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Functional Analysis of Tattoos from an Evolutionary Perspective

Elise V. Neville

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FUNCTIONAL ASSESSMENT OF TATTOOS FROM AN EVOLUTIONARY PERSPECTIVE

by

ELISE V. NEVILLE

(Under the Direction of Bradley R. Sturz)

ABSTRACT

Recently, rates of tattooing in the U.S. have surged despite evidence of negative perceptions of individuals with tattoos. Additionally, perceptions appear to vary by target gender, with tattooed women being perceived more negatively than their male counterparts. The purpose of the current research was to examine (a) if perceptions of those with tattoos indeed vary by gender, (b) if tattoos conceivably serve an evolutionary function and (c) if so, do tattoos serve different functions for women and men. An evolutionary approach takes into consideration the purpose an observed behavior may serve for the individual in terms of how it solves specific problems of survival or reproduction (Buss, 2009). Considering current research showing gender stratification related to tattoo behavior, it is predicted that tattoos serve to address distinct evolutionary problems for men versus women. Specifically, tattoos address problems of mating for men and problems of survival for women. We argue that for men, tattoos act as a signal of good health, helping them better compete for access to mates. For women, tattoos may be a signal of group affiliation, which historically provided a number of benefits for survival.

These hypotheses were explored through two studies. Study 1 investigated relationships between gender and tattoo status of participant on number of sexual partners, tattoo status of social network, and gender role orientation. Study 2 was a replication and extension of Study 1
with participants randomly assigned to rate photographs of individuals with no tattoos, non-visible tattoos, or visible tattoos according to attractiveness and likelihood of including in their social network. Only non-significant differences were revealed in Study 1. Results of Study 2 indicated significant gender differences in ratings of attractiveness and social inclusion. Specifically, men reported higher overall ratings of attractiveness compared to women and women reported higher overall ratings of social inclusion compared to men. All other gender X personal tattoo status X photo set group interaction effects were non-significant. Theoretical and practical implications are discussed.

INDEX WORDS: Tattooing, Evolutionary theory, Perceptions, Gender role
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FUNCTIONAL ASSESSMENT OF TATTOOS FROM AN EVOLUTIONARY PERSPECTIVE

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CHAPTER 1
INTRODUCTION

Rationale

The practice of tattooing has been documented in a wide range of cultures, spanning countless generations (Kerner, 2012). In Western culture, tattoos were historically restricted to certain marginalized groups (e.g. prisoners, bikers, “sideshow freaks”) and those with tattoos encountered considerable stigmatization (Wohlrab, Fink, Kappeler, & Brewer, 2009). Recently, tattooing has seen a tremendous rise in popularity and practice among men and women from an array of social classes (Heywood et al., 2012). Consequently, there has been a parallel increase in research related to behavioral and social correlates for persons with tattoos (Koch, Roberts, Armstrong, & Owen, 2015). Prevailing findings have shown that tattoos negatively impact perceptions of the wearer, though gender appears to moderate these attitudes (Hawkes, Senn, & Thorn, 2004; Dickson, Dukes, Smith, & Strapko, 2014). Specifically, tattooed women are perceived more negatively than tattooed men. Women with tattoos are perceived as less attractive, less healthy, and more sexually promiscuous than women without tattoos (Swami & Furnham, 2007). By contrast, tattooed men are often viewed as healthier, more attractive, and more masculine than men without tattoos (Arndt & Glassman, 2012; Braunberger, 2000). A potential reason for this discrepancy may be that tattooing has historically been a masculine practice thus women with tattoos represent a violation of gender role norms (Arndt & Glassman, 2012).

Given the negative perceptions of those with tattoos, it seems counterintuitive that the practice of tattooing is not only surviving but thriving. For a better understanding of this behavior, an evolutionary perspective was taken. An evolutionary approach takes into
consideration the purpose an observed behavior may serve for the individual in terms of how it solves specific problems of survival or reproduction (Buss, 2009). Considering current research showing gender stratification related to tattoo behavior, it is predicted that tattoos serve to address distinct evolutionary problems for men versus women. Specifically, tattoos address problems of mating for men and problems of survival for women. We argue that for men, tattoos act as a signal of good health, helping them better compete for access to mates. For women, tattoos may be a signal of group affiliation, which historically provided a number of benefits to survival.

**Purpose**

While the body of literature on tattoos is growing, the majority of studies have considered proximate, or present-day explanations for the practice of tattooing. Very little research exists examining tattoos from an evolutionary approach, which could provide insight into the ultimate adaptive function they may serve. Considering this overarching approach, the current study examined the following questions:

a) Are there differences in perceived attractiveness of men versus women with tattoos? If so, what is the possible cause of this difference?

b) Is there an evolutionary purpose of tattoos? If so, do tattoos serve different functions for women and men?

**Significance**

The current study sought to advance our understanding of the motivations for and potential function of tattoos in order to decrease the pathologizing of and stereotypes associated
with tattooing. Increasing awareness of tattoo biases could also serve to improve mental health care provision to tattooed clients.

**Definition of Terms**

**Tattooing:** Puncturing the skin with a sharp object in order to introduce color (Gay & Whittington, 2002).

**Gender role:** Theoretical construct involving a set of social and behavioral norms that, within a specific culture, are widely considered to be socially appropriate for individuals of a specific sex (Pitts, 2003).

**Natural Selection:** Natural selection occurs when variants of a trait that best suit an organism to its environment, and that are heritable, increase in frequency over evolutionary time (Dugatkin, 2004).

**Sexual Selection:** A form of natural selection that, according to Darwin, involves a struggle between the individuals of one sex, generally the males, for the possession of the other sex (Buss, 2009).

**Group affiliation:** A number of persons bound together by common social standards, interests, etc. (Buss, 2009).

**Ornamentation:** The state of being decorated, adorned, or embellished (Dugatkin, 2004).
CHAPTER 2
LITERATURE REVIEW

Tattoo History

The practice of tattooing dates to prehistoric times, with Otzi the Iceman providing the earliest example. This 5,300-year-old mummy is covered in simple tattoos made with carbon, the purpose of which appears to be medicinal due to the degeneration of the bones in the tattooed areas (Kerner, 2012). Examples of tattooing also exist in ancient Egyptian mummies dating back to 2055 BC. It is interesting to note that tattoos have been found only on female mummies who were part of harems. As a result of these findings, it is posited that tattoos were considered extremely erotic in Egyptian culture. These early examples of tattoos are thought to have been created by cutting the skin and rubbing the wound with ashes or some other type of pigment (Taliaferro & Odden, 2012).

The practice of tattooing was later used by the Greeks and Romans as a method of control (Fischer, 2002). Criminals and slaves were marked with visible tattoos in order to control their movements and visibly display the individual’s social standing. Tattoos continued to serve punitive purposes in European societies up until the middle ages. Eventually, the writings of Captain James Cook led to the inclusion of the term tattoo in the English language (Fischer, 2002). Cook described the concept of “tatau” (the Polynesian word for “to make a mark”) after his contact with the Maori tribe in 1770.

In the United States, tattoos continued to be associated with criminals and those of lower social status. In the late 1800’s, Sam O’ Reilly designed the first electric tattoo machine and he began selling his designs to fellow tattoo enthusiasts. This began the growing interest in tattoos among the upper class as more elaborate and artistic tattoos could now be created. In the 1930’s,
tattoos became very popular with sailors to indicate masculinity and assert dominance over their peers. Alfred Kinsey, renowned sex researcher, was interested in sexual motivations behind tattooing and established that asserting masculinity was a main motivator for men obtaining tattoos. Kinsey interviewed numerous men with tattoos and argued that “competition among what society considered degenerates fueled the need for tattoos” (Taliaferro & Odden, 2012, p. 6). Throughout the 20th century, the practice of tattooing gained and lost favor with entertainers, soldiers, and hippies, to name a few.

At present, tattoos are becoming increasingly more common, which may be changing the perceptions of the practice as well as the demographics of individuals obtaining tattoos. Current estimates show that as many as one in five Americans has a tattoo. Although men have historically been the main demographic procuring tattoos, almost half of those receiving tattoos in the United States are now women (Stuppy, Armstrong, & Casals-Ariet, 1998).

**Motivations Behind Tattooing**

As with any unique, personal decision, the motivation behind obtaining a tattoo varies greatly. Tattoos are now being obtained by individuals from all ages and social standing so the reasoning behind this decision may be quite different from person-to-person. Wohlrab et. al. (2009) conducted a qualitative meta-analysis compiling the existing research on the most common motivational categories for those deciding to get a tattoo. The categories the author describes are as follows:

*Beauty, Art, and Fashion*: tattooing as works of art or embellishment of the body

*Individuality*: distinguishing one’s appearance from the appearance of others

*Personal Narratives*: expression of values or unique experiences

*Physical Endurance*: overcoming personal threshold for pain
Group Affiliations and Commitment: belonging to certain groups or social circles

Resistance: social protest

Spirituality and Cultural Tradition: unique traditions for distinct groups

Addiction: psychological addiction for collectors of tattoos

Sexual Motivations- expression of sexuality through body decoration

No Specific Reasons: impulsive decision to obtain a tattoo

Regardless of the motivations for obtaining tattoos, an often-overlooked consideration is the possible health risks involved (Armstrong, Owen, Roberts, & Koch, 2002). Skin infections, allergic reactions, and blood borne diseases (e.g. Hepatitis C) are all potential complications that can occur as a result of getting a tattoo. Along these lines, there are psychological risks for tattooed individuals. Stigmatization and negative responses from others are possible hazards associated with tattoos (Stuppy et. al., 1998). As the number of individuals with tattoos continues to increase, research focused on perceptions of this practice has proliferated.

