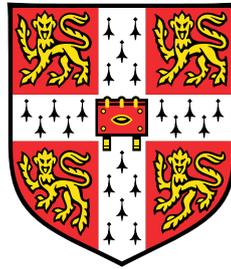


Be Rich or Be Good: The Interaction Between Prosociality and Socioeconomic Status in Predicting Personal Benefits



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I would like to dedicate this thesis to my parents, Pau, Mixeta and Mixu

Declaration

I hereby declare that except where specific reference is made to the work of others, the contents of this dissertation are original and have not been submitted in whole or in part for consideration for any other degree or qualification in this, or any other university. This dissertation is my own work and contains nothing which is the outcome of work done in collaboration with others, except as specified in the text and Acknowledgements. This dissertation contains fewer than 60,000 words including appendices, bibliography, footnotes, tables and equations and has fewer than 150 figures.

Chapter 2 of this dissertation has been revised into the co-authored manuscript "Socio-economic Status Predicts Who Initiates and Who Awaits Social Connections", which is ready to submit. Authors: Rui Sun, Matthew Samson, Aleksandr Kogan.

Chapter 3 of this dissertation has been revised into the co-authored manuscript "Money Well Given: Donations Predict Social Capital Gains for Low SES, but Not High SES Individuals", which is ready to submit. Authors: Rui Sun, Matthew Samson, Aleksandr Kogan.

Chapter 4 of this dissertation has been revised into the co-authored manuscript "Caring Helps: Trait Empathy is Related to Better Coping Strategies and Differs in the Poor Versus the Rich", which has been submitted to the journal *PLOS ONE*. Authors: Rui Sun, Laura Vuillier, Bryant P. H. Hui, Aleksandr Kogan.

Chapter 5 of this dissertation has been revised into the co-authored manuscript "Oxytocin Increases Emotional Theory of Mind, but Only for Low Socioeconomic Status Individuals", which has been submitted to the journal *Psychological Science*. Authors: Rui Sun, Laura Vuillier, Gabriela Pavarini, Julia Deakin, Aleksandr Kogan.

Rui Sun
February 2018

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Abstract

Researchers and lay people alike have long held an interest in understanding the antecedents, mechanisms, and consequences of prosocial behaviours: Acts people behave in ways that benefit others, such as cooperation, altruism, care-giving, empathy, sympathy, and compassion. Numerous lines of inquiry have now documented that acting prosocially carries many benefits for not only the recipient, but also the actor. For instance, acting prosocially attracts social capital, social support, and boosts interpersonal relationships; prosociality also increases one's well-being, happiness, and has long-term physical and mental health benefits. While much of the past work has focused on the main effects of prosociality on various positive outcomes, one area that has received limited attention is understanding the contextual factors and individual differences that moderate these relationships. In the present thesis, I focus on understanding how socioeconomic status (SES) acts as a moderator of the link between prosociality and numerous positive outcomes. In particular, I examined how prosociality is related to building social networks through weak ties, coping with daily stress, and building interpersonal skills. Across these relationships, I examined how SES moderates the link between prosociality and each outcome.

My research was guided by the SES-prosociality paradox: That while the rich have access to far greater resources – and thus the ability to act prosocially – it is the poor that tend to act most generously. I theorized that one reason for this paradox is that people across different SES strata benefit differently from acting prosocially. In particular, I reasoned that the people from lower SES backgrounds will tend to have stronger relationship between prosociality and various positive outcomes than people from higher SES backgrounds.

To test this hypothesis, I conducted numerous empirical studies using multiple methods – analysing data from subjective reports via surveys and existing data from social media, running natural experiments, and conducting lab experiments using genetic and pharmacological challenge methods. In Chapters 2 and 3, I found that people who act prosocially tend to attract more weak social ties – this is only true for the relatively poor. In Chapter 4, I tested how empathic traits relate to better coping strategies for both lower and higher SES individuals, and found a complex pattern of differing benefits. Finally, in Chapter 5, I found that intranasal oxytocin improves emotional theory of mind, but only for the low SES individuals.

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Chapter 1

Introduction

Prosocial behaviour, often defined as voluntary behavior intended to benefit others, is a social behaviour which benefits other people or the society as a whole (Eisenberg, 2006). Prosociality carries many forms, including donating, care-giving, cooperation, helping, volunteering, altruism, sharing, as well as moral emotions such as empathy, compassion, and gratitude (Brief & Motowidlo, 1986; F. B. De Waal, 2008; Keltner, Kogan, Piff, & Saturn, 2014a; Penner, Dovidio, Piliavin, & Schroeder, 2005). Understanding prosocial behavior has long been a heated theme in the social and political sciences.

The practice of prosociality has many benefits. While it is self-evident that receivers of prosocial behaviour would benefit from a prosocial act, emerging evidence suggested that acting prosocially also yields various benefits for the altruist. Donations to others provide us with a purpose, a sense of mission, which gives our lives meaning and structure (Van Tongeren, Green, Davis, Hook, & Hulse, 2016). Helping others can build trust between people, create a sense of security and acceptance for the giver as well as the receiver of the gift (Luks & Payne, 2001). Many acts of prosociality are social: They occur in organizational settings and engage people in social interactions that are usually positive and emotionally warm (Keltner et al., 2014a). I thus loosely summarize the benefits of prosociality into two broad areas: First, attracting social capital (e.g., social support, friendships, acquaintances); and second, increasing happiness, well-being, and improving health. Along this line, I tested how prosociality is related to building up weak ties (attracting social capital), coping

with stress (increased well-being), and increased emotional theory of mind (interpersonal relationship).

In addition to broadening our understanding of prosociality and its benefits, I also asked an additional question which is less studied: Does prosociality benefit everyone equally? More specifically, does prosociality bring the same benefits for the poor vs the rich? In this thesis, I explored the moderating effect of socioeconomic status (SES) on the prosociality-benefits relationship. SES, measured as one's objective education and wealth, and subjective received respect from the society, is related to every aspect of people's social lives (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006; House, 2001). Individuals from low SES backgrounds have less access to social resources, health care and suffer from more stress (Adler et al., 1994a); however, there is growing evidence that lower SES individuals are more prosocial than their higher SES counterparts (Piff, Kraus, Côté, Cheng, & Keltner, 2010). Given this paradox, I argue that one of the reasons individuals from different SES backgrounds differ in prosociality is that they would benefit differently from prosocial acts. I thus hypothesise that prosociality overall benefits, but it may benefit individuals from different SES backgrounds differently.

To test this hypothesis, I applied different research methods. In the first study reported in Chapters 2 and 3, I used subjective reports, natural experiments, and analysed existing data from social media to test whether prosociality is associated with greater levels of weak ties. In the second study, reported in Chapter 4, I studied the relationship between trait empathy and coping strategies via subjective report; I also investigated whether the biological antecedent of empathy would also have an influence on coping strategies. In the last study, reported in Chapter 5, I explored whether intranasal oxytocin, which has been shown to be related to prosocial behaviour, would improve mentalising. Overall, I integrated multiple research methods: Questionnaires, natural and lab experiments, secondary data analysis, genetics, and pharmacological challenges.

1.1 Prosociality – benefits relationship

1.1.1 Prosociality attracts social support, social resources, social capital, and boosts interpersonal relationships

Kindness attracts. Prosociality can function like a magnet, attracting social support, social resources, and social capital. Prosocial emotions such as compassion, build personal resources such as social support (Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008). In a field experiment conducted by Fredrickson et al. (2008), participants were allocated to either a loving-kindness meditation or a control condition. The researchers found that participants who practiced the loving-kindness meditation produced increases in a wide range of personal resources, such as increased mindfulness, purpose in life, social support, and decreased illness symptoms. In line with the broaden-and-build-theory (Fredrickson, 1998), when people expressed more gratitude than usual, they also reported themselves grateful for more people, which in turn can lead to more social support (McCullough, Tsang, & Emmons, 2004).

Another line of research suggests that prosociality helps to attract resources and in turn leads to social power. Research from chimpanzees, hunter-gather tribes, kindergartners or university students has all shown that it is not bullies and manipulators that gain power in a group, but rather those who demonstrate empathy and enthusiasm, solve others' problems, and otherwise further the greater good (Keltner, 2017). In the chimpanzee group, it is the more prosocial chimpanzee rising to the group leader: A male chimpanzee Luit rose into leadership by enhancing the welfare of other chimpanzees. He groomed and embraced others, contributed social resources to others, and in turn he accumulated resources and power (F. De Waal & Waal, 2007). In an extensive survey of 48 studies in hunter-gather societies, groups gave power to those who were prosocial. More specifically, leaders were described as generous, brave in combat, wise in making subsistence or military decisions, apt at resolving intragroup conflicts, a good speaker, fair, impartial, tactful, reliable, and morally upright (Boehm et al., 1993).

In organizations, prosocial individuals quickly accumulate reputations in the social networks. For example, in investment banks and accounting firms, collaborative and trustworthy individuals can be quickly recognised and get good reputations; and before these people move to a new department, the prosocial reputation would have already arrived to new colleagues in the network (Burt, Kilduff, & Tasselli, 2013). A study of an Andean community also suggested cooperation can bring the households better reputations for various qualities and have larger support networks, with the latter associated with healthier households (Lyle & Smith, 2014).

In research on human interpersonal attraction, researchers also found that males who are prosocial attract more attention from females: They are rated more physically and sexually attractive, socially desirable, and more desirable as a date than non-prosocial males (Jensen-Campbell, Graziano, & West, 1995). Prosociality is also related to emotional benefits, such as increased positive emotions, and thus leads to better understanding of others and better interpersonal relationships. For instance, in a prospective study of first-year college students, after 1 week in college, positive emotions predicted increased self-other overlap with new roommates, which in turn predicted a more complex understanding of the roommates and feelings of being close with the friends (Waugh & Fredrickson, 2006). Agreeable personality and positive emotions predict young adults' close friendship (Berry, Willingham, & Thayer, 2000). Positive emotions are also related to better relationship satisfaction; for instance, women displaying positive emotions tend to have more sociable personalities, and people expect to have better interactions and interpersonal relationship with them (Harker & Keltner, 2001). In close relationships, prosociality-related positive emotions are also related to more satisfied relationships (Impett et al., 2010).

1.1.2 Prosociality increases happiness, well-being and improving health

Prosocial actions tend to also lead to increases in happiness, well-being, and health. For example, spending money on other people may have a more positive impact on happiness than spending money on oneself (Dunn, Aknin, & Norton, 2008). Dunn and her colleagues first analysed a nationally representative sample of Americans about their spending habits

and found initial evidence that how people spend their money may be as important for their happiness as how much money they earn – and that spending money on others might represent a more effective route to happiness than spending money on oneself. They then ran an ecological longitudinal study and found participants who used the bonus they received for prosocial spending were happier than spending money on themselves. Finally, when participants were randomly allocated to “prosocial spending” and “self-spending” groups, those who were in the “prosocial spending” group were happier. Following these results, Aknin and colleagues showed that this phenomenon is universal: In survey data from 136 countries, prosocial spending was associated with greater happiness around the world, showing that rewards experienced from prosocial spending may be deeply ingrained in human nature, emerging in diverse cultural and economic contexts (L. B. Aknin, Dunn, Whillans, Grant, & Norton, 2013). A follow-up study also suggested that when prosocial spending on others has a positive impact, individuals would be happier than this prosocial spending having no impact (L. B. Aknin et al., 2013).

