

## **Social Ties and Health: Mechanisms and Implications**

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In September 2003, the Commission on Children at Risk, a group of doctors, research scientists, and mental health specialists, issued their report titled “Hardwired to Connect.” The Commission was called together to address a specific problem: Why are children today at such heightened risk for behavioral and mental disorders? The conclusion of the Commission was that children are “hardwired” for enduring connections to others and for moral and spiritual meaning. Children in the latter part of the 20<sup>th</sup> century and the first part of the 21<sup>st</sup> century are not making these connections, and when these connections are not made, serious problems can result, problems such as depression, anxiety, conduct disorders, and suicidal thoughts (The Commission on Children at Risk, 2003).

What is true of America’s children is also likely true of America’s adults. Over the last third of the 20<sup>th</sup> century through today, Americans have become increasingly disconnected from one another. Social structures such as churches, community service organizations (e.g., Kiwanis, Lions, Elks, etc.), card clubs, and bowling leagues, have suffered from decreased participation as Americans join less, give less, trust less and socialize with others less. The political scientist Robert Putnam documents this decline in social connections in his book *Bowling Alone* (Putnam, 2000). Putnam refers to the connections among individuals as social capital—the “social networks and norms of reciprocity and trustworthiness” that arise from these connections (Putnam, 2000, p. 19). Just as a society must have physical capital (such as buildings or machinery) or cultural capital (such as knowledge, skills, and education), so too must a society have interconnections among the members of that society. As is true for physical and cultural

capital, social capital has real value for the people in a society. There are objective benefits to a society that is rich in social capital.

The term “social capital” did not originate with Putnam. The notion that there are positive effects on individuals when they participate in groups with others dates back to the work of Durkheim, and the first contemporary analysis of social capital was conducted by Bourdieu in the 1980s (Portes, 1998). Another important use of the term was that of Coleman (1988) who saw the importance of social capital as a resource for creating human capital, the skills, abilities, experiences, knowledge etc. that are possessed collectively by individuals in a population. An important component of the current understanding of social capital is that its resources are derived from the structure of an individual’s social networks and other social institutions and norms (Eriksson, 2011). Social capital exists in different forms including structural (what people do) and cognitive (what people feel with regard to social relations). Additionally, bonding social capital consists of resources that help strengthen ties among members of a particular network (e.g., friends bringing meals to you when a loved one has died), while bridging social capital is characterized by links among individuals from separate networks, such as might be developed during an interfaith, international conference on human trafficking (Putnam & Feldstein, 2003).

Social networks consist of the relationships that exist in a person’s life and can include family, friends, colleagues at work or school, and co-members of clubs, churches, societies. Qualities that make up a specific social network include the number of members in the network, the interconnections among the members (for example, how many of one’s friends are also members of the same church), and the age of the relationships—how long have the friends or co-members been a part of one’s social network. Generally speaking, the older the relationships and

the richer the interconnections among the network's members, the more social capital is provided by the network and the greater benefit to the individual.

### **Neurobiological Systems of Caregiving**

To benefit from these social resources, the individual must be able to accurately detect and “read” or decode the many social signals (verbal as well as gestures and postures) coming from a particular network that facilitate social interaction. We might expect that, given the importance of making connections with others and reading social signals from others, a dedicated neurobiological system of brain structures would be utilized to motivate caregiving and helping behaviors in highly social primates such as humans. Such a system exists and involves the medial preoptic area (MPOA) of the hypothalamus, a region responsible for regulating many homeostatic functions, such as hunger, water balance, temperature regulation, and caregiving behavior (e.g., maternal care) (Brown, Brown, & Preston, 2012). In response to cues from another person in need, the MPOA serves to activate maternal and other caring responses. Other brain areas involved in this caregiving response include the amygdala and the anterior cingulate cortex, which are important in the processing of cues signaling need. Research suggests that the volume of the amygdala and thickness of the temporal cortex are correlated with social network size in both humans and monkeys (Dziura & Thompson, 2014). Humans are a highly social species. We need to establish relationships with others for our own survival; these ties are a biological imperative. We seem to be wired for social connections. When these affiliations are made, conditions are conducive for the individual to thrive physically and psychologically, but when the ties are not made or are inadequate, health can fail (Umberson, Crosnoe, & Reczek, 2010).