General Perceptions of Tattooed Individuals

Seiter and Hatch (2005) conducted a study exploring the effect of tattoos on an individual’s perceived credibility and attractiveness. The researchers used photographs of two undergraduate students, one male and one female, and created four photographs depicting the two students with and without a tattoo. The participants were then asked to complete a questionnaire about the credibility and attractiveness of the individual in the photograph. Results showed that the models without a tattoo received significantly higher ratings of competence, sociability, and character than the models with a tattoo. Surprisingly, they found no significant differences in attractiveness ratings for the tattooed versus non-tattooed model.
Previous research has found that even children hold these negative views of tattooed individuals. In a study conducted by Durkin and Houghton (2000), children’s and adolescents’ stereotypes about tattooed individuals and antisocial and delinquent behavior were assessed. The authors also wanted to explore how prejudices in general develop in children and how these views evolve over time. The participants ranged in age from 6-16 and were shown pictures of three men, one of which had a tattoo, and were asked to match a verbal description with the picture they felt was the best fit. These descriptions consisted of behaviors or attributes that were negative, positive, or neutral. Results showed that the children and adolescents attributed negative descriptions to the tattooed individual significantly more often than either positive or neutral descriptions. Although all of the participants were more likely to ascribe negative descriptions to the tattooed individual, younger children were less likely to do so than older children and adolescents.

**Tattoos and the Workplace**

While the practice of tattooing is generally thought of as a very personal choice, the decision to obtain tattoos can impact other areas of an individual’s life. One such area of concern for those with visible tattoos is the workplace. Research is now beginning to address how employers view potential employees with visible tattoos. One such study by Bekhor, Bekhor, and Gandrabur (1995) utilized phone interviews to assess how employers in a variety of job sectors (retail, hospitality, beauty, private sector, building industry, motor, personal care, and public service) viewed job seekers with visible tattoos. All employers were asked the same four yes or no questions:

1) If you had two equally suitable job applicants, one with and one without a tattoo, would this influence you?
2) Would you employ someone with a visible tattoo in normal work attire?
3) Do you employ anyone with a tattoo visible on hands, wrists, or forearms?
4) If you had an employee with a tattoo would you encourage removal?

Hospitality, office, and retail employers were most likely to report that the presence of a tattoo would influence their hiring decision. Hospitality, retail, and office employers were least willing to hire someone with a visible tattoo; however, 84% of employers in the building and public service industries reported they would hire someone with a visible tattoo. Most employers interviewed were unaware of having current tattooed employees and less than 10% stated that they would encourage tattoo removal. This study indicates that many employers would be accepting of tattoos, but only within certain sectors of the job market. Certain geographical areas also seem to be more accepting of tattoos. Areas of the East and West coast tend to be more accepting of body modification than the Midwest (Gay & Whittington, 2002). With this in mind, individuals with visible tattoos may have difficulty finding employment, especially if they are trained in “white collar” positions or living in more conservative regions of the U.S.

Despite the increase in visible tattoos on potential employees, employers may have valid concerns about how consumers will ultimately view these employees. Dean (2010) conducted a study exploring how consumers view tattooed employees in a variety of service industries. Participants were given a questionnaire asking about their perceptions of service providers with tattoos as well as traits they attributed to tattooed individuals outside of business transactions. Regarding service industries, participants were asked about tattooed employees in the following occupations: barber/ hair-stylist, bank loan officer, grocery store clerk, auto mechanic, nurse, accountant, bartender, dentist, and stockbroker. Results showed that participants evaluated tattoos on auto mechanics and bartenders as appropriate, but inappropriate on employees in all
other industries. Participants were able to explain their perceptions and most indicated that
tattoos on employees handling money (e.g. accountant, stockbroker) were seen as a sign of poor
judgment and impulsive behavior. In regard to healthcare providers, tattoos were seen as
unsanitary and “dirty.” Traits attributed to tattooed individuals in general included less honest,
more rebellious, less attractive, and less intelligent. Overall, these findings lend credence to
employers’ concerns regarding hiring employees with visible tattoos, as it seems it can have a
negative impact on potential consumers.

**Perceptions of Tattooed Men versus Women**

Perceptions of individuals with tattoos have been shown to vary according to the gender
of the tattoo wearer. Generally, men with visible tattoos are much more socially accepted than
women with visible tattoos (Hawkes, Senn, & Thorn, 2004). Tattooing has historically been a
man’s practice, and many evaluate men with tattoos as more attractive and masculine than those
without tattoos (Ardnt & Glassman, 2012). One of the reasons Atkinson (2002) believes this
gender difference exists is because women were historically barred from many of the
organizations associated with tattooing (e.g. motorcycle gangs, military).

Overall, the body of literature indicates that women with tattoos are viewed more
negatively than men with tattoos. For example, Swami and Furnham (2007) examined
perceptions of women with a varying number of tattoos according to physical attractiveness,
alcohol consumption, and sexual promiscuity. This study found that with increasing number of
tattoos, women were perceived as more sexually promiscuous, more likely to consume greater
amounts of alcohol, and less physically attractive. Given these perceptions, it was surprising to
see that two-thirds of participants in the study still stated they would consider getting a tattoo in
the future. Resenhoeft, Villa, and Wiseman (2008) conducted a similar study examining
perceptions of personal characteristics of women with and without tattoos. The authors found that women without tattoos were viewed as more honest, attractive, and intelligent than their tattooed counterparts. Consequently, researchers argue that these negative perceptions may be because women with tattoos are seen as violating social expectations of their gender.

In terms of gender norms, society creates certain expectations for the appearance and behavior of each gender (Hawkes et. al., 2004). For women, it is expected that they will be more emotional, kind, and skilled within interpersonal relationships (Ardnt & Glassman, 2012). Men are expected to be strong, independent, and unemotional. Any violation of these societal expectations can lead to negative evaluations from others. Typically, men hold more traditional ideas about gender norms compared to women (Gere & Helwig, 2012). As tattoos are perceived as highly masculine, tattooed women may be viewed more negatively because they are seen as acting contrary to their expected gender norms.

Given the long history of tattooing in a variety of cultural groups, it can be argued that tattoos serve some adaptive purpose to the wearer. Due to the discrepancies in perceptions of men and women with tattoos, it is also likely that tattoos serve different adaptive purposes based on gender. Accordingly, this study will attempt to investigate the occurrence of tattooing from an evolutionary perspective with a focus on natural and sexual selection. These concepts and their proposed relationship to current tattoo practices are discussed in the following sections.

**Natural Selection**

From an evolutionary perspective, the primary goal of an individual is to survive and reproduce (Buss, 2009). These two “struggles,” first described in depth by Charles Darwin, are founded in his theories of natural and sexual selection. Darwin’s theory of natural selection attempted to explain the adaptive function of physical and behavioral traits and how these traits
may promote (or be detrimental to) survival. The premise of natural selection is that various traits (i.e., body shape, coloration, food acquisition behavior) will increase or decrease as a result of the trait’s survival benefit for an organism within a given environment (Dugatkin, 2004). In order for natural selection of a particular trait to occur, three mechanisms must be involved: variation, inheritance, and fitness benefit (Buss, 1999). With respect to variation, natural selection requires that individuals differ with respect to a particular trait. With respect to inheritance, natural selection requires that these individual differences in traits are reliably inherited by offspring. With respect to selection, natural selection requires that these individual differences in traits that are reliably inherited serve to increase the survival or reproductive potential of an individual.

Natural selection is obligatory due to the variety of survival problems an organism must face in their environment. Salient survival problems include food acquisition, combating predators, and environmental dangers. Unfortunately, the process of natural selection is very gradual and the specific dangers an organism will encounter are unpredictable. Given this, natural selection occurs when a heritable trait successfully addresses a survival problem and increases the survival rate of the individual possessing that trait. For example, efficacious food acquisition is a survival problem faced by almost all organisms, facilitating selection for qualities that increase the ability to find sufficient nourishment. Organisms that are skilled in efficiently procuring non-toxic food sources are more likely to survive and pass these abilities along to subsequent generations.

**Group living.** Historically, humans have addressed multiple survival problems by living in groups (Rubenstein, 1978). Male coalitions facilitated more successful hunting and large game provided a surplus of meat that no single male could consume (Buss, 1999). Ancestral
women were more likely to contribute food through gathering, likely due to women’s smaller size and physical strength. The opportunity to access food sources encouraged group living and provided additional benefits to group members. Due to gender differences in body size and musculature, women arguably benefited more from group living by affiliating with men who could provide physical protection from predators. Group living also served to increase mating opportunities and provided additional assistance in child rearing (Baumeister, 1995). While the formation of groups was often a product of genetic relatedness, cooperation among non-related individuals also evolved. Given the potential cost incurred by cooperating with non-relatives, these networks likely evolved as a result of reciprocal altruism. Group living among genetically unrelated individuals could still be adaptive as long as benefits afforded to other members were reciprocated. In this social environment, cheaters (i.e., those who received benefit without reciprocating) posed a significant threat. In order to detect cheaters, humans determined trustworthy group members by past experience, physical cues, and reputation.

In addition to the benefits of group living our ancestors received, modern day groups and social networks address a fundamental human need to belong (Baumeister, 1995). Many studies have explored this occurrence and indicate that happiness and a sense of overall well-being heavily depend on forming supportive social ties. Individuals with limited social contacts more often report higher levels of psychological distress and poorer health status. Given the detrimental consequences of social isolation, individuals can be highly motivated to engage in behavior that will increase their social interactions. In a related vein of research, studies have shown that social networks often develop as a result of similarity among members (Lewis, 2010). When forming friendships, individuals tend to choose associates who share similar interests,
experiences, and even physical traits. Tattoos may serve as an example of shared physical traits that lead to the development of new social interactions.

