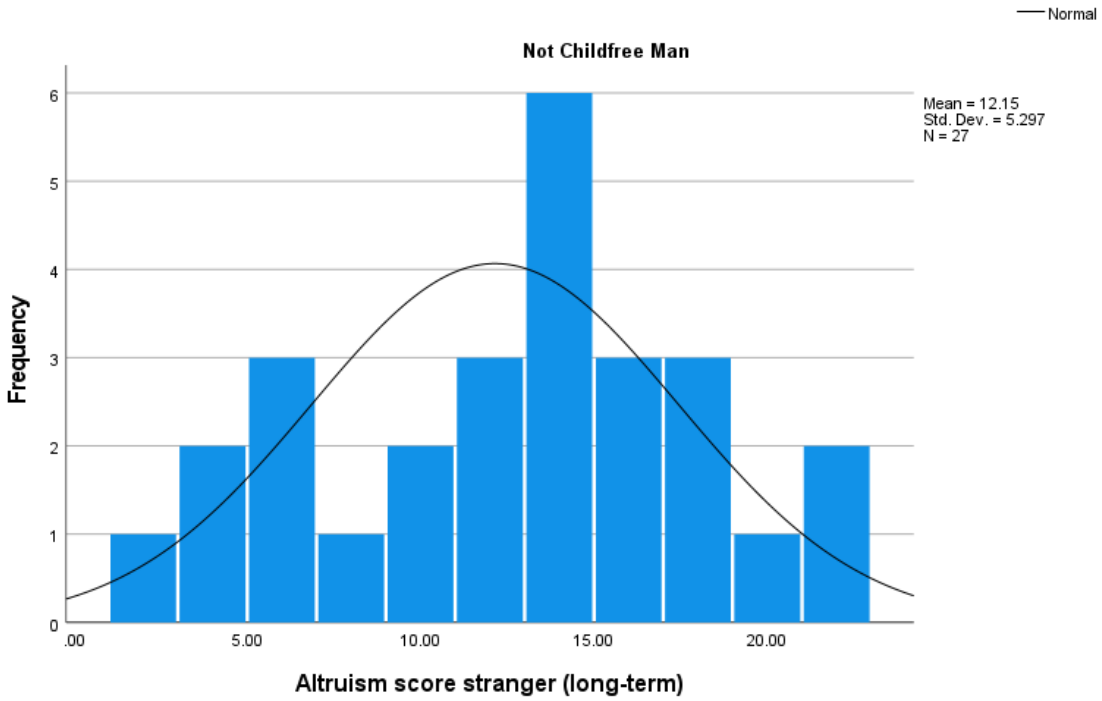

Childfree
Altruism score for stranger (short-term)
25.00
20.00
15.00
10.00
5.00
.00
Woman
Man
Gender

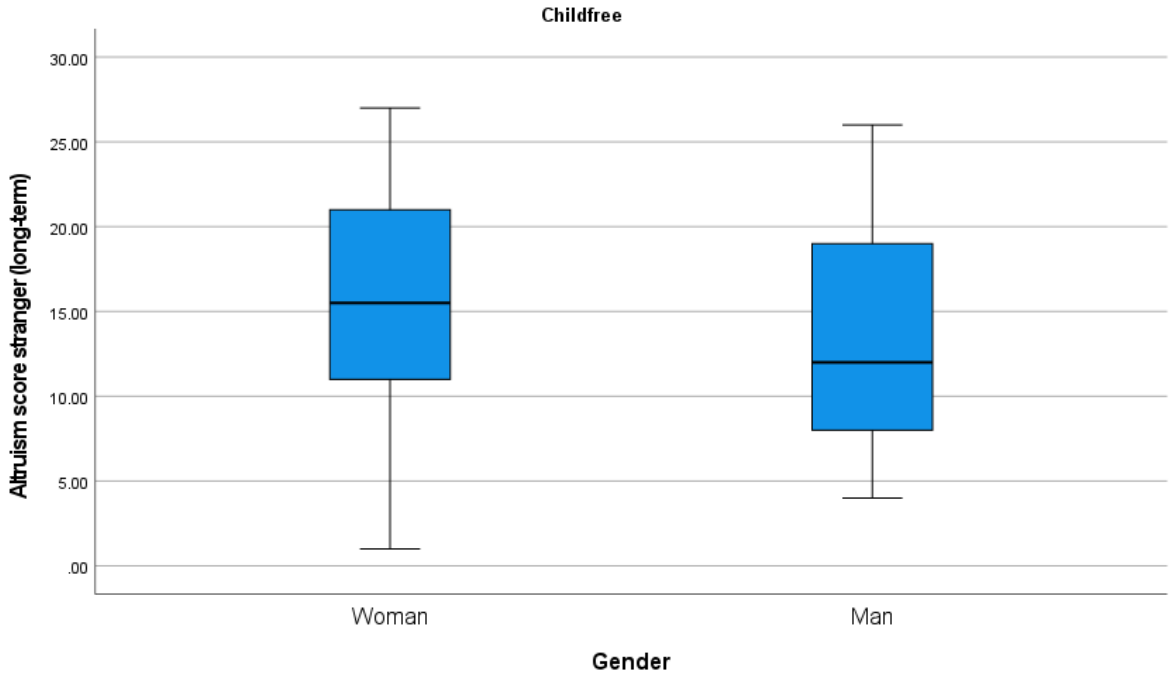

Not Childfree
Altruism score for stranger (short-term)
30.00
25.00
20.00
15.00
10.00
5.00
.00
Woman
Man
Gender

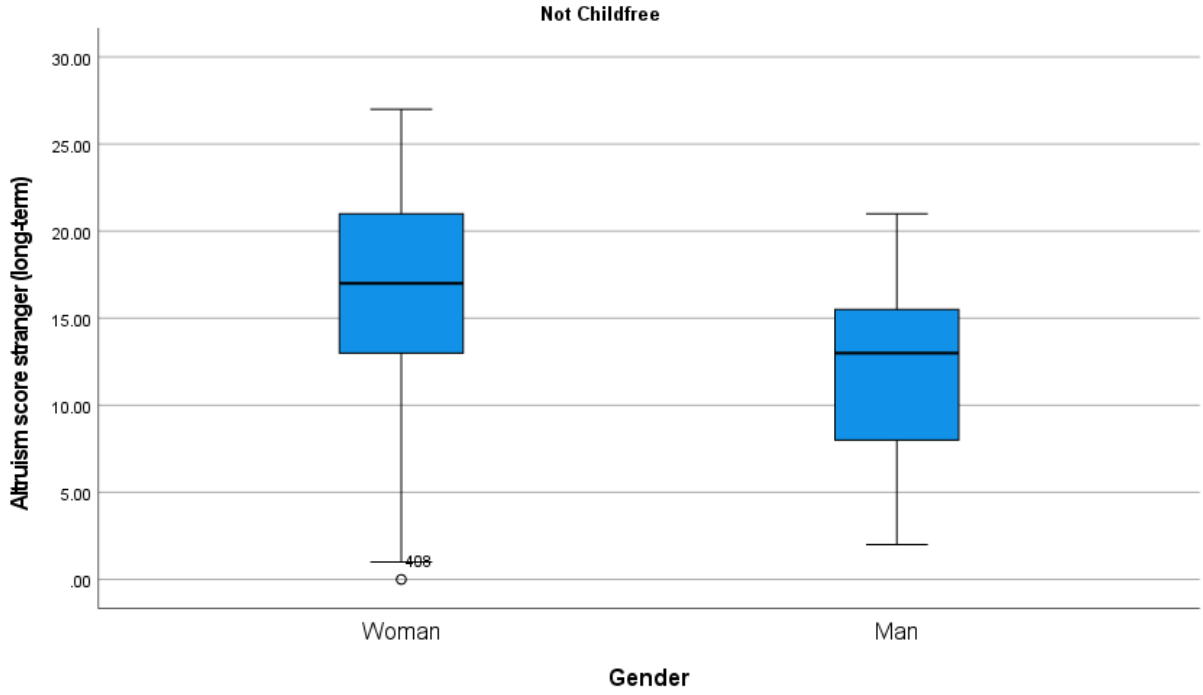

Normal
Childfree Woman
Mean = 15.36
Std. Dev. = 6.692
N = 70
Frequency
0
2
4
6
8
10
.00
5.00
10.00
15.00
20.00
25.00
Altruism score stranger (long-term)


Normal
Childfree Man
Mean = 13.56
Std. Dev. = 6.526
N = 25
Frequency
0
1
2
3
4
5.00
10.00
15.00
20.00
25.00
Altruism score stranger (long-term)


Normal
Not Childfree Woman
Mean = 16.59
Std. Dev. = 5.799
N = 121
Frequency
20
15
10
5
0
.00
5.00
10.00
15.00
20.00
25.00
30.00
Altruism score stranger (long-term)


Normal
Not Childfree Man
Mean = 12.15
Std. Dev. = 5.297
N = 27
Frequency
6
5
4
3
2
1
0
.00
5.00
10.00
15.00
20.00
Altruism score stranger (long-term)


Childfree
Altruism score stranger (long-term)
30.00
25.00
20.00
15.00
10.00
5.00
.00
Woman
Man
Gender


Not Childfree
Altruism score stranger (long-term)
30.00
25.00
20.00
15.00
10.00
5.00
408
.00
Woman
Man
Gender

Hypothesis 4

Tests of Normality

	Which is your sexual orientation? - Selected Choice	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Altruism score (self-evaluation)	Heterosexual or straight	.106	215	<.001	.958	215	<.001
	Gay	.140	17	.200*	.935	17	.260
	Lesbian	.199	20	.038	.895	20	.033
	Bisexual	.147	29	.108	.943	29	.121
	Pansexual	.272	14	.006	.843	14	.018

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Tests of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Altruism score (self-evaluation)	Based on Mean	4.09	5	289	<.001
	Based on Median	3.77	5	289	.003
	Based on Median and with adjusted df	3.77	5	281.23	.003
	Based on trimmed mean	4.05	5	289	<.001

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
						Significance		Std. Error	95% Confidence Interval of the Difference	
		F	Sig.	t	df	Two-Sided p	Mean Difference	Difference	Lower	Upper
alt_self_eval	Equal variances assumed	.93	.335	-.73	2358	.463	-.17	.23	-.61	.28
	Equal variances not assumed			-.77	1251	.443	-.17	.22	-.59	.26