Besides the benefits of prosocial spending, being caring and compassionate for others has been related to elevated self-esteem and self-efficacy (Le, Impett, Kogan, Webster, & Cheng, 2013; Mongrain, Chin, & Shapira, 2011; Piferi & Lawler, 2006). Piferi and Lawler (2006) found that when participants cared about others and gave social support, they felt an elevated self-efficacy, greater self-esteem, less depression, and less stress than participants with a lower tendency to give social support to others. At the same time, participants who gave social support to others also reaped health benefits: They had lower ambulatory blood pressure, less depression, and experienced less stress. In a ten-year longitudinal study, researchers also found a positive correlation between the development of prosociality and self-esteem (Zuffianò et al., 2014). In a four-week daily experience study, individuals with communally oriented traits – who care for the welfare of others based on others’ needs – experienced greater self-esteem, greater satisfaction and love in their relationships, and greater love for humanity in daily life (Le et al., 2013). Participating in prosociality also has long-term benefiting effects. In a one-week compassion-practice experiment, participants were assigned to a compassionate action condition or a control condition which involved

writing about an early memory, and results suggested that those in the compassionate action condition showed sustained gains in self-esteem over 6 months, relative to those in the control condition (Mongrain et al., 2011).

Prosociality is also related to better health. In an experiment exploring the relationship between compassion and physiological stress reactivity, participants who had previously completed an online assessment of compassion experienced a social stress task, while their blood pressure, cortisol, high frequency heart rate variability (HF-HRV), and liking for the evaluators were monitored. Participants with higher compassion, when provided with social support, had lower blood pressure reactivity, lower cortisol reactivity, and higher HF-HRV reactivity (Cosley, McCoy, Saslow, & Epel, 2010). Numerous researchers have also documented that prosocial behaviour is related to longevity, and better physical and mental health (Borgonovi, 2008; Lum & Lightfoot, 2005; Oman, 2007; Thoits & Hewitt, 2001). For example, volunteer actions contribute to decreased psychological stress and buffers the negative influence of stressors (Rietschlin, 1998), and is associated with better physical health and lower mortality rate as far as 30 years later (House, Landis, & Umberson, 1988a; Moen, Dempster-McClain, & Williams Jr, 1989; Young & Glasgow, 1998).

1.1.3 Does prosociality benefit everyone equally?

Even though there is ample research exploring the benefits of prosociality, far less research has explored how these effects are moderated by individual differences and contextual factors. The research that does exist in this area is highly suggestive that the benefits of prosociality are not universal, but rather do vary across many factors. For example, volunteer work has generally been linked to increased well-being and life satisfaction as well as decreased depression, but this benefit is more prominent for older rather than younger people (Morrow-Howell, Hong, & Tang, 2009; Musick & Wilson, 2003; Van Willigen, 2000). The reason why volunteering benefits more the elderly is that in our society, being productive or useful is important for maintaining a high self-esteem and self-identity, and volunteering can substitute for the paid work for retirees (Midlarsky, 1991). Another study explored how student acts of kindness (helping a fellow student study, giving a homeless person

spare change, and cleaning the apartment for a roommate who is studying for an exam) related to improvements in happiness and well-being. The researchers found that such acts of kindness were related to increases in self-acceptance, self-evaluations, happiness, and subjective well-being, and lower levels of stress and negative affect. However, these effects appeared to be strongest for those low in dispositional empathy (Oaksford, 1980). Benefits of volunteering may also depend on one's personality. Some research has found that the benefit of volunteering may be specifically strong for those who are high in extraversion, gregariousness, warmth and conscientiousness (Cabrera-Darias & Marrero-Quevedo, 2015; King, Jackson, Morrow-Howell, & Oltmanns, 2014). Prosocial acts also benefit people with lower trait autonomy more than their higher autonomy counterparts (Hui & Kogan, 2017). And finally spouse caregivers benefit from positive affect generated from active helping if they perceive themselves as interdependent with their spouse (Poulin et al., 2010).

Besides age, personality traits, and interpersonal relationships, a few studies have also examined the moderating effect of SES on the prosociality – wellbeing relationship. However, these studies have largely generated inconsistent results. For instance, in a study of Chinese college students, researchers explored the relationship between altruism and well-being, and they found that family socioeconomic status moderated the effects of self-reported altruism on well-being via self-esteem; college students with low family SES were more likely to reap benefits from altruism (Feng & Guo, 2017). In another quantitative study of 13 volunteer programs, 401 older adults served in those programs. Overall, older volunteers reported a wide variety of benefits to the people they served, themselves, their families, and communities, but lower-income and lower-educated volunteers reported more benefits than their richer counterparts (Morrow-Howell et al., 2009). However, another study argued that it was the higher SES individuals who benefited more from prosociality. In that study, interviews were conducted with a nationally representative sample of older adults at three points in time: 1992-1993, 1996-1997, 1998-1999. Initially, the findings revealed that helping others tended to bolster the self-esteem of all study participants regardless of their SES standing. However, these benefits began to taper off for lower SES elders during the course of the study. By the

third wave of interviews, the salutary effects of helping others were evident only among older adults in upper SES strata (Krause & Shaw, 2000a).

While the above highlights the extant work on moderators of the prosociality to benefits relationships, there are several important limitations of this work. First, almost all of the work has focused on well-being as the outcome – little research has explored how individuals benefit differently from prosociality in gaining social capital. Second, even though having both theoretical and practical importance, the work on how SES moderates the relationships between prosociality and various benefits is in its infancy, with only a handful of studies in existence – and even those studies having conflicting results. In my thesis, I aimed to contribute to the existing prosociality research by addressing these limitations.

1.2 SES – social behaviour and social cognition

1.2.1 SES influences every aspect of social cognition and social behaviours

Individuals and families vary in their access to jobs, earnings, assets, and power, and they also vary according to the status of their families of origin (Mueller & Parcel, 1981). In social psychology, SES is a widely used term defined as a measure of one's combined economic and social status (Galobardes et al., 2006; House, 2001). Generally, SES is viewed as a latent construct and is measured using a composite measure of education, income, and occupation or some variation of these three indicators. While these three indicators represent the most widely accepted measures of SES, the construct is also sometimes defined in terms of subjective SES, wealth, home ownership, or as neighborhood disadvantage (Baker, 2014). In my thesis, I used both objective SES (measured by income and education) and subjective SES (measured by one's regard of own position in the social hierarchy).

SES is related to nearly all aspects of human social cognition and human social behaviours documented in psychology, sociology, education, public health, and political science. It is an important predictor of a range of health and illness outcomes: Lower SES individuals consistently appear to have much worse health outcomes. No matter which measures of SES are used or how health is measured, the evidence that this association is large and

pervasive across time and space is abundant (M. Marmot, 2000; J. P. Smith, 1999). Until the end of life, at each age every downward movement in income is associated with being in poorer health. Moreover, these health differences by income class can only be described as dramatically large. The fraction in excellent or very good health in the top income quartile is often 40 percentage larger than the fraction in the lowest income quartile (J. P. Smith, 2004). However, even not comparing the richest in the society vs the poorest in the society directly, the association of SES and health outcomes occurs at every level of the health hierarchy, not only for those under the poverty line (Adler et al., 1994a). Just to name a few, lower SES individuals and countries are related to poorer diets (Hanson & Chen, 2007), higher percentage of obesity (F. Johnson, Pratt, & Wardle, 2011), depression (Link, Lennon, & Dohrenwend, 1993), diabetes (J. A. Dalstra et al., 2005), and a shorter life expectancy (Meara, Richards, & Cutler, 2008). Children from lower SES families have higher rate of chronic and acute illness (E. Chen, Matthews, & Boyce, 2002) and more injuries (Hasselberg & Laflamme, 2005). Adults from lower SES backgrounds are associated with greater rates of morbidity and mortality, including cardiovascular disease, hypertension, osteo-arthritis, asthma, and cancer (Adler et al., 1994a; M. G. Marmot, Shipley, & Rose, 1984). Moreover, lower SES individuals are more likely to be involved in unhealthy life styles, such as more drug and alcohol use (Hanson & Chen, 2007; Hawkins, Catalano, & Miller, 1992), and risky health behaviours, increasing their susceptibility to poor health (Wardle et al., 2003). In short, low SES may place individuals at risk for poorer health for a variety of reasons, such as having less access to health care, poorer living conditions, less knowledge about the negative consequences of health-compromising behaviors, and greater psychological stress (Adler et al., 1994a; Baum, Garofalo, & Yali, 1999; E. Chen, 2004; E. Chen et al., 2002).

Besides the monotonic disadvantage of health-related issues related to low SES, compared to their higher-SES counterparts, lower SES individuals have fewer economic resources, fewer educational opportunities and generally worse academic performance (Drentea & Lavrakas, 2000; Sirin, 2005a; Snibbe & Markus, 2005; White, 1982). Because of lack of economic, health, and education resources, lower SES individuals also face more stress from

life, including domestic violence and more stress in close relationship (Bohn, Tebben, & Campbell, 2004; Gallo, Bogart, Vranceanu, & Matthews, 2005; Kaya & Patton, 2011).

1.2.2 SES – Prosociality paradox: having less, giving more

Given the constraints, it is intuitive to expect that lower SES individuals would be more focused on their own welfare than spending time and energy on others. However, lower SES individuals displayed more prosocial traits and behaved more prosocially than their higher SES counterparts across numerous studies (Piff, Kraus, Côté, et al., 2010). For instance, in a series of behavioural studies, Piff and colleagues (2010) found that lower SES individuals were more generous in the dictator game than their higher-SES counterparts, gave more in charitable donations, engaged in more prosocial trust behavior, and this relationship was moderated by the feeling of compassion. The same behavioral pattern also happens on children as young as 4 years old. These pre-school children from less wealthy families behave more altruistically (willing to donate the prize they earned from their lab visit) than those from wealthier families, suggesting that SES differences in prosociality may manifest early in development (Miller, Kahle, & Hastings, 2015). This effect is also cross-cultural. More than 400 four-year-old children from eight rural areas in China took part in a dictator game, and children from lower income families donated more stickers than children from higher income families (Y. Chen, Zhu, & Chen, 2013).

Similarly, higher SES predicts more unethical behaviours. In a few naturalistic observations and lab experiments, higher SES individuals were more likely to cut off other vehicles at a busy four-way intersection with stop signs on all sides and were more likely to cut off pedestrians at a crosswalk. They also take children's valued candies, lie in negotiating a salary with a job candidate seeking long-term employment, cheat in games to increase the chance of winning a prize, as well as support unethical behaviours at work (Piff, Stancato, Côté, Mendoza-Denton, & Keltner, 2012). Furthermore, it was found that SES positively predicted unethical behaviour, but only when this behaviour was self-beneficial; when unethical behaviour was performed to benefit others, SES negatively predicted unethical behaviour

– lower SES individuals were more likely than higher SES individuals to engage in unethical behaviour (Dubois, Rucker, & Galinsky, 2015).