A major neurobiological system involved in caregiving and social support is the hormone oxytocin. A hormone is a chemical that is released into the general circulation, traveling throughout the body. At particular target cells of the body, the hormone will have a specified effect on those cells, influencing the physiology and behavior of the organism. Oxytocin is a hormone that is released from the pituitary, a structure located at the base of the brain and considered the “master gland” of the body; that is to say, the pituitary gland releases hormones that have direct effects on other glands of the body (e.g., thyroid and adrenal), causing those glands to release additional hormones. The pituitary gland is divided into two sections, anterior and posterior, and oxytocin is released from the posterior portion of the pituitary gland. The effects of oxytocin are many, including milk ejection in lactating females, contractions of the uterus during labor, and contributions to smooth muscle contractions during sexual orgasm in both males and females. Oxytocin release is induced in males and females in response to touch, warm temperature, massage, and light pressure. It also lowers blood pressure, pulse, and the stress response, and increases pain thresholds. Given its role in touch and sexual intercourse, oxytocin is a hormone that seems to promote secure partner preferences, bonds and attachments (Brown et al., 2012). For example, following sexual intercourse, the release of oxytocin increases the bond between the couple and performs a similar function during the attachment process between infants and primary caregivers.

Oxytocin is also implicated in the development of social attachments in general. One important feature in establishing and maintaining social affiliations is the ability to “read” another person’s thoughts, feelings, potential behaviors, etc. This ability is often referred to as Theory of Mind (ToM) in psychological literature. ToM typically develops around four years of age in human children and enables the child to understand that other minds exist and that those

minds might not have the same thoughts as the child's. Such empathy is basic to the development of attachments to those other minds. Oxytocin facilitates this type of social affiliation in humans (Feldman, 2012) by increasing empathic accuracy (Bartz et al., 2010; Domes, Heinrichs, Michel, Berger, & Herpertz, 2007) and increasing one's sensitivity to positive aspects of social relationships (Unkelbach, Guastella, & Forgas, 2008).

Social affiliation is also enhanced by oxytocin through its effects on trust, cooperation, and generosity. Laboratory investigations indicate that administration of oxytocin in humans increases trust, altruism and generosity (Zak, Stanton, & Ahmadi, 2007) as measured in various economic games (Coakley & Nowak, 2013), such as the dictator game in which one subject (the proposer) determines how a sum of money will be divided between him- or herself and another individual (the responder). The responder is entirely passive in this version of the game, accepting whatever amount the proposer determines is appropriate. Oxytocin administration increases the amount of money the proposer gives to the responder compared to amounts proposed following administration of a placebo. Oxytocin also increases trust in similar types of games, confirming its role in the physiological basis for prosocial behaviors (Kosfeld, Heinrichs, Zak, Fishbacher, & Fehr, 2005; Zak, Kurzban, & Matzner, 2005).

Several evolutionary mechanisms might explain such increases in trust, altruism and generosity, including kin selection, reciprocity, and group selection (Zak et al, 2007). Humans are a highly social species, and group selection proposes that there was an evolutionary advantage provided to individual humans who banded together for mutual protection, hunting, etc. In addition, groups that work well together, showing higher levels of trust, generosity, and cooperation among the members, will have a survival advantage over groups having fewer of these prosocial behaviors (see Greene, 2013). Oxytocin is part of the psycho-social-physiological

mechanism that is involved in forming these social affiliations, not merely between two humans (e.g., through sexual intercourse or through infant-caregiver bonding and attachment), but between larger social groups as well. Evidence to support this approach shows that oxytocin increases in-group conformity of behaviors, attitudes, and beliefs (Stallen, De Dreu, Shalvi, Smidts, &Sanfey, 2012) and modulates cooperation within groups (De Dreu, 2012). De Dreu (2012) also found that, in addition to increasing cooperation within a social group, oxytocin motivates non-cooperation toward outsiders. Fear of and lack of trust toward out-groups is the other side of the preference shown toward members of the in-group, and oxytocin is implicated in both the positive increases in trust and cooperation for the in-group and the fear and lack of cooperation toward the out-group (Kirsch et al., 2005).

### **Social Networks and Health**

Support coming from social networks is a well-documented factor influencing physical and mental health. The origin of this connection between social support and health is thought to come from early familial transactions, such as caring, affection, and positive involvement (Uchino, 2009). Expectations about social relationships in adulthood are largely affected by infant-caretaker attachment processes. Infant-caretaker interactions are thought to form a basis for developing trusting and dependable relationships in adulthood. Early family environment can also influence an array of psychosocial processes relevant to physical and mental health, such as coping strategies, self-regulation and control, and emotional reactivity, and the early environment within the family (e.g., the mother's response to infant cues) can also impact the development of basic social competencies and peer acceptance. Perceived support from the family is also related to lower stress exposure and improved health behaviors, such as diet,

exercise, smoking cessation, and medical regimens (Uchino, 2009). Not all social network effects produce positive health outcomes. Caregiving directed toward members of one's own social network can produce high stress, reduced immunity and an increased risk of infection, doctor visits, serious illness and even death (Smith & Christakis, 2008; Robles, Slatcher, Trombello, & McGinn, 2014). Poor mental health in a spouse can also alter the physical health of the caregiving partner, and negative marital functioning is correlated with dysfunction in the immune system which can lead to chronic physical ailments.