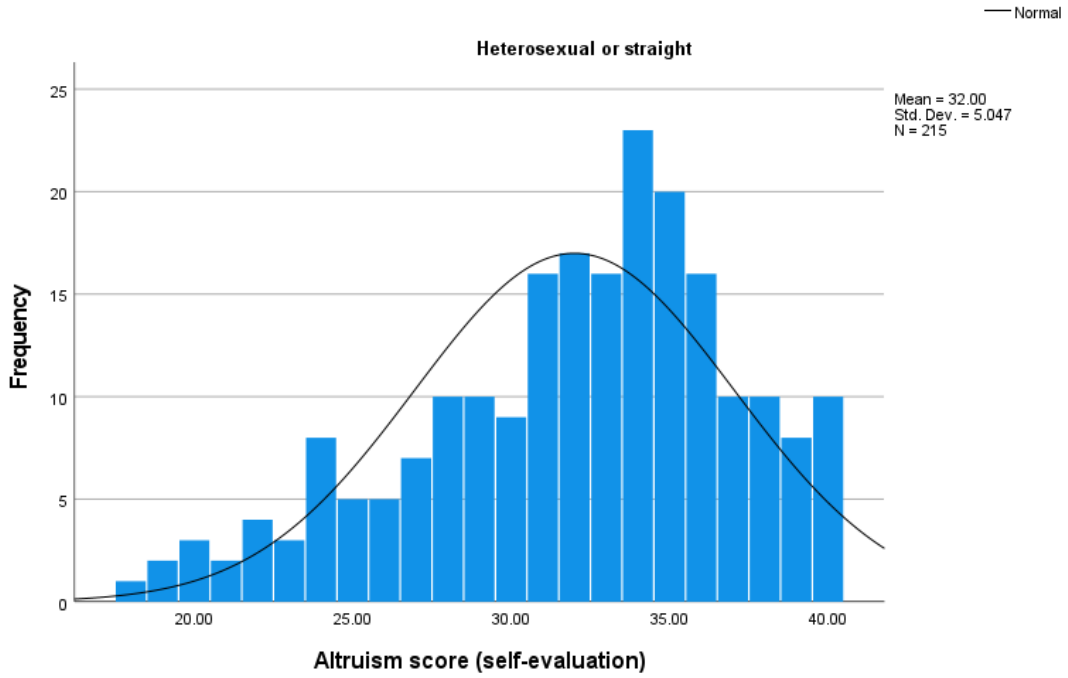
XXX

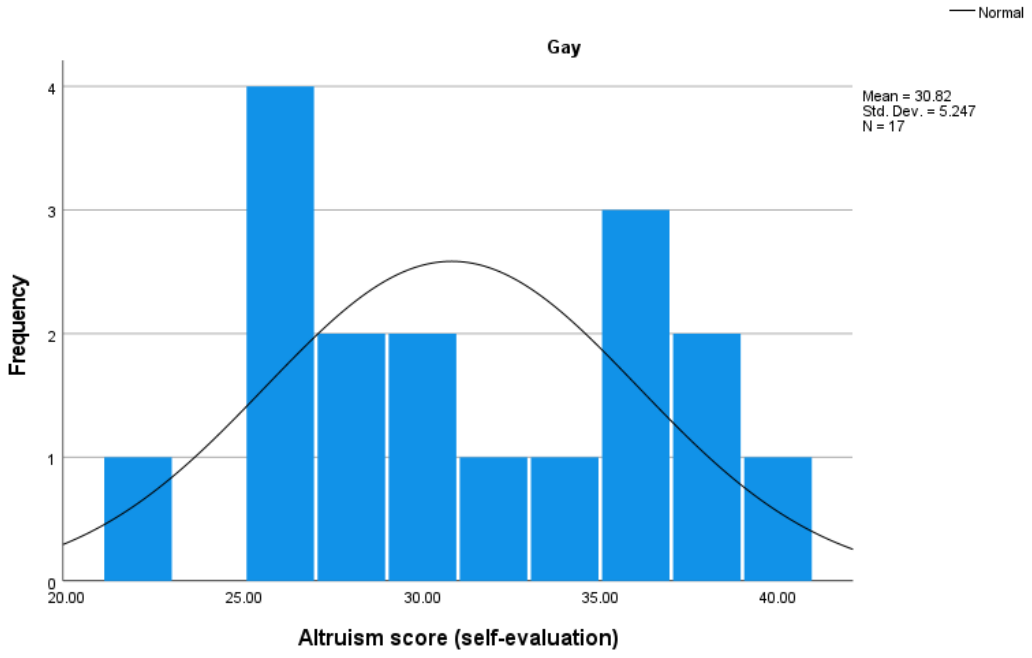
Hypothesis Test Summary

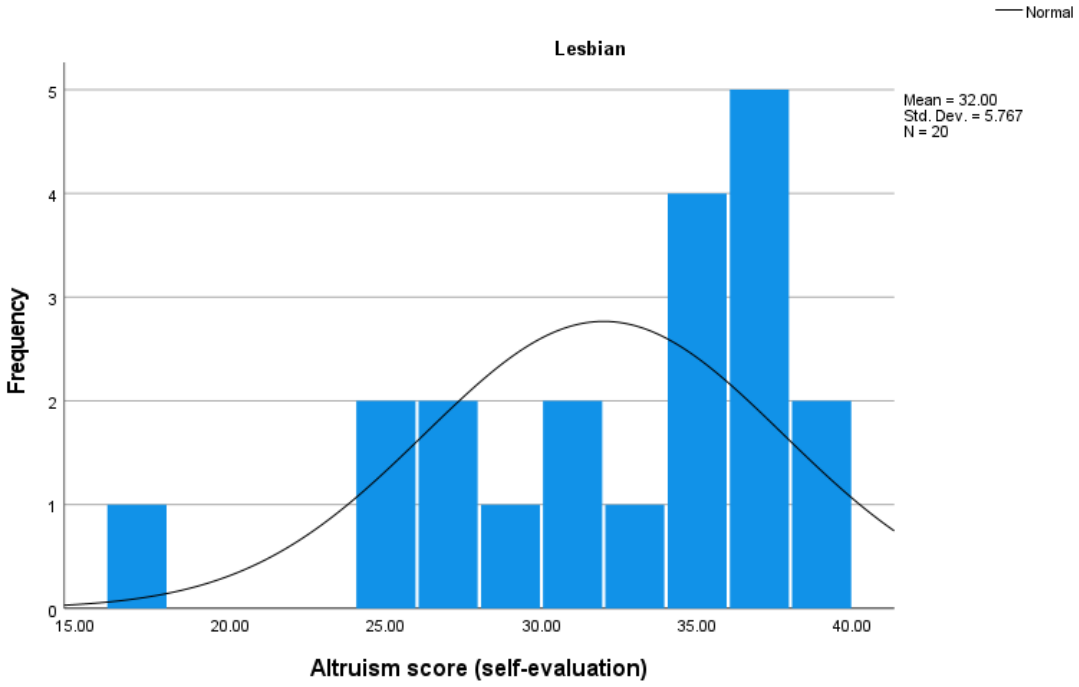
	Null Hypothesis	Test	Sig.[a,b]	Decision
1	The distribution of Altruism score (self-evaluation) is the same across categories of Which is your sexual orientation? - Selected Choice.	Independent-Samples Kruskal-Wallis Test	.758	Retain the null hypothesis.

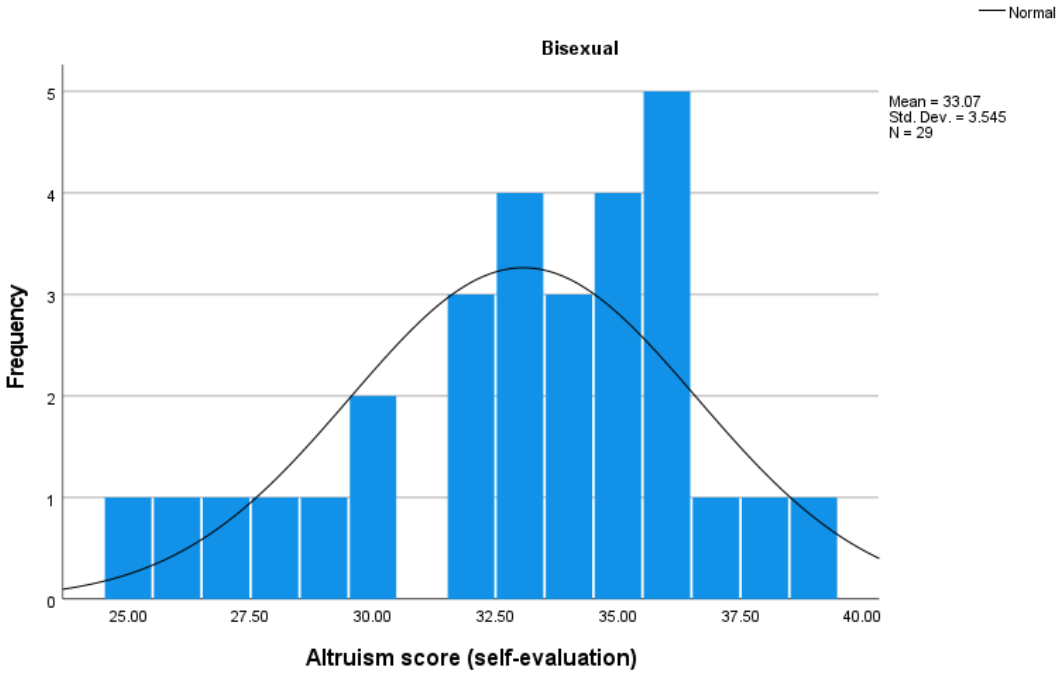
a. The significance level is .050.

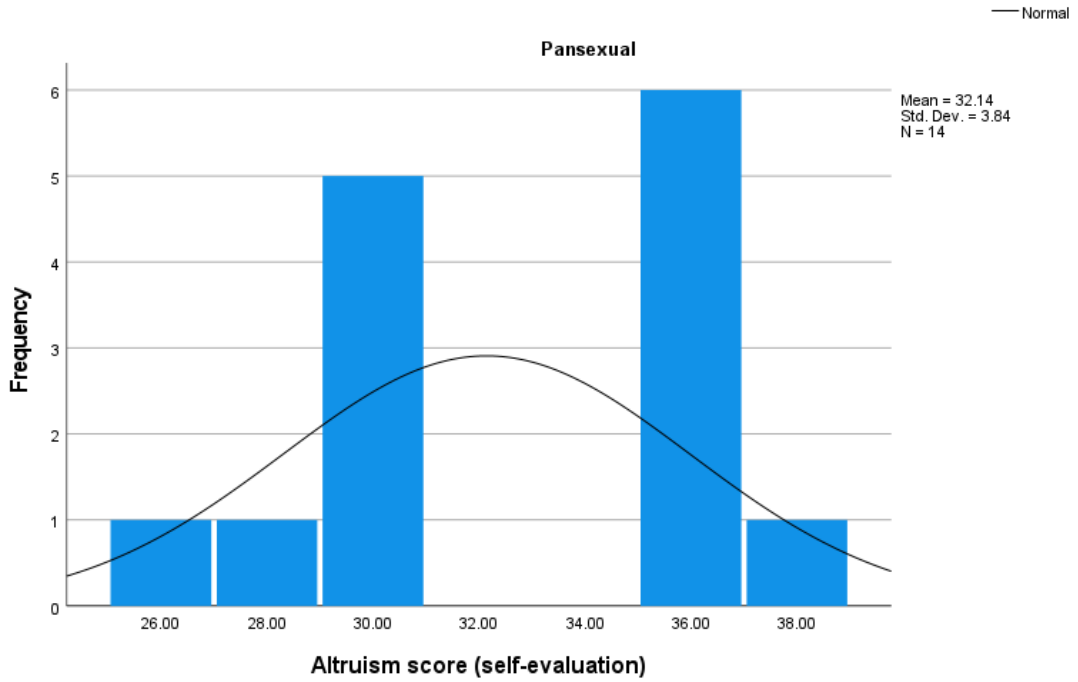
b. Asymptotic significance is displayed.

