Chapter 10
Empathy and Gender: Are Men and Women Complementary or Opposite Sexes?

Then the Lord said: "It is not good for the man to be alone,
I will make him a helper who is just right for him."

—(Genesis 2:18)

Abstract

- Findings from a large number of gender studies indicate that women in the general population and in health professionals-in-training and in-practice often obtain higher scores than men on self-reported measures of empathy.
- There are some plausible explanations for gender differences in empathy. For example, women are endowed with a greater capacity for social relationship than men, evident by the observations that they often begin showing more sensitivity to social stimuli and emotional signals and demonstrate more care-oriented qualities at an early age.
- Although social learning and cultural values have important role in determining gender differences in social behavior and empathy, other factors such as human evolution history (e.g., sexual selection, parental investment in child rearing, and ancestral division of labor), constitutional dispositions, and hormonal and biophysiological factors also contribute to the differences.
- Evidence suggests that some of the gender differences could be pre-wired beyond social or observational learning.
- Although in a broader context men and women are more similar than different, accumulated evidence continues to confirm that gender differences in some personal qualities and mental abilities should not be considered as trivial or nonexistent.
- The fact that some of the gender differences are in favor of women (e.g., "communal" inclination, verbal ability) and some in favor of men (e.g., "agentic" inclination, spatial ability) implies that in social skills and mental abilities, men and women should be viewed as "complementary" rather than "opposite" sexes.

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Introduction

Differences in personal qualities between men and women have long been discussed, and the implications of those differences have been hotly debated. Although most gender differences have been attributed to social learning, role adaptation, and other sociocultural factors, studies on gender differences in infants and toddlers, before social learning takes place, suggest that some differences may be "prewired"—that is, apart from social learning and sociocultural factors (Cahill, 2005; Campbell, 2008; Carter, 2007; Hall, 1978, 1990; Hittelman & Dickes, 1979; Kimura, 1999; Singer et al., 2006; Van Honk et al., 2011). The role of sexual selection, parental investment, and division of labor during the history of human evolution, and the contribution of hormones and biophysiological function in human behavior must be part of dialogue in any discussion of gender differences.

The issue of gender differences in social behavior and mental abilities is a sensitive topic. One reason for such sensitivity is that in an atmosphere of political correctness, there is a tendency to overlook gender differences for fear of inappropriate social implications and adverse reactions. However, regardless of political correctness, the fact remains that despite many gender similarities, universal variations observed between men and women exist and are part of life.

Research Evidence in the General Population

In addition to the obvious gender differences in physical attributes and reproductive function, empirical evidence consistently indicates that men and women do differ substantially from one another in social behavior and the capacity for empathy. Findings from a large volume of empirical research in the general population indicate that women often outscore men on measures of empathy (Davis, 1983; Eisenberg & Lennon, 1983; Hoffman, 1977; Hogan, 1969; Jose, 1989; Karniol, Gabay, Ochion, & Harari, 1998). Block (1976) reported that the results of most of the studies she examined favored women with regard to empathy. However, Eisenberg and Lennon (1983) reported a significant gender difference in empathy favoring women when the measures of empathy were self-reported inventories. But they noted no gender difference when the measures of empathy were either physiological or unobtrusive observations of behavior. Similarly, Michalska, Kinzler, and Decety (2013) reported gender difference in favor of women when comparisons were made on explicit self-ratings, but not when neurophysiological indicators of empathy were compared.

The controversial findings indicate that women may have an image of themselves as empathic that is reflected in their self-reported measures of empathy. Accordingly, some empathy scholars suggest that women's superiority on self-reported measures of empathy may be due in part to "demand characteristics" that prompt women to respond in a manner that confirms how the researcher expects

them to respond (Eisenberg & Lennon, 1983; Ickes, Gesn, & Graham, 2000). However, there are a number of studies in which gender differences were noticed on objective measures, such as physiological reactions and brain activities.

Studies with adults indicate that women are more skillful than men at initiating empathic relationships. They typically exhibit "communal" behaviors (e.g., social sensitivity, caring attitudes, friendliness), whereas men tend to manifest "agentic" behaviors (e.g., controlling, independent, dominant) (Eagly, 1995). Also, Rokeach (1973) found that women place more emphasis on the emotional aspects of their interactions than do men, who instead place more emphasis on the rational aspects. Consistent with Rokeach's findings, a study of undergraduate students found that women differed significantly from men on emotional empathy (akin to sympathy) but not on the perspective taking aspect of cognitive empathy (Riggio, Tucker, & Coffaro, 1989).

Other authors have reported that women tend to adopt care-oriented moral perspective, whereas men tend to have a more justice-oriented moral view (Gilligan, 1982; Gilligan & Attanucci, 1988; Sochting, Skoe, & Marcia, 1994). In a meta-analytic study, Jaffee and Hyde (2000) reported that gender differences in the care-oriented morality favoring women and in justice-oriented mentality favoring men are consistent, but the effect size estimates of differences are not large (see Chap. 7 for a description of the effect size estimates). Gender difference in moral judgment is reflected in their choice in the "runaway trolley" ethical conundrum, which was introduced by Philippa Foot, the British social philosopher. When confronted with a dilemma to divert an out-of-control runaway trolley down to a side track by pulling a signal lever to save five people who are on the train but killing another person who is trapped on the side track (Edmonds, 2015), more men than women choose to pull the signal lever to save five lives, but killing one person. In a brain imaging study (Singer et al., 2006), men and women were engaged in a game in which two confederates who played fairly and unfairly received painful stimuli. Results of the fMRI showed that both men and women exhibit pain-related brain activities. However, empathy-related brain responses significantly reduced in men when observing an unfair person receiving pain, accompanied by increased brain activation in reward-related brain areas, and correlated with an expressed desire for revenge. This pattern of brain activities was not observed in women.

