

**KIN SELECTION AND MALE ANDROPHILIA:
SOCIOCULTURAL INFLUENCES ON THE EXPRESSION
OF KIN-DIRECTED ALTRUISM**

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“Wisdom is not a product of schooling,
but of the lifelong attempt to acquire it.”

- Albert Einstien

ABSTRACT

The Kin Selection Hypothesis proposes that the genes associated with male androphilia (i.e., sexual attraction/arousal to adult males) may be maintained over evolutionary time if the fitness costs of not reproducing directly are offset by increasing one's indirect fitness. Theoretically, this could be accomplished by allocating altruism toward kin which would increase the recipient's ability to survive and reproduce. Evidence for this hypothesis has been garnered through research conducted in Samoa however, no support has been garnered from research conducted in more industrialized cultures (i.e., USA, UK, Japan). In this thesis, I use a Canadian population to examine: (1) the role geographic proximity plays in the expression of androphilic male avuncularity and (2) whether androphilic males direct altruism toward the children of friends who might represent proxies for nieces and nephews in more industrialized cultures. Other sociocultural factors that potentially influence the expression of androphilic male avuncularity are also discussed.

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CHAPTER ONE

Introduction

Natural selection functions by maintaining and increasing the prevalence of genes that increase an individual's reproductive success while decreasing and eventually eliminating those detrimental to reproductive success. Thus, any heritable element of human psychology that is maintained throughout human antiquity ought to pose some benefit to the reproductive success of those in possession of that element. Evidence from behavioural genetics indicates that male androphilia (i.e. male sexual attraction and arousal to adult males) is, at least in part, heritable (Bailey, Dunne, & Martin, 2000; Kendler, Thornton, Gilman, & Kessler, 2000; Långström, Rahman, Carlström, & Lichtenstein, 2010), yet androphilic males experience a reproductive rate one fifth to one tenth of that of gynephilic males (i.e. males sexually attracted and aroused to adult females; e.g., King et al., 2005; Saghir & Robins, 1973; Schwartz, Kim, Kolundziji, Rieger, & Sanders, 2010; Van de Ven, Rodden, Crawford & Kippax, 1997; Yankelovich, 1994). Further, prehistoric rock art, pottery and gravesites suggest the existence of male same-sex sexual activity over millennia (e.g. Hollimon, 1997; Mathieu, 2003; Nash, 2001; Yates, 1993). We are therefore left to question how it is that the genes associated with male androphilia have been allowed to persist over evolutionary time.

Genetic fitness is defined as a measure of an individual's combined direct and indirect fitness. Direct fitness refers to an individual's own reproductive success. Indirect fitness refers to an individual's impact on the fitness of kin (who share some identical genes by virtue of descent) weighted by the degree of relatedness to that kin (Hamilton, 1963). The Kin Selection Hypothesis (KSH) posits that the genes associated

with male androphilia persist, at least in part, because androphilic males evolved to increase their indirect fitness. By increasing one's indirect fitness, costs associated with not reproducing directly may be offset partially or completely (Wilson, 1975). Theoretically speaking, by allocating valuable resources toward kin, androphilic males may increase the survival and, ultimately, the direct fitness of the recipient kin. In doing so, androphilic males aid in the perpetuation of the genes associated with male androphilia and compensate, partially or fully, for the decrease in direct reproduction that they experience.

Tests of the Kin Selection Hypothesis in Samoa

Empirical support for the KSH has been garnered from a number of studies conducted on the South Pacific island of Samoa. In Samoa, androphilic males are referred to as *fa'afafine* which, when translated literally, means "in the manner of a woman." *Fa'afafine* are, with very few exceptions, effeminate or transgendered biological males who are exclusively attracted to masculine males (i.e., "men"). In Samoa, *fa'afafine* are recognized as a "third" gender and, as such, they self-identify and are identified by others, as *fa'afafine*, not as "men" or "women" (Bartlett & Vasey, 2006; Schmidt, 2003; Vasey & Bartlett, 2007). Despite adopting feminine gender roles, most *fa'afafine* do not experience dysphoria¹ with respect to their male bodies, thus, only a small minority could be characterized as transsexual (Vasey & Bartlett, 2007).

Avuncularity refers to the degree to which an individual behaves in a manner which is uncle-like. Research demonstrates that *fa'afafine* exhibit elevated avuncular

¹ Otherwise identified by the DSM-IV-TR (2000) as *gender dysphoria*, this term is defined as the persistent discomfort with or sense of inappropriateness in the gender role typical of the individual's biological sex.

tendencies compared to the avuncular tendencies of Samoan gynephilic males (Vasey, Pocock & VanderLaan, 2007) and compared to the materteral (aunt-like) tendencies of Samoan androphilic females (Vasey & VanderLaan, 2009). A number of explanations for the *fa'afafine's* elevated avuncular tendencies can be eliminated based on the existing data. First, one might explain this pattern in terms of the *fa'afafine's* lack of parental care responsibilities, which may, in turn, result in the *fa'afafine* having greater resources for avuncular investment. If the *fa'afafine's* elevated avuncular tendencies were a simple by-product of their lack of parental care responsibilities, then one would expect their expressed avuncular tendencies to be similar to those of childless males and females. This is not the case. Instead, *fa'afafine* exhibit significantly higher avuncular tendencies compared to childless females and gynephilic males (Vasey & VanderLaan, 2009, 2010a).

Second, one might explain this pattern in terms of the *fa'afafine's* feminine gender role presentation. If the *fa'afafine's* elevated avuncular tendencies were a simple by-product of the *fa'afafine's* feminine gender role presentation (included in which are expectations for elevated childcare; Lippa, 2002), then one would expect their avuncular expressed tendencies to be similar to the materteral tendencies of Samoan mothers and childless females. However, this is also not the case. Instead, *fa'afafine* exhibit significantly higher avuncular tendencies compared to the materteral tendencies of Samoan mothers and childless females (Vasey & VanderLaan, 2009).

Third, one might explain this pattern as a result of the *fa'afafine* having extra resources available because they lack intimate sexual/romantic relationship. If the elevated avuncular tendencies of the *fa'afafine* were a simple by-product of their having

more time and resources for investment due to their failure to form and invest in intimate sexual/romantic relationships, then one would expect the *fa'afafine* to exhibit lower levels of sexual/romantic relationship involvement compared to Samoan gynephilic males and androphilic females. However, this is not the case. Instead, *fa'afafine* report comparable levels of sexual/romantic relationships involvement to those exhibited by Samoan gynephilic males and androphilic females (VanderLaan & Vasey, 2011).

Fourth, one might explain this pattern as a result of the *fa'afafine* demonstrating a general increase in interest toward all children, regardless of kin status. If the *fa'afafine*'s elevated avuncular tendencies were a simple by-product of their generally elevated altruistic interest in all children, regardless of kin status, then one would expect the *fa'afafine* to exhibit elevated altruistic tendencies to non-kin children as well as kin children. However, this is not the case. Instead, the *fa'afafine* are significantly more likely to report elevated avuncular tendencies toward nieces and nephews than they are to report elevated altruistic tendencies toward non-kin children (Vasey & VanderLaan, 2010b). Moreover, their interest in non-kin children is not significantly different than that of Samoan gynephilic males and androphilic females (Vasey & VanderLaan, 2010b).

Elevated avuncular tendencies must translate into real-world avuncular behaviour if they are to have any direct impact on the fitness of nieces and nephews and indirect impact on the fitness of uncles themselves. Vasey & VanderLaan (2010c) used money given to, and received from, oldest and youngest siblings' sons and daughters as a behavioural assay of kin altruism. In line with the predictions of the KSH, compared to Samoan gynephilic males and androphilic females, *fa'afafine* gave significantly more money to their youngest siblings' daughters. No other group differences were observed

for money given to, or received from, nieces and/or nephews. Moreover, there were no correlations between the number of children parented and monetary exchanges with the niece and nephew categories examined, suggesting, once again, that childlessness cannot account for why *fa'afafine* give more money to their youngest siblings' daughters.

Several lines of evidence indicate that compared to Samoan gynephilic males and androphilic females, the avuncular cognition of the *fa'afafine* appears to be more adaptively designed. First, avuncular tendencies are more dissociated from (i.e., co-vary less with) altruistic interest in non-kin children in *fa'afafine*, compared to gynephilic males and androphilic females (Vasey & VanderLaan, 2010b). Such dissociation would allow the *fa'afafine* to more optimally focus resources toward nieces/nephews, while minimizing those directed toward non-kin children. Second, whereas Samoan gynephilic males and androphilic females show a tendency to decrease their willingness to invest in nieces and nephews when they have sexual or romantic relationship partners, the cognition of the *fa'afafine* appears to protect against this tendency by maintaining a high level of willingness to invest in nieces and nephews regardless of relationship status (VanderLaan & Vasey, 2011).

In sum, the data collected from Samoa provides strong evidence in line with the predictions set forth by the Kin Selection Hypothesis.

Tests of the Kin Selection Hypothesis in Industrialized Cultures

In contrast to research conducted in Samoa, studies conducted in more industrialized cultures have, by and large, failed to furnish any compelling evidence that androphilic males exhibit elevated avuncular tendencies compared to their gynephilic counterparts (Canada: Forrester, VanderLaan, Parker & Vasey, 2011; Japan: Vasey &

VanderLaan, 2011; UK: Rahman & Hull, 2005; USA: Bobrow & Bailey, 2001). However, some authors have presented what might be taken as indirect support for the KSH in more industrialized cultures. First, Salais & Fischer (1995) found evidence in the USA for elevated empathy among androphilic males compared to gynephilic males. They interpreted this finding as indirect support for the KSH because empathy and altruism are positively correlated (Eisenberg, 1986; Hoffman, 1981; Rosenhan, 1978). This interpretation has been criticized, however, because increases in general altruism do not necessarily translate into elevated levels of kin-directed altruism (Bobrow & Bailey, 2001; Vasey et al., 2007).

Second, Forrester et al. (2011) found that, even without group differences in avuncular/maternal tendencies, the avuncular interest in nieces and nephews demonstrated by Canadian androphilic males were more dissociated from altruistic interest in non-kin children compared to gynephilic males and androphilic males. The authors noted that this finding is consistent with the conclusion that avuncular cognition with hallmarks of adaptive design appears to be present in Canadian androphilic males despite not being expressed in terms of elevated avuncular tendencies. The authors were cautious, however, not to frame this finding as strong support for the KSH.

Finally, VanderLaan, Gothreau, Bartlett, & Vasey (2011a) suggest that elevated separation anxiety in (pre)androphilic boys may be indicative of an elevated attachment to family and may represent a developmental precursor to elevated avuncularity in androphilic males. In line with this suggestion, research conducted in Samoa demonstrates that *fa'afafine* recall significantly more childhood separation anxiety than gynephilic males and androphilic females and exhibited elevated avuncularity in

adulthood (Vasey, VanderLaan, Gothreau & Bartlett, 2011). Similar research conducted in Canada demonstrates that androphilic males recall elevated traits of childhood separation anxiety compared to gynephilic males and androphilic females (VanderLaan, Gothreau, Bartlett & Vasey, 2011a), despite lacking elevated avuncular tendencies in adulthood (Forrester et al., 2011). As such, the hypothesized developmental precursor for elevated avuncularity appears to be present in Canadian androphilic males, but not expressed in terms of elevated avuncular tendencies in adulthood. Some interpret the findings on recalled separation anxiety as support for the KSH, but further work is necessary before any strong conclusions can be drawn in this regard. In sum, evidence in support of the KSH that has been derived from more industrialized cultures is largely scant and weak, especially when compared to data collected from Samoa.