**Sexual Selection**

Darwin also theorized that certain traits may increase or decrease as a function of the reproductive advantage they provide an organism, labeling this occurrence sexual selection (Buss, 1999). He argued sexual selection occurs as a result of two mechanisms: intersexual selection (preferential mate choice) and intrasexual competition (competition between members of the same sex for access to mates of the opposite sex). Intersexual selection restricts choice of possible mates to those meeting preferred criteria while intrasexual competition serves to increase the number of potential mates through competition (Paul, 2002).

**Mating systems.** Generally speaking, mating strategies vary by sex, with females engaging in intersexual strategies and males engaging in intrasexual strategies (Kenrick, Sadalla, Groth, & Trost, 1990). Additionally, these strategies are related to the dominant mating system(s) employed by a species. There are three primary types of mating systems: monogamy (one male mating with one female), polygamy (subset of males mating with multiple females), and polyandry (subset of females mating with multiple males). The mating system employed by a species is influenced by various ecological factors such as dispersion of resources and mate availability within a given habitat (Emlen & Oring, 1977).

Monogamous systems are most often seen in species living in environments high in predatory risk and low in access to material resources like food (Dugatkin, 2004). The risk of predation and food scarcity in these types of habitats often necessitates bi-parental care, which maximizes offspring fitness. Monogamous males miss out on the opportunity to breed with several females, decreasing the chances of capitalizing on reproductive success. Explanations
for monogamy point to increased paternity certainty and the increased fitness of offspring due to shared parental care (Clutton-Brock, 1989). Due to decreased mate competition in monogamous systems, there is less sexual dimorphism in size and diminished sexual selection of preferred traits (Emlen & Oring, 1977). Monogamous systems may be social and/or genetic in nature, meaning a pair-bond could be raising offspring together that may or may not be the direct genetic offspring of the partner (Sefcek, Brumbach, Vasquez, & Miller, 2007). Serial monogamy is a variation of this mating pattern, with a pair-bond mating during a single breeding season and mating with a new partner in subsequent seasons.

While monogamy is the general expectation in today’s society, humans appear to be adapted for a mating system somewhere in between monogamy and polygamy. This argument is supported by evidence of sperm competition and variation in testes size among species (Simmons, Firman, Rhodes, & Peters, 2004; Gomendio, Martin-Coello, Crespo, Magana, & Roldan, 2006). Sperm competition is defined as the presence of sperm from two or more males vying to fertilize the egg of a single female. Competition influences structural and morphological adaptations in the sperm of males, serving to increase the ability to successfully fertilize ovum. Some such adaptations include the development of larger spermatozoa, spermatozoa with greater swimming velocity, and ejaculates containing more viable sperm. Sperm competition is correlated with relative testicular size, with larger testes producing more sperm in response to competition for fertilization (Parker & Ball, 2005). Consequently, it is posited that relative testes size provides information about the dominant mating system employed by a species (Vahed & Parker, 2012). Smaller testes are more common in monogamous species, such as birds, while larger testes are seen in polygamous species, such as primates. Human males have a testicle to body weight ratio of roughly .8, which is considered
moderate. Accordingly, this suggests that humans have historically engaged in a somewhat polygamous mating pattern (Sefcek et al., 2007).

Mating behavior and preferences are context dependent, altering according to the desire for a short-term versus long-term mate (Miner & Shackelford, 2010). Overall, signals of quality genetics and fertility are important in short-term mates (Sefcek et al., 2007). Challenges for males in short-term mating include identifying fertile women who are sexually accessible, while minimizing required investment. Females searching for a short-term mate must be able to evaluate the genetic quality and immediate access to resources of a potential mate. For males, a preference for short-term mating increases reproductive success given there is the opportunity to mate with more females (Miller, Putcha-Bhagavatula, & Peterson, 2002). While females generally show less interest in short-term mating, they are significantly more selective in short-term mate choice than males (Buss, 1994). The costs of short-term mating for males include possible decrease in offspring viability due to paternal abandonment, violence from other mates, and sexually transmitted diseases. The costs of short-term mating for females include greater risk of being abandoned and left to care for offspring without paternal assistance. Indicators of parental capacity and overall access to resources are desired in long-term mates. Males searching for a long-term mate benefit from choosing a female with high reproductive value and good parenting skills. Females need to ensure a long-term mate is willing to invest in the parenting process as well as provide quality genetic material.

**Parental investment theory.** One proposed reason for sex differences in mating strategies is the reproductive effort involved with producing offspring. Reproductive effort considers the mating effort and parental investment required to successfully produce offspring (Geary, 2000). Parental investment is defined as “any investment by the parent in an individual
offspring that increases the offspring’s chance of surviving (and hence reproductive success) at the cost of the parent’s ability to invest in other offspring” (Trivers, 1974, p. 249). In essence, parental investment is the price of reproduction. This cost can include time, energy, and resources which reduces the potential for producing and providing for additional offspring. Potentially, males need only provide sex cells to a willing female to ensure offspring survival. As a result, males benefit from a focus on mating effort (Kenrick, et. al., 1990). Conversely, females in nearly every species of mammal have higher rates of parental investment (e.g., gestation of offspring) and provide the majority of parental care an offspring receives postpartum (Geary, 2000). Given that females have lower reproductive potential and higher rates of parental investment, females benefit from discerning mate selection, making females a limited resource to males. Utilizing a mating strategy that will yield viable offspring with high reproductive potential is vital for females. Preferential mate selection by females means males must compete with each other in order to mate with quality members of the opposite sex.

Due to disparate requirements in parental investment, females must be choosier when selecting a potential mate, as they have more to lose by poor mate choice (Trivers, 1974). Poor mate choice can be detrimental for females, potentially leaving them vulnerable to desertion or reproducing with a genetically inferior male. Given the negative consequences, females should show preferential selection for mates that can provide optimal benefits to their offspring. These benefits can be characterized as direct or indirect (Buss, 1999). Direct benefits include provision of resources such as food or protection for offspring while indirect benefits relate to the quality of genetic contribution to offspring (Paul, 2002). While it may be relatively easy for a female to determine if a mate can provide direct resources, determining the indirect benefits of a potential mate can pose a challenge.
**Indicators of fitness.** One way to assess the genetic makeup of males is via fitness indicators. Phenotypic traits, such as symmetry and bright coloration, can signal that a particular male is “fit” and would provide quality genetic material to offspring (Miller, 2001; Roberts & Little, 2008). Offspring from fit males tend to live longer and reproduce more often. Fitness indicators also serve to ensure that potential mates are more likely to be healthy and better providers for offspring. While a variety of traits can signal that a male is fit, females must determine if the trait is an honest indicator of fitness. One way to verify this is through the use of costly signals. Costly signals indicate genetic quality that inferior organisms are unable to display due to their high marginal costs (Carmen, Guitar, & Dillon, 2012). These costly signals are considered “handicaps” because they inflict increased risks or costs to the individual (Gangestad & Scheyd, 2005). The high cost of some indicators of fitness prevents less fit individuals from cheating or displaying dishonest signals (Miller, 2001). Individuals who display significant handicaps are considered to possess higher genetic quality than those displaying smaller handicaps because they are able to afford the costs involved. Larger handicaps can amplify individual differences and signal to potential mates that the individual can afford to waste resources. Though costly indicators can signal fitness to potential mates, handicaps also decrease the survival rates of those employing these displays. With this in mind, there is a marginal cost to handicaps that necessitates consideration of the benefits of increased reproduction and the cost of decreased survival ability (Getty, 2006).

When males must compete to demonstrate fitness, a costly signal may be the development of secondary sexual characteristics. These characteristics may include ornamentation, bright coloration, or unique behavioral displays (Bergman, Ho, & Beehner, 2009). Darwin illustrates this point in *The Origin of Species:*
I believe, that when the males and females of any animal have the same general habits of life, but differ in structure, color, or ornament, such differences have been mainly caused by sexual selection that is, by individual males having had, in successive generations, some slight advantage over other males, in their weapons, means of defense, or charms, which they have transmitted to their male offspring alone (Darwin, 1859, p. 257).

Male geladas, a species of primate, provide an example of the use of bright coloration to signal fitness to potential mates (Bergman et. al., 2009). These males have a patch of red skin on their chest that has been found to correlate with reproductive success. Male geladas with redder chest patches mate with significantly more females and hold higher status within their social group. The peacock’s tail is another example of the use of ornamentation in the animal kingdom. Symmetrical, colorful peacock tails signal to peahens that the male is healthy and could provide high quality genes to offspring (Miller, 2001). In both examples, the indicators of fitness signal to potential mates that the individual possesses important traits for reproduction.

Although many animals display forms of biological ornamentation (i.e., tail of peacocks), the creation of external ornamentation can be used to display an organism’s extended phenotype. Extended phenotypes are considered to be the effect of genetic factors beyond the organism’s body such as a spider’s web (Etcoff, Stock, Haley, Vickery, & House, 2011). An example of the utility of extended phenotypes in animals is the Bowerbird. Male bowerbirds make ornate nests in order to attract viable females for reproduction. Bowerbirds will use ornate, brightly colored natural material in order to decorate their nests, and construction involves a significant time and energy investment. Skillful nest ornamentation serves as a signal to female bowerbirds that the
male possesses high quality genetic material. The bowerbird’s nest is a strong illustration of sexual selection through mate choice, leading to psychological adaptations for ornamentation.