These brain imaging findings suggest that men are more justice oriented than women in perception of others' pain. In a brain activity experiment by Horton (1995), the hypotheses that men and women differ in their empathic responses and that the comforting substrate is located in the right parietal area of the brain were confirmed. Horton (1995) also concluded that the right brain activities of the comforting substrate are more pronounced among women in general and among mothers in particular.

In a brain imaging study, it was noticed that men and women show different brain responses to infant crying and laughing (Seifritz et al., 2003). Correct recognition of infant vocalization is crucial for offspring well-being and survival. Women independent of their parental status, and mothers, in particular, were more sensitive to infant crying than laughing. The gender difference in vocalization recognition is

attributed to the variation in biologically based emotional regulation in men and women (Decety & Jackson, 2004). In another study, it was found that at 30 days postpartum, 80 % of mothers, compared to only 45 % of fathers, were able to recognize their own infants' cries (Green & Gustafson, 1983).

In a study of nursing and medical students, the differences in judicial and moral considerations regarding patient care appeared to be explained by gender, rather than by differences in professional roles (Peter & Gallop, 1994). When the students were faced with a hypothetical clinical dilemma, female students, regardless of academic major, were more care oriented than their male counterparts. Gender differences in empathy have been observed among various professionals. In a study of nurses, social workers, and teachers (Williams, 1989), women obtained significantly higher empathy scores than men did on Mehrabian and Epstein's Emotional Empathy Scale (Chap. 5).

Despite their advantage in interpersonal style and empathic capability, women seem to be more vulnerable than men when working under stressful conditions. This differential vulnerability to stress prompts women to appraise stressful events as being more overwhelming than men do (Barnett, Biener, & Baruch, 1987). In our study with medical students, we found that women were more sensitive than men to stressful life events and consequently appraised the same stressful events (e.g., change of health of a family member) as more disturbing than men (Hojat, Gonnella, Erdmann, & Vogel, 2003). These results indicate that although female health professionals have an advantage when it comes to establishing empathic engagement with their patients, vulnerability to professional stress puts them at a disadvantage.

It should also be noted that although empathy enhances patient outcomes (see Chap. 11) and is valued by both clinicians and patients, research shows that empathy is not associated with promotion (Carmel & Glick, 1996), and this may exert more effect on women than men in professional advancement. In one large-scale study involving 5314 medical students, we found that female medical students at the beginning of their medical education expected, on the average, 23 % less financial gain from the practice of medicine than their male counterparts regardless of their planned specialties (Hojat, Gonnella, Erdmann, Rattner et al., 2000). These findings are consistent with the notion that women are more likely than men to choose medicine for altruistic reasons (Gross, 1992) than for financial gain or promotion (Stamps & Boley Cruz, 1994).

Research Evidence in the Health Professions

In a study of 7746 foreign medical school graduate physicians, who were assessed by standardized patients, it was found that female physicians scored significantly higher than their male counterparts on indicators of empathic capacity (e.g., skills in interviewing and counselling, rapport, and personal manner conducive to empathic engagement) (Van Zanten, Boulet, Norcini, & McKinley, 2005). English

proficiency of participating physicians was controlled in statistical analyses by their scores on the Test of English as a Foreign Language (TOEFL). In this study, patients also expressed more satisfaction with female than male physicians. In our own studies as well as others with physicians-in-training and in-practice and other health professions students and practitioners in different cultures, gender variations on the JSE scores in favor of women have been frequently observed (Hojat, Mangione, Nasca et al., 2001; Hojat, Gonnella, Mangione et al., 2002; Hojat, Gonnella, Nasca, Mangione, Veloski et al., 2002; Hojat, Gonnella, Nasca, Mangione, Vergare et al., 2002). Chen, Lew, Hershman, and Orlander (2007) and Michalec (2010) reported that female medical students and physicians in the USA, on average, outscored their male counterparts on the JSE. The differences favoring female physicians were particularly pronounced on items that measured the "perspective taking" component of empathy (Hojat, Gonnella, Nasca, Mangione, Veloski et al., 2002). This pattern of gender difference in the JSE has also been observed in osteopathic medical students (Calabrese, Bianco, Mann, Massello, & Hojat, 2013), nursing students (Fields, Mahan, Hojat, Tillman, & Maxwell, 2011; Ward et al., 2009), dental students (Sherman & Cramer, 2005), pharmacy students (Fjortoft, Van Winkle, & Hojat, 2011), and physician assistant students (Mandel & Schweinle, 2012) in the USA and abroad (see Appendix A).

Inconsistent with our findings, however, Kupfer, Drew, Curtis, and Rubinstein (1978) found no gender differences in medical students at the University of Pittsburgh School of Medicine on their scores on an abbreviated version of Hogan's Empathy Scale. In a study of positive role models in medicine, however, female physicians scored higher than their male counterparts on measures of personality facets that were conceptually relevant to empathy, such as openness to new experiences, aesthetics, and feelings (Magee & Hojat, 1998).