In light of these findings, the question arises as to why Samoan *fa'afafine* express elevated avuncular tendencies in line with the predictions of the KSH, while androphilic (i.e., *gay*) males from the other, more industrialized cultures (e.g., UK, USA, Canada, Japan) demonstrate, at best, limited support for this hypothesis. This question is particularly compelling given that while Canadian androphilic males do not exhibit elevated avuncular tendencies toward nieces and nephews compared to gynephilic males and androphilic females (Forrester et al., 2011), this same group appears to exhibit avuncular cognition with hallmarks of adaptive design, as well as the hypothesized developmental precursor for elevated avuncularity (VanderLaan, Gothreau, Bartlett & Vasey, 2011b).

Reasonable Explanations for the Observed Cross-cultural Differences

When testing evolutionary hypotheses, such as the Kin Selection Hypothesis, it is important to consider the role that environmental factors, like culture, play in the development of heritable traits. Genes interact with the environment to produce phenotypes, which include behavioural output. Thus, there are a number of ways in which, and time points when, the environment (of which culture is one component) can alter the expression of a gene. First, the environment can influence the development of a phenotypes expression. Second, the functional expression of the gene (i.e. the phenotype) can be altered by the environment within which it resides. Put another way, the environment within which a gene is found can negate the expression of the gene entirely or alter the expression of the gene enough to render it currently non-functional despite its adaptive expression in the past. In the absence of a sociocultural context that approximates the adaptively relevant environment within which the gene evolved, a functional behavioural expression of the gene may simply not manifest (for a more general discussion of this point, see Irons, 1998).

With this in mind, it is possible that the KSH plays a substantial role in the perpetuation of the genes associated with male androphilia, but that the genes in question are not functionally expressed in more industrialized cultures because the environment is not representative of the context in which male androphilia originally evolved. As such, genes that influence male androphilia might be expressed in more industrialized cultures in ways that are not necessarily adaptive, but which nonetheless reflect the affordances available in contemporary environments. Further, environmental factors that are necessary for the development or expression of an altruistic androphilic male phenotype may not be present in cultures found in the USA, the UK, Canada and Japan (Bobrow &

Bailey, 2001; Forrester et al., in press; Rahman & Hull, 2005; Vasey & VanderLaan, 2011).

What then might the relevant sociocultural components be and how might the phenotypical expression of a gene manifest in more industrialized cultures? The remainder of this thesis will examine two of such possible components. First, it has been suggested that androphilic males in more industrialized cultures may not be able to engage in avuncular activities because they routinely live at a distance from their kin (Bobrow & Bailey, 2001). Consequently, in Chapter 2 of this thesis, I examine the role geographic proximity to kin might play in the expression of androphilic male avuncularity in Canada. Second, it has been suggested that androphilic males living in industrialized cultures may direct elevated altruistic behavior towards friends' children, because such non-kin children are available in such environments to serve as a proxy for unavailable nieces and nephews (VanderLaan, Gothreau, Bartlett & Vasey, 2011b). Consequently, in Chapter 3 of this thesis, I examine the role friendships might play in the expression of Canadian androphilic male avuncularity in Canada. In Chapter 4 of this thesis, I summarize my findings and discuss other possible reasons for the disparity between data collected in Samoa and data collected from other more industrialized countries (e.g., USA, UK, Canada, Japan).

CHAPTER TWO

Does geographic proximity influence the expression of avuncular tendencies in Canadian androphilic males?

Bobrow & Bailey (2001) suggested that, compared to their non-Western counterparts, androphilic males in Western cultures may be less geographically connected to their kin, thus mitigating the potential for androphilic males to exhibit elevated kin-directed altruism. This geographic disconnect may stem from the fact that individuals in Western cultures tend to be relatively more individualistic (Hofstede, 1980; Triandis Bontempo, Villareal, Asai, & Lucca, 1988) or because Western androphilic males might experience greater than average familial estrangement due to homophobia (D'Augelli, Hershberger & Pilkington, 1998; Oswald, 2002). Of particular importance, androphilic males appear to be more likely to move away from their families to live in urban environments where they can more easily achieve personal goals (Bagley & Tremblay, 1998; Knopp, 1990).

I reasoned that if an adaptive avuncular androphilic male phenotype exists and is present in a Western cultural context, but its expression is constrained due to geographic separation from kin, then its existence should be revealed more readily when examining avuncular activity items that can be performed at a distance from kin. As such, I predicted that, when examining activity items that could be performed from a distance, Canadian androphilic males would exhibit elevated avuncular tendencies compared to the avuncular tendencies of gynephilic males and the materteral tendencies of androphilic females.

Method

Participants. A mixed-methods recruitment design was utilized. Canadian participants were recruited via a diverse selection of online mailing lists ($N = 858$), through the University of Lethbridge human participant pool, and through online advertisements placed on Facebook - a well-known social-networking website (see Appendix 1). Information from a total of 100 androphilic males, 115 gynephilic males and 138 androphilic females was collected.

Kinsey ratings (Kinsey, Pomeroy, & Martin, 1948) of sexual feelings over the previous year were obtained for all participants. This measure asked participants to indicate “Which of the following statements best describes your sexual feelings during the last year?” Subsequently, participants selected one of the following seven options: “Sexual feelings only toward females” (Kinsey rating = 0), “Most sexual feelings toward females, but an occasional fantasy about males” (Kinsey rating = 1), “Most sexual feelings toward females, but some definite sexual feelings toward males” (Kinsey rating = 2), “Sexual feelings equally divided between males and females with no strong preference for one or the other” (Kinsey rating = 3), “Most sexual feelings toward males, but some definite sexual feelings toward females” (Kinsey rating = 4), “Most sexual feelings toward males, but an occasional fantasy about females” (Kinsey rating = 5), “Sexual feelings only toward males” (Kinsey rating = 6). Kinsey ratings were reverse scored for females. Those with a Kinsey rating of 2, 3, or 4 were not included in the analysis because these individuals could be considered bisexual in orientation. Kinsey ratings were obtained for 100 androphilic males. Of these, 74.0% ($n = 74$) had a rating of 6, and 26.0% ($n = 26$) had a rating of 5. Of the Kinsey ratings obtained for 115 gynephilic males, 87.8% ($n = 101$) had a rating of 0, and 12.2% ($n = 14$) had a rating of 1. Of the Kinsey ratings

obtained for 138 androphilic females, 68.1% ($n = 94$) had a rating of 0, and 31.9% ($n = 44$) had a rating of 1.

Procedure and measures. All data were collected via an online questionnaire (see Appendix 3). The questionnaire comprised of two sections. The first section contained standard biographical questions pertaining to participant sex, gender identity, age, sexual orientation, ethnicity, annual income, highest level of education, parental status and the number and ages of children parented.

The next section included a scale composed of 20 avuncular/materteral tendency items used to assess how geographic distance might influence kin-directed altruism. Of the 20 items, 9 were derived from the previously employed Avuncular/Materteral Tendencies Subscale (AMTS; Bobrow & Bailey, 2011; Vasey & VanderLaan, 2009) and 11 new items were added. The original AMTS contained four activity items that could be performed from a distance and five activity items that necessitated close proximity to nieces and nephews. Of the new activity items, six could be performed from a distance and five necessitated close proximity to nieces and nephews. This 20-item new avuncular/materteral tendencies scale consisted of a total of 10 activity items that could be performed at a distance and 10 items that required close proximity. Those items that could be performed despite a large geographic distance between the parties (e.g. buying toys for the child or sending a birthday card to the child) were grouped together as the *Distant Avuncular/Materteral Tendencies Subscale (DAMTS)*. Those items that could not be performed from a large geographical distance (e.g. babysitting for an evening or hosting a celebratory event for the child) were grouped together as the *Proximate Avuncular/Materteral Tendencies Subscale (PAMTS)*.

The 10 DAMTS items included: (1) buying toys for the children, (2) contributing money for daycare, (3) contributing money for children's medical expenses, (4) contributing money for the children's education, (5) purchasing items (clothing, etc.) needed by the child, (6) answering questions about dating if asked by the child, (7) sending a birthday card to the child, (8) purchasing a travel ticket so that the child might come and visit, (9) keeping in touch with the child via the internet, and (10) contributing money so that the child may attend a field trip. The 10 PAMTS items included: (1) babysitting for an evening, (2) babysitting on a regular basis, (3) taking care of the children for a week while the parents are away, (4) tutoring one of the children in a subject they knew well, (5) helping expose the children to art and music, (6) helping the parents complete a task (e.g. grocery shopping) so that they may spend time with the child, (7) hosting or arranging a celebratory event for the child, (8) picking the child up from school, (9) attending a school play within which the child is participating, and (10) attending a sporting event (football, soccer, etc.) in which the child is participating.

Participants were told that it was not important if they actually have a niece or nephew but that they should indicate how willing they would be to do the 10 DAMTS and the 10 PAMTS tasks/activities for an imagined niece or nephew (see Wilson & O'Gorman [2003] on the utility of using such hypothetical scenarios). A 7-point Likert-type scale ranging from 1 = *very unwilling*, to 7 = *very willing* was used.

For each subscale, participants' ratings were averaged to create DAMTS and PAMTS scores. Difference scores were calculated by subtracting DAMTS scores from PAMTS scores. Between-group differences were assessed using analysis of covariance (ANCOVA). Fisher's Protected Test was used to limit type I error. That is, direct group

comparisons were performed using Fisher's LSD, but only in the presence of statistically significant main effects.

Results

A factor analysis was conducted to determine whether the 11 new items loaded similarly to the 9 traditionally-used AMTS items. For this analysis, data were used from 439 individuals: 45 of these were observed as multivariate outliers in that responses from these individuals deviated from that of the typical respondent and were subsequently deleted from the analysis (Thomson, 2004). For each item, fewer than 3% of participants failed to provide a response. Nonetheless, missing values were imputed using the conservative Series Mean imputation method (as per SPSS default). The principal components extraction method was used prior to the factor analysis to estimate the number of factors present, to ensure the absence of variable outliers, multicollinearity and singularity, and to assess the factorability of the correlation matrix (Green & Salkind, 2011; Tabachnick & Fidell, 2001). One factor was extracted from these data and, according to methods outlined by Guttman (1954) and Cattell (1966), this pattern suggested that the 11 new avuncular/maternal tendency items measure a similar construct to that measured by the 9 original AMTS items. Factor loadings were then determined using the Maximum Likelihood procedure and rotated using the Varimax rotation procedure (Thomson, 2004; see Table 2.1). This factor accounted for 46.1% of the item variance.