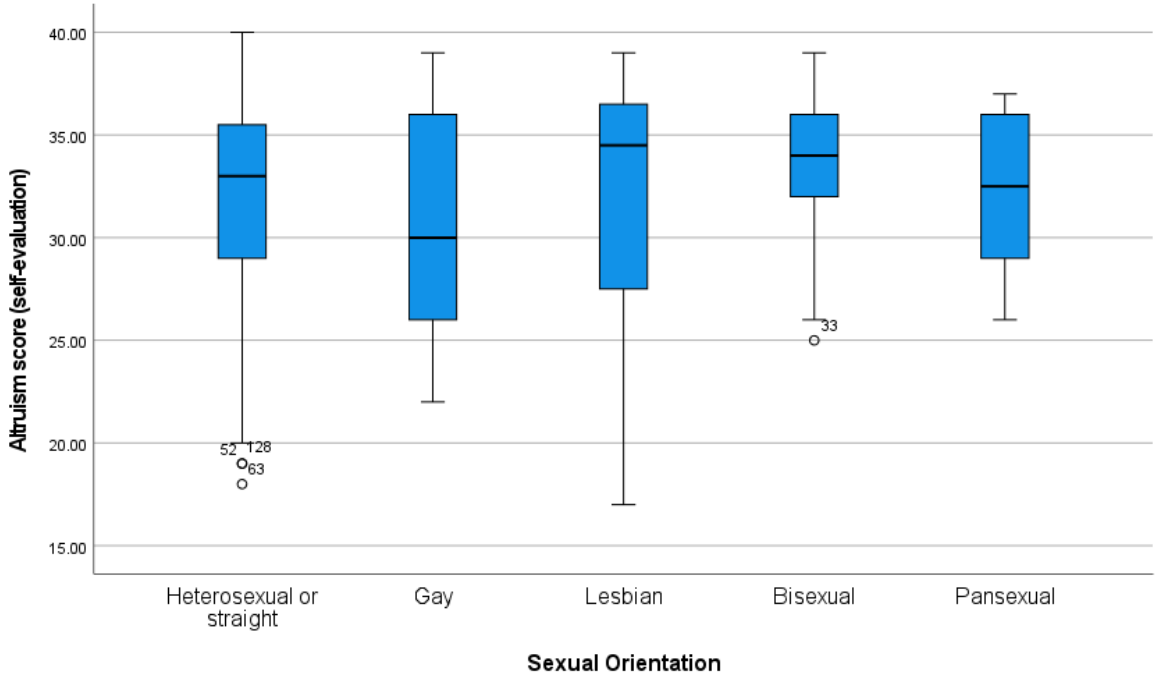

Normal
Heterosexual or straight
Mean = 32.00
Std. Dev. = 5.047
N = 215
Frequency
25
20
15
10
5
0
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)


Normal
Gay
Mean = 30.82
Std. Dev. = 5.247
N = 17
Frequency
4
3
2
1
0
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)


Normal
Lesbian
Mean = 32.00
Std. Dev. = 5.767
N = 20
Frequency
0
1
2
3
4
5
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)


Normal
Bisexual
Mean = 33.07
Std. Dev. = 3.545
N = 29
Frequency
0
1
2
3
4
5
25.00
27.50
30.00
32.50
35.00
37.50
40.00
Altruism score (self-evaluation)


Pansexual
Normal
Mean = 32.14
Std. Dev. = 3.84
N = 14
Frequency
0
1
2
3
4
5
6
26.00
28.00
30.00
32.00
34.00
36.00
38.00
Altruism score (self-evaluation)


Altruism score (self-evaluation)
40.00
35.00
30.00
25.00
20.00
15.00
52
128
63
33
Heterosexual or straight
Gay
Lesbian
Bisexual
Pansexual
Sexual Orientation

Hypothesis 5

Test of Homogeneity of Variances (Short-term)

		Levene Statistic	df1	df2	Sig.
Altruism score for friend (short term)	Based on Mean	1.99	5	293	.080
	Based on Median	1.70	5	293	.135
	Based on Median and with adjusted df	1.70	5	285.04	.135
	Based on trimmed mean	1.92	5	293	.091

Test of Homogeneity of Variances (Long-term)

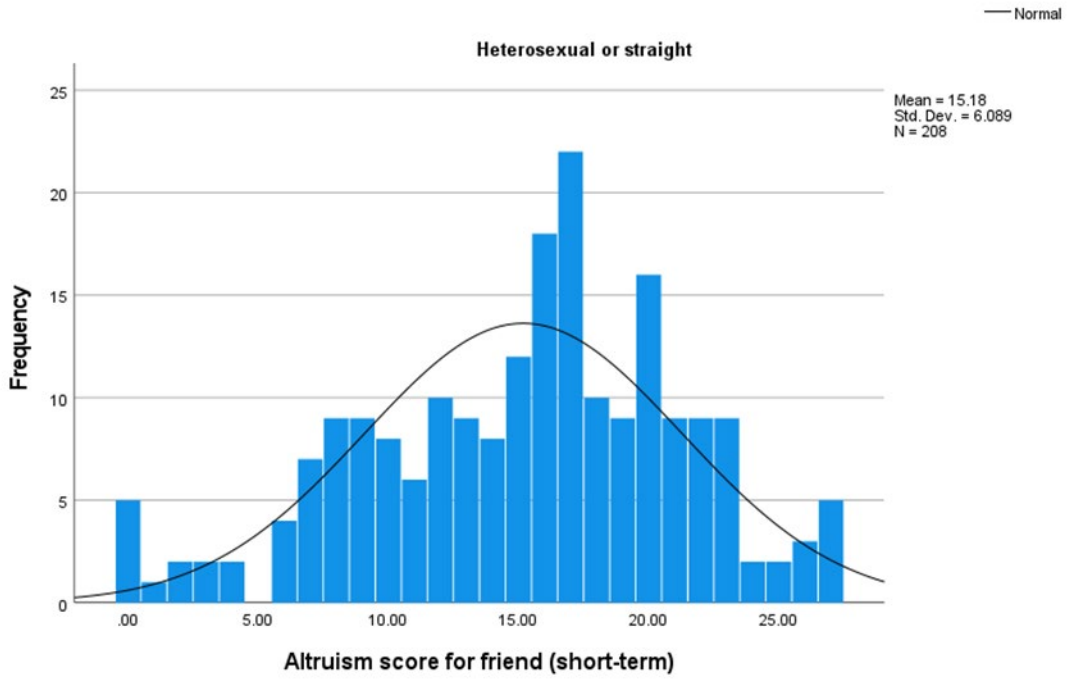
		Levene Statistic	df1	df2	Sig.
Altruism score friend (long term)	Based on Mean	1.11	5	285	.355
	Based on Median	1.03	5	285	.399
	Based on Median and with adjusted df	1.03	5	277.68	.399
	Based on trimmed mean	1.08	5	285	.370