Women in other cultures outscored men on the JSE: for example, in Mexican medical students (Alcorta-Garza, Gonzalez-Guerrero, Tavitas-Herrera, Rodrigues-Lara, & Hojat, 2005), Italian medical students (Leombruni et al., 2014), Iranian medical students (Rahimi-Madiseh, Tavakol, Dennick, & Nasiri, 2010; Shariat & Habibi, 2013), Japanese medical students (Kataoka, Koide, Ochi, Hojat, & Gonnella, 2009), Chinese medical students (Wen, Ma, Li, Liu, Xian & Liu, 2013), Korean medical students (Park, Roh, Suh, & Hojat, 2015), medical students in Kuwait (Hasan, Al-Sharqawi et al., 2013; Hasan, Babar, Chen, Ahmed, & Mitha, 2013), Portuguese medical students (Gonçalves-Pereira, Trancas, Loureiro, Papoila, & Caldas-De-Almeida, 2013; Magalhães, Salgueira, Costa, & Costa, 2011), medical students in South Africa (Vallabh, 2011), medical students in Thailand (Jumroonrojana, & Zartrungpak, 2012), medical students in Bangladesh (Mostafa, Hoque, Mosrafa, Rana, & Mostafa, 2014), Caribbean medical students (Youssef, Nunes, Sa, & Williams, 2014), Malaysian pharmacy students (Hasan, Babar, et al., 2013), Taiwanese nursing students (Hsiao, Tsai, & Kao, 2012), nursing students in Greece (Ouzouni & Nakakis, 2012), Australian health professions students (Boyle et al., 2009; Brown et al., 2011; Nunes, Williams, Sa, & Stevenson, 2011), Australian paramedic students (Williams, Boyle et al., 2015), and medical students in England (Austin, Evans, Magnus, & O'Hanlon, 2007).

Also, women obtained higher JSE scores than men in Korean physicians (Suh, Hong, Lee, Gonnella, & Hojat, 2012), Italian physicians (Soncini et al., 2013), and resident physicians in Romania (Voinescu, Szentagotai, & Coogan, 2009). There are a few other studies in which the gender difference on the JSE did not reach the accepted level of statistical significance ($p < 0.05$). For example, no statistically significant gender difference was found in Italian physicians (DiLillo, Cicchetti, Lo Scalzo, Taroni, & Hojat, 2009), dental students in the USA (Hsieh, Herzig, Gansky, & Danley, 2006), Polish medical students (Kliszcz, Nowicka-Sauer, Trzeciak, Nowak, & Sadowska, 2006), Czechoslovakian medical students (Kožený, Tišanská, & Hoschl, 2013), Brazilian medical students (Paro, Daud-Gallotti, Tiberio, Pinto, & Martins, 2012), residents in internal medicine and family medicine in the USA (Grosseman, Hojat et al., 2014), Korean medical students (Hong et al., 2012), medical students in New Zealand (Lim et al., 2013), and nursing students in Australia (McKenna et al., 2012).

In a study with students in the first and final years of a medical school in Poland (Kliszcz, Hebanowski, & Rembowski, 1998), women scored higher than men on both the Emotional Empathy Scale and the IRI (see Chap. 5). A survey of physicians showed that the female physicians rated themselves as more empathic than their male counterparts (Barnsley, Williams, Cockerill, & Tanner, 1999). Similarly, female residents in internal medicine (Day, Norcini, Shea, & Benson, 1989) and family medicine (Abbott, 1983) outscored their male counterparts on a measure of humanism.

In our recent large-scale study of 2637 medical students (1301 men; 1336 women), described in Chap. 7 (also see Hojat & Gonnella, 2015), we examined stability of gender differences on the JSE during a period of 11 years for matriculating students between 2002 and 2012 at Jefferson (currently Sidney Kimmel) Medical College, before students were exposed to formal medical education. Summary results of statistical analysis were presented in Chap. 7 (see Table 7.10). Consistent with the aforementioned findings (also see Appendix A), women consistently obtained higher mean empathy scores than men in all of our comparisons in different matriculating classes. The gender differences in favor of women were all statistically significant, with the exception of only one matriculating class (overall Cohen's effect size = 0.40). These results are in agreement with a great majority of empirical findings on gender difference in empathy in the general population and in health professions students and practitioners. The overwhelming evidence and consistent findings in observational, empirical, and experimental research on differences in empathy between men and women in different samples, settings, and cultures demand plausible explanations.

Plausible Explanations for Gender Differences

Because some of the gender differences are robust regardless of social and cultural differences, the intriguing question is the following: How can those differences be explained? Debate about the reasons for gender differences can be summarized in

terms of nature-nurture dichotomy (Eagly & Wood, 1999). Wood and Eagly (2002) suggested that gender differences drive from the interaction between nature and nurture factors, including for example physical differences, reproductive capacity, as well as the social and economic factors in societies. There is a large volume of studies, views, and reviews particularly in social psychology literature in explaining gender differences in terms of social learning, role expectations, and sociocultural factors (more relevant to the nurture aspects of gender differences). Detailed discussion of the contribution of social learning and other social and cultural factors in gender differences is beyond the scope of this book.

Therefore, in this chapter, I will not focus on those findings or theories, related to social learning and social cultural factors that contribute to gender differences; instead, I will briefly present evidence in support of the notion that some aspects of gender differences may be pre-wired (more relevant to the nature aspects of the gender differences), independent from social learning. I will provide brief explanations for gender differences in terms of evolutionary history and hormonal and biophysiological factors. Needless to say that those explanations should not be viewed at all as an argument against the undeniable role of social learning and social-cultural contributions to gender differences.

Evolutionary Underpinnings

In Chap. 3, I indicated that human beings are evolved to make connection for survival purposes. Human beings are endowed with a capacity to understand and a need to be understood. Although manifestations of the aforementioned capacity and need might be different in men and women, evolutionary psychology suggests that men and women in the course of human evolutionary history developed some gender-specific characteristics for better adaptation to survival challenges (Buss, 1995; Tooby & Cosmides, 1990). According to this view, the evolved gender differences are indeed accommodations for survival in the living environment. I will discuss a few aspects of evolutionary theory of gender differences that are more relevant to social behavior and empathic orientation such as mate selection, parental investment, and division of labor.