Descriptive statistics for all demographic and recruitment variables were calculated and are presented in Table 2.2 according to group. Groups included

Table 2.1*Factor loadings by subscale.*

Item	How willing would you be to...	Factor Loading
Distant Avuncular/Maternal Tendencies Subscale		
1 ^a	... buy toys for your niece or nephew?	.686
2 ^a	... contribute money for daycare?	.590
3 ^a	... contribute money for your niece or nephew's medical expenses?	.651
4 ^a	... contribute money for your niece or nephew's education?	.648
5	... purchase items (clothing, etc.) needed by your niece or nephew?	.726
6	... answer questions about dating if your niece or nephew asks you?	.534
7	... send a birthday card to your niece or nephew?	.641
8	... purchase a travel ticket for your niece or nephew so that they may come visit you?	.758
9	... keep in touch with your niece or nephew via the internet?	.639
10	... contribute money so that your niece or nephew may attend a field trip?	.685
Proximate Avuncular/Maternal Tendencies Subscale		
1 ^a	... babysit your niece or nephew for an evening?	.740
2 ^a	... babysit your niece or nephew on a regular basis?	.632
3 ^a	... take care of your niece or nephew for a week while their parents are away?	.655
4 ^a	... tutor your niece or nephew in a subject you know well?	.692
5 ^a	... help expose your niece or nephew to art and music (museum, theater, gallery, etc.)?	.597
6	... help the parents complete a task (e.g. grocery shopping) so that they may spend more time with your niece or nephew?	.582
7	... host or arrange a celebratory event for your niece or nephew (e.g. birthday)?	.761
8	... pick your niece or nephew up from school?	.808
9	... attend a school play within which your niece or nephew is participating?	.774

10 ... attend a sporting event (football, soccer, etc.) within which your niece or
nephew is participating? .707

^aOriginal AMTS item (Bobrow & Bailey, 2001).

Table 2.2*Descriptive statistics for demographic and recruitment variables by group.*

Demographic/Recruitment Variable	Androphilic males (<i>n</i> = 100)	Gynephilic males (<i>n</i> = 115)	Androphilic females (<i>n</i> = 138)
Age (in years) <i>M</i> (<i>SD</i>)	23.19 (4.59)	22.89 (4.07)	22.94 (4.09)
Education			
Secondary or less (%)	81.00	80.87	77.54
Post-secondary (%)	19.00	19.13	22.46
Ethnicity			
Caucasian (%)	89.00	86.96	92.03
Non-Caucasian (%)	11.00	13.04	7.97
Income ^a (CDN\$)	20,525.80	11,746.00	16,819.67
Recruitment Method			
Mailing List (%)	66.00	78.26	78.26
University Sample (%)	3.00	18.26	15.94
Facebook Advertisement (%)	31.00	3.48	5.80
Do you have children			
Yes (%)	2.00	6.09	8.70
No (%)	98.00	93.91	91.30
Number of children <i>M</i> (<i>SD</i>)	.03 (.22)	.09 (.39)	.17 (.60)

^a Androphilic males, *n* = 91; Gynephilic males, *n* = 113, Androphilic females, *n* = 129

participants 18-35 years of age and were age matched. An analysis of variance (ANOVA) indicated a main effect of group for income (*Brown Forsythe* $F[2, 284.92] = 12.81, p < .001, \eta_p^2 = .07$), and number of children parented (*Brown Forsythe* $F[2, 279.79] = 3.16, p = .04, \eta_p^2 = .02$), but no main effect of group for age ($F[2, 350] = 1.90, p = .15, \eta_p^2 = .01$). Chi-square tests of independence demonstrated no group differences with respect to level of education ($\chi^2 [2, 353] = .60, p = .74, \text{Cramer's } \phi = .04$), ethnicity ($\chi^2 [2, 353] = 1.76, p = .42, \text{Cramer's } \phi = .07$), and whether the participant was a parent ($\chi^2 [2, 353] = 4.65, p = .10, \text{Cramer's } \phi = .12$). Chi-square tests of independence demonstrated a group difference with respect to recruitment method ($\chi^2 [3, 353] = 55.73, p < .001, \text{Cramer's } \phi = .40$). Recruitment method was therefore divided into 3 nominal, dummy-coded variables: mailing list recruitment, university recruitment, and Facebook recruitment. Chi-square tests of independence demonstrated no group differences with respect to mailing list recruitment ($\chi^2 [2, 353] = 5.71, p = .06, \text{Cramer's } \phi = .13$), but did demonstrate group differences with respect to the university recruitment ($\chi^2 [2, 353] = 12.69, p = .002, \text{Cramer's } \phi = .19$), and Facebook recruitment ($\chi^2 [2, 353] = 46.51, p < .001, \text{Cramer's } \phi = .36$). Thus, income, number of children, university recruitment, and Facebook recruitment were examined further as possible covariates.

Correlation tests were conducted comparing income, number of children, university recruitment, and Facebook recruitment to PAMTS scores, DAMTS scores and difference scores. Results of these correlations are presented in Table 2.3 according to group. Correlation tests indicated that for androphilic males, number of children was significantly correlated with DAMTS scores and difference scores. Thus, an interaction

Table 2.3

Correlation values between income, number of children parented, University recruitment and Facebook recruitment, and subscale scores per group.

	Androphilic males		Gynephilic males		Androphilic females		Overall	
	Pearson's <i>r</i> value	<i>n</i>	Pearson's <i>r</i> value	<i>n</i>	Pearson's <i>r</i> value	<i>n</i>	Pearson's <i>r</i> value	<i>n</i>
Distant Avuncular/Materteral Tendencies Subscale								
Income	.084	91	-.065	113	.134	129	.036	333
Number of children	-.348**	100	.064	115	.081	138	.014	353
University recruitment	.028	100	-.009	115	.042	138	.013	353
Facebook recruitment	.041	100	-.227*	115	-.012	138	-.035	353
Proximate Avuncular/Materteral Tendencies Subscale								
Income	.087	91	-.065	113	-.023	129	-.023	333
Number of children	-.087	100	.108	115	-.052	138	.027	353
University recruitment	-.085	100	.014	115	-.021	138	-.007	353
Facebook recruitment	.062	100	-.262**	115	-.097	138	-.063	353
Difference scores (PAMTS – DAMTS)								
Income	.001	91	.014	113	-.195*	129	-.086	333
Number of children	.395**	100	.056	115	-.155	138	.016	353
University	-.162	100	.037	115	-.074	138	-.030	353

recruitment								
Facebook								
recruitment	.027	100	-.012	115	-.082	138	-.034	353

* $p < .05$, ** $p \leq .005$

variable (androphilic males X number of children) was used as a covariate in subsequent relevant analyses. Further, correlation tests indicated that for gynephilic males, Facebook recruitment was significantly correlated with PAMTS and DAMTS scores. Thus, an interaction variable (gynephilic males X Facebook recruitment) was used as a covariate in subsequent relevant analyses. Finally, correlation tests indicated that for androphilic females, income was significantly correlated with difference scores. Thus, an interaction variable (androphilic females X income) was used as a covariate in subsequent relevant analyses.

Table 2.4 summarizes the means, standard deviations, and internal consistency reliabilities, Cronbach's *alpha's* (α), pertaining to the subscale scores (DAMTS and PAMTS) for androphilic males, gynephilic males, and androphilic females. Reliabilities were appreciable for all groups for these subscales. A repeated mixed model ANCOVA was conducted with subscale scores (DAMTS and PAMTS) as the within-subjects factor and group (androphilic males, gynephilic males and androphilic females) as the between-subjects factor while controlling for each of the three interaction variables (androphilic males X number of children, gynephilic males X Facebook recruitment, androphilic females X income). There was a main between-subjects effect of group ($F[2, 338] = 5.71, p = .033, \eta_p^2 = .02$), a main within-subjects effect of subscale, ($F[1, 338] = 89.57, p < .001, \eta_p^2 = .21$), and a significant interaction effect between group and subscale ($F[2, 338] = 5.15, p = .006, \eta_p^2 = .03$).

For androphilic males, a repeated measures ANCOVA was conducted with subscale scores (DAMTS and PAMTS) as the within-subjects factor while controlling for the androphilic males X number of children interaction variable. A main within-subjects

Table 2.4

Cronbach's α reliabilities, means and standard deviations per group for each subscale.

Variable	Androphilic males (<i>n</i> = 100)	Gynephilic males (<i>n</i> = 115)	Androphilic females (<i>n</i> = 138)
Distant Avuncular/Materteral Tendencies Subscale			
Reliability (α)	.90	.91	.86
Mean(SD)	4.65(1.13)	4.49(1.19)	4.87(.81)
Proximate Avuncular/Materteral Tendencies Subscale			
Reliability (α)	.91	.91	.82
Mean(SD)	4.95(1.07)	4.81(1.06)	5.35(.64)

effect of subscale, ($F[1, 98] = 13.24, p < .001, \eta_p^2 = .12$) was observed. For gynephilic males, a repeated measures ANCOVA was conducted with subscale scores (DAMTS and PAMTS) as the within-subjects factor while controlling for the gynephilic males X Facebook recruitment interaction variable. A main within-subjects effect of subscale, ($F[1, 113] = 23.38, p < .001, \eta_p^2 = .17$) was observed. For androphilic females, a repeated measures ANCOVA was conducted with subscale scores (DAMTS and PAMTS) as the within-subjects factor while controlling for the androphilic females X income interaction variable. A main within-subjects effect of subscale, ($F[1, 113] = 23.38, p < .001, \eta_p^2 = .17$) was observed. These results demonstrate that for all groups, PAMTS scores were significantly higher than DAMTS scores.

A one-way ANCOVA was conducted with DAMTS scores as the dependent variable and group as the fixed factor while controlling for the androphilic males X number of children and gynephilic males X Facebook recruitment interaction variables. The androphilic females X income interaction variable was not controlled for in this analysis as it did not show a significant correlation with the DAMTS dependent variable. This test showed a significant between-group difference ($F[2, 348] = 3.19, p = .042, \eta_p^2 = .02$) in DAMTS scores. Protected Fisher's Least Significant Difference (LSD) subsequently revealed that androphilic females displayed significantly higher DAMTS scores than gynephilic males ($p = .012, \text{Cohen's } d = .38$), but not androphilic males ($p = .223, \text{Cohen's } d = .23$). Further, androphilic males did not display higher DAMTS scores than gynephilic males ($p = .249, \text{Cohen's } d = -.14$).

Additionally, a one-way ANCOVA was conducted with PAMTS scores acting as the dependent variable and group as the fixed factor while controlling for the gynephilic

males X Facebook recruitment interaction variable. The alternative interaction variables (i.e., androphilic males X number of children and androphilic women X income) were not controlled for as they did not show a significant correlation with the PAMTS dependent variable. This test showed a significant between-group difference ($F[2, 349] = 10.06, p < .001, \eta_p^2 = .05$) in PAMTS scores. Protected Fisher's LSD subsequently revealed that androphilic women displayed significantly higher PAMTS scores than gynephilic males ($p < .001, \text{Cohen's } d = .63$) and androphilic males ($p = .001, \text{Cohen's } d = .47$). Further, androphilic males did not display higher PAMTS scores than gynephilic males ($p = .499, \text{Cohen's } d = .13$).