There have been several preliminary explanations for this SES – prosociality paradox. The first explanation is about the difference in social attention. Lower SES individuals experience great uncertainty, more stress, and more danger and violence in their lives; at the same time, they have lower personal control and increased vulnerability to others and to the environment, and they thus have to adopt a more other-oriented focus (M. W. Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012a; M. W. Kraus, Rheinschmidt, & Piff, 2012; Levine, 2014; Piff & Robinson, 2017). For higher SES individuals, because they have enough personal and social resources, more self-control over their lives, greater freedom of choice, less vulnerability toward the environment and other individuals, they can pursue personal goals and accomplishment, and have a focus on individualism. So compared to lower SES individuals, they are more self-oriented in terms of social attention (W. Johnson & Krueger, 2005; M. W. Kraus, Piff, & Keltner, 2009; Snibbe & Markus, 2005; Stephens, Markus, & Townsend, 2007). Indeed, when testing the social attention directly in a thin-slicing method where different SES individuals interacted with a stranger, lower SES participants displayed more engagement cues (e.g., head nods, laughs) and fewer disengagement cues (e.g., doodling, checking their cell phone, or looking away) than higher SES individuals (M. W. Kraus & Keltner, 2009a). Lower SES individuals are also better at mentalising; for example, they received higher scores on a test of empathic accuracy, judged the emotions of an interaction partner more accurately, and made more accurate inferences about emotion from static images of muscle movements in the eyes (M. W. Kraus, Côté, & Keltner, 2010).

The second explanation is related to reciprocity and the self-other relationship. As mentioned earlier, higher SES individuals value more independence over social connections (Stephens et al., 2007), but the lower SES individuals have to be more interdependent: Their family ties are stronger and they have more extended family (Lareau, 2002), they have to rely on each other in their social network to achieve reciprocal aid (Lamont & Lamont, 2009). Lower SES individuals may construe themselves more in terms relationship with others, and

the self-other overlap may account for their sensitivity to others' needs and welfare (Markus & Kitayama, 2010; Stephens et al., 2007). Embedded in a more interdependence social network, lower SES individuals may develop more communal than exchange relationships (Clark, Mills, & Powell, 1986); they thus (1) have to be prosocial because in a tight social network, the prosocial reputation is more important, (2) are willing to be prosocial even when they do not expect others to be immediately prosocial in return, and (3) are predisposed to be prosocial because of the communal orientation (Piff, Kraus, Côté, et al., 2010).

In my thesis, I hereby would like to provide a result-oriented explanation: Different SES individuals differ in prosociality because they benefit differently from prosocial traits and prosocial acts. As the few studies mentioned earlier documented, the well-being benefits from altruism and volunteering may be more significant for those from lower SES backgrounds (Feng & Guo, 2017; Morrow-Howell et al., 2009). I argue that because higher SES individuals have already possessed enough social and health resources, and they value more independence over interdependence, even though prosociality generally brings benefits, those benefits may not add value to the higher SES's existence social resources. For instance, as summarized earlier, prosociality attracts social resources and social capital (Burt et al., 2013; Lyle & Smith, 2014). If the higher SES individuals have already attained these social resources through their wealth and power, they need not act prosocially to gain these benefits. Besides, as we summarized earlier, lower SES individuals are more communally oriented, and their prosocial acts would naturally lead to a reciprocal return – I act as a caregiver this time, in the future if I am sick, I expect you to care for me. However, for the higher SES individuals, their money and resources can buy them health care, thus the benefits from communal prosocial acts may not be valuable to them. From another point of view, lower SES individuals have fewer social resources and thus they are less likely to benefit from wealth and existing status. Therefore, acting prosocially provides another path for them to accumulate social capital. As I mentioned earlier, prosocial acts can accumulate support and rise in power; for the lower SES individuals, their prosocial acts may be a good substitute for wealth to bring them social resources. However, it is worth mentioning that this result-oriented explanation does not mean that higher SES individuals do not need any benefits from prosociality. As I

summarized before, prosocial traits and prosocial acts improve well-being, decrease mental illness, maintain mental health, and increase happiness. Besides their existing methods to gain happiness, higher SES individuals may still need the prosociality path to increase well-being and happiness.

1.3 Current studies

In the thesis, I explored prosociality – social capital, prosociality – wellbeing, and prosociality – interpersonal relationship across four chapters. In Chapter 2 and Chapter 3, I explored the prosociality – social capital relationship. I used weak ties as a measurement for social capital. Chapter 2 tried to show that SES indeed attracts social capital, and Chapter 3 focused on the prosociality – weak tie relationship and the SES moderating effect. I used multiple methods in these two chapters. I analysed subjective report through surveys, a chatroom where people could freely chat and build up a relationship, and analysed data about Facebook friends, as well as Twitter followers/friends. In Chapter 4, I explored the prosociality – wellbeing relationship. More specifically, I explored whether trait empathy would influence coping strategies for daily stress, and whether this relationship differs for the rich vs the poor. In total, I ran five studies. Studies 1-4 used questionnaire-measured trait empathy as the prosociality metric, and in Study 5, I used the biological antecedent of empathy – rs53576 polymorphic site of oxytocin receptor gene (OXTR) – as the metric.

In Chapter 5, I tested the prosociality – interpersonal relationship benefits. I studied whether oxytocin nasal spray would boost emotional mentalising, and whether different SES individuals benefit from a “prosocial” spray. In this lab-controlled experiment, Caucasian male participants were randomly allocated to either experiment or control group and those in the experiment group self-executed intranasal oxytocin. Numerous studies have linked oxytocin to prosociality (for example, K. MacDonald & MacDonald, 2010a); by comparing the oxytocin group and the control group, I directly tested whether prosociality induced by oxytocin would lead to interpersonal relationship gains.

Chapter 2

Socioeconomic Status Predicts Who Initiates and Who Awaits Social Connections

2.1 Introduction

Recent advances in the social and network sciences have consistently found that weak ties (e.g., acquaintances) can prove highly consequential to social life (Borgatti, Mehra, Brass, & Labianca, 2009; M. Kilduff & Brass, 2010). Individuals who have weak ties to each other are less likely to have overlapping friendship groups, but derive many benefits from these relationships (Baer, 2010). For example, weak ties broadly defined benefit knowledge sharing (Hansen, 1999), relay more job offers (Montgomery, 1992), rises in social status (Keltner, Van Kleef, Chen, & Kraus, 2008), reactions to stress (Eisenberger, Lieberman, & Williams, 2003; Taylor, 2007), daily emotion and well-being (Sandstrom & Dunn, 2014), and even physical health (O'malley, Arbesman, Steiger, Fowler, & Christakis, 2012). Even studies of nonhuman primates find that these sorts of alliances are critical to rises in social power (F. B. De Waal, 1986). Public policy also capitalize on the importance of weak ties, seeking agendas of informal education, health and lifestyle advice, and civic participation

(Livingstone & Brake, 2010). Given the many aspects of our lives that are governed by weak ties, it is critical to understand what influences the initiation of weak ties.

Although the benefits of weak ties are becoming increasingly clear, little is known about the social predictors of who initiates such ties. Here, I examine how socioeconomic status (SES) as measured by one's income and education (objective SES), and subjective perceptions of others' respect and admiration (subjective SES), influences who initiates and who awaits these valuable social connections (Berger, Cohen, & Zelditch Jr, 1972; Côté, 2011; Keltner, Gruenfeld, & Anderson, 2003a; Magee & Galinsky, 2008). Converging lines of evidence document that social status organizes group living, coordinates actions between groups, and is a powerful, proximal determinant of cognitive tendencies and social behavior (Bunderson, 2003; Cummins, 2005; Keltner et al., 2003a; M. W. Kraus, Piff, et al., 2012a; Magee & Galinsky, 2008; Sapolsky, 2004). Guided by these theoretical developments, I hypothesized that SES will determine which individuals, and groups will form social connections. I proposed two competing hypotheses to test this relationship: the *active status* hypothesis and the *passive status* hypothesis.

2.1.1 SES and Social Connection

Increased SES confers a host of important advantages. Relative to those with low SES, high-SES people tend to have better health (Adler et al., 1994a), a stronger sense of personal control (M. W. Kraus et al., 2009), and less stress in close relationships (Gallo et al., 2005). Interestingly, broad patterns of data, from playground interactions to face-to-face interactions between strangers, also suggest that the higher SES are more socially disengaged (M. W. Kraus, Piff, et al., 2012a). Work by M. W. Kraus and Keltner (2009a) documented that compared to low SES individuals, high SES individuals exhibit increased disengagement behaviour even in a 60s interaction with a stranger. In their study, higher SES individuals were interacting in more rude behaviours such as checking their cell-phone, doodling, and self-grooming, etc. On the contrary, lower SES individuals were more engaging – having more head nods, eyebrow raises, laughs, and shared gaze. No study to date, though, has systematically examined how SES, both as actor and as target, influences the initiation of

relationships that would be defined as “weak ties.” Extant theory within the literatures on power, status, and class suggests two competing perspectives, which we will refer to as the *active status* hypothesis and the *passive status* hypothesis.

On the one hand, there are ample reasons to suspect that individuals of higher SES will actively attempt to connect with distant others – which I deem the *active status hypothesis*. This hypothesis readily derives from recent studies documenting that individuals of higher SES backgrounds are less sensitive to rejection, less likely to think that they will be taken advantage of by others, and more trusting of others than people with low SES (Henry, 2009). Social power, which correlates with elevated SES (M. W. Kraus, Piff, et al., 2012a), produces social approach tendencies, which often result in increased social contact and connection (Keltner et al., 2003a). Higher SES individuals, therefore, are less worried about rejection and more trusting and inclined to approach, which yields the prediction that they will be more inclined to initiate social connections with distant others, relative to their low-SES peers.

A different line of empirical inquiry suggests an alternative hypothesis – the *passive status hypothesis*. Numerous findings now suggest that high SES people are reluctant helpers; they are, relative to their lower-SES counterparts, less engaged with the needs of others and less likely to engage in prosocial behavior (Piff, Kraus, Côté, et al., 2010). In casual interactions with strangers, high-SES individuals show less socially engaged behavior, such as eye contact and head nods (M. W. Kraus & Keltner, 2009a). Theories of power and social exchange suggest that high-SES people may refrain from asking for advice, but provide it when asked, on account of not wishing to appear dependent on others (Blau, 1964; Flynn, Reagans, Amanatullah, & Ames, 2006). People are drawn to high SES individuals: Individuals are more inclined to affiliate and be attracted to people with elevated status, given that they have increased resources and less threat (R. H. Smith, 2000). One implication of this general tendency is that higher SES individuals may regularly develop social connections without having to initiate them as much as their low-SES counterparts. Taken together, these findings yield the passive status hypothesis that (a) people are likely to initiate connections with those

they perceive to have high SES and (b) high-SES people are likely to await connections from others instead of initiating ties themselves.