In humans, indications of fitness include having an attractive face. Despite perceived variation in what people consider attractive, there is a universal preference for faces that are highly symmetrical (Gallup & Fredrick, 2010). Highly symmetrical faces indicate developmental stability during gestation (Roberts & Little, 2008). Mutations and developmental insults can cause deviations in symmetry which signals compromised genetic quality (Scheib, Gangestad, & Thornhill, 1999). Another indicator of fitness is body configuration. The size ratio between body parts, musculature, and distribution of body fat can all serve to signal genetic quality. For women, an important body ratio compares the size of waist to hips. Women with narrow waists and broad hips (specifically, a .7 WHR) are rated as more attractive in a variety of cultures and geographic areas. This desired ratio indicates to potential mates that the woman is healthier and reproduction likelihood is increased. WHR also helps potential mates to determine if a woman is already pregnant, as the WHR is altered. For men, shoulder-to-hip ratios (SHR) are utilized to determine genetic quality. Women prefer men with broad shoulders and narrow hips because it indicates higher levels of testosterone and strength. Muscle mass in men can also function as a signal of health because it requires high testosterone levels and caloric intake to develop. Preferences for musculature are considered an inverted-U trait as women find men with very low or very high muscle mass as less attractive. Very low musculature indicates low testosterone levels and is likely seen as less attractive because they are seen as less masculine. Very high muscle mass is an indicator of high testosterone levels and is likely seen as less attractive because it may indicate greater aggression.
Current Study

The purpose of the current study was to explore the potential adaptive function of tattoos. Specifically, we hypothesized tattoos address evolutionary problems of mating for men and problems of survival for women. We argue that for men, tattoos act as a signal of good health, helping them better compete for access to mates. Due to differential parental investment, women tend to be more selective in their choice of sexual partners. This leads to competition among men to meet preferred selection criteria in order to attract attention (Paul, 2002). As human societies have evolved, sexual selection has been affected by our ever-growing population and progress toward better healthcare practices (Carmen, et. al., 2012). This population increase and improved access to healthcare means more competition among men for access to a quality partner. Tattoos may function as a display of fitness to potential sexual partners. More specifically, the cost incurred by men with tattoos (e.g., monetary investment, potential for infection) may signal to women that he is physically healthy and has access to resources. Furthermore, tattoos could help men “stand out from the crowd,” thus increasing the likelihood of attracting sexual partners. If tattoos function as a signal of biological quality for men, we would expect men with visible tattoo to report more sexual partners than men with non-visible or no tattoos. In like manner, we would expect men with visible tattoos to report fewer social contacts with tattoos, as they represent competition for attracting potential mates. Additionally, women should rate men with visible tattoos as more attractive than men with non-visible or no tattoos.

For women, a proposed adaptive function of tattoos relates to the beneficial nature of group membership. Due to gender differences in body size and muscularity, women arguably benefited more from group living by affiliating with men who could provide physical protection.
from predators. Group living also served to increase mating opportunities and provided additional assistance in child rearing (Baumeister, 1995). The benefits of being part of a group, along with an instinctual need to belong, are strong motivators for engaging in behavior that will promote an individual’s acceptance within a social network (Lewis, 2010). As physical similarity is a factor in the development of voluntary associations, women may use tattoos to demonstrate a shared interest to members of a desired group. Additionally, common physical traits may serve as visual cue of trustworthiness, fostering interpersonal networks (Rubenstein, 1978). If tattoos function as a means of group affiliation for women, we would expect women with tattoos to report more social contacts with tattoos than women with no tattoos. Furthermore, social inclusion ratings should be higher for women with tattoos rating women in the tattooed photo groups.

**Overall Predictions**

To test previously discussed hypotheses, two studies were conducted. Study 1 investigated demographic differences (i.e. gender, personal tattoo status, rural status) in sexual partners, tattoo status of participant’s social network, and gender role orientation. Considering applicable theory, we predicted: (1A) Men with visible tattoos would have more opposite-sexed sexual partners than men with non-visible tattoos or no tattoos, (1B) women with tattoos would have more tattooed social contacts than women without tattoos, (1C) and women with tattoos would report higher mean masculinity scores than women without tattoos. Investigating rural differences among reports of sexual partners, tattoo status of social network, and gender role orientation was an exploratory component of Study 1. However, due to the insufficient literature on rural differences, no specific hypotheses were made on whether individuals from rural versus non-rural areas differ.
Study 2 was a replication and extension of Study 1. Demographic differences (i.e. gender, personal tattoo status, rural status) in sexual partners, tattoo status of participant’s social network, and gender role orientation were analyzed with a new pool of participants. Predictions regarding demographic differences were identical to those in Study 1 (hypotheses 2A, 2B, & 2C). Additionally, the following were hypothesized for Study 2: (2D) men without tattoos would rate women in the tattooed photo groups as less attractive than women with no tattoos and (2E) social inclusion ratings would be highest for women with tattoos rating women in the tattooed photo groups. Furthermore, social inclusion ratings would be lowest for men with tattoos rating men in the tattooed photo groups.
CHAPTER 3
STUDY 1 METHODOLOGY

Participants

Undergraduate students enrolled in psychology courses at a large university in the southeastern United States served as participants in this study. A total of 719 students participated in the study. Data from 19 participants were excluded due to incomplete responses, and analyses were conducted on the remaining 700 participants. The average age of the sample was 19.82 years. Three hundred ninety-five (56.4%) participants identified as women, and 305 (43.6%) participants identified as men. Four hundred and fifty-one (64.4%) participants identified as White, 203 (29%) participants identified as Black or African American, 16 (2.3%) participants identified as Other, 15 (2.1%) participants identified as Hispanic or Latino, 12 (1.7%) participants identified as Asian/Pacific Islander, and 3 (.4%) participants identified as Native American or American Indian. Five hundred and twenty-eight (75.4%) participants indicated they were reared in non-rural communities and 172 (24.6%) participants indicated they were reared in rural communities. Five hundred and fifty-nine (74.8%) participants indicated they had no tattoos, 142 (19%) participants indicated they had non-visible tattoos, and 46 (6.2%) indicated they had visible tattoos.

Procedure

Research studies conducted within the university can be accessed through the SONA system, which provides students with information about current research participation opportunities. Those choosing to participate in the study were redirected to an on-line survey created in Qualtrics, a web-based data collection service. Those consenting to participation were presented with a questionnaire consisting of demographic questions, tattoo related questions, the
Bem Sex Role Inventory- Short Form (BSRI-Short Form; Bem, 2000), and the Personal Attributes Questionnaire (PAQ; Spence & Helmreich, 1978). Upon completion, participants were debriefed and credited for participation through the SONA system. The full questionnaire can be found in Appendix A. Once all data were collected, the primary researcher transferred the data to an SPSS file for cleaning, maintenance, and analysis.

**Measures**

**Demographic form.** Demographic data associated with age, sex, ethnicity, religious preference, marital status, sexual orientation, education, and residential setting were collected from all participants.

**Tattoo items.** To address hypotheses regarding tattoos, the survey included several questions developed by the researcher. Participants were asked about the prevalence and location of personal tattoos, their willingness to obtain a tattoo, and the prevalence of tattooing in members of their social network.

**Bem Sex Role Inventory- Short Form (BSRI-Short Form; Bem, 2000).** The BSRI-Short Form is a 30-item self-report measure of gender-role orientation. This abridged version of the BSRI was developed to increase reliability of the Femininity and Masculinity scales (Bem, 2000). The femininity (F) scale consists of 10 characteristics identified as preferable for women and includes items such as gentle and sensitive to the needs of others. The masculinity (M) scale consists of 10 characteristics identified as preferable for men and includes items such as competitive and dominant. The measure also includes 10 filler items not included in scaled scores. Participants are asked to rate themselves on each item using a 7-point Likert-type scale ranging from 1 (“never or almost never true”) to 7 (“almost always true”). Item ratings for each scale are summed to determine M and F scores. Higher scores on one scale with lower scores on
the other are indicative of a sex-typed orientation. The BSRI-Short Form has shown good internal consistency reliability with alpha coefficients of .82 for the masculinity scale and .89 for the femininity scale (Campbell, Gillaspy & Thompson, 1997). The BSRI-Short Form has demonstrated convergent validity with the Adjective Check List M and F scales and the Personality Research Form ANDRO Scale (Choi & Fuqua, 2003).

**Personal Attributes Questionnaire (PAQ; Spence & Helmreich, 1978).** The PAQ is a 24-item self-report measure of gender role characteristics. Each item consists of paired adjectives, with the letters A-E between them. Participants were asked to choose the letter that best describes where they fall on the scale (e.g. Not at all aggressive A….B….C….D…E Very aggressive). The PAQ consists of two scales, expressivity (feminine adjectives) and instrumentality (masculine adjectives), with items representing qualities stereotypically possessed by each gender. Items on the expressivity scale include *emotional* and *kind*, with higher scores reflecting higher femininity. Items on the instrumentality scale include *independent* and *self-confident*, with higher scores reflecting higher masculinity. The PAQ has demonstrated adequate internal consistency reliability with alpha coefficients ranging from .70 to .87 (Ward, Thorn, Clements, Dixon, & Sanford, 2006)

**Research Design**

The design for the study 1 was descriptive and data was collected online. The purpose of this design was to explore how gender and personal tattoo status of participants differed in self-report of sexual partners, tattooed social contacts, and mean masculinity gender role scores.
Data Analysis

The data were analyzed with three separate 2 x 3 analyses of variance (ANOVA) with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, and visible tattoos) as the factors to assess main effects and interactions of gender and personal tattoo status on gender role, tattooed social contacts, and sexual partners. Additionally, a multivariate analysis of variance (MANOVA) was conducted to determine if there are differences in self-reported sexual partners, tattoo status of social networks, and gender role orientation between individuals from rural and non-rural areas.
CHAPTER 4
STUDY 1 RESULTS

Hypothesis 1A

*Men with visible tattoos will report more sexual partners compared to men with non-visible or no tattoos.* Results did not support the hypothesis that men with visible tattoos would report more sexual partners than men with non-visible or no tattoos as confirmed by a 2 x 3 fully between-subjects analysis of variance (ANOVA) on reported number of previous sexual partners with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects or interactions, Gender, \(F(1, 686) = 3.60, p = .06, \eta_p^2 = .005\), Personal Tattoo Status, \(F(2, 686) = 1.05, p = .35, \eta_p^2 = .003\), interaction, \(F(2, 686) = .05, p = .96, \eta_p^2 = .000\). Means and 95% confidence intervals (CIs) are displayed in Table 1.