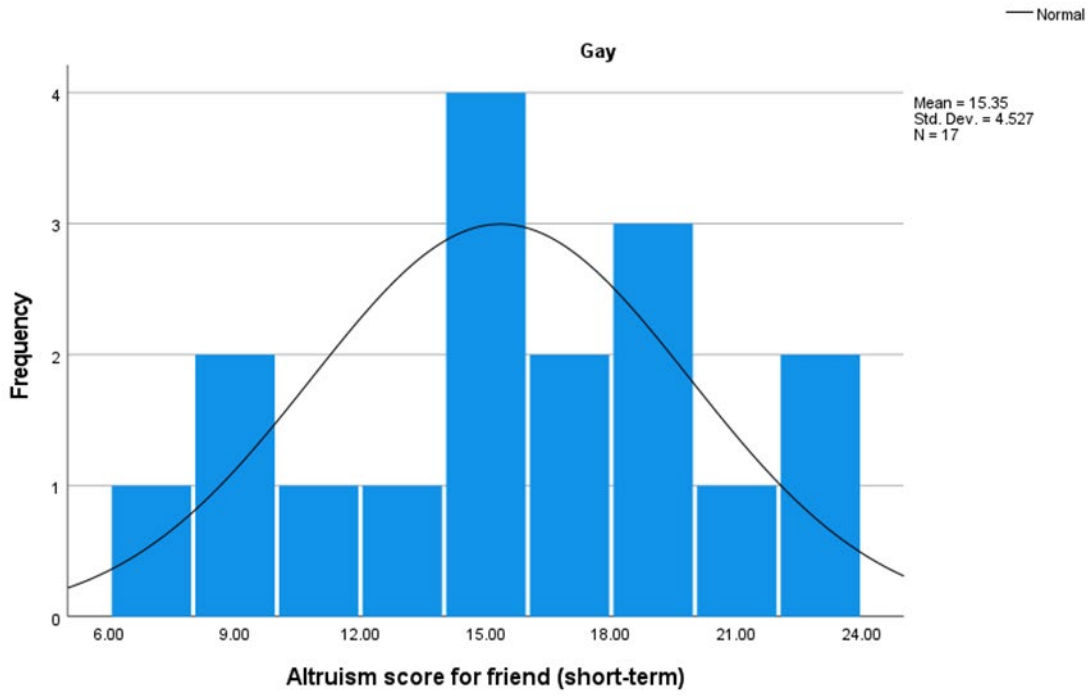
Tests of Normality

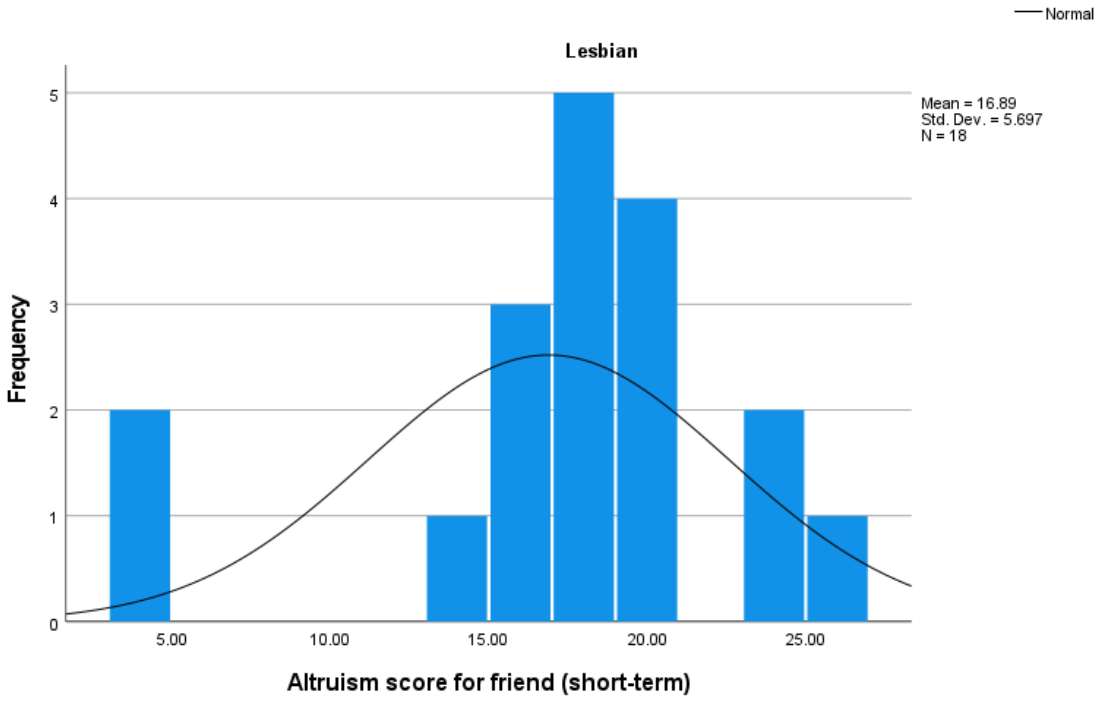
		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Sexual Orientation	Statistic	df	Sig.	Statistic	df	Sig.
Altruism score for friend (short term)	Heterosexual or straight	.101	208	<.001	.977	208	.002
	Gay	.113	17	.200*	.959	17	.622
	Lesbian	.203	18	.047	.882	18	.028
	Bisexual	.149	28	.114	.918	28	.031
	Pansexual	.154	13	.200*	.954	13	.659
Altruism score friend (long term)	Heterosexual or straight	.066	208	.029	.973	208	<.001
	Gay	.169	17	.200*	.944	17	.365
	Lesbian	.211	18	.033	.829	18	.004
	Bisexual	.071	28	.200*	.980	28	.851
	Pansexual	.119	13	.200*	.978	13	.966

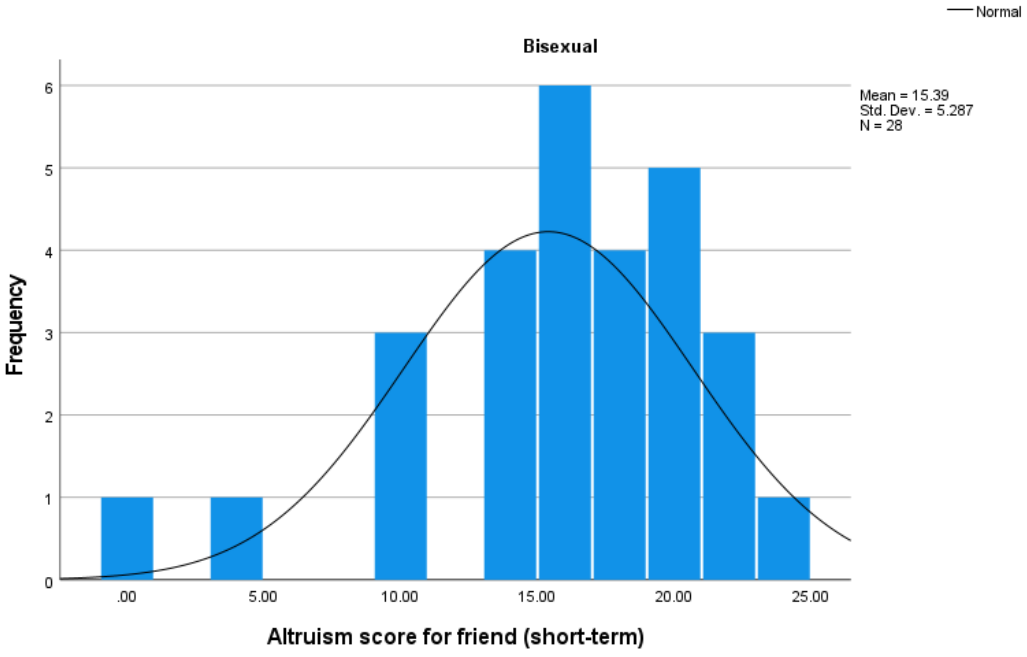
*. This is a lower bound of the true significance.

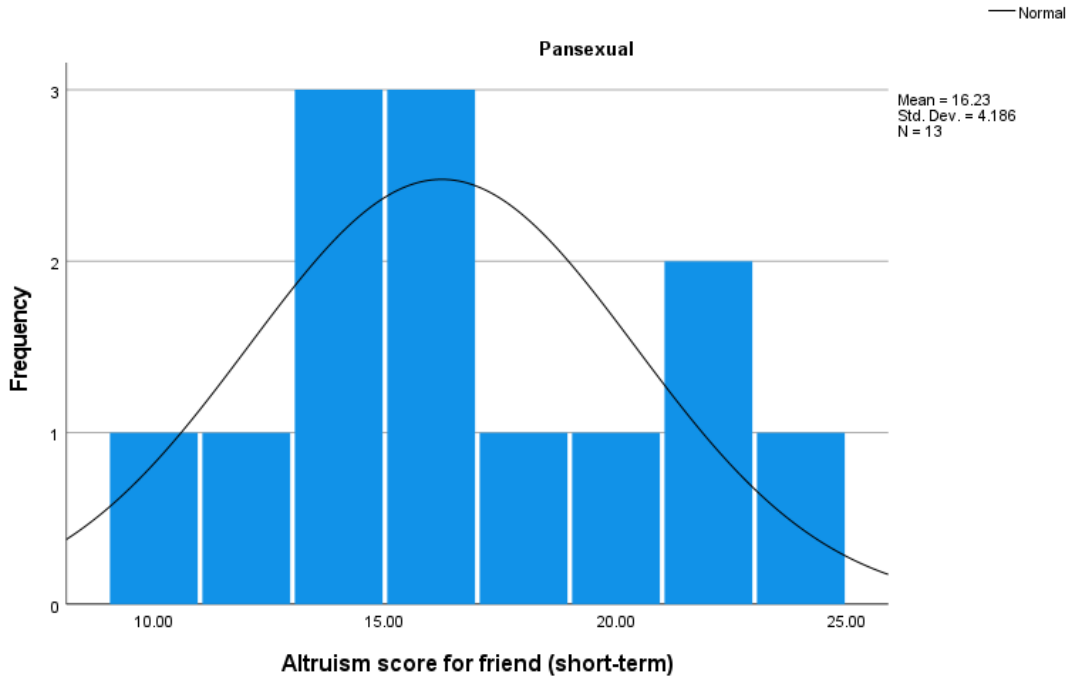
a. Lilliefors Significance Correction

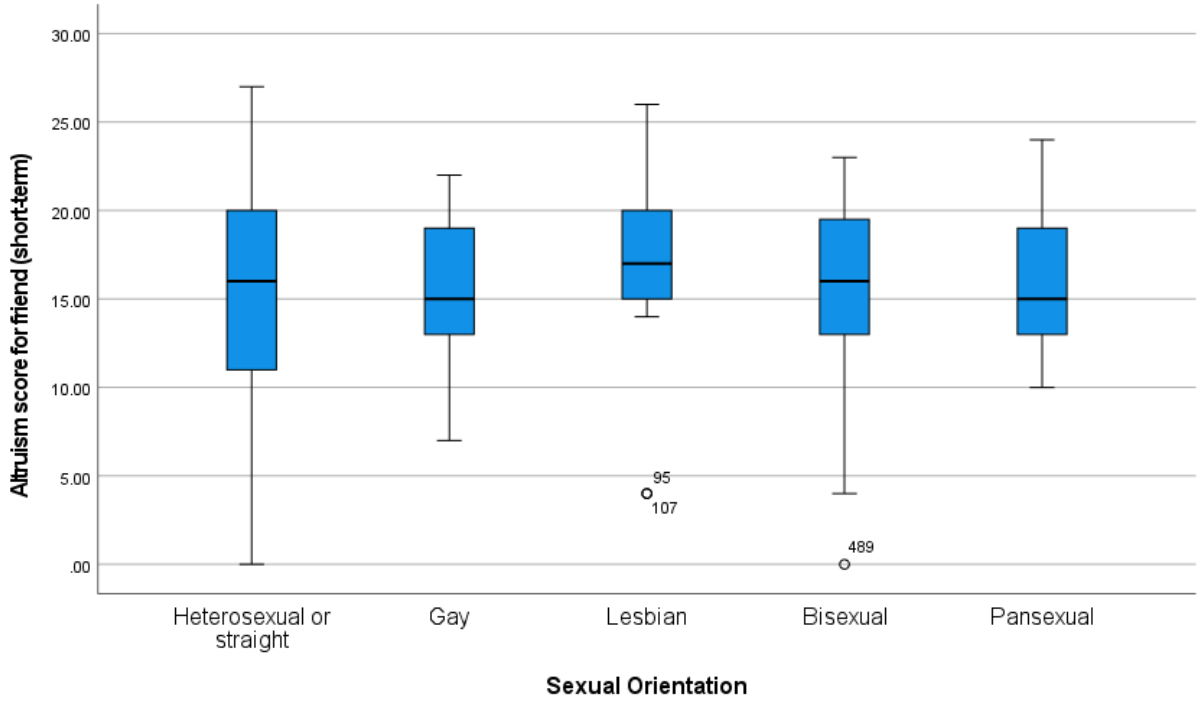

Normal
Heterosexual or straight
Mean = 15.18
Std. Dev. = 6.089
N = 208
Frequency
25
20
15
10
5
0
.00
5.00
10.00
15.00
20.00
25.00
Altruism score for friend (short-term)

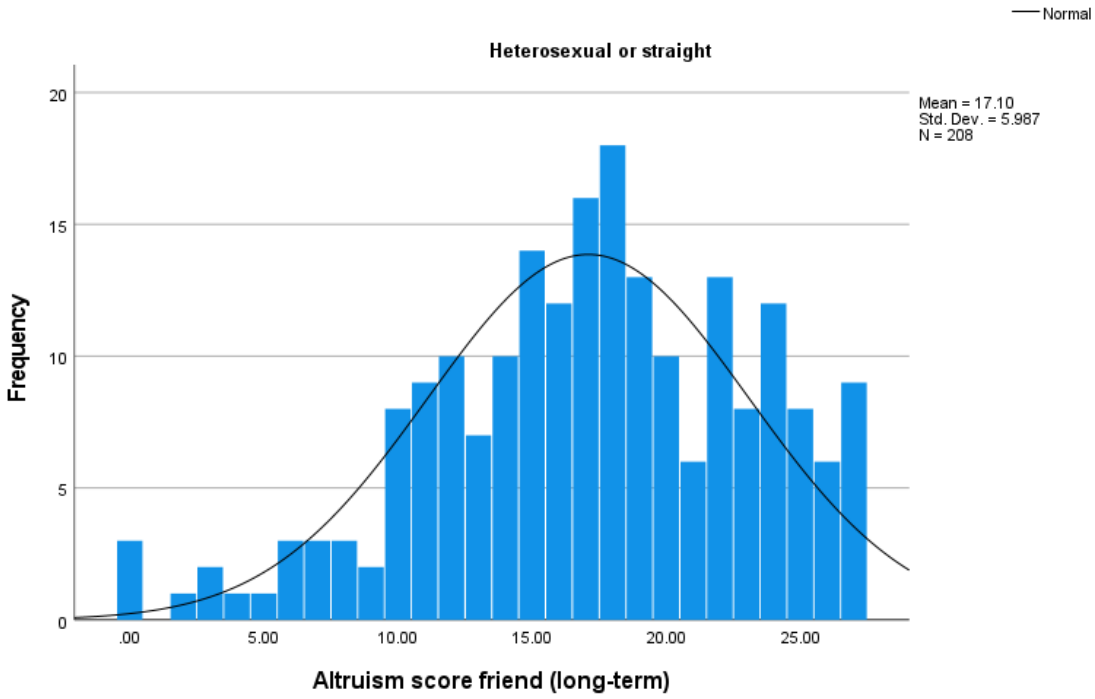

Normal
Gay
Mean = 15.35
Std. Dev. = 4.527
N = 17
Frequency
4
3
2
1
0
6.00
9.00
12.00
15.00
18.00
21.00
24.00
Altruism score for friend (short-term)