2.1.2 Present study

I conducted three studies to test these competing hypotheses. First, to have a preliminary idea about people's attitude on sending/accepting friendship request, I conducted a survey among Facebook users. I asked them several questions, including their demographic information, number of Facebook friends, their intention of sending and receiving Facebook friendship requests. This first study was to test the subjective inclination of sending/requesting friendship for participants with different SES.

In the second study, to capture the effects of SES in interpersonal interactions, I conducted a live interaction study in which two people who had never met before were introduced in an online chatroom and given the opportunity to discuss their answers to a set of questions designed to foster social bonds (Aron, Melinat, Aron, Vallone, & Bator, 1997). For each participant, I captured three aspects of SES: (1) participants' objective SES as reflected in their income and education levels; (2) participants' perception of their chat partner's SES, and (3) a manipulation of situational status using a widely used situational status-boosting paradigm (G. J. Kilduff & Galinsky, 2013). The manipulation of SES entailed that participants recall a time in which they were a part of a group that regarded them with respect and admiration, and held them in high esteem. After ten minutes of conversing, each person indicated whether they would like to send the other participant an email after the conclusion of the study. Thus, each person had an opportunity to initiate a distant connection with someone who is likely unconnected to his or her current circle of friends. In this way, I could test how one's SES, as well as the interaction partner's SES, influence the tendency to connect.

In the third study, I extended my analysis by examining existing online weak-tie data. To do so, I sent a questionnaire to 6000 Twitter users and asked them about their demographic information (age and gender), annual household income, highest level of education they have acquired, hours of twitter usage per week, as well as getting their followers/friends numbers

on Twitter. Facebook friendship and Twitter friends/followers are different in the sense that Facebook friends are “mutual” while Twitter followers and friends may not be the same person. However, I can roughly compare Facebook “friender” and Twitter “friends”, and Facebook “friended” and Twitter “followers” because of the direction of friendship. I tested the active and passive status hypotheses by looking at whether higher SES individuals have more higher friend/follower ratio (active-status hypothesis) or lower follower/friend ratio (passive-status hypothesis).

2.2 Study 1

2.2.1 Method

Participants and Procedure.

I recruited 283 Facebook users (female = 197; age = 36.43) from United States using Amazon Mechanical Turk. Participants needed to answer two questions (1) “How likely are you to ACCEPT a friend request from someone that you don’t know but who has common Facebook friends with you?” and (2) “How likely are you to SEND a friend request to someone that you don’t know but who has common Facebook friends with you?” on a five-point scale (1 = never, 5 = always). To control for the Facebook usage habit influence on friendship, I asked participants to report (1) how frequently they use Facebook (1 = “Never”, 5 = “Several times a day”) (2) how long they have been a Facebook user (reported in months). I calculated the z-score for participants’ Facebook usage frequency, and the skewness was -.87, kurtosis was -.38. For the length of Facebook usage, since Facebook was founded in Feb 2004, this dataset was collected in Jan 2016, the maximum length should be 144 months. After removing the data points reporting the length of usage larger than 144, I created the z-score for length of Facebook usage, and used it in the analysis. Skewness for Facebook usage length was .12 and kurtosis was -.58.

SES measures.

Participants reported their current income bracket by selecting one of 9-brackets. These brackets started with below \$20,000 and ended at over \$90,000, with each bracket covering \$10,000. The average income was approximately \$47,000 (SD=\$25,300). Participants also reported their education background, choosing from one of 7-brackets, from 1(“less than high school”) to 7(“PhD/JD/MD”). The average education level was “finished 2-year college degree”. I then created a composite SES score by averaging each individual’s income and education. Consistent with prior research (Oakes & Rossi, 2003a), these two indicators were transformed into z scores and then summed to form an overall measure of socioeconomic status. The z-score for income had a skewness of .77 and kurtosis of -.49; and the z-score for education had a skewness of -.02 and kurtosis of -.65. I thus did not further log-transform the z-score.

2.2.2 Results

I used R Studio 3.1 to analyse the data in all three studies. Before running the analysis, I coded gender with “female” = 0, and “male” = 1. I used the z score of SES, age, Facebook usage frequency and length as predictors in the hierarchical regression models.

First, I studied whether SES influenced individuals’ attitude for sending a Facebook friendship request to people they do not know but have common friends. I ran a hierarchical linear regression model with likelihood to send friend request as outcome, and SES as predictor. In line with the passive status hypothesis, there was a negative influence of SES on sending friend request, and results still held after controlling for age, gender, length of Facebook usage, and Facebook usage frequency. I displayed the results in Table 2.1.

Second, I studied whether SES influenced individuals’ attitude for accepting a Facebook friendship request from people they don’t know but have common friends. There was also a negative influence of SES on accepting friend request, the result also held after controlling for the relevant factors mentioned above. Hierarchical regression results are displayed in Table 2.2. The above findings suggest that higher SES individuals are less likely to send

Table 2.1 Regression Models for SES's influence on Sending Facebook Friends request

	Variable	β	SE	t	95% CI	R ²	Adjusted R ²	F
Step 1	SES	-.083	.034	-2.473*	-.149, -.017	.021	.018	6.114*
Step 2	SES	-.090	.034	-2.656*	-.157, -.023	.028	.021	4.079*
	Age	.078	.055	1.422	-.030, .185			
Step 3	SES	-.095	.034	-2.793**	-.162, -.028	.037	.027	3.591
	Age	.082	.054	1.498	-.026, .189			
	Gender	.188	.117	1.602	-.043, .419			
Step 4	SES	-.137	.055	-2.486*	-.246, -.029	.035	.021	2.477*
	Age	.077	.055	1.397	-.031, .185			
	Gender	.20841	.120	1.734	-.028, .445			
	Facebook usage frequency	.050	.055	.901	-.059, .159			
Step 5	SES	-.113	.057	-1.993*	-.225, -.001	.042	.024	2.354
	Age	.054	.057	.953	-.058, .167			
	Gender	.193	.123	1.574	-.048, .435			
	Facebook usage frequency	.080	.058	1.372	-.035, .195			
	Length of Facebook usage	-.095	.059	-1.611	-.212, .021			

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2.2 Regression Models for SES's influence on Accepting Facebook Friends request

	Variable	β	SE	t	95% CI	R ²	Adjusted R ²	F
Step 1	SES	-.123	.056	-2.204*	-.233, -.013	.017	.014	4.859
Step 2	SES	-.125	.057	-2.203*	-.236, -.013	.017	.010	2.439
	Age	.011	.056	.187	-.100, .122			
Step 3	SES	-.126	.057	-2.215*	-.238, -.014	.017	.007	1.646
	Age	.011	.057	.200	-.100, .123			
	Gender	.033	.122	.274	-.206, .273			
Step 4	SES	-.126	.057	-2.216*	-.239, -.014	.018	.004	1.294
	Age	.009	.057	.156	-.103, .121			
	Gender	.045	.124	.366	-.199, .290			
	Facebook usage frequency	.029	.057	.502	-.084, .142			
Step 5	SES	-.114	.059	-1.936	-.231, .002	.018	0	.971
	Age	-.005	.059	-.082	-.122, .112			
	Gender	.041	.128	.322	-.210, .292			
	Facebook usage frequency	.046	.061	.758	-.074, .166			
	Length of Facebook usage	-.026	.062	-.415	-.147, .096			

* $p < .05$, ** $p < .01$, *** $p < .001$

out and accept friendships on Facebook, making them both more passive and more picky in friendship formation. These findings are broadly in line with the passive status hypothesis.

2.3 Study 2

Study 1 suggested the passive-status hypothesis: an increase of SES is related to less likelihood of reaching out to build network and accepting inward relationship. However, in Study 1, I only asked participants their subjective opinion about their intention to send and accept friendship. I did not know what participants' performance in real online interaction. Also, I did not know whether the other person's SES would influence the tendency to build up weak ties. Therefore, in Study 2, I designed a live experiment in which participants could interact with a stranger online, and I could examine the direction of friendship in a live manner. I also tested whether the perception of the stranger's SES would influence the intention to connect.

2.3.1 Method

Participants and procedure.

I recruited 323 (female = 205; age = 35.01) participants using Amazon's Mechanical Turk to participate in Study 2. In this online experiment, participants entered an online chatroom with another member of the study and spent ten minutes discussing their answers to questions on a given list. The questions were not related to SES. Questions included: "Would you like to be famous? In what way?" "What would constitute a "perfect" day for you?" etc. The full list of questions please see the supplementary materials. The chatroom program was developed by Cambridge Prosociality and Wellbeing Lab. Every pair of chat partners was randomly selected. After a 10-min online chat, participants indicated whether they would like to initiate contact with the other person by sending them an email (yes or no). This intention to contact was a measurement of initiation of weak tie.

SES measures.

I measured personal SES as reflected in annual income (nine income brackets ranging from below \$20,000 to more than \$90,000 per year) and the highest level of education achieved (1 = less than high school, 2 = high school, 3 = some college, 4 = 2-year degree, 5 = 4-year

degree, 6 = master's degree, 7 = professional degree, 8 = doctoral degree). Participants' mean income was \$44,800 (SD = 25,000) and mean achieved education level was between 2-4 year college degree. The skewness for income was .81, kurtosis -.52; and skewness for education was .07, kurtosis -.37. Same as in Study 1, I transformed both income and education into z scores and summed them to form an overall measure of socioeconomic status.

I measured perceived SES (for their chat partner) by adopting two items from prior research (G. J. Kilduff & Galinsky, 2013). Participants reported on a 7-point scale (1 = not at all, 7 = very much) the extent to which they "respected and admired" the other person and how much "influence he or she had in the discussion." These two items exhibited strong internal consistency ($\alpha = .85$).

2.3.2 Results

In Study 2, I investigated whether personal status increases the propensity to initiate a social tie with a stranger after only ten minutes of interaction. In my first set of analyses, I focused on people's dispositional status (income and educational levels) and their perceptions of dispositional personal status of their interaction partner. In support of the *passive status hypothesis*, people were more likely to initiate a connection through an email request as perceptions of their interaction partner's SES increased, $r = .27$, 95% CI [.16, .37], $t(324) = 5.00$, $p < .001$. Furthermore, this positive relationship was offset by a significant, negative relationship between SES and initiating a connection, $r = -.14$, 95% CI [-.25, -.03], $t(321) = -2.55$, $p < .05$, which indicated that high-status individuals in general were less likely to initiate connections. Indeed, higher status individuals tended to refrain from initiating connections, whereas low-status people were more active. I tested these predictions together in a binary logistic regression analysis predicting decisions to initiate a connection, and both personal SES, $\beta = -.24$, 95% CI [-.45, -.03], $\chi^2(3, 320) = 5.13$, $p < .05$, and perceived SES of the interaction partner, $\beta = .25$, 95% CI [.14, .36], $\chi^2(3, 320) = 20.32$, $p < .001$, each remained significant.