Finally, a one-way ANCOVA was conducted with difference scores acting as the dependent variable and group as the fixed factor (androphilic males: $n = 100, M = .30, SD = .76$; gynephilic males: $n = 115, M = .32, SD = .70$; androphilic females: $n = 129, M = .47, SD = .65$) while controlling for the androphilic females X income interaction variable. The alternative interaction variables (i.e., gynephilic males X Facebook recruitment and androphilic males X number of children) were not controlled for as they did not show a significant correlation with the difference scores dependent variable. This test showed a significant between-group difference ($F[2, 340] = 4.16, p = .016, \eta_p^2 = .02$) in difference scores. Protected Fisher's LSD subsequently revealed that androphilic females displayed significantly higher difference scores than gynephilic males ($p = .013, \text{Cohen's } d = .23$) and for androphilic males ($p = .009, \text{Cohen's } d = .25$). Further, androphilic males did not display higher difference scores than gynephilic males ($p = .821, \text{Cohen's } d = -.03$).

Comparative data on individual DAMTS and PAMTS items for androphilic males, gynephilic males and androphilic females are presented in Table 2.5. Overall, 9 of the 10 PAMTS items demonstrated a significant sex difference with androphilic females showing significantly higher willingness to engage in the particular activity compared to both androphilic and gynephilic males. In comparison, only six of the 10 DAMTS items demonstrated the same pattern. Further, three DAMTS items demonstrated a significant male sex orientation difference with androphilic males showing significantly higher willingness to engage in the particular activity compared to gynephilic males. These included items measuring: (1) willingness to answer questions about dating if asked, (2) willingness to purchase a travel ticket so that the niece or nephew may visit and, (3) willingness to keep in touch via the internet. Overall, only two PAMTS items demonstrated the same pattern, including those items measuring: (1) willingness to expose the niece or nephew to art and music, and (2) willingness to help the parents complete a task (e.g. grocery shopping) so that they may spend more time with your niece or nephew.

Discussion

It has been suggested that the willingness of androphilic males to express avuncular tendencies may be constrained in more industrialized environments because they frequently live at a distance from their kin, thereby mitigating the ability to actually perform the activities in question (Bobrow & Bailey, 2011). Here, I examined whether Canadian androphilic males expressed elevated willingness to engage in avuncular/maternal activities, compared to gynephilic males and androphilic females, when the activities in question could be executed from a distance. Contrary to my

Table 2.5*Individual DAMTS and PAMTS items for androphilic males, gynephilic males and androphilic females.*

<i>How willing would you be to...</i>	Androphilic males (<i>n</i> = 100)		Gynephilic males (<i>n</i> = 115)		Androphilic females (<i>n</i> = 138)		<i>F</i>	Within-group <i>df</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
DAMTS items									
... buy toys for your niece or nephew? ^{b, c}	4.93	1.38	4.73	1.43	5.33	1.09	6.02 ^{d, h}	348	.003
... contribute money for daycare?	3.50	1.97	3.62	1.78	3.55	1.64	.13	350	.879
... contribute money for your niece or nephew's medical expenses?	4.23	1.75	4.50	1.68	4.45	1.57	.37 ^h	349	.690
... contribute money for your niece or nephew's education?	4.18	1.87	4.35	1.65	4.19	1.47	.30 ^h	349	.738
... purchase items (clothing, etc.) needed by your niece or nephew? ^{b, c}	4.62	1.47	4.60	1.52	5.10	1.16	5.31	350	.005
... answer questions about dating if your niece or nephew asks you? ^{a, c}	5.18	1.32	4.72	1.49	5.33	.91	6.16 ^d	349	.002
... send a birthday card to your niece or nephew? ^{b, c}	5.46	1.24	5.33	1.29	5.88	.39	8.66 ^d	349	.000
... purchase a travel ticket for your niece or nephew so that they may come visit you? ^{a, c}	4.64	1.48	4.04	1.80	4.77	1.26	8.19 ^h	349	.000
... keep in touch with your niece or nephew via the internet? ^{a, b, c}	5.19	1.28	4.83	1.53	5.59	.69	11.25 ^{d, h}	348	.000
... contribute money so that your niece or nephew may attend a field trip?	4.60	1.48	4.21	1.70	4.49	1.43	2.52 ^h	349	.082
PAMTS items									
... babysit your niece or nephew for an evening? ^{b, c}	5.19	1.20	5.25	1.08	5.63	.95	6.37 ^{d, e}	348	.002

... babysit your niece or nephew on a regular basis? ^{b, c}	3.81	1.88	3.77	1.68	4.58	1.51	9.31	350	.000
... take care of your niece or nephew for a week while their parents are away? ^{b, c}	4.29	1.82	4.39	1.74	5.00	1.32	7.14	350	.001
... tutor your niece or nephew in a subject you know well?	5.45	1.18	5.48	.98	5.62	.71	.93 ^d	349	.395
... help expose your niece or nephew to art and music (museum, theater, gallery, etc.)? ^{a, c}	5.54	1.05	4.92	1.47	5.55	.77	9.69 ^{d, f}	341	.000
... help the parents complete a task (e.g. grocery shopping) so that they may spend more time with your niece or nephew? ^{a, c}	4.75	1.53	4.25	1.66	4.74	1.41	4.61 ^g	329	.011
... host or arrange a celebratory event for your niece or nephew (e.g. birthday)? ^{b, c}	4.90	1.48	4.69	1.54	5.33	1.10	7.40	350	.001
... pick your niece or nephew up from school? ^{b, c}	5.16	1.33	5.11	1.19	5.66	.70	9.10 ^d	349	.000
... attend a school play within which your niece or nephew is participating? ^{b, c}	5.39	1.17	5.08	1.39	5.74	.66	9.90 ^d	349	.000
... attend a sporting event (football, soccer, etc.) within which your niece or nephew is participating? ^{b, c}	4.96	1.43	5.18	1.28	5.64	.80	10.42 ^d	349	.000

Note. Between group $df = 2$.

^a Statistically significant difference ($p < .05$) between androphilic males and gynephilic males.

^b Statistically significant difference ($p < .05$) between androphilic males and androphilic females.

^c Statistically significant difference ($p < .05$) between gynephilic males and androphilic females.

^d Gynephilic males X Facebook recruitment interaction variable controlled for due to positive correlation between item and dependent variable for this group.

^e Androphilic females X number of children interaction variable controlled for due to positive correlation between item and dependent variable for this group.

^f Androphilic males X income interaction variable controlled for due to positive correlation between item and dependent variable for this group.

^g Income controlled for as it co-varied significantly between groups for this item.

^h Androphilic males X number of children interaction variable controlled for due to positive correlation between item and dependent variable for this group.

prediction, when comparing these groups for willingness to engage in avuncular/materteral tasks/activities that could be performed from a distance using DAMTS average scores, I did not find that Canadian androphilic males exhibited significantly higher avuncular tendencies. On the basis of these results, it appears that even when Canadian androphilic males are able to execute avuncular activities from a distance, they do not express increased willingness to do so.

Analyses of PAMTS and DAMTS average scores, revealed a heterosexual sex difference in avuncular/materteral tendencies with androphilic females displaying significantly higher altruistic tendencies toward nieces/nephews compared to gynephilic males, regardless of whether the activities in question could be performed at a distance or required proximity to kin. Further analyses of PAMTS and DAMTS average scores, revealed no male sexual orientation difference for avuncular activities, regardless of whether they could be performed at a distance or required proximity to kin. Interestingly, however, androphilic males and females did not differ significantly in terms of their avuncular/materteral tendency scores for activities that could be performed at a distance. This pattern suggests that androphilic males in our Canadian sample may be shifted in a female-typical direction with respect to this particular measure. This finding is in line with a large body of literature suggesting that androphilic males are more female-typical in terms of many of their social behaviours and preferences, compared to gynephilic males (e.g., Bailey, 2003; Lippa, 2002).

Although analyses of PAMTS and DAMTS average scores did not reveal any male sexual orientation differences, analyses of individual subscale items did. Male sexual orientation differences were observed for three of the 10 DAMTS items and for

two of the 10 PAMTS items. Androphilic male's scores were not significantly different from those of females for two of these DAMTS items (i.e., willingness to answer questions about dating if asked, and willingness to purchase a travel ticket so that the niece or nephew may visit) and for both of the PAMTS items (i.e., willingness to help expose your nieces or nephews to art and music, and willingness to help the parents complete a task [e.g., grocery shopping] so that they may spend more time with your niece or nephew). As such, androphilic male's scores were female-typical for these particular DAMTS and PAMTS items. Regarding the third DAMTS item which showed a sex difference (i.e., willingness to keep in touch with your nieces or nephews via the internet), a pattern was observed in which androphilic male's scores were intermediate between those of androphilic females and gynephilic males, but significantly different from both. This pattern suggests that androphilic males in our Canadian sample appear to be shifted in a female-typical direction with respect to their willingness to perform this particular avuncular activity. Finally, it is important to note that none of the PAMTS or DAMTS items demonstrated a pattern similar to that observed in Samoa where, in general, androphilic men demonstrate significantly higher willingness to engage in avuncular activities compared to both androphilic women and gynephilic men.

The question remains as to why androphilic males in Canada, do not exhibit elevated avuncular tendencies, whereas those in Samoa do. A number of inter-related factors might account for the observed cross-cultural differences. First, my results show that all groups in our Canadian sample, regardless of sex or sexual orientation, expressed significantly greater willingness to engage in avuncular/maternal activities that required proximity to kin as opposed to those that could be performed from a distance. Thus, it

appears that proximity to kin is an important sociocultural component facilitating kin-directed altruism in Canada. In contrast to Canada, Samoan extended family members often live together or in closely situated dwellings (Mageo, 1998). Furthermore, given Samoa's small land mass (2934 km²; Lal & Fortune, 2000), kin members are likely to be less geographically dispersed from each other compared to much larger Western nations like Canada (Bone, 2001). Thus, differences in spatial proximity among kin members may be one sociocultural factor contributing, at least in part, to the documented cross-cultural differences in avuncularity by Samoan and Canadian androphilic males.

Second, the manner in which male androphilia is publicly expressed differs between Samoa and Canada. Most androphilic males in Canada present themselves publicly in a manner that is relatively masculine (Murray, 2000). In contrast, the vast majority of Samoan *fa'afafine* present themselves publicly in a manner that is relatively feminine (Bartlett & Vasey, 2006; Schmidt, 2003; Vasey & Bartlett, 2007). In fact, many, if not most, *fa'afafine* would be described as transgendered by Western observers. It is interesting to note that although both are androphilic, it is the transgendered Samoan *fa'afafine* who exhibit elevated avuncular tendencies relative to gynephilic males (Vasey et al., 2007; Vasey & VanderLaan, 2009, 2010a, b, c), whereas gender-normative androphilic males from Canada do not (Forrester et al., 2011). As such, one possible explanation for the cross-cultural difference in avuncularity is that elevated avuncularity may be contingent on an androphilic male's transgendered status.