Mate Selection

The evolutionary explanation of gender differences in sexual selection was initially described by Darwin (1871/1981). There is a large volume of research showing that men and women have different preferences in mate selection for the purpose of survival of the genes (Buss & Schmitt, 1993). For example, studies on mate selection have showed that historically women have higher preference for a mate with higher social status, better access to resources (indicators of better earning potential and

more security), and ambitiousness (an indicator of better prospect) (Feingold, 1992). Men, however, place more value on physical attractiveness, and child-bearing capacity in searching for potential mates (Feingold, 1990). In an oft-cited study of 37 cultures, Buss (1989) observed the aforementioned pattern of mate preferences in men and women across all of the studied cultures. These findings confirmed the views in the evolutionary theory that women evolved to prefer mates who are resource providers, and men are evolved to prefer mates who are physically attractive (an indication of the women's health and younger age to bear and rear children).

Aspects of physical appearance such as smooth skin, muscle tone, lively gait, shiny and reddish lips, lustrous hair, curvy hip, and breast shape were proximate cues to a women's age and health that could increase reproduction success (Buss & Barnes, 1986) (at the time in which no birth certificate or medical tests were available to confirm a women's age or health status). Age in men, however, imposes less constraint for reproduction success; thus, preference for signs of younger age in men did not present a great advantage for mate selection However, potential for earning and financial prospect remained a strong selection advantage for women's mate selection. Remnants of the aforementioned mate selection factors are still noticeable in most modern societies. For example, could women's inclination to use make up, beauty parlors, cosmetic surgery, seductive dressing be an evolutionary leftover of retaining physical appeal, an advantage in sexual selection? Or, could the preference for richer male mates with college educations or successful businesses, family fortune, or high ambitious be the remnants of human evolution history to indicate potential for higher social status and better resources, aimed for survival of genes? Eagly and Wood (2013) suggest that changes in romantic mate selection have occurred in some industrial societies as women have entered the labor force and increasingly engaged in paid employment. Gender differences in mate selection contributed to the development of gender specific propensity for social skills and interpersonal behavior.

Maternal Investment

I described in Chap. 4 that during the course of human evolution, mothers have usually been involved more than any other person (including the fathers) in taking care of their own children (Trivers, 1972). Several reasons were described for the unmatched maternal investment (as opposed to paternal investment) including gestation and pregnancy experiences, bearing, weaning, and rearing children (Buss, 2003; Isabella & Belsky, 1991; Smotherman & Robinson, 1994). Also, maternal certainty (as opposed to paternal certainty), scarcity of women's gametes (compared to the abundance of men's sperms), lactation, and breast feeding prompt mothers to invest more than fathers in child care.

Maternal tender loving care and intimate experiences in raising one's own child contributed to women's development of caring attitudes, reflected also in their interpersonal relationships and social behavior. This notion was confirmed in a meta-analytic study by Feingold (1994) in which it was found that women rated

themselves as more nurturing than did men. Such unique caring experiences can naturally enhance women's ability in forming empathic engagement. According to Reverby (1987) and Trivers (1972), women's caring attitude toward their offspring, which can be generalized to other humans, has evolutionary roots. Women's caring attitude toward their children often takes precedence over other matters. For example, caring attitudes toward offspring can sometimes interfere with a woman's career advancement in ways that have nothing to do with the barrier known as the "glass ceiling" effect. In support of this notion, Carr, Ash, and Friedman (1998) reported that male and female faculty members of academic medical centers who did not have children showed equivalent career accomplishments, but female faculty members who had children progressed more slowly in their careers because of their involvement with raising children. This phenomenon is an indication of the intrinsic motivation that also prompts professional women to enter into "caring" careers, rather than the prospect of great financial gain. This in turn can contribute to gender differences in empathy.

Division of Labor

Gender roles within the society are not chosen arbitrarily; they are firmly rooted in the human biology that laid the foundation for the genders' historical division of labor. The ancestral division of labor in men and women, determined by the Mother Nature, can provide plausible explanation for the development of gender differences in social skills as well as mental abilities. For example, because of women's advantage to bear and raise children, they naturally developed a propensity for nurturance. Men, because of their greater size, speed, and strength, naturally took the role of hunting, competing for resources, and protection of the family. The division of labor paved the road for gender differences, so that men took on the responsibilities for hunting and scavenging, defending the family against predators and enemies, and making and using weapons, while women took on the responsibilities of gathering, preparing food and clothing, and caring for small children. The division of labor contributed to disparate development of specific areas of the brains of men and women which were more often activated by their gender-specific task during the course of human evolution.

Obviously, those routine and daily activities performed by men and women for a long ancestral history which consistently activated different areas of their brain contributed to pre-wiring their brains differently, providing them with a differing propensity for social behavior and mental abilities. The notion of "neurons that fire together wire together" (Doidge, 2007, p. 63) means that acts or experiences that are repeated enough become embedded in the brain neurons which are activated together simultaneously by performing that act or experience. The set of brain network connections strengthen each time the act or experience is repeated. Hence, propensity for performing that act is "pre-wired" in the brain. On the contrary, lack of experience prevents cells to form a set of network. This notion is reflected in the statements

that "neurons that fire apart wire apart" (Doidge, 2007, p. 64). No wonder that men are endowed with better spatial skills (acquired from hunting experiences), and women acquired superior skills in recognizing landmarks (required to locate a gathering spot and returning to the correct place of living). These "pre-wired" gender differences in mental ability have been shown in large volumes of empirical gender studies (Eagly & Wood, 1999; Geary, 1995; Voyer, Voyer, & Bryden, 1995).

Men's "Agentic" and Women's "Communal" Characteristics

No doubt that the human evolutionary history has significantly contributed to the development of distinct psychological qualities in men and women, labeled by Eagly (1987) as the "agentic" personal qualities in men and "communal" personal characteristics in women. Bakan (1966) who coined the terms "agency" and "communion" argues that agency is important for the existence of an individual, and communion is important for the existence of the group in which the individual is a member of. According to Abele and Wojciszke (2007) agency characteristics emerged from striving to expand the self which involves qualities such as dominance and ambition, while communion characteristics emerged from striving for integration in the group and involve qualities such as emotional expressiveness and cooperation. Thus, gender stereotypes are reflected in the two aforementioned agentic and communal characteristics (Abele & Wojciszke, 2007).