To illustrate these results, a person with high SES (one standard deviation above the mean: an income between \$60,000-69,999 and a 4-year college degree) compared to a person

with low SES (an income below \$20,000 and some university education) is 1.58 times *less likely* to initiate contact with a stranger. In addition, a one-point increase in the perceived SES of the other person is associated with being 1.28 times *more likely* to initiate contact with that person.

One plausible secondary prediction stemming from the *active status hypothesis* is that high-SES people do friend others, but only if they are high-SES themselves. This would suggest an interaction between a person's SES and the perceived SES of the interaction partner – specifically, I would expect a positive slope for the interaction term. Providing further evidence against the *active status hypothesis*, the interaction term did not approach any level of statistical significance, $\beta = -.06$, 95% CI $(-.57, .60)$, $\chi^2(4, 319) = .09$, $p = .77$. Thus, there was little evidence to suggest that high-SES people selectively initiate connections with high-SES others – it appears they simply are more passive in their friending of strangers than low-SES individuals.

2.4 Study 3

2.4.1 Method

Participants and procedure.

Six thousand Twitter users were recruited through the online survey panel Tellwut. Participants gave authorization to researchers getting their twitter information including their number of followers and friends. Participants also reported their age, gender, highest level of education achieved, and annual household income. To control for the influence of twitter usage habit on the numbers of friends and followers, I asked participants to report their average hours of Twitter usage per week (1 to 20, 21=25+). I first created a log form of hours then created a z-score for the logged Twitter hours. I excluded participants who did not report both income and education, and 2293 participants (female = 1455, age = 35.85(13.41)) entered the final analyses.

SES measures.

Participants reported their household income in brackets, with 1 equaled to “less than 10,000” local currency, 2 equaled to “10,001 - 20,000” local money, etc. Participants’ income ranged from “less than 10,000” to “more than 160,000”, with a mean income \$45,700 (SD = £31,000). Since the result of income showed a pattern of long right-hand tail, I applied a “log” format for income. I then centered the logged form of income and created a z-score for income to use in the analyses. Participants also reported their highest level of education achieved (1 = less than high school, 2 = high school graduate or equivalent, 3 = associate degree (e.g., AA, AS), 4 = bachelors degree (e.g., BA, AB, BS), 5 = masters degree (e.g., MA, MS, MEng, MEd, MSW, MBA), 6 = professional degree (e.g., MD, DDS, DVM, LLB, JD), 7 = doctoral degree. Similar to before, I created a z-score for education. The sum-up of z-scored income and education was used to measure SES.

2.4.2 Results

I first explored whether participants’ SES influenced participants’ number of followers and friends. Similar to Study 1, I ran a hierarchical linear regression, treating SES as the predictor and number of followers or friends as outcome. I also controlled for age, gender, and hours spent on Twitter per week. There was no significant relationship between SES and number of followers (inbound connections), however there was a negative relationship between SES and number of friends (outbound connections), suggesting that higher SES individuals were less likely to follow others on Twitter. This result supported the passive-status hypothesis. Results were displayed in Table 2.3 and Table 2.4.

To control for the influence that the number of followers may have on the number of friends, I then calculated individuals’ friend percentage. $\text{Friend percentage} = \text{friends} / (\text{friends} + \text{followers})$. Here, 0.5 is equal split. When the ratio is between 0 and 0.5, it means participants having fewer friends than followers; when the ratio is between 0.5 and 1, it means participants having more friends than followers. I ran the same hierarchical linear regression with friend percentage as the outcome. Results were shown in Table 2.5.

Table 2.3 Hierarchical Linear Regression Models for SES's influence on Twitter Followers (Inbound Connections)

	Variable	β	SE	<i>t</i>	95% CI	R^2	Adjusted R^2	<i>F</i>
Step 1	SES	-.048	.025	-1.903*	-.097, .001	.002	.001	3.623
Step 2	SES	-.050	.025	-2.009*	-.099, -.001	.024	.023	28.27***
	Age	-.286	.040	-7.228***	-.364, -.209			
Step 3	SES	-.048	.025	-1.918	-.097, .001	.031	.030	23.91***
	Age	-.276	.040	-6.904***	-.354, .197			
Step 4	Gender	-.294	.083	-3.533***	-.458, -.131			67.05***
	SES	-.041	.024	-1.678	-.088, .007	.108	.107	
	Age	-.241	.039	-5.499***	-.290, -.138			
	Gender	-.431	.081	-5.311***	-.590, -.272			
	Twitter usage hours	.533	.039	13.740***	.457, .609			

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2.4 Hierarchical Linear Regression Models for SES's influence on Twitter Friends (Outbound Connections)

	Variable	β	SE	<i>t</i>	95% CI	R^2	Adjusted R^2	<i>F</i>
Step 1	SES	-.101	.021	-4.512	-.145, -.057	.009	.008	20.36***
Step 2	SES	-.103	.022	-4.586***	-.147, -.059	.014	.013	15.92***
	Age	-.115	.036	-3.247***	-.185, -.046			
Step 3	SES	-.102	.022	-4.526***	-.146, -.058	.021	.020	16.27***
	Age	-.107	.036	-2.992***	-.177, -.037			
Step 4	Gender	-.278	.075	-3.718***	-.424, -.131			55.3***
	SES	-.096	.022	-4.394***	-.139, -.053	.091	.089	
	Age	-.053	.035	-1.509	-.122, .016			
	Gender	-.396	.073	-5.414***	-.539, -.252			
	Twitter usage hours	.452	.035	12.951***	.384, .521			

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 2.5 Hierarchical Linear Regression Models for SES's influence on Twitter Friend Percentage

	Variable	β	SE	<i>t</i>	95% CI	R^2	Adjusted R^2	<i>F</i>
Step 1	SES	-.008	.003	-3.001**	-.013, -.003	.004	.004	9.006**
Step 2	SES	-.008	.003	-3.007**	-.012, -.003	.031	.030	35.59***
	Age	.031	.004	7.905***	.024, .039			
Step 3	SES	-.008	.003	-3.078	-.013, -.003	.031	.030	23.78***
	Age	.031	.004	7.725	.023, .039			
Step 4	Gender	.006	.008	.704	-.011, .022			22.69***
	SES	-.008	.003	-3.123**	-.013, -.003	.040	.038	
	Age	.029	.004	7.148***	.021, .037			
	Gender	.010	.009	1.134	-.007, .026			
	Twitter usage hours	-.018	.004	-4.431***	-.026, -.011			

* $p < .05$, ** $p < .01$, *** $p < .001$

Again, the percentage of friends (inbound connection) supported the passive-status hypothesis. Higher SES individuals have lower percentage of friends, and this result held after controlling for age, gender, and hours of using Twitter per week.

These results from Twitter users also supported the passive status hypothesis, that higher status individuals have fewer friends (less willing to reach out to build connections), and have lower percentage of friends, meaning that they attracted more followers than willing to reach out for more connections.

2.5 Discussion

Alliances and connections, both strong and weak, are vital to SES. They are integral to rises in SES, and determine the scope of the individual's power. In the present chapter, I tested two competing hypotheses about the role of SES, as captured in measures of wealth and education, in predicting who initiates friendships with distant others, or what I have called weak ties. My findings strongly supported the *passive status hypothesis* with no evidence for the *active status hypothesis*. In three studies using survey, live interaction, and existing Twitter user information, I found that high-SES people, relative to their low-SES counterparts, refrained from initiating social connections, and less likely to accept social connections. I also found support for the notion that people tend to initiate ties with those perceived to have high SES. Importantly, these processes appeared to be independent of each other, such that people were most likely to refrain from initiating distant social ties when they had high SES and perceived the other person as having low SES and vice versa. Furthermore, I found no evidence to suggest that high-SES people are merely more selective in whom they friend – it seems for high-SES individuals, they are consistently more passive in forming friends than low-SES individuals regardless of the SES of the potential new social tie. I consistently found this pattern of results using different research methods, from questionnaire, online interpersonal interaction, and existing social network dataset. Collectively, these results represent an unprecedented large-scale investigation into SES and friendship dynamics.

Classic models of who connects with whom tend to focus on the prevailing tendency for those who are similar to each other and in close proximity to form connections (Ingram & Morris, 2007; Kossinets & Watts, 2009; McPherson, Smith-Lovin, & Cook, 2001; Nahemow & Lawton, 1975; Reagans, 2011). However, this theorizing about the formation of social ties has largely been silent on the question of how SES influences who initiates social ties. My findings offer a valuable complement to these two classic predictors by showing that SES predicts who initiates connections with whom. But my results are silent on the mechanism behind this effect. Why are lower SES individuals more willing to reach out to build connections and more willing to receive social connections? One explanation is that lower SES individuals, because of their vulnerability toward social environment and life events, are more communally oriented and more interdependent with each other (Keltner, Kogan, Piff, & Saturn, 2014b; Krause & Shaw, 2000b). Resources from the social network may be essential for lower SES individuals, and thus they are more prone to the build-up of social connections. For example, lower SES individuals may more likely need their relatives and acquaintances for caregiving, while higher SES individuals could achieve this goal through the wealth path. Therefore, it is natural that when possible, lower SES individuals tend to connect to others. This line of reasoning, while consistent with my findings, is untested – it is thus a logical next step for research in this area.

In addition, my work offers insights into how SES seeps into social inequality and intergroup processes. In the current society, resources are distributed unevenly, and can be differentiated by one's religion, kinship, prestige, race, ethnicity, gender, age, and sexual orientation. However, the unequal distribution of income or wealth – the core concept of SES – is a frequently studied type of social inequality (Wade, 2014). SES inequality has great impact both to individuals and to society – for example, greater income inequality has generally been associated with worse health (Kaplan, Pamuk, Lynch, Cohen, & Balfour, 1996; Szwarcwald, Bastos, Viacava, & De Andrade, 1999; Lynch, Smith, Kaplan, & House, 2000), happiness (Oishi, Kesebir, & Diener, 2011), well-being (Buhmann, n.d.), and public resources such as schooling, health care, social welfare, and working conditions (Lareau, 2002). Therefore, it is especially important to understand how individuals combat this

inequality, survive and thrive. My research suggested at least one path for the lower SES individuals: To actively reach out and build up social ties.

One limitation of my work is its correlational nature. All three studies found effects for existing SES, so I must take care in making any causal conclusions. One of the challenges in providing causal evidence for future research to tackle is developing a proper SES manipulation. One potential pathway forward is identifying natural experiments – cities or nations where random events divide a homogenous group into two, with one gaining high-SES and the other low-SES.

Another limitation in this work lies in the way I measured weak ties. The study of weak ties derived from Nick Granovetter's 1973 article "The Strength of Weak Ties" (M. S. Granovetter, 1973a) in which he discussed the spread of information and resources through social networks. At that time, social networks happened almost exclusively in the physical world. However, more recently, social media websites such as Facebook and Twitter also provide a location for the development and maintenance of interpersonal ties. Even though individuals with strong-ties also communicate through social media, it has been suggested that most ties on social media are weak ties (De Meo, Ferrara, Fiumara, & Provetti, 2014), making my choice of weak ties measures a good one. However, my work is still limited to social media measured weak ties. Future work should explore alternative weak ties, such as new comers coming to a new community or a new society.