Hypothesis 1B

*Women with visible and non-visible tattoos will report more social contacts with visible tattoos than women with no tattoos.* Results did not support the hypothesis that women with visible and non-visible tattoos would report more social contacts with visible tattoos than women with no tattoos as confirmed by a 2 x 3 fully between-subjects analysis of variance (ANOVA) on reported number of social contacts with visible tattoos with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects or interactions, Gender, \(F(1, 686) = .06, p = .81, \eta_p^2 = .000\), Personal Tattoo Status, \(F(2, 686) = .11, p = .89, \eta_p^2 = .000\), interaction, \(F(2, 686) = .87, p = .42, \eta_p^2 = .003\). Means and 95% confidence intervals (CIs) are displayed in Table 2.
Hypothesis 1C

Women with visible and non-visible tattoos will report higher masculinity scores than women with no tattoos. Pre-screening of data revealed a significant amount of missing data due to incomplete responses provided on the Personality Attributes Questionnaire. For more accurate evaluation of reported masculinity scores, mean ratings for the 10 items of the BEM-Masculinity scale were used for analysis. Alpha coefficient for the masculinity scale items was .78. Results did not support the hypothesis that women with visible and non-visible tattoos would report higher mean masculinity scores than women with no tattoos as confirmed by a 2 x 3 fully between-subjects analysis of variance (ANOVA) on gender role orientation scores with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects or interactions, Gender, $F(1, 747) = .24, p = .62, \eta^2_p = .00$, Personal Tattoo Status, $F(2, 747) = .56, p = .57, \eta^2_p = .002$, interaction, $F(2, 747) = .71, p = .49, \eta^2_p = .002$. Means and 95% confidence intervals (CIs) are displayed in Table 3.

Exploratory Analysis

A multivariate analysis of variance (MANOVA) was conducted in order to assess mean differences in self-reported sexual partners, tattoo status of social networks, and gender role orientation between individuals from rural and non-rural geographic areas. Results revealed a non-significant multivariate effect ($\lambda = .02, F(9, 1947) = 1.58, p = .12, \eta^2 = .007$). These results indicate that individuals from rural areas report comparable levels of sexual partners, tattoo status of social networks, and gender role orientation to individual with non-rural upbringings. Means and 95% confidence intervals (CIs) are displayed in Table 4.
CHAPTER 5

STUDY 1 DISCUSSION

No significant differences were found in reported number of sexual partners, social contacts with visible tattoos, or mean masculinity scores. These results are incongruent with the findings by Wohlrab et. al. (2007) indicating individuals with tattoos have more sexual partners than those without tattoos. Such a result is perhaps due to characteristics of the participant sample, given that participants in Wohlrab’s study were older and showed more variability in overall sexual partners. Our results further contradicted previous research suggesting individuals with tattoos report more social contacts with tattoos (Resenhoeft et. al., 2008). A possible explanation for these results may relate to human’s fundamental need to belong to a group, regardless of similarity among members (Baumeister, 1995). We also expected women with visible tattoos to endorse a more masculine gender role orientation, which was not supported by these findings. This is incongruent with previous research suggesting tattoos are correlated with increased perceptions of masculinity (Ardnt & Glassman, 2012). These findings suggest there exists a discrepancy between perceptions of women with tattoos and personal views on gender roles. Furthermore, this lack of significant differences may be related to the changing demographics of those obtaining tattoos. Currently, almost half of all tattoos are received by women, which may be disintegrating stereotypes that tattoos are predominantly masculine practice.

For a more comprehensive understanding of the non-significant findings, it may be helpful to reconsider important aspects of evolutionary theory. To review, evolutionary theory postulates that one various mechanisms or behaviors function to improve the likelihood of survival and reproduction. As such, it is important to note that the practice of tattooing may be a
related to a number of social and psychological factors that complicate explaining this particular behavior. While the findings from this study are inconsistent with our predictions based on evolutionary theory, results may still provide support for a signaling function of tattoos for men. For example, similar numbers of sexual partners for men across tattoo status could be because men without tattoos already possess traits signaling good genetic quality. Utilizing external ornamentation to signal biological quality may simply level the playing field in terms of ability to attract potential mates. Furthermore, non-significant differences in social contacts with tattoos could perhaps be reflective of the adaptive tendency for humans to live in groups and prioritize the development of interpersonal networks, regardless if similarity in physical traits of members. While these findings fail to provide strong support for our original hypotheses, some important evolutionary-based patterns seem to have emerged.
CHAPTER 6
STUDY 2 METHODOLOGY

Participants

Participants who participated in study 1 were excluded from study two. Data for study 2 were collected from a sample of undergraduate students enrolled in psychology courses at a large southeastern university. A total of 477 students participated in study 2. The average age of the sample was 19.81 years. Three hundred (63.8%) participants identified as women and 170 (36.2%) identified as men. Three hundred and eleven (66.3%) participants identified as White, 113 (24%) participants identified as Black or African American, 19 (4.1%) participants identified as Other, 17 (3.6%) participants identified as Hispanic or Latino, 9 (1.9%) participants identified as Asian/Pacific Islander, and 1 (.2%) participant identified as Native American or American Indian. Two hundred and sixty-one (55.6%) participants indicated they were reared in non-rural communities and 209 (44.4%) participants indicated they were reared in rural communities. Three hundred and nine (66%) participants indicated they had no tattoos, 72 (16.9%) participants indicated they had non-visible tattoos, and 80 (17.1%) participants indicated they had visible tattoos.

All participants in study 2 were randomly assigned to rate attractiveness in one of three photo conditions; one hundred and fifty-five participants were assigned to the No Tattoos condition (33.1%), one hundred fifty-six participants were assigned to the Non-Visible Tattoos condition (33.5%), and one hundred fifty-nine participants were assigned to the Visible Tattoos condition (34.2%). Additionally, all participants were assigned to rate social inclusion in one of three photo conditions; one hundred fifty-seven participants were assigned to the No Tattoos condition (33.4%), one hundred fifty-six participants were assigned to the Non-Visible Tattoos
condition (33.2%), and one hundred fifty-six participants were assigned to the Visible Tattoos condition (33.3%).

**Procedure**

Study 2 was also conducted through the SONA system and those choosing to participate were redirected to an on-line survey created in Qualtrics, a web-based data collection service. Those consenting to participation were presented with demographic and tattoo related questions and were then asked to rate two sets of photographs. Participants were asked to rate 10 same-sex photos according to likelihood of including the individual in their social network. They were then asked to rate 10 opposite-sex photos according to perceived attractiveness of the individual. Participants were randomly assigned to view photos asking them to visualize that the individuals pictured had visible tattoos, non-visible tattoos, or no tattoos. Participants then completed the Bem Sex Role Inventory- Short Form (BSRI-Short Form; Bem, 2000) and the Personal Attributes Questionnaire (PAQ; Spence & Helmreich, 1978). The survey concluded with a manipulation check. Upon completion, participants were debriefed and credited for participation through the SONA system. Examples questions from photo sets and the manipulation check can be found in Appendix B. Once all data were collected, the primary researcher transferred the data to an SPSS file for cleaning, maintenance, and analysis.

**Materials**

Those participating in Study 2 completed identical measures utilized in Study 1. Along with these measures, participants rated two photo sets and answered a manipulation check question.

**Photo sets.** The same sets of 10 men and 10 women photographs were utilized for each level of tattoo status manipulation. The photographs depict individuals from the shoulders
upward and include a caption indicating tattoo status of all individuals in the set. This narrative was used in place of direct manipulation of tattoos status in order to address potential confounds of tattoo size, content, and placement. Photographs were retrieved from http://www.frontiersin.org/files/Articles/16951/fpsyg-03-00014-HTML/image_m/fpsyg-03-00014-g007.jpg.

**Manipulation check.** Upon completion of all other survey components, a manipulation check was administered. Participants were asked to indicate what characteristic, if any, they were asked to visualize about the individuals in the photo sets.

**Research Design**

Study 2 utilized a between-groups, experimental design with random assignment. The study was a 2 x 3 x 3 design with Gender (men, women), Personal Tattoo Status (no tattoos, non-visible tattoos, and visible tattoos), and Photo Set Group (no tattoos, non-visible tattoos, and visible tattoos) as factors. Attractiveness ratings and social inclusion ratings were the dependent variables.