Despite these documented negative effects, the overall impact of social support is positive. Support from social networks (family, friends, colleagues, etc.) is associated with lower levels of cardiovascular disease, cancer, myocardial infarction, atherosclerosis, and overall mortality. Social support is also linked to lower blood pressure, improved immune function, and higher levels of psychological well-being (Smith & Christakis, 2008; Uchino, 2009; Umberson et al., 2010; Umberson & Montez, 2010; Robles et al., 2014). As in any correlational research, the problem of directionality is an issue: Do poor social relationships lead to impaired physical/mental health or does impaired health lead to poor social relationships? The use of longitudinal studies, testing a given cohort of subjects repeatedly over a number of years, can provide some information regarding the direction of the effect, and these studies give the stronger influence to the social relationships affecting health (Umberson et al., 2010).

Social networks can affect health (both physical and mental) through a variety of possible processes. Many of the health issues experienced today are due to behavior (rather than infections, for example). Influences from social networks (e.g., friends or family members) can improve health by encouraging healthy behaviors and discouraging unhealthy behaviors (Umberson & Montez, 2010). For example, a friend who runs with you in the morning, a spouse

who encourages you to stop smoking or eat a healthier diet, church requirements (for members) that insist on abstinence from drug use or moderating alcohol consumption can each direct behavior and result in improved overall health.

In addition to social networks influencing or controlling habits, social ties can affect the health of an individual through various psychosocial processes (Umberson & Montez, 2010). Social networks can provide a sense of meaning, control, fulfillment, and purpose to an individual which can serve as a buffer to stress and improve the individual's health. Social networks can also provide an environment through which positive and negative life events can be interpreted. For example, being connected to a community of like-minded individuals (e.g., a church) can motivate a person experiencing difficulty to reframe the problem, changing it into a positive life event (or at least one that is neutral) which can serve to reduce the detrimental effects that event might have on overall health.

Being a member of a group can provide a source of identity for a person. Much of our sense of personhood is derived from group membership, and this membership can provide an organizing strategy to help the person comprehend and put perspective on events that occur. There are downsides to this effect of the group on individual understanding, of course. How an individual thinks about a particular issue can be heavily shaped by the group to which one belongs. We often assume the beliefs or perspectives of the group in order to maintain our identity with that group, sometimes fearing that expressing views contrary to those of the group might lead to our rejection from the group and loss of those group connections (Hogg, 2014; Kahan, 2013).

The ability of social networks to reduce stress illustrates a third mechanism whereby social ties can affect health and that is via certain physiological processes, such as the



hypothalamic-pituitary-adrenal (HPA) axis, the immune system, and the autonomic nervous system (Seybold, 2007). The HPA axis consists of a neural and hormonal communication system whereby the brain ultimately controls the body's stress response to environmental stressors. When physical, social, or psychological stressors are experienced, the hypothalamus (a brain region involved in a number of important biological behaviors such as eating, drinking, temperature regulation, and sexual behavior) causes, either through direct neural connections or indirectly through the release of chemical modulators, the pituitary gland to release adrenocorticotropic hormone (ACTH). This hormone eventually results in the release of the stress hormone cortisol from the adrenal cortex. Cortisol helps the body to respond to the stressor, and under normal, healthy conditions, also causes the pituitary gland (via the hypothalamus) to inhibit the release of ACTH, which results in lowered levels of cortisol in the body. This negative feedback system is vital in the healthy regulation of the body's stress response. Under abnormal conditions, this negative feedback system does not respond properly and the levels of cortisol in the body remain elevated, contributing to various stress-related disorders, such as high blood pressure and cardiovascular disease to name but two.