Finally, in my three studies, all participants were recruited online, meaning that I could not reach to the very lowest SES individuals in the society. At the same time, it is likely that I could not reach the very highest SES individuals in the society either because they would less likely to take part in a study for a very small amount of reimbursement. Therefore, conclusion from this work needs to be further tested in a wider range of participants.

Yet even with the above limitations, my work provides a robust test of the *active* and *passive status hypotheses*. My data allows researchers to generalize not to just classic WEIRD samples (Henrich, Heine, & Norenzayan, 2010), but to ordinary population. Furthermore, by demonstrating the effect using an individual-based chatting paradigm and naturalistic

Twitter user information, I can have confidence that the results are not merely an artifact of methodology.

Supplementary materials

Question list for participants to use in the online chatroom study:

- a) Would you like to be famous? In what way?
- b) What would constitute a "perfect" day for you?
- c) Do you think yourself a creative person? In what way?
- d) Before making a call, do you ever rehearse what you're going to say? Why?
- e) If your friends and acquaintances were willing to bluntly and honestly tell you what they think of you, would you want them to? Why?
- f) For what in your life do you feel most grateful?
- g) What is the greatest accomplishment of your life?
- h) What do you value most in friendship?
- i) What does friendship mean to you?
- j) What is your most treasured memory?
- k) What is your most terrible memory?
- l) Share with your partner an embarrassing moment in your life.
- m) What are you looking for when you converse with other people? What kinds of things do you usually discuss? Are there things that would be more interesting to you?

Chapter 3

Money Well Given: Donations Predict Social Capital Gains for Low SES, But Not High SES Individuals

3.1 Introduction

Interpersonal ties are defined as information-carrying connections between people, and ties can be loosely summarised into strong, weak, or absent. Weak ties, arguably, are regarded responsible for the majority of the embeddedness and structure of social networks in the society as well as the transmission of information through the networks (M. S. Granovetter, 1973b). Weak ties, according to network researchers, are a type of bridging social capital (Putnam, 2000), providing individuals useful information or new perspectives for one another but typically not emotional support (M. Granovetter, 1983). For example, in the process of job hunting, when professional, technical, and managerial workers were more likely to hear about and obtain new jobs through weak ties than through strong ones (Langlois, 1977; Lin, Ensel, & Vaughn, 1981; M. S. Granovetter, 1973b). Besides information sharing, weak ties also have great relationship to mental and physical health (Berkman, 1984; House, Landis, & Umberson, 1988b; Kawachi & Berkman, 2001). Weak ties provide individuals a sense of belongingness and general social identity, which sociological theorists have argued as

being relevant for the promotion of psychological and physical well-being (Faris & Dunham, 1939).

Given the importance of weak ties, there is an increasing interest in understanding what promotes weak ties, and socioeconomic status (SES) has been demonstrated to be a powerful pathway. As shown in Chapter 2, high SES, like a magnitude, attracts weak ties. Even though higher SES individuals reported less willingness to initiate and accept weak ties on Facebook (Study 1), are less likely to email a chat partner in an online chatroom (Study 2), and are also followed fewer people on twitter (Study 3), being perceived high in SES was associated with initiating connections toward those individuals (Study 2). However, what about individuals who lack the advantage of wealth? Are there any other pathways through which individuals lacking wealth could build weak ties? In this chapter, I propose and test the notion that prosociality can act as a pathway to attract weak ties. I hypothesized that (1) acting prosocially promotes weak ties, and (2) this effect is stronger for people from lower SES than higher SES backgrounds. I tested these hypotheses in two studies.

3.1.1 Prosociality is an alternative pathway for lower SES to gain weak ties

Increasingly, empirical evidence has supported the thesis that those who act kindly reap numerous social and psychological benefits. For instance, prosocial people tend to be happier in general (Dunn et al., 2008; Weinstein & Ryan, 2010) and have higher well-being when sacrificing for others (Kogan et al., 2010) and when spending money for others (L. B. L. Akinin et al., 2013; Dunn, Akinin, & Norton, 2014). Numerous mechanisms for these effects have been proposed. For instance, various theorists have argued that prosociality leads to deeper happiness because it promotes a sense of connection and community with others, distracts individuals from focusing on personal problems and self-preoccupation, helps individuals cultivate positive emotions, which in turn displace harmful negative emotional states (see Post, 2005, for review). Besides happiness, prosocial people also tend to enjoy many reputational gains. Trustworthy and collaborative individuals often climb up social hierarchies, have

higher returns for brokerage, and are more likely to be selected into leadership roles in their organizations (Burt et al., 2013; Keltner, Kleef, et al., 2008; Keltner et al., 2014b). Prosocial behaviours have also been related to better physical and mental health, longevity, better life satisfaction and overall well-being (Dulin & Hill, 2003; Post, 2005, 2007; Schwartz, Meisenhelder, Ma, & Reed, 2003).

As highlighted above, behind the positive impact of prosociality, the core mechanism is interpersonal resources. Acting prosocially naturally promotes greater social ties since people overwhelmingly and naturally prefer to engage in relationships with others that are prosocial rather than selfish. For example, prosocial men were rated as more attractive, more socially desirable, and more desirable as a date, as compared to non-altruistic men (Graziano, Jensen-Campbell, Todd, & Finch, 1997; Jensen-Campbell et al., 1995; Stürmer, Snyder, & Omoto, 2005; Swaab, Postmes, & Spears, 2004). Altruism and goodness are both essential for social networks to grow and endure (Christakis & Fowler, 2009). In an organization, trustworthy individuals have more important roles. For example, there are high returns to brokerage for investment bankers, salesmen, and managers who have above-average social standing in their organizations (Burt et al., 2013). After all, prosocial people are happier and have more positive emotions, more likely to act cooperatively and are therefore more trustworthy (Fehrler & Przepiorka, 2013; Post, 2005; West, Griffin, & Gardner, 2007) – all desirable qualities in any social relation. While the above strongly highlights that prosociality should be related to greater number of weak ties, no work to date has empirically tested this directly. Given the existing research, however, I hypothesized that there is a positive link between prosociality and weak tie gains.

I propose that SES and prosociality can thus both act as promoters of weak ties; however, they are not purely additive. Instead, I theorized that the prosociality would be most effective in promoting weak ties for those who are low in SES. This hypothesis stems from the fact that for the rich, they already have a major magnet for weak ties, and thus there is less space for prosociality to make an impact. Research on social networks has demonstrated that people generally have networks no larger than 150 people (Hill & Dunbar, 2003). Even if this precise number proves to be inaccurate, the general suggestion is that people do not have

infinite space for social connections, even if they are in the form of weak ties. Thus, there is a natural ceiling that will limit the capacity of different mechanisms to help people grow their weak ties if other strong promoters of weak ties are already in place. I reasoned that for people high in SES, this is precisely the circumstance – while acting prosocially may promote some weak ties, its likely to be a much weaker effect than for the poor, who, all other factors being equal, will on average have fewer weak ties because of their lower SES status.

3.1.2 Present Studies

In this Chapter, I focus on testing two other hypotheses: First, prosociality promotes weak tie gains; and second, the weak tie gains from acting prosocially are larger for people with low SES as compared to high SES. I tested these hypotheses across two studies. In the first study, I used participants' number of Facebook friends as a measure of weak ties and explored whether self-reported donation is positively related to more Facebook friends for lower SES individuals than higher SES individuals. In the second study, I used a live chat program in which participants were randomly allocated into a chatroom and had a conversation with a stranger.

3.2 Study 1: Income, Donations, and Digital Social Ties

The main focus in Study 1 was to test our central hypothesis at the individual level: That donating (our metric of prosociality) is positively related to the number of friendships on Facebook (weak ties proxy), but only among the poor.

3.2.1 Method

Participants and procedure

Participants were recruited through Amazon Mechanical Turk and all participants were from the United States. The study consisted of answering several questionnaires and self-report

their Facebook information including number of friends. After I excluded participants who had fewer than 50 friends, 864 participants remained (male = 491). The participants ranged in age from 18 to 73 (mean = 30.38, SD = 9.67). The average user had approximately 376 friends on average (SD = 328, median = 276).

To quantify the number of weak ties, I used each participant's number of Facebook friendships (self-report). The number of Facebook friends was the main outcome variable in all our analyses. Numerous lines of research suggest that such usage is appropriate: Previous research has shown that Facebook relationships are almost always with real-world social connections (A. D. I. Kramer, Guillory, & Hancock, 2014; Wilson, Gosling, & Graham, 2012), and the way people engage with their friends on Facebook is much the same way they engage with people offline (Buote, Wood, & Pratt, 2009; Subrahmanyam, Reich, Waechter, & Espinoza, 2008); Our own work also found that number of Facebook friendships is moderately correlated with classic self-report metrics of close social relationships, that people with greater friends on Facebook tend to also report greater number of close social ties using more traditional inventories (Kogan et al., under review). Facebook is also proved to be an effective method studying human behaviours ecologically given its popularity among over 1 billion people all over the world and the un-biased information it provides compared to self-report.

Prosociality

Participants answered a single item measure of whether they had donated in the past month using dichotomous scale (0=no, 1=yes).

SES measure

I used a composite score of participants' income and education as the SES measurement. Participants reported their current income bracket by selecting one of X-brackets. These brackets started with \$0-10,000 and ended at over \$100,000, with each bracket covering \$10,000. The average income was approximately \$45,800 (SD = \$30,200). I also asked participants the highest level of education achieved (1 = less than high school, 2 = high

school, 3 = some college, 4 = 2-year degree, 5 = 4-year degree, 6 = master's degree, 7 = professional degree, 8 = doctoral degree). On average, our participants reached the education level between "some college" and "2-year degree". The skewness for income was .68, kurtosis .40; and skewness for education was .68, kurtosis -.56. Similar to how I treated these two indicators in Chapter 2, we transformed income and education into z scores and then summed to form an overall measure of socioeconomic status.

Facebook usage

Since Facebook usage frequency can heavily skew the number of Facebook friends a person has, I aimed to control for this effect in all analyses. I assessed the activity through a single question: "How frequently do you use Facebook?", on a scale of 1 (Never) to 5 (Several times a day).

3.2.2 Results

Given the extreme skew towards low numbers, I transformed number of Facebook friends by using a natural log. To test our prediction that donating is positively related to the number of friendships on Facebook, but only among the poor individuals, I began by taking a simple correlation between donations and number of Facebook friendships. As predicted, donation was positively related to the number of friends one has on Facebook, $b = .137$, 95%CI [.024, .250], $t(806) = 2.373$, $p = .018$. This positive relationship still held after controlling for age (natural logged), gender, and frequency of using Facebook (natural logged), $b = .169$, 95%CI [.058, .280], $t(777) = 2.980$, $p < .001$.