Women's historical role as domestic child-rearing individuals requires interpersonal skills that favor development of personality attributes that are linked to tender loving care and social skills, friendliness, concern, compassion, emotional expression, and empathic engagement, described as specific features of the "communal" personality (Eagly & Wood; 1999; Wood & Eagly, 2010). Men's instrumental roles in proving food and security which favor assertiveness and competition are described as specific features of the "agentic" personality (Eagly & Wood, 1999; Wood & Eagly, 2010). Women's communal attributes fosters prosocial behavior such as caring for others, while men's agentic characteristics facilitate some other forms of prosocial behavior such as physical challenges, acts of rescuing, and chivalrous protection (Wood & Eagly, 2010). Women's communal characteristic inspires close relationship, friendliness, perspective taking, and empathy which are indispensable for survival (Abele & Wojciszke, 2007).

The difference between men and women in communal and agentic attributes is reflected in the title of a meta-analytic article on gender differences, "Men and things, women and people." (Su, Rounds, & Armstrong, 2009). Tannen (1990) in her book, "You Just Don't Understand: Women and Men in Conversation," describes the difference in interpersonal style in boys as often doing things together (a feature of agentic attribute), and in girls as often talking together (a feature of communal attribute). In his popular book, "Men Are from Mars, Women Are from Venus" Gray

(1992) suggests that the difference in social behavior and communication between men and women is so wide that they seem to come from different planets!

In the stressful situations women would tend to express their emotions and talk about problem to acquire their mates' support (communal characteristic), but men often prefer not to talk but rather do something about problems (an agentic characteristic). According to Wood and Eagly (2010), women more often use communication to enhance interpersonal relationships due to their communal character. However, men because of their agentic character use communication to achieve tangible outcomes and exert dominance.

Despite the aforementioned gender differences, I must caution that the abovementioned evolutionary determinants of gender behaviors should not lead us to making the fundamental "attribution error." In judging the gender differences, this well-known error can be committed by incorrectly assuming from evolutionary history that gender roles have been fixed for good! In the modern societies, women's domestic role and their maternal investment in nurturing their children on demand and men's role as the sole breadwinners for the family have changed to some extent. The evolutionary advantages in mate selection and division of labor have also been changing in most modern societies. These adjustments, in long run, can insert their effects in the gender role equation formulated by evolution history, and bring about some new gender roles suited to better survival in the modern societies. Consistent with this notion, Zentner and Mitura (2012) studied a large sample of research participants in ten nations and concluded that the historical gender differences in preference for mate selection declined proportionally in nations with a higher gender parity.

However, these findings have been challenged by others (Schmitt, 2012). Changes currently occurring in modern societies include women's out-of-home employment, provision of child care by nonparental sources, and reconstruction of the traditional family structure and function. Over a sufficiently long period of time, this progression may influence the trace of the old history of human evolution by the tracks of modern history, in a way that transforms current gender differences to something more beneficial to survival of the human race. But for now, the impact of the evolutionary history on current social behavior of men and women should not be dismissed.

Hormonal and Biophysiological Differences

Exposure to various sex hormones from the time of conception plays an important role in gender differentiation. The presence of the "Y" chromosome at conception which contributes to the development of testes and male gonads, and its absence which leads to forming ovaries, is the starting point in gender differentiation. Male hormones (e.g., androgens or testosterone, its chief derivative) produces by male testes will have permanent effects on the brain development from inception. Some hormones that are relevant to understanding gender differences include

testosterone, oxytocin, and to some extent cortisol. These hormones act as chemical transmitters in the brain that contribute to performance in certain social behaviors.

Higher levels of testosterone for example are associated with dominance, or behaviors that gain or maintain status, which often entail competition, risk taking, thrill seeking, and aggression (Booth, Granger, Mazur, & Kivlighan, 2006), which are consistent with men's agentic characteristic. It is reported that fathers as well as non-father men with lower level of testosterone showed a higher need to respond and more empathic sensitivity to infant cries than fathers with higher testosterone levels (Fleming, Corter, Stallings, & Steiner, 2002). In contrast, higher levels of oxytocin (and low levels of testosterone) are associated with human bonding and attachment, affiliation and friend seeking, nurturance, intimacy, and a propensity for empathic engagement (Campbell, 2008), which are consistent with women's communal attribute.

Some authors have argued that the difference in levels of prenatal testosterone in male and female fetuses supports the notion that the hormone has an important role in forming sex-specific interpersonal styles and verbal ability (Baron-Cohen, 2003; Connellan, Baron-Cohen, Wheelwright, Batki, & Ahluwalia, 2000). For example, a study in which an inverse relationship was found between levels of fetal testosterone and size of the vocabulary in children at 18 and 24 months of age supported the importance of fetal testosterone levels in verbal ability in men and women (Lutchmaya, Baron-Cohen, & Raggatt, 2002).

It is well known that the hormone oxytocin rises in women during childbirth and is released during childbirth and lactation. It has also been shown that women with higher level of oxytocin in early pregnancy and postpartum engage in more intimate behaviors with their babies such as gazing, eye-to-eye contact, affectionate touching, and tender loving care (Feldman, Weller, Zagoor-Sharon, & Levine, 2007). Oxytocin is associated with pair bonding, sexual behavior, maternal care, social attachment, prosocial behavior, and trust in others (Chakrabarti & BaronCohen, 2006; Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005). It is also reported that oxytocin improves the "mind-reading" ability and adeptness to infer the mental state of others from social cues of the eye region (Domes, Heinrichs, Michel, Berger, & Herpertz, 2007), measured by the Reading the Mind in the Eye Test (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001), which can facilitate empathic engagement. Hurlemann et al. (2010) reported that oxytocin can enhance social learning and emotional empathy in humans.