Vasey and VanderLaan (2009) suggested that the elevated avuncular tendencies of *fa'afafine* may reflect unique (trans)gender role orientations that they adopt, which are distinct from, but combine elements of, the singularly masculine and feminine roles of

men and women. On a related note, Williams (1992) suggested that transgendered androphilic males in many non-Western cultures excel at various labor practices, especially feminine ones, as a way of striving for prestige within their families and communities. Status striving by over-excelling at labour practices, particularly those deemed feminine, may translate into increased willingness on the part of *fa'afafine* to direct avuncular behaviour towards nieces and nephews compared to women and men. Future research should examine both of these possibilities.

Future research in Canada could examine the actual avuncular behaviour of Canadian androphilic males directed toward their nieces and nephews in order to assess the degree to which avuncular tendencies translate to real-life avuncularity (e.g., Pollet, Kuppens, & Dunbar, 2006). In addition, it would be interesting to see if Western androphilic males who live apart from their families treat their close friends' children as "social kin" by exhibiting elevated altruistic tendencies toward them (for more on the concept of friends as "social kin" see, Ackerman, Kenrick, & Schaller, 2007).

CHAPTER THREE

Do Canadian androphilic males treat friends' children as kin?

Implications for the Kin Selection Hypothesis

To reiterate, the premise of this thesis is to examine the role particular sociocultural components might play in the expression of avuncularity by androphilic males living in more industrialized cultures. In keeping with the KSH, it is theoretically possible that an adaptive avuncular male phenotype exists but industrialized cultural settings constrain the functional expression of avuncularity by androphilic males. For example, VanderLaan, Gothreau, Bartlett, and Vasey (2011), suggested that androphilic males from industrialized cultures may live at a distance from their kin and, as such, may not have access to their nieces and nephews. These authors go on to suggest that androphilic males may express avuncular-like tendencies in a non-functional manner, namely, by directing altruism toward more accessible recipients like the children of close friends who may be more readily available than nieces and nephews. Put another way, androphilic males may interact with “social kin” (i.e., friends' children) as the closest possible facsimile of nieces and nephews who then receive the avuncular-like behaviour instead of genetically related kin.

A number of studies have demonstrated that friends are treated like kin in some more industrialized societies. For example, Silk (2003) demonstrates that friends are treated more like kin than like strangers in regard to the exchange of altruistic behaviour. Stewart-Williams (2007) found that help is allocated toward friends above kin (siblings), or equal to kin (siblings), as a function of the cost of the help being given. Specifically, friends are treated more like kin if the cost of the help is low to moderate. In other words,

friends are treated more like kin, more often than not. Korchmaros & Kenny (2006) noted that it is likely one's sense of emotional closeness and obligation toward the receiver (not genetic relatedness *per se*) that influences altruism - both of which can be experienced in kinships and friendships alike. Ackerman, Kenrick, and Schaller (2007) found that females in particular are more likely to treat friends like kin while males are more likely to treat friends like strangers. Given that androphilic males are more female-typical in terms of many of their social behaviours and preferences (e.g., Bailey, 2003; Lippa, 2002), it stands to reason that they may also be more female-typical in how they treat friends.

In this Chapter, I examine altruistic tendencies towards friends' children in a Canadian sample. On the basis of the existing literature, I predict that a heterosexual sex difference will exist with Canadian androphilic females exhibiting elevated altruistic tendencies toward their friends' children compared to gynephilic males. Because androphilic males do not reproduce directly, they should be particularly focused on enhancing their indirect fitness, compared to individuals whose life-histories are, or will likely be, characterized by direct reproduction. As outlined above, however, avuncular behaviour exhibited in Western cultural contexts may be expressed in terms of altruism toward friends' children. Consequently, I predict that Canadian androphilic males will exhibit elevated altruistic tendencies toward their friends' children compared to both gynephilic males and androphilic females.

Method

Participants. A mixed-methods recruitment design was utilized. Canadian participants were recruited via online mailing lists ($N = 858$), the University of Lethbridge

human participant pool, online advertisements placed on Facebook - a well-known social-networking website - and by word-of-mouth (see Appendix 1). Information was collected from a total of 180 androphilic males, 133 gynephilic males, and 202 androphilic females.

Kinsey ratings (Kinsey, Pomeroy, & Martin, 1948) of sexual feelings over the previous year were obtained for all participants. This measure asked participants to indicate “Which of the following statements best describes your sexual feelings during the last year?” Subsequently, participants selected one of the following seven options: “Sexual feelings only toward the opposite sex” (Kinsey rating = 0), “Most sexual feelings toward the opposite sex, but an occasional fantasy about the same sex” (Kinsey rating = 1), “Most sexual feelings toward the opposite sex, but some definite sexual feelings toward the same sex” (Kinsey rating = 2), “Sexual feelings equally divided between males and females with no strong preference for one or the other” (Kinsey rating = 3), “Most sexual feelings toward the same sex, but some definite sexual feelings toward the opposite sex” (Kinsey rating = 4), “Most sexual feelings toward the same sex, but an occasional fantasy about the opposite sex” (Kinsey rating = 5), “Sexual feelings only toward the same sex” (Kinsey rating = 6). Kinsey ratings were obtained for 180 androphilic males. Of these, 77.2% ($n = 139$) had a rating of 6, and 22.8% ($n = 41$) had a rating of 5. Of the Kinsey ratings obtained for 133 gynephilic males, 85.0% ($n = 113$) had a rating of 0, and 15.0% ($n = 20$) had a rating of 1. Of the Kinsey ratings obtained for 202 androphilic females, 69.3% ($n = 140$) had a rating of 0, and 30.7% ($n = 62$) had a rating of 1.

Procedure and measures. All data were collected via an online questionnaire (see Appendix 3). The questionnaire was comprised of two sections. The first section

contained standard demographic questions pertaining to participant sex, gender identity, age, sexual orientation, ethnicity, annual income, highest level of education, parent status, and number and ages of children parented.

The second section consisted of the Altruistic Tendencies Toward Friends' Children subscale (ATTFCFS), which is comprised of 9 items. These items were adapted from Bobrow and Bailey (2001) and were designed to measure willingness to exhibit altruistic behaviour toward friends' children. Participants were told that it was not important if they actually knew a child of a friend but that they should indicate how willing they would be to engage in these activities with an imagined child of a friend (see Wilson & O'Gorman [2003] on the utility of using such hypothetical scenarios). Willingness was rated on a 7-point Likert scale ranging from 1 = *very unwilling* to 7 = *very willing*. Items included (1) babysitting for an evening, (2) babysitting on a regular basis, (3) babysitting for a week while the parents are away, (4) buying toys for the children, (5) tutoring the child in a subject the participant knew well, (6) helping to expose the child to art and music, (7) contributing money for daycare, (8) contributing money for the child's medical expenses, and (9) contributing money for the child's education. Participants' ratings for individual items were then averaged to create a mean ATTFS score.

Between-group differences were assessed using analysis of variance (ANOVA). Fisher's Protected Tests were used to limit Type I Error. That is, direct group comparisons were performed using Fisher's Least Significant Difference (LSD) tests, but only in the presence of statistically significant main effects. All *p*-values for direct group comparisons are two-tailed.

Results

Table 3.1 shows the descriptive statistics and standardized internal consistency reliabilities, Cronbach's *alphas* (α), pertaining to Altruistic Tendencies Toward Friends' Children subscale (ATTFCSC) score for androphilic males, gynephilic males, and androphilic females. Reliabilities were high for all three groups. Descriptive statistics for all demographic and recruitment variables are presented in Table 3.2. A one-way ANOVA indicated a significant main effect of group for age ($F[2, 512] = 81.12, p < .001, \eta_p^2 = .24$) and income ($F[2, 476] = 54.58, p < .001, \eta_p^2 = .19$), but not for number of children parented ($F[2, 512] = .87, p = .42, \eta_p^2 < .01$). Chi-square tests of independence demonstrated group differences with respect to level of education ($\chi^2 [2, 515] = 44.74, p < .001, \text{Cramer's } \phi = .30$) and recruitment method ($\chi^2 [4, 515] = 68.16, p < .001, \text{Cramer's } \phi = .26$), but did not demonstrate group differences with respect to ethnicity ($\chi^2 [2, 515] = 2.73, p = .26, \text{Cramer's } \phi = .07$) or whether the participant had children ($\chi^2 [2, 515] = 1.50, p = .47, \text{Cramer's } \phi = .05$). Recruitment method was therefore divided into 4 nominal, dummy-coded variables: Facebook/website recruitment, mailing list recruitment, university recruitment, and word-of-mouth recruitment. Further chi-square tests of independence demonstrated group differences with respect to Facebook/website recruitment ($\chi^2 [2, 515] = 40.85, p < .001, \text{Cramer's } \phi = .28$), university recruitment ($\chi^2 [2, 515] = 36.57, p < .001, \text{Cramer's } \phi = .27$), and word-of-mouth recruitment ($\chi^2 [2, 515] = 17.70, p < .001, \text{Cramer's } \phi = .19$) but did not demonstrate group differences with respect to mailing list recruitment ($\chi^2 [2, 515] = .90,$

Table 3.1

Descriptive statistics and internal consistency reliabilities, standardized item alphas (α) by group for Altruistic Tendencies Toward Friends' Children subscale.

	Androphilic males (<i>n</i> = 180)	Gynephilic males (<i>n</i> = 133)	Androphilic females (<i>n</i> = 202)
<i>M</i> (SD)	4.83 (1.38)	4.64 (1.30)	5.12 (.94)
Reliability (α)	.90	.88	.83

Table 3.2*Descriptive statistics for demographic and recruitment variables by group.*

Biographic/Recruitment Variable	Androphilic males (<i>n</i> = 180)	Gynephilic males (<i>n</i> = 133)	Androphilic females (<i>n</i> = 202)
Age (in years) <i>M</i> (SD)	35.87 (15.92)	24.59 (7.59)	22.47 (5.67)
Income ^a (\$CDN) <i>M</i> (SD)	41,390.59 (28,087.09)	22,224.02 (21,399.11)	16053.41 (19473.11)
Education Level			
Secondary or less (%)	31.1	54.9	64.9
Post-secondary (%)	68.9	45.1	35.1
Recruitment Method			
Facebook/online (%)	69.4	38.3	41.1
Mailing list (%)	25.6	27.8	23.3
University (%)	2.2	17.3	23.8
Word-of-mouth (%)	2.8	16.5	11.9
Ethnicity			
Caucasian (%)	91.7	85.0	91.1
Non-Caucasian (%)	8.3	15.0	8.9
Do you have children?			
Yes (%)	12.8	11.3	8.9
No (%)	87.2	88.7	91.1
Number of children <i>M</i> (SD)	.27 (.727781)	.20 (.65)	.17 (.63)

^a Androphilic males, *n* = 164; Gynephilic males, *n* = 129; Androphilic females, *n* = 186

$p = .64$, Cramer's $\phi = .04$). Thus, age, income, level of education, Facebook/website recruitment, university recruitment, and word-of-mouth recruitment were examined further as possible covariates. None of these demographic variables were significantly correlated with ATTFCS scores (Table 3.3) nor did they demonstrate significance as covariates in a one-way analysis of covariance (ANCOVA) with Altruistic Tendencies Toward Friends' Children scores as the dependent variable and group as the fixed factor (see Table 3.4). As such, no demographic variables were treated as covariates for subsequent analyses.