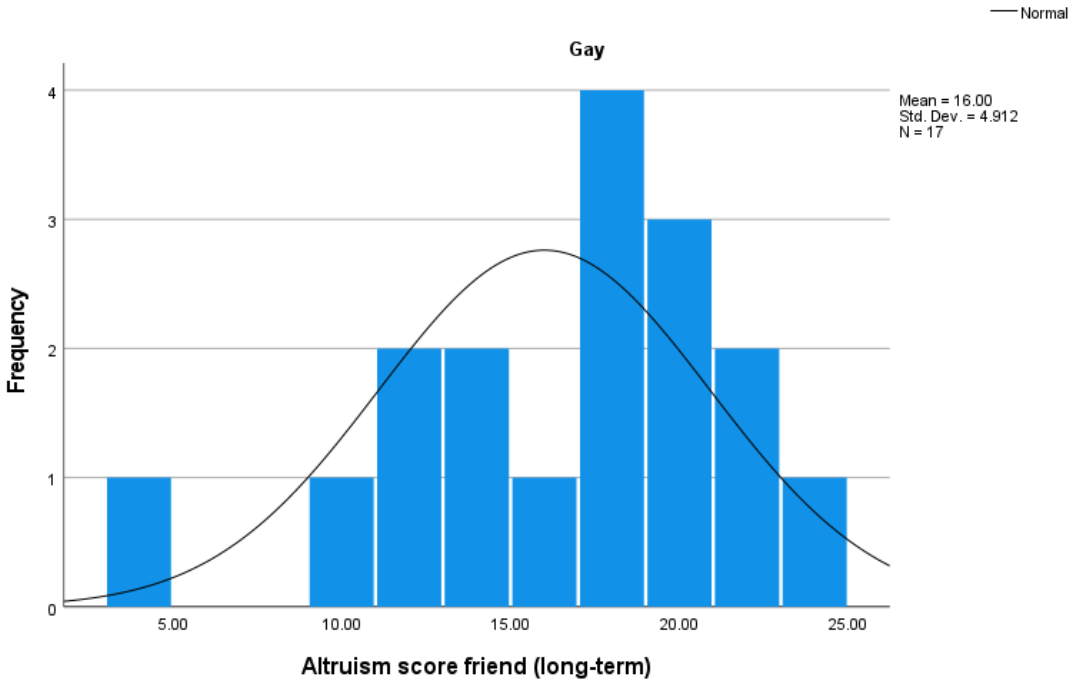

Normal
Lesbian
Mean = 16.89
Std. Dev. = 5.697
N = 18
Frequency
0
1
2
3
4
5
5.00
10.00
15.00
20.00
25.00
Altruism score for friend (short-term)

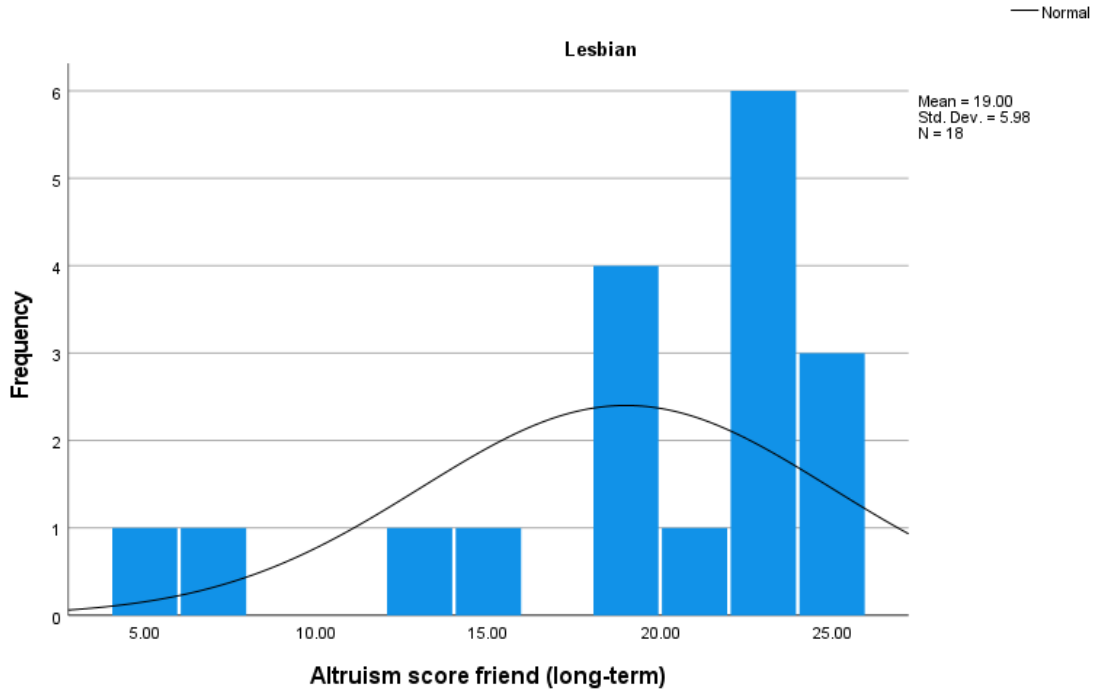

Normal
Bisexual
Mean = 15.39
Std. Dev. = 5.287
N = 28
Frequency
0
1
2
3
4
5
6
.00
5.00
10.00
15.00
20.00
25.00
Altruism score for friend (short-term)

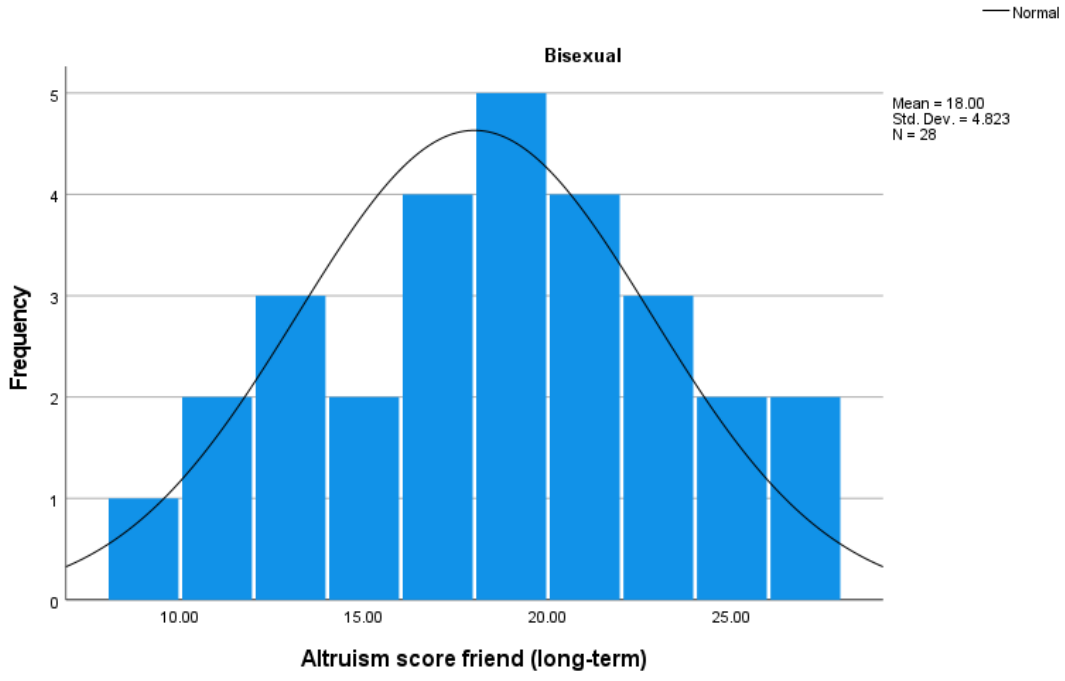

Normal
Pansexual
Mean = 16.23
Std. Dev. = 4.186
N = 13
Frequency
3
2
1
0
10.00
15.00
20.00
25.00
Altruism score for friend (short-term)

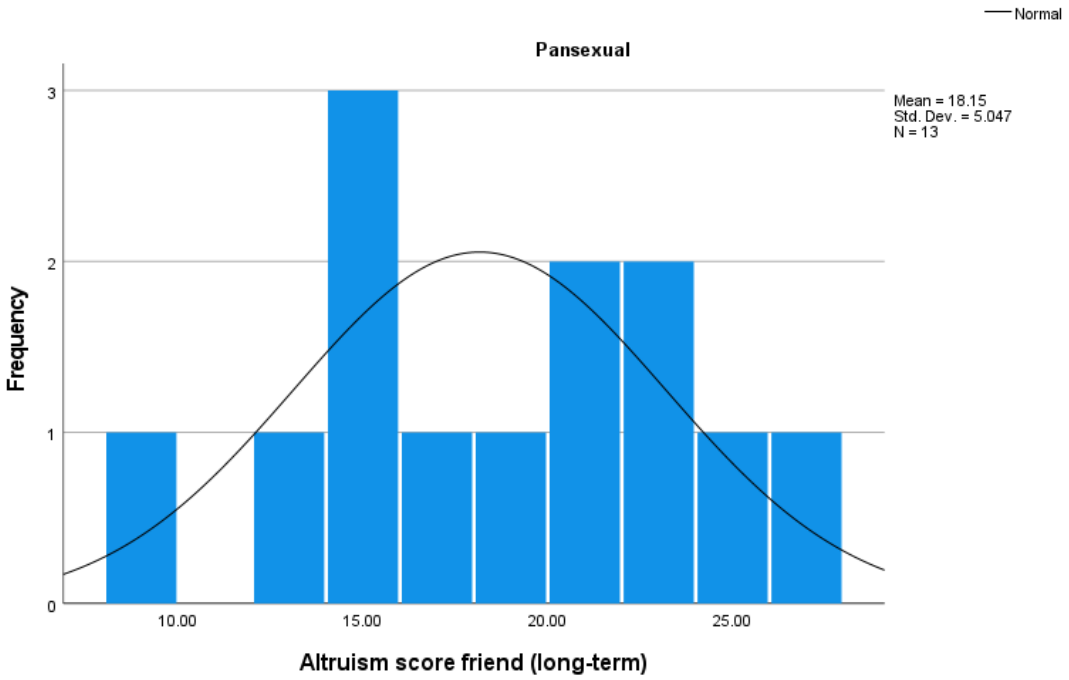

Altruism score for friend (short-term)
30.00
25.00
20.00
15.00
10.00
5.00
.00
95
107
489
Heterosexual or straight
Gay
Lesbian
Bisexual
Pansexual
Sexual Orientation