Another sex-typed hormone, cortisol, is also implicated in initiation of the parental role, and in gender differences. Hormonal changes have been linked to gender-typed behaviors. Such changes in mothers accompany childbirth and stimulate nursing (Fleming, Ruble, Krieger, & Wong, 1997). It has been observed that anticipation of becoming a father could lead to hormonal changes in men, parallel to the changes that occur in mothers (e.g., in cortisol). Such changes may include a decrease in testosterone (Berg & Wynne-Edwards, 2001). These changes can influence social behavior and empathic orientation.

Inborn Sensitivity to Social Stimuli and Propensity to Social Interaction

Inborn gender differences in responses to social stimuli, prior to any social learning, can be observed in children at an early age. For example, female newborns are more responsive than male newborns to auditory and social stimuli and are able to maintain eye contact for longer periods of time (Hittelman & Dickes, 1979; Osofsky & O'Connell, 1977). Infant's eye contact, recognized as an inducer of maternal caregiving (Hittelman & Dickes, 1979), is a social interaction which is under control of the infant and occurs immediately after birth prior to any social learning. Female neonates also smile more and show less rapid buildup of arousal and excitement (Osofsky & O'Connell, 1977). A study of neonates (mean age 36.7 hours) in which a human face and a mobile were presented simultaneously found that the female infants exhibited a stronger interest in the human face, whereas the male infants showed a greater interest in the mobile (Connellan et al., 2000).

Female newborns have shown less irritability than male newborns (Moss, 1967), and infant girls had less difficulty regulating emotions and displayed less irritation than infant boys when confronted with their mother's expressionless face (the still-face experiment described in Chap. 4) (Weinberg, Tronick, & Cohn, 1999). Obviously, these early differences that are precursor to social development cannot be attributed to socialization and adaptation to gender roles.

It has been reported that girls, compared to boys, show more concern for fairness (Charlesworth & Dzur, 1987), and respond more empathically to the stress of others (Hoffman, 1977). Also, at 1 year of age, girls can show their empathic concern through their sad looks and sympathetic vocalization (Hoffman, 1977).

Perception of Emotions and Decoding of Emotional Signals

Empirical research suggests that from an early age, females seem to be more sensitive to emotional signals than males. For example, female infants exhibit more reactive crying when another crying infant is present than male infants (Sagi & Hoffman, 1976) (in Chap. 5, a reactive crying response was described as an indication of a primitive empathic response).

A significant difference has also been observed in favor of women regarding the transmission and detection of nonverbal emotional cues (Brown & Dunn, 1996; Buck, 1984; Buck, Savin, Miller, & Caul, 1972). In a meta-analytic study, effect sizes of gender differences in sensitivity to nonverbal cues were reported to be in a moderate range of 0.40–0.50 (Hall, 1998). Women's ability to understand emotional cues has been observed in a number of studies in both children and adults (Brown & Dunn, 1996; Davis, 1983, 1994; Eisenberg & Lennon, 1983; Eisenberg & Strayer, 1987a; Feshbach, 1982; Hogan, 1969; Jose, 1989; Litvack-Miller, McDougall, & Romney, 1997).

The ability to perceive the emotions of another person and to "send" and "receive" nonverbal signals through facial expressions and body language (Hall, Carter, & Horgan, 2000; Hall & Gunnery, 2013) contributes significantly to empathic engagement. Yawning for example, as described in Chap. 2 has been linked to empathic ability and social awareness. In a study of naturalistic observations, it was found that the rate of contagious yawning was significantly higher in women than men (Norsica, Demuru, & Palagi, 2016). Also women are more receptive to emotional signals than men (Trivers, 1972), and are more perceptive about their meaning (Baron-Cohen, 2003; Bjorklund & Kipp, 1996; Buss & Schmitt, 1993). Despite the fact that women are generally better at perceiving other people's emotions and are less socially constrained about expressing their emotions, they are not always superior to men in the expression of certain emotions (Brody & Hall, 2008). For example, although women generally are better at expressing fear, sadness, love, and happiness, men are better at expressing anger and hatred (Wagner, Buck, & Winterbotham, 1993), characteristics that are not conducive to empathy. Women have been stereotyped as nurturing and interpersonally oriented (Eisenberg & Lennon, 1983), characteristics that have been identified as central components of female identity (Jack, 1993) and facilitate empathic engagement.

Women not only understand other people's facial expressions better than men, but they are also more facially expressive (Buck, Miller, & Caul, 1974). In one experiment, female pairs were more skillful than male pairs at understanding nonverbal emotional cues (by observing on closed-circuit television the facial expressions of a person who was watching slides with varied emotional content) (Buck et al., 1972). Hall's review (1978) of 75 studies on gender differences in the ability to decode other people's emotional states confirmed women's superiority in decoding visual and auditory cues. Another study (Zuckerman, DePauls, & Rosenthal, 1981) found that women could even detect negative aspects of interpersonal behavior, such as deception, better than men. Obviously, the ability to correctly interpret nonverbal cues and another person's state of mind is relevant to the capacity to form empathic relationships.

Women are more likely than men to exhibit comforting behavior even to strangers in stress (Hoffman, 1977). Women value reciprocity in relationship and endorse cooperation more than men do, whereas men place more value on competition and power (Ahlgren & Johnson, 1979). These characteristics are conducive to empathic engagement in women.