The autonomic nervous system (ANS) is also involved in the stress response of the body. While the HPA axis is responding to a stressor, the ANS is as well. The ANS consists of two systems which serve to keep each other balanced. The first is the sympathetic nervous system (SNS) which functions to arouse the body physiologically when confronted with a stressor. For example, the SNS increases blood pressure, heart rate, respiration, and causes pupil dilation (among other effects), each of which serves to prepare the body to respond actively to the environmental event. These effects are sometimes referred to as the "fight or flight" response. The second system, the parasympathetic nervous system (PNS), has the opposite effect on the

body. It decreases blood pressure, heart rate, respiration, and causes pupil constriction (among other effects) which serve to put the body at rest. When functioning in a healthy manner, these two systems are complementary and keep the body in the proper balance between arousal and relaxation.

The immune system is also involved in the body's response to stressors. This system consists of numerous biological processes and structures that detect a variety of pathogens, distinguish these from the body's own tissue, and respond to the pathogens to try to neutralize them. Together with the HPA axis and ANS, the immune system, when functioning as it should, helps to maintain health and fight against the deleterious effects of stressors in the environment. Rich social networks help to maintain health in an individual through facilitating the positive effects of each of these systems. When social networks are impoverished, the individual is more susceptible to stress and the diseases that can result from extended exposure to stressors because the HPA axis, ANS, and immune systems are compromised and not functioning normally. It is important to keep in mind that these mechanisms are not mutually exclusive. Certainly, physiological mechanisms will be implicated in any pathway involving behavior (e.g., Increasing exercise is a behavioral mechanism, but clearly has implications for one's physiological responses as well.), and psychosocial mechanisms (e.g., control and meaning) will affect the individual's overall physiological responses (e.g., the HPA axis).

### **Marriage and Health**

An important kind of social support comes from marriage. In summarizing the relationship between marriage and health, Kiecolt-Glaser and Newton (2001, p. 477) report, "Marital relationship factors bear significant relationships with physiological and objective

health status indicators. The broad influence of marital factors is revealed by the number of different biological systems implicated (e.g., immunological, cardiovascular, neurophysiological).” Marital status is associated with psychological and physical health with married persons reporting higher levels of well-being and recording lower mortality rates (Kim & McKenry, 2002; Robles & Kiecolt-Glaser, 2003). Marriage seems to provide a protective effect, facilitating better health that is not available to cohabitating couples (Kiecolt-Glaser & Newton, 2001; Kim & McKenry, 2002), and this protective effect of marriage (seen in lower rates of cardiovascular disease and cancer, pneumonia and influenza, chronic pulmonary disease and liver disease) is estimated to be four times stronger for men than women (Kiecolt-Glaser & Newton, 2001). Other research suggests that it is the quality of the marriage, not marital status itself, which is correlated with better health, with poor marital quality being a risk factor for impaired health (Robles et al., 2014). Indeed, poor marital quality can be a source of stress and can limit contact with other people and relationships (Kiecolt-Glaser & Newton, 2001). Marital quality is associated with a variety of physical and psychosocial outcomes, including dental health, cardiac function, immune system activity, emotional health, ulcer formation, depression, violent behavior, pain responsivity, and sleep quality (Kiecolt-Glaser & Newton, 2001). These studies are correlational and so the directionality problem is an issue. Their methods, however, are similar to those used in other health-related research, and the effect sizes, while small, are comparable to effect sizes seen in research on the influences of diet and exercise on health (Robles et al., 2014). This suggests that there is practical as well as statistical significance to considering marital quality (as a type of social support) as a factor in overall physical and mental health.

A clear case where marriage has positive effects on the mechanisms linking social connections to health is the research of Coan, Schaefer, and Davidson (2006). Based on animal work suggesting that supportive social behaviors attenuate stress-related activity in the ANS and the HPA axis, Coan et al. (2006) used hand-holding and threat of electric shock to investigate social regulation of neural systems involved in response to threat. Married women were subjected to the threat of electric shock while holding their husband's hand, the hand of a stranger, or no hand holding at all. Attenuated neural response to threat was found with both spouse and stranger hand-holding, but the effect was much more powerful with spousal hand-holding, especially in couples with high quality relationships (Coan et al., 2006). The decreased neural activity signifying this reframing of the threat was found in areas involved in the regulation of emotion which affect the HPA axis and immune systems.

### **Public Policy Implications**

A definitive connection exists between the kind of support a person receives from social networks and that person's physical and mental health. In addition, research from a variety of sources suggests that strong correlations exist between marriage, marriage quality, and health outcomes for children as well as for adults. As one researcher noted in summarizing these findings, "Clearly there is something important going on here!" (Staton & Ooms, 2012, p. 4). Umberson and Montez (2010) argue that the scientific literature confirms the following premises that can serve as a foundation upon which public policy encouraging social support (including the important support coming from families and marriage) can be built. These premises recognize not only the health benefits of social ties, but also that these ties can, in certain circumstances, impair health and that the links between social ties and health vary across groups.