**Data Analysis**

The data were analyzed with two separate 2 x 3 x 3 analyses of variance (ANOVA) with Gender (men, women), Personal Tattoo Status (no tattoos, non-visible tattoos, and visible tattoos), and Photo Set Group (no tattoos, non-visible tattoos, and visible tattoos) as the factors to assess the main effects and interactions effects of gender, personal tattoo status, and photo tattoo status on attractiveness and social inclusion ratings. Attractiveness and social inclusion ratings were based on a scale of 1-10 for the 10 photos in each set. Mean ratings for both attractiveness and social inclusion sets were calculated and used in analysis. Responses from 14 participants
were excluded from the final sample because they incorrectly responded to the manipulation check question. The final sample consisted of 463 individuals.
CHAPTER 7

STUDY 2 RESULTS

Hypothesis 2A

*Men with visible tattoos will report more sexual partners compared to men with non-visible or no tattoos.* Results did not support the hypothesis that men with visible tattoos would report more sexual partners than men with non-visible or no tattoos as confirmed by a 2 x 3 between-subjects analysis of variance (ANOVA) on reported number of sexual partners with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects for Gender, $F(1, 276) = .01, p = .94, \eta^2_p = .000$, or Personal Tattoo Status, $F(2, 276) = 2.26, p = .11, \eta^2_p = .016$. However, there was a significant interaction effect, $F(2, 276) = 3.35, p = .04, \eta^2_p = .024$. Post hoc analyses revealed men with no tattoos ($M=6.21, CI=[4.95, 7.47]$) reported significantly more sexual partners compared to men with visible tattoos ($M=1.55, CI=[-1.10, 4.20]$). Means and 95% confidence intervals (CIs) are displayed in Table 5.

Hypothesis 2B

*Women with visible and non-visible tattoos will report more social contacts with visible tattoos than women with no tattoos.* Results did not support the hypothesis that women with visible and non-visible tattoos would report more social contacts with visible tattoos than women with no tattoos as confirmed by a 2 x 3 between-subjects analysis of variance (ANOVA) on reported number of social contacts with visible tattoos with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects or interactions, Gender, $F(1, 269) = .97, p = .33, \eta^2_p = .004$, Personal Tattoo Status,
Hypothesis 2C

*Women with visible and non-visible tattoos will report higher masculinity scores than women with no tattoos.* Mean ratings for the 10 items of the BEM-Masculinity scale were used for analysis. Alpha coefficient for the masculinity scale items was .76. Results did not support the hypothesis that women with visible and non-visible tattoos would report higher mean masculinity scores than women with no tattoos as confirmed by a 2 x 3 between-subjects analysis of variance (ANOVA) on mean masculinity scores with Gender (men, women) and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as factors. There were no significant main effects or interactions, Gender, $F(1, 284) = 2.06, p = .15, \eta_p^2 = .007$, Personal Tattoo Status, $F(2, 284) = .09, p = .91, \eta_p^2 = .001$, interaction, $F(2, 284) = 1.24, p = .29, \eta_p^2 = .009$. Means and 95% confidence intervals (CIs) are displayed in Table 7.

Hypothesis 2D

*Attractiveness ratings would be lowest for men without tattoos rating women in the visible tattoo photo group.* A 2 x 3 x 3 between-subjects analysis of variance (ANOVA) was conducted on attractiveness ratings with Gender (men, women), Photo Set Group (no tattoos, non-visible tattoos, visible tattoos), and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as the factors. A significant main effect of gender on attractiveness rating was found, $F(1, 445) = 47.62, p = .00, \eta_p^2 = .097$. Attractiveness ratings were higher for men rating women ($M=3.76, CI=[2.16, 4.35]$) than for women rating men ($M=2.93, CI=[1.64, 3.04]$). There were no significant main effects for Photo Set Group, $F(2, 445) = 1.54, p = .22, \eta_p^2 = .007$, or Personal Tattoo Status, $F(2, 445) = .55, p = .58, \eta_p^2 = .002$. The Gender x Personal Tattoo
Status interaction was not significant, $F(2, 445) = 1.55, p = .22, \eta^2_p = .007$. The Gender x Photo Set Group interaction was not significant, $F(2, 445) = .06, p = .94, \eta^2_p = .000$. The Personal Tattoo Status x Photo Set Group interaction was not significant, $F(2, 445) = .71, p = .59, \eta^2_p = .006$. The Gender x Photo Set Group x Personal Tattoo Status interaction was not significant, $F(4, 445) = 1.21, p = .31, \eta^2_p = .011$. Means and 95% confidence intervals (CIs) are displayed in Figures 1 and 2.

**Hypothesis 2E**

*Social inclusion ratings would be highest for women with tattoos rating women in the tattooed photo groups.* A 2 x 3 x 3 between-subjects analysis of variance (ANOVA) was conducted on social inclusion ratings with Gender (men, women), Photo Set Group (no tattoos, non-visible tattoos, visible tattoos), and Personal Tattoo Status (no tattoos, non-visible tattoos, visible tattoos) as the factors. A significant main effect of Gender on social inclusion rating was found, $F(1, 435) = 9.43, p = .00, \eta^2_p = .021$. Social inclusion ratings were higher for women rating women ($M=4.18, CI=[2.76, 4.77]$) than for men rating men ($M= 3.35, CI=[2.92, 4.18]$). There were no significant main effects for Photo Set Group, $F(2, 435) = 1.22, p = .30, \eta^2_p = .006$, or Personal Tattoo Status, $F(2, 435) = 2.24, p = .01, \eta^2_p = .010$. The Gender x Personal Tattoo Status interaction was not significant, $F(2, 435) = .41, p = .67, \eta^2_p = .002$. The Gender x Photo Set Group interaction was not significant, $F(2, 435) = 1.10, p = .34, \eta^2_p = .005$. The Personal Tattoo Status x Photo Set Group interaction was not significant, $F(2, 435) = 1.24, p = .29, \eta^2_p = .011$. Lastly, the Gender x Photo Set Group x Personal tattoo status interaction was not significant, $F(4, 435) = 1.18, p = .32, \eta^2_p = .011$. Means and 95% confidence intervals (CIs) are displayed in Figures 3 and 4.
Exploratory Analysis

A multivariate analysis of variance (MANOVA) was conducted in order to assess mean differences in self-reported sexual partners, tattoo status of social networks, and gender role orientation between individuals from rural and non-rural geographic areas. Results revealed a non-significant multivariate effect ($\lambda = .98$, $F (3, 425) = 2.24$, $p = .09$, $\eta^2 = .016$). These results indicate that individuals from rural areas report comparable levels of sexual partners, tattoo status of social networks, and gender role orientation to individuals with non-rural upbringings. Means and 95% confidence intervals (CIs) are displayed in Table 8.
CHAPTER 8
STUDY 2 DISCUSSION

Results from Study 2 are inconsistent with previous literature finding that women with tattoos are perceived as less attractive than women without tattoos (Dean, 2010; Swami & Furnham, 2007). Furthermore, given previous studies showing tattoos increased perceptions of masculinity and attractiveness (Koziel et. al., 2013), it was surprising to find that women did not rate men with tattoos as more attractive. Despite these contradictory findings, an appeal for evolutionary-related arguments may still be made. A possible explanation for non-significant results may be because attraction is a function of many factors, including body configuration. Schieb (1999) noted men’s muscularity and women’s waist to hip ratio are related to perceived attractiveness. Given that the photo sets only showed individuals from the waist upward, this may have impacted ratings of attractiveness. Additionally, if women perceived men with tattoos as higher in masculinity, this could be interpreted as threatening, leading to lower ratings of attractiveness. Future studies may benefit from utilizing full-body depictions to explore the impact on perceptions of attractiveness.

Regarding ratings of social inclusion, we predicted ratings would be highest for women with tattoos rating women in the tattooed photo groups. Despite non-significant findings due to personal and photo group tattoo status, women endorsed higher overall ratings of social inclusion compared to men. Though not statistically significant, ratings were in the hypothesized direction, such that women with non-visible and visible tattoos reported higher likelihood of including others with tattoos in their social network. This finding potentially lends support for tattoos as a means of group affiliation for women; however, future research is still needed in this area. Of interesting note, mean comparisons revealed men with visible tattoos reported the
lowest ratings of social inclusion for the individuals in the visible tattoo photo set. A potential explanation for this finding may be a function of sexual selection and mate competition in men. Overall, main effects indicating overall higher ratings of attractiveness by men and higher social inclusion ratings by women lend support for differential evolutionary prioritizations between women and men.
CHAPTER 9

GENERAL DISCUSSION

Overview

The purpose of the current study was to explore a potential evolutionary function of tattoos, as well as fill gaps in the body of literature regarding gender differences in perceptions of those with tattoos. Considering this overarching objective, this study examined the following questions: a) Are there differences in perceived attractiveness of men versus women with tattoos? If so, what is the possible cause of this difference? and b) Is there an evolutionary purpose of tattoos? If so, do tattoos serve different functions for women and men?

Findings have shown that tattoos negatively impact perceptions of the wearer, though gender appears to moderate these attitudes (Hawkes, Senn, & Thorn, 2004; Dickson, Dukes, Smith, & Strapko, 2014). Specifically, tattooed women are perceived more negatively than tattooed men. Women with tattoos are perceived as less attractive, less healthy, and more sexually promiscuous than women without tattoos (Swami & Furnham, 2007). By contrast, tattooed men are often viewed as healthier, more attractive, and more masculine than men without tattoos (Arndt & Glassman, 2012; Braunberger, 2000). For a better understanding of this behavior, an evolutionary perspective was taken. An evolutionary approach takes into consideration the purpose an observed behavior may serve for the individual in terms of how it solves specific problems of survival or reproduction (Buss, 2009). Considering current research showing gender stratification related to tattoo behavior, it was predicted that tattoos serve to address distinct evolutionary problems for men versus women. Specifically, tattoos address problems of mating for men and problems of survival for women. We argued that for men, tattoos act as a signal of good health, helping them better compete for access to mates. For
women, tattoos may be a signal of group affiliation, which historically provided a number of benefits to survival.