Interpersonal Style, Verbal Ability, Aggressive Behavior, and Caring Attitudes

Men and women have different interpersonal styles. Research has shown that men are more likely to interrupt when women are talking with each other, whereas women are less likely to interrupt when men are talking with each other (McMillan, Clifton, McGrath, & Gale, 1977). In addition, men tend to speak more assertively

than women during verbal communication (Kramer, 1974). Taylor et al. (2000) reported that men and women often exhibit different biobehavioral responses to stressful events that reflect differences in their neuroendocrine and physiological systems. The authors suggested that men generally tend to react to stress with the "fight-or-flight" response, whereas women's response tends to be characterized as "tend-and-befriend" (Taylor et al., 2000), a pattern involving nurturing activities developed during human evolution to protect the self and offspring.

Taylor et al. (2000) suggested that the underlying biobehavioral mechanism responsible for this "tend-and-befriend" pattern might be set in motion by the attachment system described in Chap. 4, and by hormones such as oxytocin in conjunction with other female reproductive hormones, and the activities of endogenous opioid peptides. The "tend-and-befriend" approach of social behavior is reflected in typical acts such as taking on the phone for a longer period of time and simple social contacts such as asking for directions without hesitation when lost. Both of these examples are more typical characteristics of women than men. Obviously, these gender differences in interpersonal styles and biobehavioral responses can influence the formation of empathic relationships.

In interpersonal interactions, smiling is the best single predictor of warmth (Bayes, 1972) and an indicator of prosocial behavior and positive affect. Appropriate use of smiling serves as a positive signal in interpersonal communication. A meta-analytic study of gender differences with regard to smiling found that women and adolescent girls were significantly more likely to smile than men and adolescent boys (LaFrance, Hecht, & Paluck, 2003). Based on a meta-analytic study of 20 published articles on gender differences in smiling, Hall (1984) reported a relatively large effect size of 0.63 on gender differences in smiling. Women are generally more expressive and emotional than men (Briton & Hall, 1995; Kring & Gordon, 1998). Women's higher rate of expressing emotion and smiles is an uncomplicated facial signal that can strengthen interpersonal relationships.

Also, women's superiority on tests of verbal ability has been documented in many empirical studies (e.g., see Maccoby & Jacklin, 1974). Girls often begin talking at an earlier age than boys, and they maintain their superior verbal ability thereafter (Rutter et al., 2005). In addition to verbal skills, women surpass men in sociability. For example, Hall (1984) reported that women make more eye contact during interpersonal interactions than age-matched men. Women also tend to understand the social context of certain matters better than men (Willingham & Cole, 1997). For example, female college students identified with story characters to a greater degree than the male students did. The researcher found that such identification correlated positively with scores on the Empathic Concern scale of Davis's Interpersonal Reactivity Index (IRI) (Jose, 1989).

Women's typical characteristic of expressing their emotions (e.g., externalizing) and men's typical characteristic of concealing their emotions (e.g., internalizing) prompt the two sexes to reveal their emotions differently (Buck et al., 1972). An empirical study reported that the men and women who received higher femininity mark on the Gender Role Orientation Inventory (Bem, 1974) also had significantly higher empathy scores on the IRI (Karniol et al., 1998).

Although some gender differences in interpersonal styles and verbal skills can be attributed to socialization and learned sex roles (Eagly, 1995), evidence suggests that these differences may be partially biological in origin (Baron-Cohen, 2003). In a recent study by Singer et al. (2006) using functional magnetic resonance imaging, it was noticed that while both men and women exhibited empathy-related activation in areas that register pain (fronto-insular and anterior cingulated cortices), the empathy-related brain activities were significantly reduced in men when observing a cheater in pain, as described earlier in this chapter.

Although generally no consistent gender difference in anger has been reported, men often show physical aggression more than women, and women often show verbal aggression more than men (Archer, 2004). Verbal aggression and aggressive behavior reflect a negative affect, which interferes with the formation of empathic relationships. Women are generally less likely than men to exhibit aggressive behavior (for a meta-analytic study, see Eagly & Steffen, 1986). Gender differences in the expression of aggression may be attributable not only to hormonal differences but also to social learning and stereotypical sex roles that lead men to become tougher, more assertive, and more behaviorally aggressive than women. However, it is important to note that social learning explains only part of the picture because research indicates that aggression is more pronounced in male than in female children (Hyde, 1984).

Women express aggression in different ways than men and toward different targets. For example, women tend to direct their aggression toward other women, not men (Eagly & Steffen, 1986). Women are more likely than men to show "indirect" aggression often verbally, whereas men are likely to show "direct" physical aggression (e.g., pushing, punching) (Chakrabarti & BaronCohen, 2006). Indirect aggression requires regulation of emotion and better mind reading (Kosfeld et al., 2005) which are conducive to empathic engagement. Daly and Wilson (1988) studied data collected over 700 years on homicide and noticed that male-on-male rate of homicide was 30–40 times more than female-on-female homicide. Women often feel guilty to a greater degree than men about aggressive behavior, so that guilty feeling about aggressive behavior often prohibits women from expressing aggression (Frodi & Macauley, 1977). Control of aggression is a self-regulatory behavior that promotes empathic relationships. By using the "still-face" procedure described in Chap. 4, it was noticed that male infants had greater difficulty than female infants in maintaining emotional regulation (Weinberg et al., 1999), suggesting that women seem to have more control over regulation of their emotions, which leads to better interpersonal interactions.

Social stereotypes often portray men who help others as heroic and chivalrous (e.g., those who risk their own life to save others from harm) and portray women as nurturing and caring (Eagly & Crowley, 1986). A meta-analytic review of the literature revealed that, in general, men were more likely than women to give help and women were more inclined to receive help (Eagly & Crowley, 1986). However, women historically have been more inclined than men to place the needs of others, especially those of their children, above their own (Chodorow, 1978) and are more oriented toward care giving (Gilligan, 1982). Charles Darwin also noticed this

quality. In his seminal book, *The Descent of Man*, Darwin (1981) indicated that women exhibit greater tenderness in social relationships than men, and because of their maternal instincts, their tenderness toward their infants is likely to extend toward others.