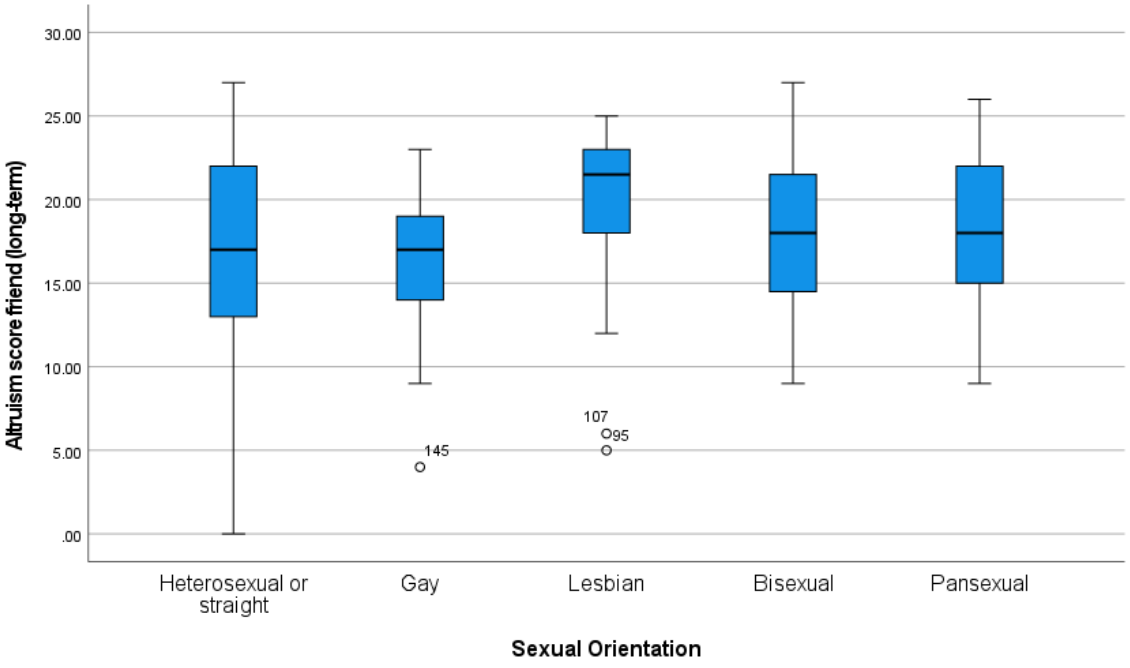

Normal
Heterosexual or straight
Mean = 17.10
Std. Dev. = 5.987
N = 208
Frequency
20
15
10
5
0
.00
5.00
10.00
15.00
20.00
25.00
Altruism score friend (long-term)

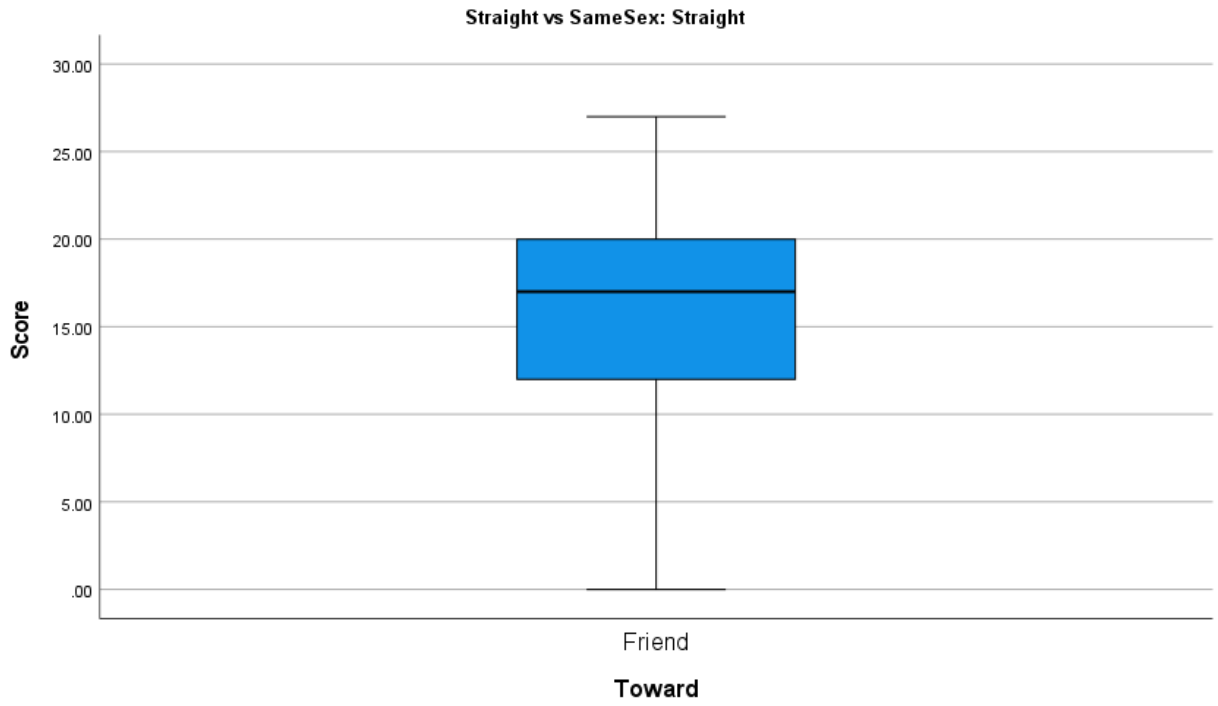

Normal
Gay
Mean = 16.00
Std. Dev. = 4.912
N = 17
Frequency
4
3
2
1
0
5.00
10.00
15.00
20.00
25.00
Altruism score friend (long-term)

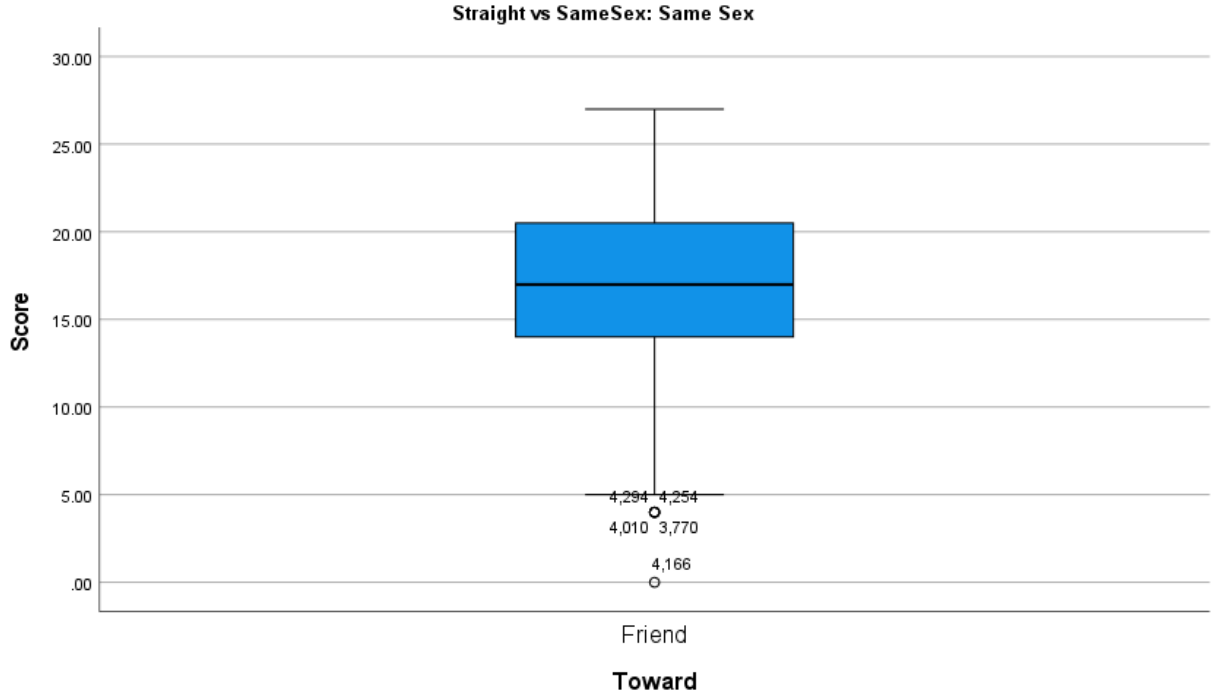

Normal
Lesbian
Mean = 19.00
Std. Dev. = 5.98
N = 18
Frequency
0
1
2
3
4
5
6
5.00
10.00
15.00
20.00
25.00
Altruism score friend (long-term)


Normal
Bisexual
Mean = 18.00
Std. Dev. = 4.823
N = 28
Frequency
0
1
2
3
4
5
10.00
15.00
20.00
25.00
Altruism score friend (long-term)


Normal
Pansexual
Mean = 18.15
Std. Dev. = 5.047
N = 13
Frequency
3
2
1
0
10.00
15.00
20.00
25.00
Altruism score friend (long-term)


Altruism score friend (long-term)
30.00
25.00
20.00
15.00
10.00
5.00
.00
107
95
145
Heterosexual or straight
Gay
Lesbian
Bisexual
Pansexual
Sexual Orientation


Straight vs SameSex: Straight
30.00
25.00
20.00
15.00
10.00
5.00
.00
Score
Friend
Toward


Straight vs SameSex: Same Sex
30.00
25.00
20.00
15.00
10.00
5.00
.00
Score
4,294
4,254
4,010
3,770
4,166
Friend
Toward

Hypothesis 6

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	328.92	770.27	<.001
Age_Reproduction	1	332.53	16.34	<.001
Family	1	1578.32	97.09	<.001
Friend	1	1578.17	74.87	<.001
General	1	1578.25	4.80	.029
Age_Reproduction * Family	1	1578.59	24.84	<.001
Age_Reproduction * Friend	1	1578.62	48.01	<.001
Age_Reproduction * General	1	1578.70	.32	.569