Two studies were conducted in efforts to explain present day tattoo behavior in terms of evolutionary adaptiveness. Study 1 investigated demographic differences (i.e. gender, personal tattoo status, rural status) in opposite-sexed sexual partners, tattoo status of participant’s social network, and gender role orientation. Investigating rural differences among reports of sexual partners, tattoo status of social network, and gender role orientation was an exploratory component of the current study.

Only non-significant differences were revealed in Study 1. Results of Study 2 indicated significant gender differences in ratings of attractiveness and social inclusion. Specifically, men reported higher overall ratings of attractiveness compared to women and women reported higher overall ratings of social inclusion compared to men. This behavior is consistent with evolutionary theory of different fitness interests of men and women. Though results from these studies did not provide strong evidence for the evolutionary hypotheses, it is important to remember that predictions based on evolutionary theory are often difficult to test empirically according to present-day behavior.

In addition to the limitations previously noted for each study, other elements may have contributed to the non-significant findings of the current study. First, the low number of participants in the study with tattoos may have affected the power to detect significant effects. In the future, it is important studies re-evaluate the current research question with a larger sample of tattooed participants. Second, the use of a college student participant sample may limit the generalizability of the current study’s findings: however, considering college-aged individuals represent one of the largest demographics obtaining tattoos, generalizability of these findings
likely occurs. Another limitation may come from the type of measures used. The use of self-report measures may contribute to social desirability concerns (i.e., the desire to present oneself in a positive light). Furthermore, the order of measures given may have primed participants for later responses, potentially leading to altered responses.

Finally, extrapolation of findings in this study potentially highlight an evolutionary function of tattoos. Having said this, motives for obtaining tattoos may continue to be misinterpreted or misunderstood if using only quantitative methods of study. Future studies may benefit from including a qualitative component to provide further insights regarding the potential adaptive function of tattoos.

**General Conclusions**

The results of the current study suggest that gender and tattoo status may not influence views of attractiveness and social inclusion in the ways originally predicted via an extensive literature review; however, these findings still somewhat support an evolutionary function of tattoos. These findings may have been influenced by the changing demographics of those obtaining tattoos, along with changes in the zeitgeist regarding gender role orientation. Future research should re-examine these areas in order to explore the influence of shifting social norms and stereotypes over time.
References


Appendix A

Informed Consent

Functional Assessment of Tattoos from an Evolutionary Perspective

1. I am Elise Neville, a graduate student in the Department of Psychology at Georgia Southern University. I am conducting this survey as part of my dissertation under the supervision of Dr. Bradley Sturz to better understand why individuals decide to get tattoos.

2. Purpose of the Study: The purpose of this research is to discover potential evolutionary motivations for obtaining tattoos.

3. Procedures to be Followed: Participation in this research will include completion of a survey that is brought to you by the Qualtrics system, and the survey will be taken with complete anonymity. At no point will personally identifiable information be collected. We will NOT log your IP address.

4. Discomforts and Risks: There is minimal risk involved in the participation of this study. There may be some feeling of embarrassment due to the nature of the questions. Questions may also bring to light some unexamined feelings, but these feelings will not be greater than those experienced during normal daily life. However, if you feel distressed, please contact Georgia Southern University Counseling Center (http://studentsupport.georgiasouthern.edu/counseling/)

Counseling and Career Development Center
Forest Drive
PO Box 8011
Georgia Southern University
Statesboro, GA 30460
Phone: (912) 478-5541
Fax: (912) 478-0834

5. Benefits: The benefits to you, the participant, includes the knowledge that you are helping to further understand why individuals decide to get tattoos.

6. Duration/Time required from the participant: The benefits to you, the participant, includes the knowledge that you are helping to further understand why individuals decide to get tattoos.

7. Statement of Confidentiality: All data collected in connection with this study will be anonymous. That is, collected information will not be linked to your name in any form and we will not collect IP addresses. The data you provide us will be merged with the data provided by other participants in this study and only the averages of collected data will be reported. Information collected thorough your participation may be published in a professional journal and presented at a professional meeting.

8. Right to Ask Questions: Participants have the right to ask questions and have those questions
answered. If you have questions about this study, please contact the researcher named above or the researcher’s faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Office of Research Services and Sponsored Programs at 912-478-0843.

9. Compensation: You will be compensated with one half hour of research credit.

10. Voluntary Participation: Your decision to participate is completely voluntary. You may end your participation at any time by closing your browser. You do not have to answer any questions that you do not want to answer.

11. Penalty: There is no penalty for deciding not to participate in the study, and you may decide at any time that you don’t want to participate further and may withdraw without penalty or retribution. Your decision of whether or not to participate will not jeopardize your future relations with Georgia Southern University, the Psychology department, or the faculty member in charge of the project. In addition, your class grade will not be affected.

12. You must be 18 years of age or older to consent to participate in this research study. If you consent to participate in this research study and to the terms above, please click yes below. You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GSU Institutional Review Board under tracking number H15438. Project Title: Functional Assessment of Tattoos from an Evolutionary Perspective
Principal Investigator: Elise Neville, mv00493@georgiasouthern.edu
Faculty Advisor: Dr. Bradley Sturz, bradleysturz@georgiasouthern.edu

Yes - I have read this informed consent, and I consent to participate in this research
No - I have read this informed consent, and I choose to NOT participate in this research

Age:

Gender:
Male
Female

Race:
Asian/ Pacific Islander
Black or African American
Hispanic or Latino
Native American or American Indian
White
Other

What is your religious preference?
Christian Scientist
Jewish
Mormon
Muslim
an Orthodox church such as the Greek or Russian Orthodox Church
Protestant
Roman Catholic
Seventh-Day Adventist
Other

Years of Education:
High school graduate, diploma, or equivalent
Trade/ technical/ vocational training
Some college credit, no degree
Associate degree
Bachelor's degree
Master's degree
Professional degree
Doctorate degree

Of these terms, which one best describes the area in which you currently live?
urban
rural

Of these terms, which one best describes the area in which you grew up?
urban
rural

Do you consider yourself to be:
asexual
bisexual
gay or lesbian
heterosexual
other
I prefer not to respond

Current Relationship Status:
Single, never married
In a relationship
Married or domestic partnership
Separated
Divorced
Widowed

Number of previous romantic relationships (i.e., mutual commitment to another characterized by affection, attachment, and appreciation):
Duration of each previous romantic relationship:

*for example:*
1) 2 years, 3 months
2) 6 months

Number of opposite sexed sexual partners:

Do you have any tattoos?
Yes
No

Are your tattoos visible (e.g. can they be seen when wearing a t-shirt and shorts)?
Yes
No

Please indicate the location of your tattoo(s) by clicking on the appropriate region on the chart

If you do not have a tattoo, how likely would you be to get one in the future?
How many individuals would you consider to be part of your close social network (i.e., close, personal relationships with people you would turn to in time of need)

Imagine the 10 individuals in your social network that you feel closest to. How many of these individuals have no tattoos?

Imagine the 10 individuals in your social network that you feel closest to. How many of these individuals have non-visible tattoos?

Imagine the 10 individuals in your social network that you feel closest to. How many of these individuals have visible tattoos?

**Rate yourself on each item, on a scale from 1 (never or almost never true) to 7 (almost always true).**

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<th>3</th>
<th>4</th>
<th>5</th>
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<th>7</th>
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<tr>
<td>Defend my own beliefs</td>
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<td>Affectionate</td>
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<td>Conscientious</td>
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<td>Moody</td>
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<td>Sensitive to needs of others</td>
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<td>Strong personality</td>
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<td>Understanding</td>
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<td>Forceful</td>
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<td>Compassionate</td>
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<td>Truthful</td>
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<td>Have leadership abilities</td>
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<td>Eager to soothe hurt feelings</td>
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<td>Secretive</td>
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<td>Willing to take risks</td>
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<td>Warm</td>
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</table>
Adaptable | Dominant | | | | | Tender | Conceited | Willing to take a stand | Love children | Tactful | Aggressive | Gentle | Conventional

The items below inquire about what kind of person you think you are. Each item consists of a PAIR of characteristics, with the letters A-E in between. For example,

Not at all artistic A.....B.....C.....D.....E Very artistic

Each pair describes contradictory characteristics - that is, you cannot be both at the same time, such as very artistic and not at all artistic.

The letters form a scale between the two extremes. You are to choose a letter which describes where YOU fall on the scale. For example, if you think that you have no artistic ability, you would choose A. If you think you are pretty good, you might choose D. If you are only medium, you might choose C, and so forth.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td>Not at all aggressive</td>
<td>Very aggressive</td>
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<tr>
<td>Not at all independent</td>
<td>Very independent</td>
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<tr>
<td>Not at all emotional</td>
<td>Very emotional</td>
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<tr>
<td>Very submissive</td>
<td>Very dominant</td>
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<td>Not at all excitable in a major crisis</td>
<td>Very excitable in a major crisis</td>
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<tr>
<td>Very passive</td>
<td>Very active</td>
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<tr>
<td>Not at able to devote self completely to others</td>
<td>Able to devote self completely to others</td>
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<td>-----------------------------------------------</td>
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<td>Very rough</td>
<td>Very gentle</td>
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<td>Not at all helpful to others</td>
<td>Very helpful to others</td>
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<tr>
<td>Not at all competitive</td>
<td>Very competitive</td>
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<tr>
<td>Very home oriented</td>
<td>Very wordly</td>
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<tr>
<td>Not at all kind</td>
<td>Very kind</td>
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<tr>
<td>Indifferent to others' approval</td>
<td>Highly needful of others' approval</td>
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<td>Feelings not easily hurt</td>
<td>Feelings easily hurt</td>
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<tr>
<td>Not at all aware of feelings of others</td>
<td>Very aware of feelings of others</td>
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<tr>
<td>Can make decisions easily</td>
<td>Has difficulty making decisions</td>
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<tr>
<td>Gives up very easily</td>
<td>Never gives up easily</td>
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<tr>
<td>Never cries</td>
<td>Cries very easily</td>
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<tr>
<td>Not at all self-confident</td>
<td>Very self-confident</td>
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<td>Feels very inferior</td>
<td>Feels very superior</td>
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<td>Not at all understanding of others</td>
<td>Very understanding of others</td>
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<td>Very cold in relations with others</td>
<td>Very warm in relations with others</td>
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<td>Very little need for security</td>
<td>Very strong need for security</td>
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<tr>
<td>Goes to pieces under pressure</td>
<td>Stands up well under pressure</td>
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Appendix B