Gender Differences in the Practice of Medicine

It seems reasonable to speculate that gender differences concerning empathy could influence male and female physicians' styles of practice and provision of patient care, and some empirical studies have confirmed this speculation (Bertakis, Helms, Callahan, Azari, & Robbins, 1995; Bylund & Makoul, 2002; Fruen, Rothman, & Steiner, 1974; Henderson & Weisman, 2001; Maheux, Duford, Beland, Jacques, & Levesque, 1990; Weisman & Teitlebaum, 1985). In examining factors that influence medical students' learning of psychopathology in a psychiatry clerkship, Fabrega, Ulrich, and Keshavan (1994) reported that female medical students showed better achievement due to gender-related factors such as students' ability to assimilate and cope with clinical experiences of the psychiatric clerkship.

Female physicians were more likely than male physicians to engage patients in positive talk, discuss psychological and social issues in health and illness, use more positive statements, engage in more verbal exchanges with patients, and spend a longer time with them (Cooper-Patrick, Gallo, & Gonzales, 1999; Hall, Irish, Roter, Ehrlic, & Miller, 1994; Meeuwesen, Schaap, & Van der Staak, 1991; Roter & Hall, 1997; Roter, Lipkin, & Korsgaard, 1991; Roter, Hall, & Aoki, 2002). On the average, female physicians spent three to four more minutes with their patients than their male counterparts, engaged in more humorous conversations with their patients, and shared more decision-making responsibility with them (Charon, Greene, & Adelman, 1994). Female physicians also are more prevention oriented than their male counterparts (Bertakis et al., 1995; Frank & Harvey, 1996; Maheux et al., 1990). Furthermore, they provide more screening and more preventive counseling about sensitive topics, particularly with female patients (Henderson & Weisman, 2001). These gender differences in practice style, according to Bylund and Makoul (2002), can be the result of the female physicians' tendency to communicate at a higher degree of empathy with their patients than their male counterparts.

Charon et al. (1994, p. 216) observed that female physicians acted as if they were alert to their patients' emotional and daily-life concerns—concerns that otherwise "tend to be muted in medical interactions." Their observation agreed with the idea posed by others that women, more than men, can bring empathy to the healing relationship (Bickel, 1994; Bylund & Makoul, 2002). Charon et al. also found that patients reacted to male and female physicians differently. Patients of both sexes reported that female physicians were more willing to discuss medical topics and probe about personal habits, such as smoking, alcohol, drug use, sex, sleep, psychological issues, family and work problems, finances, and emotional problems.

In a study of patients' satisfaction, both male and female patients gave more favorable ratings to the care they received from female residents than from male residents (Linn, Cope, & Leake, 1984). However, Howell, Gardiner, and Concato (2002) found that although a greater number of patients preferred female over male obstetricians, their satisfaction with medical care was unrelated to a physician's sex. With regard to medical malpractice claims, the fact that female physicians have a better record than male physicians is attributed more to better physician–patient relationships than to taking on less risky patients (Sloan, Mergenhagen, Burfield, Bovjerg, & Hassan, 1989). In the area of clinical competency, our study showed that directors of residency training programs rated female residents higher than their male counterparts on the "socioeconomic aspect of patient care" at the end of the first year of postgraduate medical education (Hojat et al., 1994). These findings suggest that female and male health care providers have different practice styles resulting from their differences in interpersonal style reflected in their empathic engagement with patients.

Complementary or Opposite Sexes?

Despite all gender differences I described in this chapter, a number of meta-analytic studies reported that gender similarities in social behavior are overwhelmingly higher than the overinflated claims of the differences (Eagly & Wood, 2013; Hyde, 2005; Spelke, 2005; Stewart-Williams & Thomas, 2013; Su et al., 2009; Twenge, 1997; Zell, Krizan, & Teener, 2015). Because men and women are similar in many psychosocial qualities, Zell et al. (2015) and Hyde (2005) suggested that in gender research, it would be more desirable to test hypotheses of gender similarities rather than differences. However, despite the fact that the effect size of gender differences is typically small, Zell et al. (2015) suggest that the small differences accumulate when summed across domains. Therefore, differences should not be necessarily considered negligible. Consistent trivial differences can have important consequences that need to be constantly explored.

In her meta-analytic review of 46 studies on psychological and mental ability variables, Hyde (2005) advanced the idea of gender similarities rather than gender differences, and concluded that men and women are alike on most, but not all, psychological and mental ability variables, and declared that gender differences have been substantially overinflated. The modest and sometimes negligible magnitude of gender differences, observed consistently and universally in social skills, mental abilities, emotions, personality, interest, attitudes, and behaviors, does exist. However, such differences should not be considered as an argument for viewing men and women as "opposite" sexes; rather, they should be viewed as the "complementary" genders. For example, women's superiority in communal and men's advantage in agentic characteristics can complement one another to make together a better world. Together, men and women are like a completed jigsaw puzzle.

Recapitulation

A great majority of empirical studies in the general population and in health professions students and practitioners have reported that women outscore men in measures of interpersonal relationships and empathy. The differences in men and women in social behavior and empathy have often been attributed to social learning and sociocultural factors. In this chapter I argued that while the contribution of social learning in gender differences cannot be ignored, there are other evolutionary factors and inborn characteristics that can provide plausible explanations for gender differences in social skills, beyond social learning, gender stereotypical role models, and social and cultural factors. Relying on the human evolutionary history, I proposed that ancestral history in preferred advantages in mate selection, parental investment in child care, division of labor, and hormonal and physiological factors have endowed women with a greater propensity for social skills and empathic engagement. However, some of the current gender differences may cease to exist in the future. Changes currently occurring in modern societies, if continuing over a sufficiently long period of time, require adjustments that can alter the effects of past evolution in gender differences, and transform them into something else for better survival.