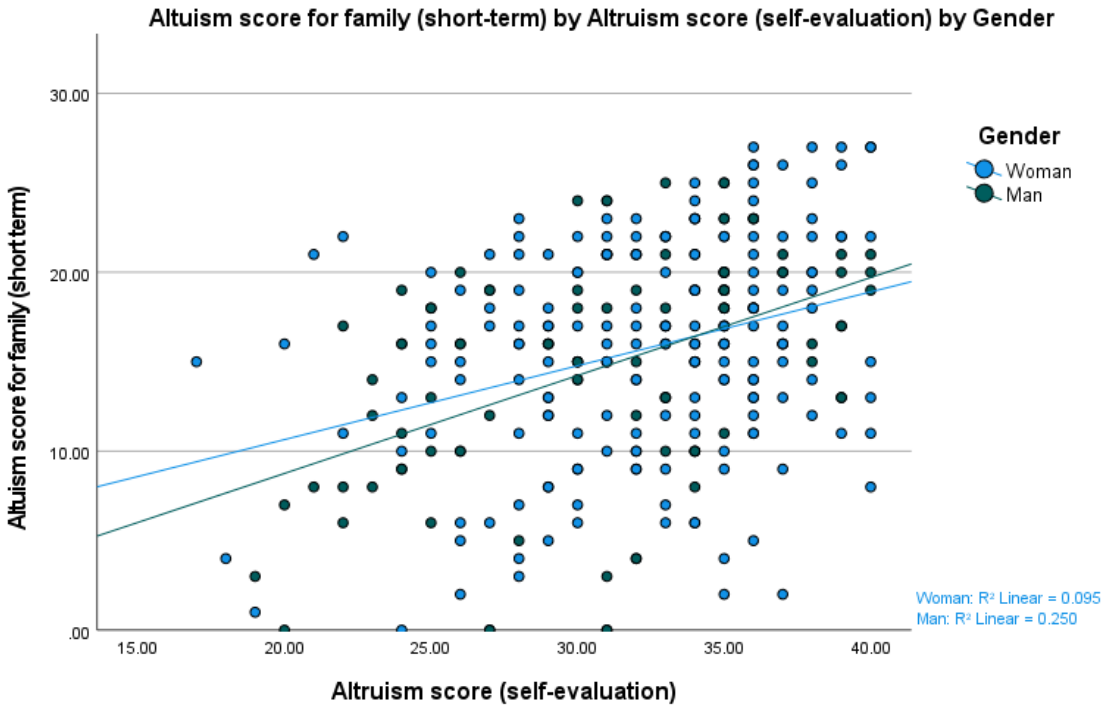
a. Dependent Variable: Score.

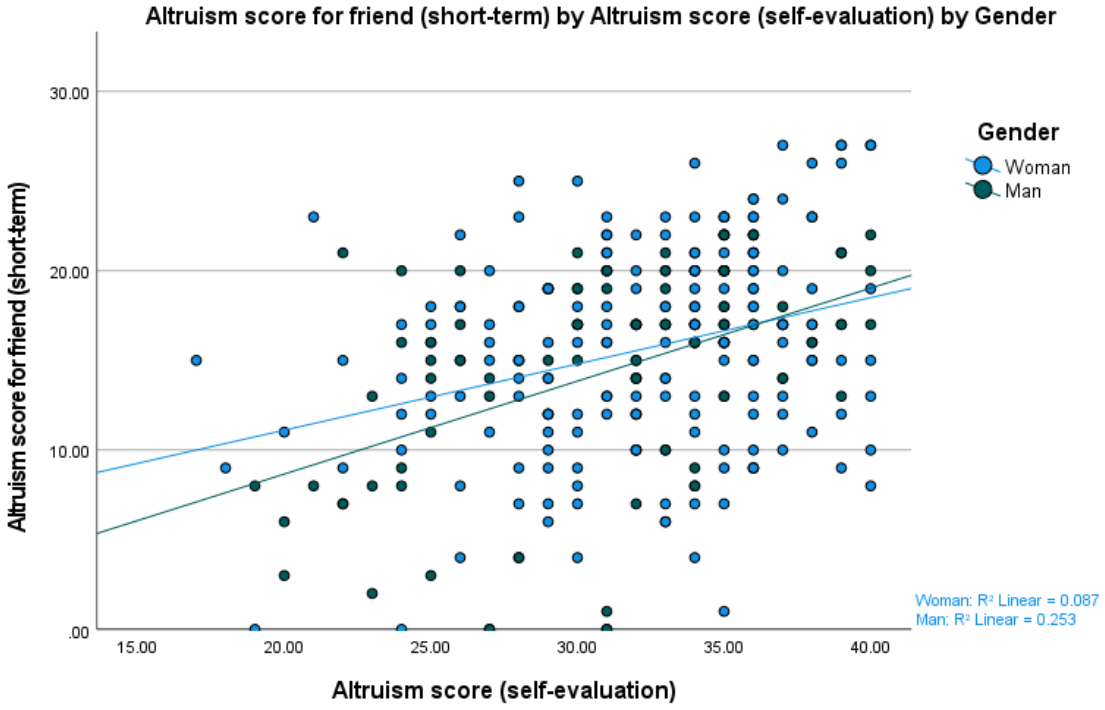
Estimates of Covariance Parameters[a]

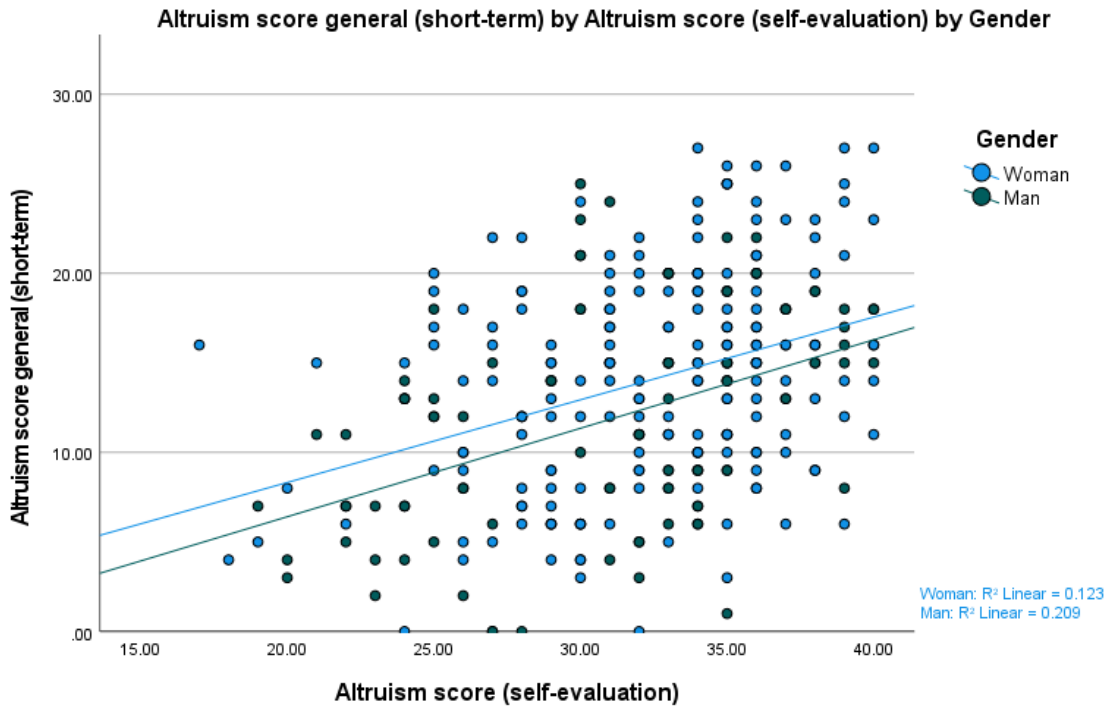
Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Residual		11.94	.43	28.09	<.001	11.13	12.80
Intercept [subject = RecordedDate]	Variance	23.22	2.29	10.16	<.001	19.15	28.16

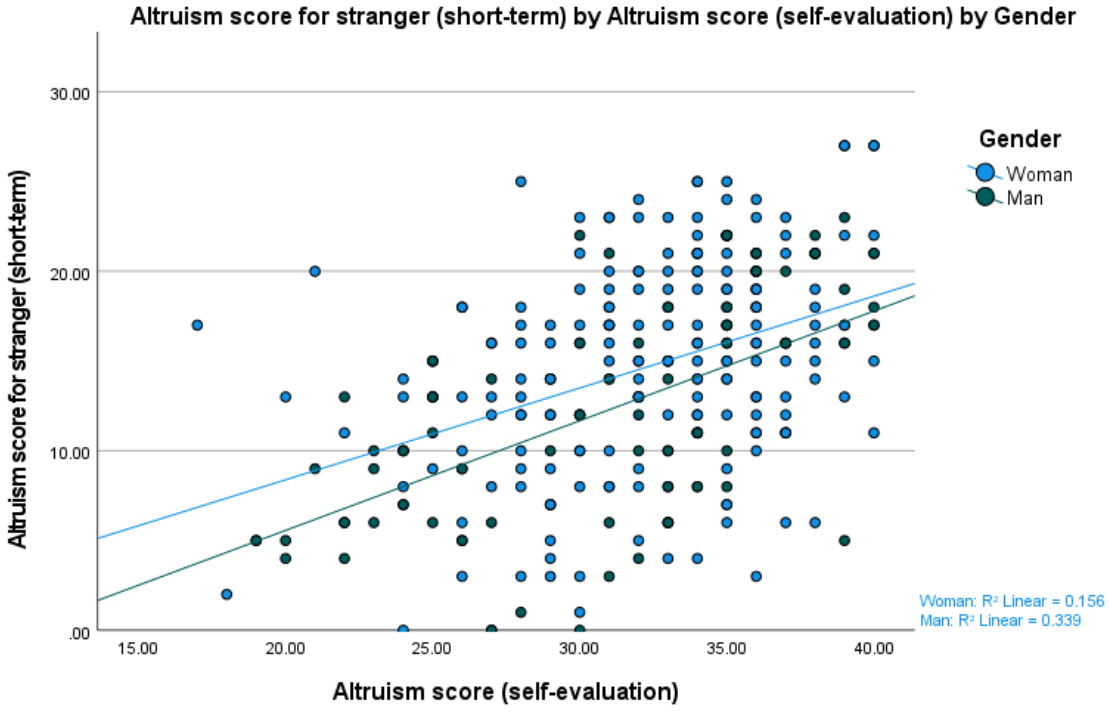
a. Dependent Variable: Score.