1. Social ties affect mental health, physical health, health behaviors, and mortality risk.
2. Social ties are a potential resource that can be harnessed to promote population health.
3. Social ties are a resource that should be protected as well as promoted.
4. Social ties can benefit health beyond target individuals by influencing the health of others throughout social networks.
5. Social ties have both immediate (mental health, health behaviors) and long-term, cumulative effects on health (e.g., physical health, mortality), and thus represent opportunities for short- and long-term investment in population health.
6. Caveat: Social ties—overburdened, strained, conflicted, abusive—can undermine health.
7. The costs and benefits of social ties are not distributed equally in the population (e.g., age, socioeconomic status, gender, race variation).

Programs already exist that are intended to foster health by promoting positive marital interactions (e.g., The Healthy Marriage Initiative), and the Family and Medical Leave Act (FMLA), which allows covered employees to take extended time away from work to attend to family matters. This can be seen as a federal program that utilizes the social ties that facilitate health. Support for federal and state funding of programs designed to foster social capital, particularly among those individuals at greatest risk (e.g., the indigent adolescent or young adult who might not have strong social ties) is promoting family values. From this perspective, public policies that undermine the positive influences that relationships can have on health should be discouraged. Bans on gay marriage are examples of public policies that act to negate the positive benefits of marriage/family on health. Research indicates that cohabitating couples (whether straight or gay) do not experience the health-related benefits that married couples enjoy, and

same-sex cohabitators are less healthy than couples in heterosexual marriages (Liu, Reczek, & Brown, 2013).

Social policies can affect an individual's susceptibility to certain health problems. Structural stigma refers to cultural norms, institutional practices, and public policies within a society that can differentially target certain stigmatized individuals for social exclusion, and many studies indicate that structural stigma can produce negative health outcomes (Hatzenbuehler, 2014; Hatzenbuehler & McLaughlin, 2014). For example, lesbian, gay, and bisexual (LGB) adults living in states which passed bans on gay marriage experienced a 42% increase in alcohol use disorders, a 37% increase in mood disorders, and a 248% increase in general anxiety disorders during the 12-month period following the bans. In states that did not pass laws banning gay marriage, the LGB population did not experience any significant changes in psychiatric disorders (Hatzenbuehler, 2014). The research also suggests that when states pass gay rights laws, the rates of depression, hypertension, and other mental and physical health indices decrease (Hatzenbuehler, 2010, 2014). For example, in the 12 months after Massachusetts legalized same-sex marriage, the rates of depression in LGB adults decreased 14%, rates of hypertension dropped by 18%, and health-care costs and use declined by 15%. These decreases in health-care costs in the LGB population of Massachusetts came at a time when the general state population experienced an increase in health-care costs during this period (Myers, 2014). So, in addition to any theological and constitutional arguments that can be raised to support gay marriage, one might, for reasons of compassion, defend gay marriage on the grounds that gay and lesbian couples, like straight couples, should have access to the social forces (expressed through high quality marriages) that have a positive impact on health.

## Summary

Human beings are a highly social species, and there are neurobiological mechanisms in place that are involved in helping individuals form connections with others. The development of these connections occurs from the moment of birth when the newborn begins to form a bond or attachment with the mother. The nature of these early social affiliations can lay a foundation for the growth and maintenance of social relationships throughout one's life. The interrelationships of friends, colleagues, and family members, the relationships that make up a person's social network, are important to health. Rich, highly developed social networks are correlated with positive health outcomes, and these influences on health can occur through a variety of biological and psychosocial pathways, including altering the way we interpret and understand events that happen to us and the way that our body responds physiologically to those events. Marriage is a social tie that is correlated with positive mental and physical health. While not all marriages are healthful at all times, high quality marriages are associated with various physical and psychosocial outcomes, including improved cardiac function, improved immune system activity, higher levels of well-being, lower rates of depression and decreased violent behavior. These benefits of marriage are stronger for men than for women, and they are not seen in other coupling patterns such as cohabitation. Given that social affiliations play an important role in the overall health of individuals, public policies encouraging the development and maintenance of social networks, including but not limited to policies dealing with marriage and families, should be considered in any discussion of health issues on a national, state, or local level. Failure to consider the role of social ties and affiliations in health policy is to ignore a well-established factor involved in individual health, a failure that, given the significant medical costs in the United States, we cannot afford.

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