In the second step, I added standardized household income as a moderator of the donating effect to test whether the effect of donating on number of friendships decreased while income increases. Donation still had a positive main effect on number of friendships, $b = .156$, 95%CI [.040, .271], $t(797) = 2.648$, $p = .008$. I also found SES had a positive trend towards predicting number of Facebook friends in this model, $b = .047$, 95%CI [-.006, .100], $t(797) = 1.728$, $p = .084$, which was consistent with our framework of status attracting social capital shown in Chapter 2. As predicted, I also indeed found a negative

interaction between income and donating in predicting number of friendships, $b = -.116$, 95%CI $[-.193, -.039]$, $t(797) = -2.963$, $p = .003$. The main effect of donation, SES, and the interaction were still significant after controlling for age (natural logged), gender, and frequency of using Facebook (natural logged). This negative interaction suggested that the positive effect of donating on number of Facebook friends was strongest among those with low incomes and weakest among the richest in the sample.

In our final step, I probed the interaction further by testing the effect of donating on number of friendships for individuals with different SES backgrounds. I specifically analysed how donation influenced coping for individuals one standard deviation lower than the mean SES (low SES) and for individuals one standard deviation higher than the mean SES (high SES). The simple slope analysis suggested that donation had a positive relationship on number of Facebook friends, but only for lower SES individuals, $b = .330$, 95%CI $[.165, .495]$, $t(797) = 3.931$, $p < .001$. For higher SES individuals, donation had no relationship with number of Facebook friends, $b = -.018$, 95%CI $[-.180, .143]$, $t(797) = -.221$, $p = .825$. Simple slope results provided support to our hypothesis that prosociality was indeed another pathway for the lower SES individuals to gain weak ties, but not for higher SES individuals. Simple slope results were depicted in Figure 3.1.

To further describe donation's influence on number of Facebook friends for individuals with different SES in a more continuously manner, I plotted the influence in Figure 3.2.

3.3 Study 2: Friendship Formation and Directionality of Effects

3.3.1 Method

Participants and procedure

Participants were recruited through Amazon Mechanical Turk and all participants were from the United States. The study consisted of answering several demographic questions, chatting with another person online for 10-15 minutes, and answering several questions about the

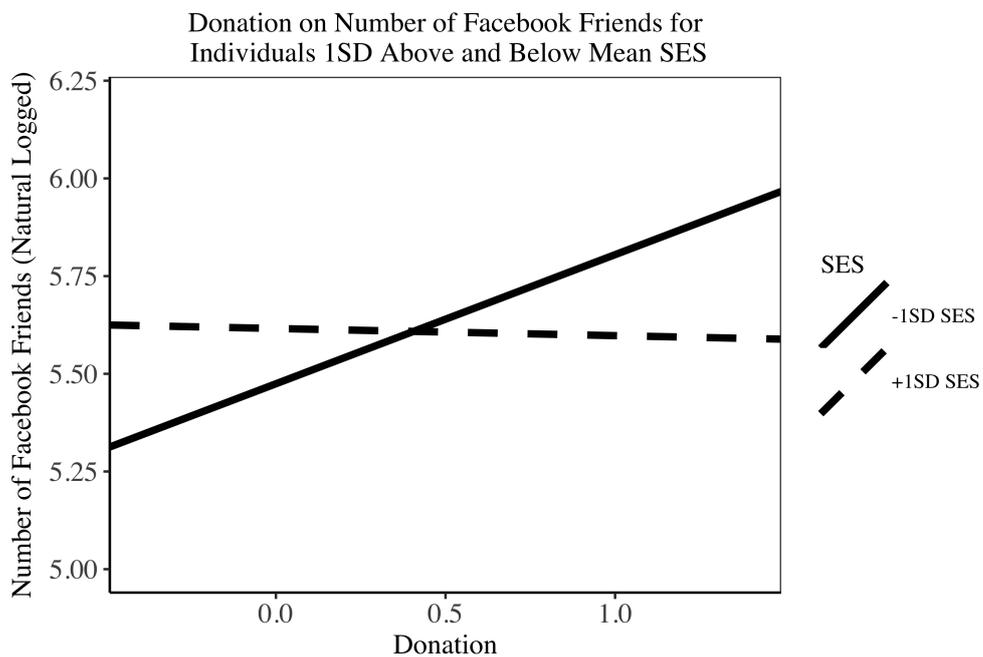


Fig. 3.1 Donation's influence on number of Facebook friends for relatively poor (-1SD) and high (+1SD) SES individuals

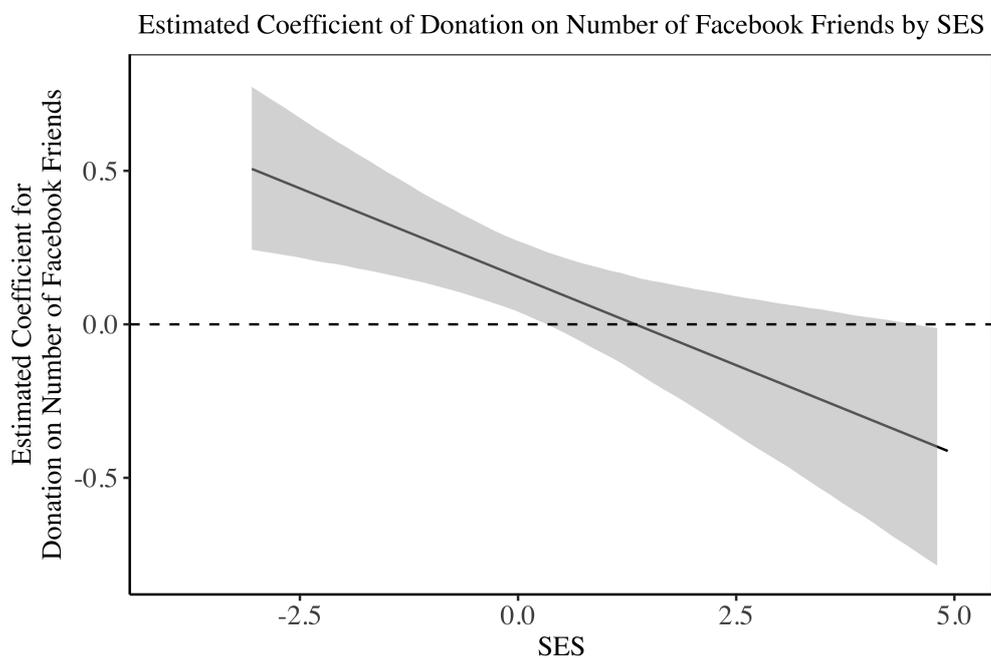


Fig. 3.2 Influence of donation on number of Facebook friendships as a function of SES

partner post-chat. After I excluded participants who either (a) did not successfully match

with another participant in a chatroom or (b) chatted for less than 7 minutes, 573 participants (male=285) remained. Participants ranged in age from 18 to 68 (mean=33.26, SD=10.30).

Participants' own pro-sociality

Participants answered question "What percentage of your income do you voluntarily donate every year?" on a scale from "I don't donate", "I donate 1%-5%", to "36%-40%" with each bracket covering 5%; and "over 40%" as the highest portion of donation. On average, participants reported donating between nothing and 5% of their income, with 40.18% report donating nothing and 53.75% report donating between 1%-5% of their income. Since more than 90% participants reported donating nothing or between 1% and 5% of their income, I recoded donation into 0 (did not donate) and 1 (donated).

SES measure

Participants reported their current income by selecting a bracket ranging from \$0-10,000 and ending at over \$100,000, with each bracket covering \$10,000. The average income was approximately \$33,500 (SD=\$23,200). Similar to Study 1, I also asked participants the highest level of education achieved (1 = less than high school, 2 = high school, 3 = some college, 4 = 2-year degree, 5 = 4-year degree, 6 = master's degree, 7 = professional degree, 8 = doctoral degree). On average, our participants reached the education level between "2-year degree" and "4-year degree". The skewness for income was .86, kurtosis -.19; and skewness for education was .10, kurtosis -.76. I transformed income and education into z scores and then summed to form an overall measure of socioeconomic status.

Online Chat

I employed a custom chat program for the study that our lab created. This software automatically pairs participants as they join the study into chatrooms of 2. Participants were instructed to spend 10-15 minutes chatting with another participant, using an adapted "fast friends" paradigm (McKenna, Green, & Gleason, 2002). Example questions are listed in the supplementary material.

Post-chat questions

After the chat, participants were asked to guess the annual income of their chat partner with the same brackets as they reported their own income. Participants' average guessing of their partners' income was approximately \$33,400 (SD=\$17,200). They were also asked to guess the highest achieved education of their chat partner. Participants' average guessing of partner's education fell between "some college" and "2-year degree". The skewness for the guessed income was .54, kurtosis -.14; and skewness for the guessed education was -.04, kurtosis -.92. I transformed guessed income and guessed education into z scores and then summed to form an overall measure of estimated socioeconomic status.

Participants also guessed donation levels of their partners. Participants guessed that on average, their chat partners' voluntarily donation fell between 0-5%, with 36.07% of the participants guessing that their partner did not donate, and 65.71% participants guessing their partner donated between 1% and 5%. Similar to how I coded own donation, I recoded estimated donation into 0 (did no donate) and 1 (donated).

Participants also guessed their chat partner's age. Since age similarity could be a predictor of how much they enjoyed the conversation, I calculated the age difference between each chat partner as a control variable.

I then asked participants to indicate how much they enjoyed the chat and found the partner a person worth knowing using the following items: "How much do you respect and admire him or her?", "How much did you enjoy chatting with your chat partner?", "How friendly do you think your chat partner behaves in daily life?" on a 5-point scale (1 = Not at all, 5 = Extremely). These items were averaged together to construct a "perceptions of partner likability" composite. Finally, participants indicated whether they would like to email their partner. However, only 15% (SD = 36%) of the participants chose yes. This might be due to the privacy policy of Amazon MTurk that participants answered all questions in an anonymous way. I thus only used the perception of likability as the outcome of the model. Even though the perception of likability was not a direct measurement of weak ties, I used it as the outcome because it is a strong indicator for tie formation. The analysis procedure in Study 2 was similar to Study 1.

This paradigm of live chat provided us with three major extensions: First, I could demonstrate the effect holds generally and is not specific to our Facebook-based index of social ties. Second, I can extend our findings from established friendships to the friendship formation process. Third, I could test whether the effects I found in Study 1 were driven by (a) prosocial people being proactive in building up connections – low-income individuals who donate seeking out weak ties (compared to low-income individuals who do not donate), or (b) prosocial people being attractive in the connection formation process – as I primarily hypothesized, low-income people who donate attract others as compared to their low-income non-donating counterparts.

Because I measured both people's own levels of prosociality and income, as well as their perceptions of their partner's prosociality and income, I tested whether prosocial people are proactive (e.g., low income prosocial individuals, as compared to low income non-prosocial individuals, view others as particularly warm and thus engage with them) or are attractive (e.g., prosocial individuals attract friendships, but only among the low-income individuals). In particular, the proactive mechanism would require an interaction between people's own levels of prosociality and income in predicting their perceptions of their partner's likability, whereas the attraction hypothesis would require people's perceptions of their partner's donation levels and income interacting in predicting the perceptions of likability.