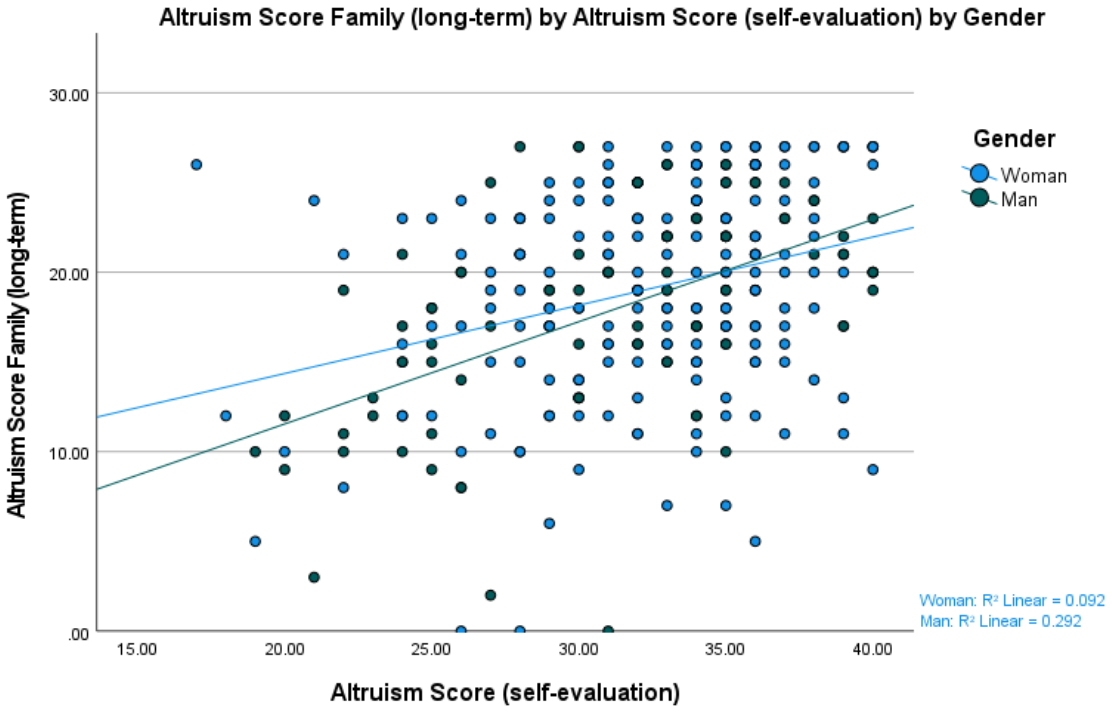
APPENDIX C

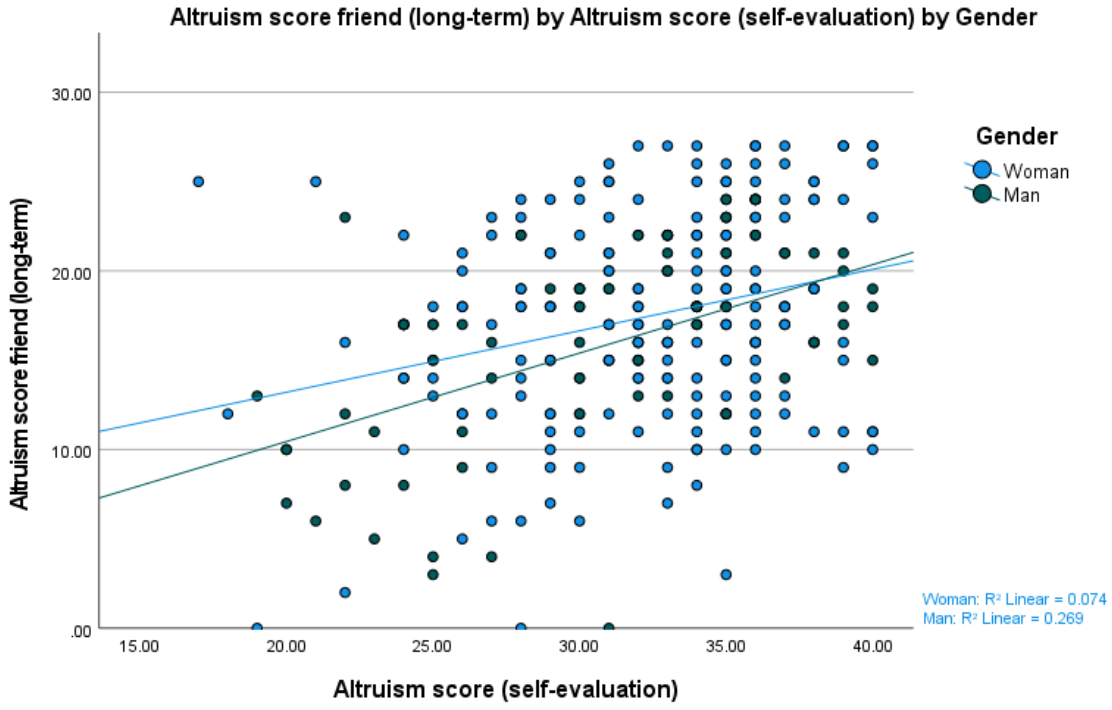

Altuism score for family (short-term) by Altruism score (self-evaluation) by Gender
Altuism score for family (short term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.095
Man: R² Linear = 0.250

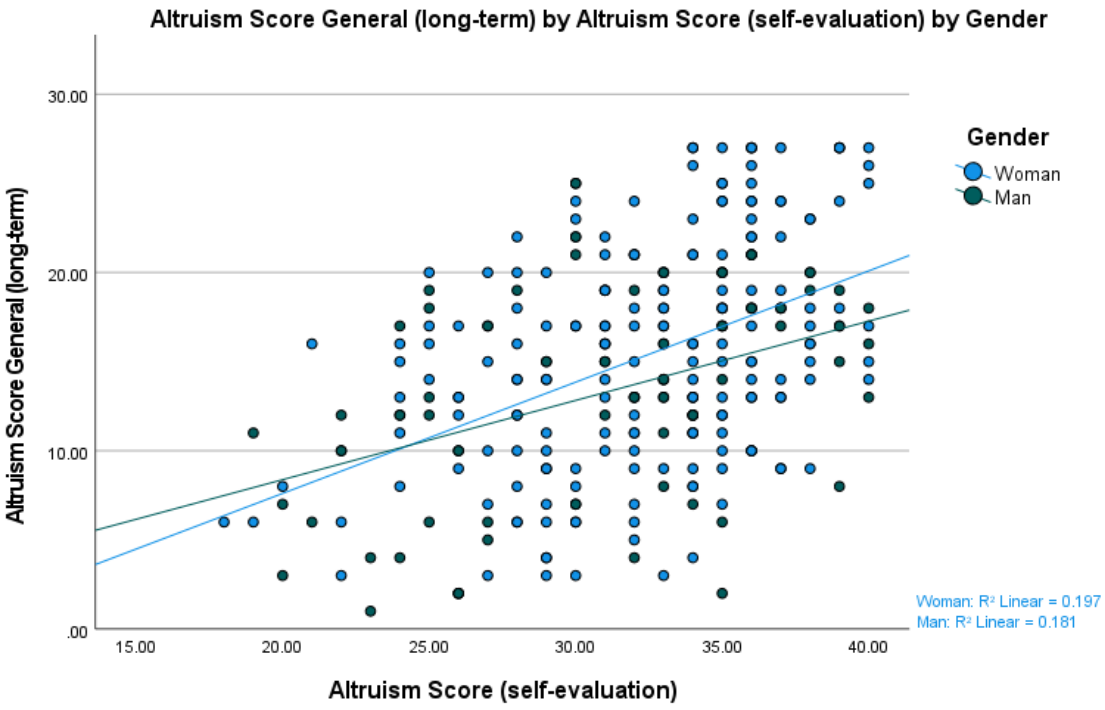

Altruism score for friend (short-term) by Altruism score (self-evaluation) by Gender
Altruism score for friend (short-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.087
Man: R² Linear = 0.253

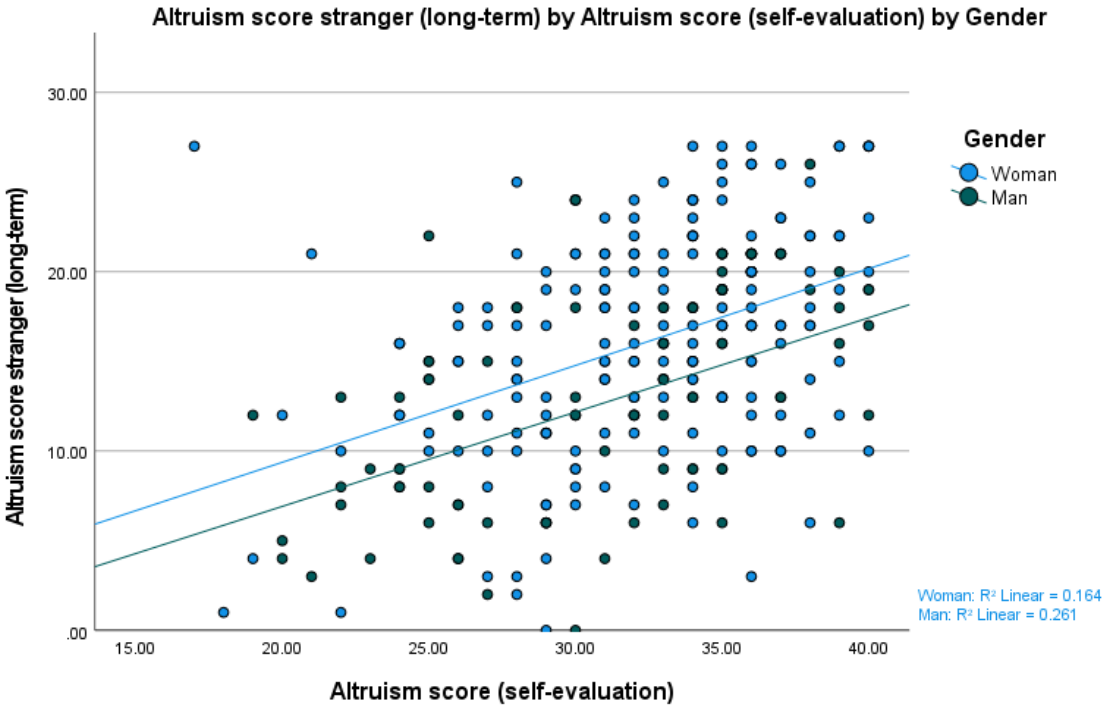

Altruism score general (short-term) by Altruism score (self-evaluation) by Gender
Altruism score general (short-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.123
Man: R² Linear = 0.209


Altruism score for stranger (short-term) by Altruism score (self-evaluation) by Gender
Altruism score for stranger (short-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.156
Man: R² Linear = 0.339


Altruism Score Family (long-term) by Altruism Score (self-evaluation) by Gender
Altruism Score Family (long-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism Score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.092
Man: R² Linear = 0.292


Altruism score friend (long-term) by Altruism score (self-evaluation) by Gender
Altruism score friend (long-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.074
Man: R² Linear = 0.269


Altruism Score General (long-term) by Altruism Score (self-evaluation) by Gender
Altruism Score General (long-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism Score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.197
Man: R² Linear = 0.181


Altruism score stranger (long-term) by Altruism score (self-evaluation) by Gender
Altruism score stranger (long-term)
30.00
20.00
10.00
.00
15.00
20.00
25.00
30.00
35.00
40.00
Altruism score (self-evaluation)
Gender
Woman
Man
Woman: R² Linear = 0.164
Man: R² Linear = 0.261