A one-way ANOVA was conducted with Altruistic Tendencies Toward Friends' Children scores as the dependent variable and group as the fixed factor. This test showed a significant between-group difference in Altruistic Tendencies Toward Friends' Children scores ($F[2, 514] = 6.69, p = .001, \eta_p^2 = .025$). Fisher's Protected LSD tests subsequently revealed that androphilic females displayed significantly higher Altruistic Tendencies Toward Friends' Children scores than gynephilic males ($p < .001$, Cohen's $d = .44$) and androphilic males ($p = .019$, Cohen's $d = .25$). Further, androphilic males did not display higher Altruistic Tendencies Toward Friends' Children scores than gynephilic males ($p = .180$, Cohen's $d = .14$).

Discussion

Research has shown that while humans evolved to preferentially direct altruism toward kin (Daly et al., 1997), they may also allocate altruism toward friends whom they treat as "social kin" (Korchmaros & Kenny, 2006; Silk, 2003; Stewart-Williams, 2007; Ackerman, Kenrick, & Schaller, 2007). It stands to reason that this may be especially true in more industrialized cultures where kin networks are more likely to be geographically

Table 3.3*Two-tailed Pearson's r correlations between ATTFCS scores and possible covariates.*

Variable	Androphilic males (<i>n</i> = 180)		Gynephilic males (<i>n</i> = 133)		Androphilic females (<i>n</i> = 202)	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
Age	.015	.84	-.064	.47	.067	.35
Income	.073	.36	-.139	.12	.139	.06
Education Level	-.056	.46	-.098	.26	.132	.06
Facebook/online Recruitment	-.006	.93	-.020	.82	-.015	.83
University Recruitment	-.079	.29	-.055	.53	-.013	.86
Word-of-mouth Recruitment	-.050	.50	-.010	.91	.078	.27

Note. ATTFCS - Altruistic Tendencies Toward Friends' Children Subscale

Table 3.4*One-way ANCOVA results.*

Variable	<i>F</i>	<i>p</i>	η_p^2
Intercept	590.33	.000	.557
Group	5.96 ^a	.003	.025
Covariates			
Age	.08	.778	.000
Income	.69	.408	.001
Education Level	.22	.643	.000
Facebook/online Recruitment	.50	.480	.001
University Recruitment	.98	.322	.002
Word-of-mouth-Recruitment	.38	.550	.001

Note. *df* = 1, 469.^a*df* = 2, 469.

disconnected (Hofstede, 1980; Triandis et al., 1988), and for those who may experience below average social or familial acceptance (Forrester et al., 2011).

First, on the basis of the existing literature (Ackerman et al., 2007), I predicted that a heterosexual sex difference would exist in altruistic tendencies toward friends' children. Specifically, I hypothesized that Canadian androphilic females would demonstrate elevated altruistic tendencies toward friends' children compared to gynephilic males. Our prediction concerning this heterosexual sex difference was confirmed.

Next, using the KSH as a theoretical starting point, coupled with findings that androphilic males are often geographically disconnected from their kin (Bobrow & Bailey, 2001; VanderLaan, Gothreau, Bartlett, & Vasey, 2011), I predicted that Canadian androphilic males would exhibit significantly higher altruistic tendencies toward friends' children compared to gynephilic males and androphilic females. I reasoned that androphilic males would do so because friends' children might serve as a proxy for nieces and nephews in the absence of accessible kin. Contrary to these predictions, I found that androphilic males exhibited significantly lower altruistic tendencies toward friends' children compared to androphilic females. Furthermore, androphilic and gynephilic males did not differ significantly from each other on scores obtained from this measure.

From a proximate (mechanistic/cognitive) perspective, it is possible that the heterosexual sex difference in altruism directed toward friends' children was observed, but the predicted sexual orientation difference was not, because males and females differ in the manner in which they process information pertaining to close relationships regardless of gender presentation. Ackerman et al. (2007) suggested that the sexes may

differ with respect to the cognitive mechanisms that underlie the processing of information pertaining to close relationships. More specifically, individuals differ in terms of how they perceived the costs associated with directing altruism toward friends' children and, in turn, their willingness to engage in such behaviour varied as a product of this assessment (Stewart-Williams, 2007). It stands to reason that males and females may assess the costs associated with altruism differently and, as such, may vary in their willingness to engage in such behaviour.

From an ultimate (evolutionary) perspective, Ackerman et al. (2007) suggested that the fitness costs of erroneously perceiving kin as nonkin may have been greater for females than for males, with the result that females are especially likely to systematically err on the side of false-positive - treating nonkin as though they were kin. A large body of literature demonstrates that androphilic males tend to be shifted in a female-typical direction for a number of psychological traits (reviewed in LeVay, 2011), including in their social interests (e.g., hobbies, occupational preferences; Bailey, 2003; Lippa, 2002). Thus, our finding that androphilic males are less like androphilic females, and more like gynephilic males in terms of directing altruism toward friends' children is inconsistent with this literature. Future research will be needed to elucidate whether the male sexual orientation difference was not detected due to a sex difference in the perceived cost of the altruistic activities being measured.

The question then remains as to why cross-cultural differences in elevated avuncular tendencies among androphilic males exist. More specifically, it remains unclear as to why elevated avuncularity by androphilic males has been repeatedly found in Samoa (Vasey et al., 1997; Vasey & VanderLaan, 2009, 2010a, b, c; VanderLaan & Vasey

2011), but has not been found in more industrialized cultures (USA: Bobrow & Bailey, 2001; UK: Rahman & Hull, 2005; Canada: Forrester, VanderLaan, Parker & Vasey, 2011; Japan: Vasey & VanderLaan, 2011).

In Samoa, male androphilia is expressed as *transgendered male androphilia*. Transgendered androphilic males occupy alternative gender role categories distinct from the categories of “men” and “women,” (e.g., *fa’afafine*) and exhibit gender role presentation that is markedly similar to that of members of the opposite sex within their given cultural context. In contrast, in the other countries in which the KSH has been tested (e.g., USA, UK, Canada, Japan), male androphilia is expressed as *sex-gender congruent androphilia*. Sex-gender congruent androphilic males adopt gender roles typical of their biological sex and self-identify as “men”. Analyses conducted by VanderLaan, Ren, and Vasey (2012) have shown that the ancestral form of male androphilia was likely transgendered, and not the sex-gender congruent form. In light of VanderLaan et al.’s findings, it seems reasonable to caution that tests of models for the evolution of male androphilia may be more valid if they are conducted in populations where transgendered male androphilia exists. The discrepant findings between Samoa and more industrialized populations provides evidence in support of the need to exercise caution when selecting populations with which to test evolutionary models of human behaviour.

Consequently, the expression of elevated avuncularity by androphilic males may be contingent upon the adoption of transgendered male androphilia. In addition, it has been suggested that it is perhaps an interplay between a number of sociocultural components (e.g., societal acceptance of male androphilia, societal acceptance of

transgenderism, cultural differences in levels of individualism and collectivism, geographic connectedness to kin-networks) that moderates the expression of elevated androphilic male avuncularity (Vasey & VanderLaan, 2011). It may stand to reason that a unique combination of these factors, found in Samoa, allows for the expression of elevated androphilic male avuncularity, while elevated avuncularity by androphilic males is not expressed in cultures where this combination of factors is absent. Future research will be needed to further define which specific cultural factors, and which unique combination of these factors, moderates the expression of elevated avuncularity by androphilic males.

CHAPTER FOUR

General Discussion

The research presented in this thesis underscores the need to carefully consider the cultural context within which evolutionary hypotheses pertaining to humans are tested. It does so by testing whether certain sociocultural features of more industrialized countries mitigate the expression of elevated avuncularity by Canadian androphilic males or mold it into different forms of expression.

In Chapter 2, I tested whether geographic disconnect from kin might mitigate the expression of elevated avuncularity by Canadian androphilic males. The results of this research indicate that all individuals are more willing to behave in an altruistic manner toward nieces and nephews when the altruistic acts require proximity. That being said, compared to gynephilic males and androphilic females, androphilic males do not exhibit increased willingness to behave in an altruistic manner toward nieces and nephews when the altruistic acts in question can be performed from a distance. As such, it does not appear that geographic distance from kin alone can account for why androphilic males in industrialized societies do not show elevated avuncular tendencies, whereas those in Samoa do.

In Chapter 3 of this thesis, I examined whether Canadian androphilic males might be directing resources toward the children of friends. It was suggested that friends might represent a form of “social kin” while their children represent the closest possible facsimile of nieces and nephews in more industrialized societies where kin networks can be more disconnected. The results of this research indicate that females are more likely to behave altruistically toward friend’s children than males. This sex difference is in

keeping with previous research findings on this topic (Ackerman, Kenrick & Schaller, 2007). That being said, there is no evidence that androphilic males exhibit elevated altruism towards their friends' children compared to gynephilic males and androphilic males. Thus, there is no evidence that Canadian androphilic males treat their friend's children as substitute recipients for kin-directed altruism.

The question therefore remains as to why the avuncularity expressed by androphilic males in Samoa is significantly elevated compared to Samoan females and gynephilic males, whereas, the avuncularity expressed by androphilic males of more industrialized cultures appears, on average, equivalent to levels expressed by gynephilic males and androphilic females. Previous research has examined three primary sociocultural features hypothesized as key to the expression of elevated avuncularity in the androphilic male population. First, it has been suggested that elevated androphilic male avuncularity is contingent upon the form of male androphilia adopted. Second, it has been proposed that elevated avuncularity exists in Samoan androphilic males, and not in their Western "gay" counterparts, because the former live in a more collectivistic society, while the latter live in more individualistic societies. Third, it has been suggested that social tolerance toward male androphilia is necessary for the expression of elevated avuncularity in that group. Each of these components will be discussed in turn.

It is possible that particular sociocultural features of the environments within which male androphilia are found might interact synergistically to promote the expression of elevated avuncularity. In other words, perhaps the simultaneous presence of some sociocultural features is critical to the expression of elevated avuncularity in the androphilic male population while the simultaneous absence of other features is also

necessary. The nature and possibility of this synergism will be discussed. Following this, the role sexually antagonistic genes play in the perpetuation of male androphilia will be discussed.

Sociocultural Components Tested in Isolation

The ancestral form of male androphilia. Researchers interested in reconstructing the ancestral social environment within which humans evolved have gleaned evidence from a wide range of disciplines and have proposed a number of sociocultural features which were likely important. These features include small social group sizes, hunting and gathering subsistence, a relatively less-complex sociopolitical structure, and animistic religious belief systems (Deacon, 1999; Dunbar, 1993; Ehrlich, 2000; Given, 2004; Hassan, 1981; Kim & Kusimba, 2008; Klein, 1999; Kusimba, 2003; Sanderson & Roberts, 2008; Underhill, 1975). By comparing the sociocultural environments of 46 societies exhibiting the transgendered form of male androphilia (“transgendered societies”) to 146 societies not exhibiting this form of male androphilia (“non-transgendered societies”), VanderLaan, Ren and Vasey (2012) provide evidence that transgendered societies tend to be more similar to ancestral human sociocultural conditions. As such, they conclude that the form of male androphilia most likely present ancestrally was transgendered, comparable to that observed in Samoa. As an extension of this line of reasoning, it is likely that the form male androphilia taken in more industrialized cultures, namely, sex-gender congruent male androphilia, is less likely to be representative of the manner in which male androphilia was expressed ancestrally. In this regard, it deserves mention that sex-gender congruent male androphilia appears to be a

historically recent phenomenon with little or no precedent outside of a Western cultural context until very recently (Murray, 2000).