**Visualize each of the men in the following 10 photos have no tattoos. You will be asked to rate how attractive you find each individual.**

Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)

<table>
<thead>
<tr>
<th>Attractiveness Rating</th>
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<tr>
<td>01</td>
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</table>

Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)

<table>
<thead>
<tr>
<th>Attractiveness Rating</th>
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<tbody>
<tr>
<td>01</td>
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</table>
Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual. (e.g. 1=not at all attractive 10=very attractive)

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<th>Attractiveness Rating</th>
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Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual. (e.g. 1=not at all attractive 10=very attractive)

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<th>Attractiveness Rating</th>
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Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual. (e.g. 1=not at all attractive 10=very attractive)

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<th>Attractiveness Rating</th>
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</table>
Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)
Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)

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<thead>
<tr>
<th>Attractiveness Rating</th>
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<tr>
<td>1</td>
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</table>

Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)

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<thead>
<tr>
<th>Attractiveness Rating</th>
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</tbody>
</table>
Please rate the individual in this photo on a scale of 1 to 10 according to how attractive you find the individual.
(e.g. 1=not at all attractive 10=very attractive)

<table>
<thead>
<tr>
<th>Attractiveness Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

Visualize each of the women in the following 10 photos with no tattoos. You will be asked to rate how likely you would be to include this person in your social network.

Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

<table>
<thead>
<tr>
<th>Likelihood Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>
Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

Likelihood Rating

Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

Likelihood Rating

Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

Likelihood Rating
Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network. (e.g. 1=not at all likely 10=very likely)
Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

<table>
<thead>
<tr>
<th>Likelihood Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
</tr>
</tbody>
</table>

Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

<table>
<thead>
<tr>
<th>Likelihood Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
</tr>
</tbody>
</table>
Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

<table>
<thead>
<tr>
<th>Likelihood Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Please rate the individual in this photo on a scale of 1 to 10 according to how likely you would be to include this person in your social network.
(e.g. 1=not at all likely 10=very likely)

<table>
<thead>
<tr>
<th>Likelihood Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
<tr>
<td>8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

What, if any, characteristic were you asked to imagine about the photographs you rated earlier in the survey?
### Table 1

*Study 1: Means and 95% Confidence Intervals (CI) of Reported Number of Sexual Partners*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>$M$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>5.96</td>
<td>[4.94, 6.99]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>5.04</td>
<td>[3.01, 7.06]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>4.39</td>
<td>[.82, 7.96]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.69</td>
<td>[3.72, 6.54]</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>3.99</td>
<td>[3.11, 4.87]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>3.53</td>
<td>[1.79, 5.27]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>2.56</td>
<td>[-.04, 5.16]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.81</td>
<td>[2.19, 4.53]</td>
</tr>
</tbody>
</table>
Table 2

*Study 1: Means and 95% Confidence Intervals (CI) of Reported Social Contacts with Visible Tattoos*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>3.06</td>
<td>[2.28, 3.89]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>2.24</td>
<td>[.63, 3.85]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>2.06</td>
<td>[.74, 4.85]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.85</td>
<td>[1.35, 3.56]</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>2.01</td>
<td>[1.32, 2.71]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>2.69</td>
<td>[1.32, 4.06]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>2.12</td>
<td>[.21, 4.44]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2.15</td>
<td>[1.35, 3.20]</td>
</tr>
</tbody>
</table>
Table 3

*Study 1: Means and 95% Confidence Intervals (CI) of Mean Ratings on BEM-Masculinity Scale*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>No tattoo</td>
<td>5.09</td>
<td>[3.98, 5.20]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>5.07</td>
<td>[4.85, 6.29]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>4.85</td>
<td>[4.46, 5.24]</td>
</tr>
<tr>
<td>Women</td>
<td>No tattoo</td>
<td>4.98</td>
<td>[4.89, 5.08]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>4.87</td>
<td>[4.67, 5.06]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>5.00</td>
<td>[4.68, 5.34]</td>
</tr>
</tbody>
</table>
Table 4

Means and 95% Confidence Intervals (CI) for number of Sexual Partners, Reported Social Contacts with Visible Tattoos, and Mean Ratings on BEM-Masculinity Scale for Rural and Non-Rural College Students

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Partners</td>
<td>5.21</td>
<td>[4.00, 6.41]</td>
</tr>
<tr>
<td>Social Network</td>
<td>2.30</td>
<td>[1.44, 3.15]</td>
</tr>
<tr>
<td>Mean Masculinity</td>
<td>5.03</td>
<td>[4.90, 5.16]</td>
</tr>
<tr>
<td><strong>Non-Rural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Partners</td>
<td>3.94</td>
<td>[2.51, 5.37]</td>
</tr>
<tr>
<td>Social Network</td>
<td>1.52</td>
<td>[.50, 2.53]</td>
</tr>
<tr>
<td>Mean Masculinity</td>
<td>5.00</td>
<td>[4.84, 5.15]</td>
</tr>
</tbody>
</table>
Table 5

Study 2: Means and 95% Confidence Intervals (CI) of Reported Number of Sexual Partners

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>6.21</td>
<td>[4.95, 7.47]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>3.45</td>
<td>[1.49, 5.42]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>1.55</td>
<td>[-1.10, 4.20]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.88</td>
<td>[2.56, 4.91]</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No tattoo</td>
<td>3.37</td>
<td>[1.97, 4.77]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>4.15</td>
<td>[1.72, 6.59]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>3.47</td>
<td>[.46, 6.49]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3.55</td>
<td>[2.29, 5.04]</td>
</tr>
</tbody>
</table>
Table 6

Study 2: Means and 95% Confidence Intervals (CI) of Reported Social Contacts with Visible Tattoos

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>$M$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>No tattoo</td>
<td>1.70</td>
<td>[1.31, 2.10]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>1.68</td>
<td>[1.04, 2.33]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>1.20</td>
<td>[.32, 2.08]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.64</td>
<td>[1.14, 1.92]</td>
</tr>
<tr>
<td>Women</td>
<td>No tattoo</td>
<td>1.59</td>
<td>[1.13, 2.04]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>2.69</td>
<td>[1.92, 3.47]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>1.20</td>
<td>[.18, 2.22]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.78</td>
<td>[1.37, 2.28]</td>
</tr>
</tbody>
</table>
Table 7

Study 2: Means and 95% Confidence Intervals (CI) of Mean Ratings on BEM-Masculinity Scale

<table>
<thead>
<tr>
<th>Variable</th>
<th>Tattoo Status</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Men</strong></td>
<td>No tattoo</td>
<td>5.16</td>
<td>[4.99, 5.34]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>5.23</td>
<td>[4.96, 5.50]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>4.97</td>
<td>[4.60, 5.35]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>5.15</td>
<td>[4.96, 5.29]</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td>No tattoo</td>
<td>4.83</td>
<td>[4.63, 5.03]</td>
</tr>
<tr>
<td></td>
<td>Non-visible tattoo</td>
<td>4.86</td>
<td>[4.52, 5.20]</td>
</tr>
<tr>
<td></td>
<td>Visible tattoo</td>
<td>5.12</td>
<td>[4.96, 5.55]</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4.88</td>
<td>[4.74, 5.13]</td>
</tr>
</tbody>
</table>
Table 8

*Study 2-Means and 95% Confidence Intervals (CI) for number of Sexual Partners, Reported Social Contacts with Visible Tattoos, and Mean Ratings on BEM-Masculinity Scale for Rural and Non-Rural College Students*

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Partners</td>
<td>3.48</td>
<td>[3.63, 4.30]</td>
</tr>
<tr>
<td>Social Network</td>
<td>1.71</td>
<td>[1.42, 2.00]</td>
</tr>
<tr>
<td>Mean Masculinity</td>
<td>4.92</td>
<td>[4.80, 5.05]</td>
</tr>
<tr>
<td><strong>Non-Rural</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Partners</td>
<td>4.36</td>
<td>[3.63, 5.10]</td>
</tr>
<tr>
<td>Social Network</td>
<td>1.79</td>
<td>[1.53, 2.05]</td>
</tr>
<tr>
<td>Mean Masculinity</td>
<td>5.12</td>
<td>[4.80, 5.23]</td>
</tr>
</tbody>
</table>
Figure 1: Attractiveness Ratings of Men Based On Personal Tattoo Status and Photo Set Group

Attractiveness Ratings: Men

- No Tattoos
- Non-Visible Tattoos
- Visible Tattoos

FIGURES
Figure 2: Attractiveness Ratings of Women Based On Personal Tattoo Status and Photo Set Group
Figure 3: Social Inclusion Ratings of Men Based On Personal Tattoo Status and Photo Set Group
Figure 4: Social Inclusion Ratings of Women Based On Personal Tattoo Status and Photo Set Group

![Inclusion Ratings: Women](image)

- No Tattoos
- Non-Visible Tattoos
- Visible Tattoos

Legend:
- Blue: No Tattoos
- Red: Non-Visible Tattoos
- Green: Visible Tattoos