Based on their findings, VanderLaan et al. (2012) conclude that the transgendered form of male androphilia represents the best contemporary model for studying the evolution of male androphilia. Further, VanderLaan et al. (2012) suggest that the level of avuncularity expressed by contemporary transgendered androphilic males is likely more akin to the levels expressed by androphilic males in the ancestral environment. Thus, it has been suggested that the form of male androphilia adopted (specifically, transgendered male androphilic) is one of the sociocultural components necessary for the expression of elevated avuncularity in androphilic males. Therefore, subsequent tests of the KSH for male androphilia would be most appropriately conducted on populations where the transgendered form of male androphilia is predominant.

Individualistic versus collectivistic societies. A number of researchers have proposed that androphilic males may not exhibit elevated avuncularity in certain populations (including the USA and the UK) because of cross-cultural differences in *individualism* versus *collectivism* (Bobrow & Bailey, 2001; Vasey, Pocock & VanderLaan, 2007). Individuals within individualistic cultures are typically described as those who are relatively more independent from their social groups and whose psychology is primarily influenced by personal beliefs and emotions rather than on the beliefs and emotions of the group to which they belong (Triandis, 2001). Individuals within collectivistic cultures, however, are typically described as those who are relatively more dependent on their groups and whose psychology is primarily influenced by the beliefs and emotions of the group to which they belong. Further, individuals from

collectivistic societies tend to follow social norms more stringently than those from individualistic societies. Those from collectivistic societies also tend to sacrifice personal goals for the goals of their group and they highly value the family unit. These constructs have a long standing history of being used to describe similarities and differences between cultures and have aided in understanding human psychology from a cross-cultural perspective.

Based upon the details outlined above, Vasey and VanderLaan (2011) reasoned that, given the relatively collectivistic nature of Samoa (Vasey et al., 2007), perhaps cultural collectivism is one of the sociocultural components necessary to illicit the expression of elevated avuncularity in androphilic males. Therefore, Vasey and VanderLaan (2011) examined whether androphilic males residing within another relatively collectivistic culture, namely, Japan (Kitayama, Marcus, Matsumoto & Norasakkunkit, 1997), would also express elevated avuncularity. However, despite the collectivistic nature of Japan, the results of Vasey and VanderLaan's (2011) analysis indicate that androphilic males of Japan, like the androphilic males of the USA, Canada and the UK, do not exhibit elevated avuncularity compared to gynephilic males and androphilic females. As such, they concluded that when examined in isolation, cultural collectivism does not appear to be responsible for the cross-cultural disparity in the expression of androphilic male avuncularity.

The role of social tolerance. Researchers have proposed that androphilic males may not exhibit elevated avuncularity in certain Western populations (including the USA and the UK) because androphilic males of these populations experience social intolerance (Forrester et al., 2011). As such, androphilic males of these populations are often

emotionally and geographically disconnected from kin networks (Bobrow & Bailey, 2001; Rahman & Hull, 2005). Thus, Forrester et al. (2011) examined the role social acceptance of male androphilia plays on the expression of elevated avuncularity by this group. They did so by examining avuncular tendencies in Canadian androphilic males given that levels of social tolerance toward male androphilia is relatively high in Canada in contrast to the USA, Japan and the UK (Anderson & Fetner, 2008; Widmer, Treas, & Newcombe, 1998). However, despite this cultural difference, the results of Forrester et al.'s (2011) analysis indicate that androphilic males of Canada, like the androphilic males of the USA, Japan, and the UK, do not exhibit elevated avuncularity compared to gynephilic males and androphilic females. As such, they concluded that when examined in isolation, social acceptance of male androphilia does not appear to be responsible for the cross-cultural disparity in the expression of elevated androphilic male avuncularity.

The Synergistic Effect of Sociocultural Components

The studies outlined above have demonstrated that when considered in isolation, the sociocultural components considered relevant to the expression of elevated avuncularity may not be sufficient to illicit the expression of elevated avuncularity in androphilic males. However, it is possible that the relevant sociocultural components may interact synergistically to promote the expression of elevated avuncularity in androphilic males. In other words, the individual components may act together in a manner that goes beyond the sum of their contributing parts. Theoretically speaking, the simultaneous absence of some key sociocultural components (e.g. transgendered male androphilia) and the presence of others (e.g. homophobia) could mitigate the expression of elevated androphilic male avuncularity even when components thought to promote its

development (i.e., collectivism) are present. More cross-cultural research is needed to identify the precise social parameters required for the development and expression of elevated avuncularity in androphilic males.

VanderLaan et al.'s (2012) analysis demonstrates how the variables that are considered to be important for the expression of elevated male avuncularity are linked in societies characterized by transgendered male androphilia. For example, they demonstrate that transgendered societies used double and bilateral descent systems more often than non-transgendered societies. Double and bilateral descent systems are characterized by social access to both the maternal and paternal sides of the family. Consequently, androphilic males living in transgendered societies have, on average, more kin available to them to whom they can direct altruism, compared to androphilic males living in non-transgendered societies. The idea that direct access to kin is important for the expression of elevated kin-directed altruism is supported by the research presented in this thesis which demonstrates that geographic proximity is important in this regard. In addition, VanderLaan et al. (2012) demonstrate that transgendered societies are unlikely to show negative social reactions toward male-male sexual behaviour compared to the non-transgendered societies. As such, it seems reasonable to suggest that androphilic males living in transgendered societies would be less estranged from their families and thus, more able to direct altruism toward their kin.

Hence, the absence of key sociocultural features (e.g. transgendered male androphilia, geographic connectedness to kin, social tolerance toward androphilic males) in the industrialized cultures in which the KSH has been tested may simply be too influential for the expression of androphilic male elevated avuncularity to occur. The

analysis by VanderLaan et al. (2012) suggests subsequent tests of the KSH for male androphilia would be most appropriately conducted in populations where the transgendered form of male androphilia is common, where social tolerance of male androphilic is high and where androphilic males are closely connected to their kin networks. To date, the research necessary to test the KSH has only been conducted in one society that is characterized by these three features, namely, Samoa. As such, further tests of the KSH for male androphilia in cultures exhibiting the combined socioculturally relevant components are needed.

Alternate cultural models for tests of the KSH

While there are a number of societies in which transgendered androphilic males are found, not every one of these cultures is characterized by all of the sociocultural features that have been deemed appropriate for testing KSH-based predictions. For example, the *hijra* of India are, by and large, biological males who adopt gender roles similar to that of the opposite sex and fulfill religious ceremonial functions such as blessing marriages and newborn babies. However, literature on this group suggests that the sexual orientation of the population is not exclusively androphilic (Nanda, 1999). Inclusion into this group is varied and is comprised of males who are intersexed, transgendered, transsexual, androphilic and even gynephilic. Perhaps most importantly, *hijra* move away from their families and live in communal housing with other members of the *hijra* community who become their “social” family (Nanda, 1999). For the *travesti* (i.e., transgendered and transsexual prostitutes) population of Brazil, homophobia, familial excommunication and migration also renders maintenance of relationships with kin difficult or impossible (Kulick, 1998).

What contemporary population might then be an appropriate model for testing KSH-based predictions? The *muxe* of Oaxaca, Mexico appear to represent a good candidate population for future research. This group is described as “predominantly male but display female characteristics”, much like the Samoan *fa’afafine*. The *muxe* are socially recognized as a third gender category separate from that of “man” or “woman” and do not identify as *homosexual*, per se, despite being exclusively androphilic (Stephen, 2002). Further, they maintain relatively close ties with their families. Thus, the *muxes* may represent a good comparative model for further tests of the KSH for male androphilia.

Other Explanations for the Perpetuation of Male Androphilia

The Kin Selection Hypothesis (KSH) posits that the genetic component of male androphilia persists, at least in part, because androphilic males evolved to increase their indirect fitness. That being said, some have questioned whether the amount of indirect fitness gained by directing resources toward kin is enough to entirely offset the costs incurred through the absence or severe reduction of direct fitness experienced by androphilic males. If kin selection does not offset the entirety of lost fitness, what other processes might account, at least in part, for the maintenance of genes for male androphilia over evolutionary time? In other words, what process might be working in concert with kin selection to maintain genes associated with male androphilia over evolutionary time?

Alternative explanations for the perpetuation of the genetic component of male androphilia over evolutionary time often invoke the notion of increased reproductive success among the kin of androphilic males. These explanations are referred to as

balancing selection hypotheses and posit that the genes associated with male androphilia persist because the relatives of androphilic males exhibit increased reproductive success as a function of carrying some of the genes associated with male androphilia. Consequently, the fitness costs associated with male androphilia are balanced by the increased reproductive output experienced by the kin of androphilic males.

Two Italian studies examined the reproductive output of relatives of androphilic males and reported elevated reproduction among matrilineal female kin (i.e., mothers and maternal-line grandmothers and aunts; Camperio-Ciani, Corna, & Capiluppi, 2004; Iemmola & Camperio-Ciani, 2009). Based on these findings, a type of balancing selection hypothesis, namely, the Sexually Antagonistic Gene Hypothesis (also known as the Female Fecundity Hypothesis), was developed. This hypothesis posits that the increased reproductive success experienced by the kin of androphilic males is incurred only by female kin because the genetic component of male androphilia appears sexually antagonistic in nature (i.e., produces fitness costs when present in one sex and fitness benefits when present in the opposite sex). Further, given that increased reproductive success was limited to maternal female kin, it was suggested that these sexually antagonistic genes may be X-chromosome linked. Indeed, androphilic male probands of some Western samples displayed an overrepresentation of androphilic male relatives among matrilineal kin but not on the patrilineal kin (Camperio-Ciani, Corna, & Capiluppi, 2004; Rahman et al., 2008; Hamer, Magnuson, Hu & Pattattucci, 1995), a pattern indicative of X-chromosome linkage.

However, a number of studies have raised doubt regarding the sexually antagonistic and X-linked nature of the genes associated with male androphilic. One

study conducted in the USA examined the reproductive output of maternal and paternal kin and showed elevated reproduction among the patrilineal grandmothers but not among the matrilineal kin of androphilic males compared to their gynephilic counterparts (Schwartz, Kim, Kolundziji, Rieger & Sanders, 2010). Another study conducted in the UK found that androphilic males had significantly more patrilineal, but not matrilineal, aunts, uncles, and cousins (King, et al., 2005). Further, two genetic studies did not show X-chromosome differences between androphilic and gynephilic males (Mustanski et al., 2005; Rice, Anderson, Risch & Ebers, 1999). The only study conducted in a high fertility population (Samoa) where females are reproducing at, or closer to, their peak reproductive potential, found that both matrilineal and patrilineal grandmothers and aunts of *fa'afafine* were more fecund than those of Samoan gynephilic males (VanderLaan, Forrester, Peterson, & Vasey, 2012). Taken together, the evidence suggests that sexually antagonistic balancing selection may be operating to maintain genes associated with male androphilia, but that the genes involved may not be X-chromosome linked. Further tests of the sexually antagonistic gene hypothesis are warranted.

While evidence collected in Samoa provides consistent support for the KSH for male androphilia, it is possible that elevated androphilic male avuncularity is not an evolved adaptation but may, nonetheless, contribute to the maintenance of the genes associated with male androphilia. The findings presented above regarding the sexually antagonistic nature of the genes associated with male androphilia raise the possibility that sexually antagonistic selection for elevated female fecundity has resulted in a non-adaptive by-product, namely, male androphilia. If so, then when the relevant sociocultural factors coalesce to promote the expression of elevated avuncularity by androphilic males

than this kin-directed altruism may, in turn, boost the reproductive success of their female kin, who are already predisposed toward elevated reproduction. Given this possibility, elevated avuncularity by androphilic males could be characterized as having a positive “effect”² on the genes associated with female fecundity (and the conjectured by-product male androphilia) even though male androphilia, itself, was not selected for this function. Further research will be needed to determine how genes associated with male androphilia might be maintained through the combined actions of Kin Selection and Sexually Antagonistic Selection. Finally, the topics discussed in this thesis emphasize the need to carefully consider the cultural contexts within which evolutionary hypotheses are tested.

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² “Effect”, used here, has been defined by Williams (1966) to refer to the fortuitous operation of a useful characteristic or trait not built by selection for its current role.

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APPENDIX 1

Recruitment Advertisements

Facebook Advertisement

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Human Sexuality Survey
seeacademic.qualtrics.com



We are recruiting _____ to participate in a 10 minute, 100% anonymous and confidential study about family dynamics.

Note : blanks were subsequently completed with one of the following:

- a. Gay men
- b. Straight men
- c. Straight women

University Advertisement

CALL FOR PARTICIPANTS!

We are looking for:



- *heterosexual* males
- *heterosexual* females
- *homosexual* males



To:

- Complete a short online survey about family and non-family
- Participation will take approximately 10 – 13 minutes
- Examines Canadian **family dynamics** and **sexual orientation**

The survey is *voluntary, individual, anonymous* and *confidential*.

Contact:

Miranda

(Department of Psychology, *University of Lethbridge*)

vaseylab@gmail.com

Email: vaseylab@gmail.com

Or go to:

https://seanacademic.qualtrics.com/SE/?SID=SV_8iZUda0gzv7WUTO

Email: vaseylab@gmail.com

Or go to:

https://seanacademic.qualtrics.com/SE/?SID=SV_8iZUda0gzv7WUTO

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Email: vaseylab@gmail.com

Or go to:

https://seanacademic.qualtrics.com/SE/?SID=SV_8iZUda0gzv7WUTO

APPENDIX 2

Informed Consent Form

Welcome to our online study.

University of Lethbridge

INFORMED CONSENT STATEMENT/INFORMATION LETTER

Study of Canadian Family Dynamics

Dr. Paul Vasey – paul.vasey@uleth.ca

You are invited to participate in a research study, aimed at examining aspects of relationships with nieces and nephews. This research is being conducted by Dr. Paul Vasey, a fulltime faculty in the Department of Psychology at the University of Lethbridge, Alberta, Canada and Miranda Abild, a Graduate students at the University of Lethbridge.

INFORMATION

In this study, you will be asked to answer some biographic questions about yourself. Also, you will be asked questions regarding your attitude toward childcare with respect to children who are, and are now, in your family. The study takes approximately 10-13 minutes to complete and will be completed entirely online.

RISKS

There are no greater risks associated with this study than the risks associated with everyday life. If there is a question that you do not feel comfortable answering, please skip that question.

BENEFITS

This research will further understanding regarding family dynamics and the attitudes of Canadians regarding their extended family.

CONFIDENTIALITY

You will be asked if you would like to be contacted to participate in future research conducted by the Vasey lab. If you choose to do so, you will be asked to provide your email address. Email addresses will be immediately separated from completed questionnaires upon receipt, at which point the data will be anonymous and confidential. Participation in future research is entirely voluntary and, as such, you are not required to supply your email for the purposes of this study. Dr. Paul Vasey, Miranda Ablid and Dr. Vasey's research assistants are the only people that will have access to these data. Dr. Vasey will keep a hard copy of these data, which only contains numeric identifiers, in a locked file cabinet. That data will be destroyed 6 years after the date of data collection. The results of this study will be published but participants will never be identified individually in any publication.

CONTACT & FURTHER INFORMATION

If you have questions about the study, or if you wish to be informed about the results of the study, you may contact Paul L. Vasey at <paul.vasey@uleth.ca>. You may contact the Office of Research Services at the University of Lethbridge in Canada at <research.services@uleth.ca> if you have any questions regarding your rights as a participant in this research.

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty. If you withdraw from the study before data collection is completed, your data will be destroyed.

Consent:



By clicking here, I acknowledge that I have read and understand the above information and consent to participate in this study. (If you do not consent, simply close this window in your browser.)

APPENDIX 3

Questionnaires

Biographical Questionnaire

Please answer the following questions as *accurately* and *honestly* as possible.

1. What is your age? (in years): _____
2. Are you biologically: (choose one) Male Female
3. How do you identify: (choose one)
 - a. Man
 - b. Woman
 - c. Other: (please specify) _____
3. What is your date of birth (mm/dd/yyyy)? _____
4. What is the highest level of education you received? (choose one)
 - a. None
 - b. Elementary or Primary school
 - c. High School Diploma or equivalency
 - d. College or trade school
 - e. University Degree
5. What is your annual income? _____
6. What hand do you use to write? (choose one)
 - a. Left
 - b. Right
 - c. Ambidextrous (use both hands approximately equally well)
7. From first born (oldest) to last born (youngest), please list all of your **biologically related** siblings (all the children you mother gave birth to; G = girl, B = boy).

Please indicate which child was you with an asterisk (*). For example, if my eldest sibling is a girl and the second born child is a boy and I am the third born and I am a girl, I would write: G, B, G*

8. How many children do you have? (Please indicate with a number) _____
9. What are the ages of your children? (Please separate responses with a comma) _____
10. How did you hear about this survey? (choose one)
 - a. Friend/Family member
 - b. Mailing list
 - c. Online website
 - d. University of Lethbridge (classroom or subject pool)
 - e. Poster
 - f. Other: (Please Specify) _____
11. What is your ethnicity?
 - a. Caucasian (White, Caucasian, Anglo, European American)
 - b. Asian (including Chinese, Japanese, etc.)
 - c. Hispanic or Latino (including Mexican, Central American, etc.)
 - d. Middle Eastern
 - e. Black
 - f. First Nations
 - g. East Indian
 - h. Other: (Please specify) _____

Kinsey Scale

Which statement best describes your sexual feelings during the last year? (choose one)

- Sexual feelings only toward females
- Most sexual feelings toward females, but an occasional fantasy about males
- Most feelings toward females, but some definite fantasy about males
- Sexual feelings about equally divided between males and females. No strong preference for one or the other
- Most sexual feelings toward males, but some definite sexual feelings toward females
- Most sexual feelings toward males, but an occasional fantasy about a female
- Sexual feelings toward males only
- No sexual feelings

Avuncular/Maternal Tendencies Subscale (Traditional)

For the following questions, it is not important if you actually have a niece or nephew. Please indicate how willing you would be to do the following tasks/activities for an imagined niece or nephew.

1. How willing would you be to... Babysit your niece or nephew for an evening?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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2. How willing would you be to... Babysit your niece or nephew on a regular basis?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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3. How willing would you be to... Take care of your niece or nephew for a week while their parents are away?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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4. How willing would you be to... Buy toys for your niece or nephew?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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5. How willing would you be to... Tutor your niece or nephew in a subject you know well?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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6. How willing would you be to... Help expose your niece or nephew to art and music (museum, theater, gallery, etc.)?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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7. How willing would you be to... Contribute money for daycare?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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8. How willing would you be to... Contribute money for your niece or nephew's medical expenses?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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9. How willing would you be to... Contribute money for your niece or nephew's education?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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Avuncular/Maternal Tendencies Subscale (New)

For the following questions, it is not important if you actually have a niece or nephew. Please indicate how willing you would be to do the following tasks/activities for an imagined niece or nephew.

1. How willing would you be to... Babysit your niece or nephew for an evening?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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2. How willing would you be to... Babysit your niece or nephew on a regular basis?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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3. How willing would you be to... Take care of your niece or nephew for a week while their parents are away?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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4. How willing would you be to... Buy toys for your niece or nephew?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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5. How willing would you be to... Tutor your niece or nephew in a subject you know well?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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6. How willing would you be to... Help expose your niece or nephew to art and music (museum, theater, gallery, etc.)?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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7. How willing would you be to... Contribute money for daycare?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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8. How willing would you be to... Contribute money for your niece or nephew's medical expenses?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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9. How willing would you be to... Contribute money for your niece or nephew's education?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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10. How willing would you be to... Purchase items (clothing, etc.) needed by your niece or nephew?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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11. How willing would you be to... Help the parent's complete a task (e.g. grocery shopping) so that they may spend more time with your niece or nephew?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
12. How willing would you be to... Host or arrange a celebratory event for your niece or nephew (e.g. birthday)?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
13. How willing would you be to... Answer questions about dating if your niece or nephew asks you?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
14. How willing would you be to... Send a birthday card to your niece or nephew?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
15. How willing would you be to... Pick your niece or nephew up from school?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
16. How willing would you be to... Purchase a travel ticket for your niece or nephew so that they may come visit you?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
17. How willing would you be to... Keep in touch with your niece or nephew via the internet?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
18. How willing would you be to... Attend a school play within which your niece or nephew is participating ?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
19. How willing would you be to... Contribute money so that your niece or nephew may attend a field trip?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
20. How willing would you be to... Attend a sporting event (football, soccer, etc.) within which your niece or nephew is participating?						
Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling

Altruistic Tendencies Toward Friends' Children Subscale

For the following questions, it is not important if you have a friend with children. Please indicate how willing you would be to do the following tasks/activities for an imagined child of a friend.

1. How willing would you be to... babysit for an evening?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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2. How willing would you be to... babysit on a regular basis?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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3. How willing would you be to... take care of the child for a week while their parents are away?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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4. How willing would you be to... buy toys for the child?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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5. How willing would you be to... tutor the child in a subject you know well?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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6. How willing would you be to... help expose the child to art and music (museum, theater, gallery, etc.)?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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7. How willing would you be to... contribute money for daycare?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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8. How willing would you be to... contribute money for the child's medical expenses?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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9. How willing would you be to... contribute money for the child's education?

Very Willing	Somewhat Willing	Slightly Willing	Not sure	Slightly Unwilling	Somewhat Unwilling	Very Unwilling
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