3.3.2 Results

In the first step, I used participants' estimation of their chat partner's donation as a predictor to predict the likability of their chat partner and I found a significant positive relationship: $b = .481$, 95%CI [.317, .644], $t(571) = 5.771$, $p < .001$. This positive relationship still held after controlling for the estimation of chat partners' age and age difference. In the second step, I used participants' estimation of chat partners' donation as predictor, estimation of chat partner's SES as moderator, and perceiving partners' likability as outcome, and found the hypothesized negative interaction between donation(estimated) and SES (estimated) on likability: $b = -.144$, 95%CI [-.250, -.039], $t(502) = -2.688$, $p = .007$. In this interaction model, there was also a main effect of estimated donation, $b = .289$, 95%CI [.105, .473],

$t(571) = 3.089, p = .002$, and a main effect of estimated SES, $b = .205, 95\%CI [.120, .289]$, $t(571) = 4.759, p < .001$. These results still held after controlling for the estimated age of chat partner and age difference.

Mirroring Study 1, I found that when someone was perceived as poor (1 SD below mean SES), how much others estimated them to donate positively predicts how much these same others view the person as likable, $b = .534, 95\%CI [.305, .765]$, $t(502) = 4.570, p < .001$. However, for people who others viewed as wealthy (1 SD above mean SES), there was no relationship between how prosocial others viewed them to be and how likable others thought they were, $b = .042, 95\%CI [-.240, .324]$, $t(502) = .293, p = .770$. Results in Study 2 showed that for the relatively poor individuals, if they were perceived as prosocial, others would perceive them as a likable person than if they were not prosocial; however, for the relatively rich individuals, whether they were perceived to be prosocial or not, would not change others' perception of likability toward them. This result also proved our key hypothesis that prosociality indeed functioned as another pathway for lower SES individuals in attracting weak ties.

Similar to Study 1, I depicted the interaction in two ways in Figure 3.3 and 3.4.

3.4 General Discussion

Together, our two studies demonstrated that prosociality functions as an additional pathway for the lower SES individuals to attract weak ties. I found this effect consistently across both established ties and forming new ones. Furthermore, our findings strongly suggest that the reason why prosociality is linked to greater weak ties among the poor is because of an attraction process – prosocial people are viewed as more likeable than non-prosocial people and potentially better friends than non-prosocial individuals, but this appears to be only true among people from low SES backgrounds.

Our findings have important implications for several literatures. First, our results provide one answer to the mystery of why the poor might act more altruistically than the rich (Keltner et al., 2014a; M. Kraus & Stephens, 2012; Piff, Kraus, Côté, Cheng, & Keltner, 2010; Stellar,

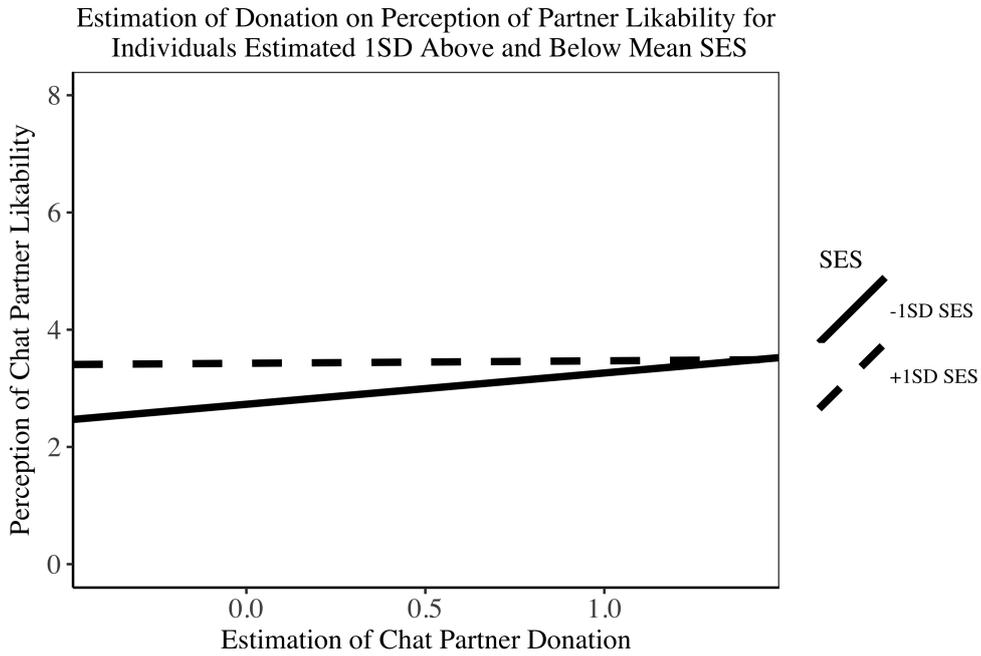


Fig. 3.3 Donation’s influence on perception of likability for relatively poor (-1SD) and high (+1SD) SES individuals

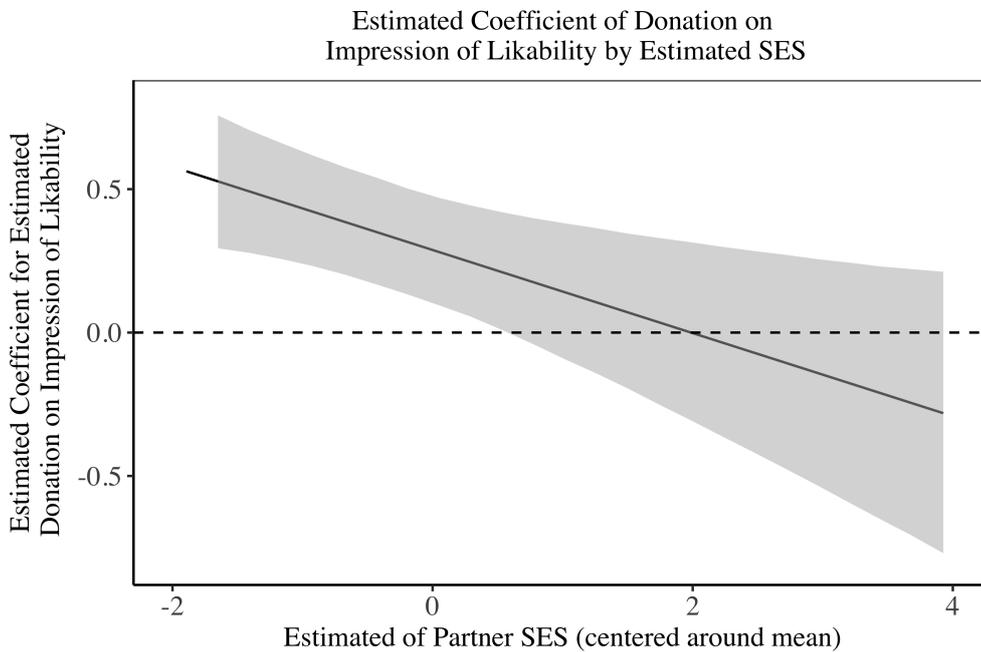


Fig. 3.4 Influence of donation on perception of likability as a function of SES

Manzo, Kraus, & Keltner, 2012b). Specifically, I suggest that when it comes to building up local social relationships – and thus creating access to the wide set of benefits that come

from a large social network (Centola, 2010; Ellison et al., 2007; Fowler & Christakis, 2008; Kossinets & Watts, 2006) – the poor have far more to gain than the rich. For the rich, they already can attract friendships through the virtue of their higher status; for the poor, however, they can attract social ties through acting prosocially and thus developing a reputation for virtue and cooperativeness. Second, our findings add to the literature on social class and friendship formation. Previous work has documented that high SES, power, and status attract others. In one empirical example, I have documented that people with higher SES are less likely to receive or initiate friendships (shown in Chapter 2). Our findings suggest that for the rich, when it comes to forming social ties with people in relatively close proximity, acting prosocially is optional – their high status is enough to already maximize friendships. Finally, our findings add to the literature on prosociality. Previous findings suggest, quite intuitively, that people are attracted to others who are prosocial and our findings qualify this truism: Prosociality can serve as a powerful method for attracting friendships when other avenues – such as through SES – are unavailable.

It is important to notice, though, there might be two mechanisms underlying the phenomenon that acting prosocially does not equally increase the number of social ties. The first possibility is that we are attracted to people for their acts of kindness, but it depends on the context – high-SES people are just doing what they can, given their means; but low-SES people are really bending over backwards to behave prosocially, given their limited resources. Therefore, people regard the poor who behave prosocially more genuine and valuable than the rich who behave prosocially. For example, in Study 2, even if someone is perceived to be rich and prosocial, they are not perceived to be warmer than they are rich and not prosocial, because their behaving prosocially might not be perceived as valuable; however, if someone is perceived as poor but prosocial, this person is perceived as warmer than a person who is poor and not prosocial, because being prosocial adds value to him/her. The second possible mechanism might be due to the fact that the rich are less likely to initiate and accept a new social tie than the poor. As shown in Chapter 2, I found that the rich are less likely than the poor to receive friendship requests on Facebook from people they have common friends but they don't know; at the same time, they are less likely to initiate friendships than the poor.

Hence it is possible that behaving prosocially attracts ties equally among the rich and the poor, but the rich are more selective in accepting a new tie. Future studies are needed to test which mechanism is true or both are functioning in explaining why there is inequality.

Our studies have several limitations. First, I only considered prosociality as an alternative pathway in attracting weak ties – there may be other mechanisms in gaining ties. Indeed, other factors, such as personality, have also been related to weak ties – after all, ties are inherently interpersonal phenomena (Fang et al., 2015; Landis, 2016). Second, I did not consider how culture functions in the SES-Prosociality-weak ties relationship. I only tested our studies among American participants, and it is worth testing whether I can extend the same results to other cultures. Third, I only used monetary donations as a measurement of prosociality; however, the SES – prosociality link may vary depending on the type of prosociality. Therefore, future research may further test these findings using various ways of measuring prosociality.

In conclusion, I found that prosociality could act as an alternative pathway for the lower SES individuals to build up weak ties. I believe this result would shed light on the research on SES and prosociality, as well as provide useful suggestion in the public policy and social issues.

3.5 Supplementary Materials

Example Topics Participants Chat Online in Study 2

- a) Would you like to be famous? In what way?
- b) What would constitute a “perfect” day for you?
- c) Do you think yourself a creative person? In what way?
- d) Before making a call, do you ever rehearse what you’re going to say? Why?
- e) If your friends and acquaintances were willing to bluntly and honestly tell you what they think of you, would you want them to? Why?
- f) For what in your life do you feel most grateful?
- g) What is the greatest accomplishment of your life?
- h) What do you value most in friendship?
 - i) What does friendship mean to you?
 - j) What is your most treasured memory?
 - k) What is your most terrible memory?
 - l) Share with your partner an embarrassing moment in your life.
- m) What are you looking for when you converse with other people? What kinds of things do you usually discuss? Are there things that would be more interesting to you?

Chapter 4

Caring Helps: Trait Empathy is Related to Better Coping Strategies and Differs in the Poor vs the Rich

4.1 Introduction

Coping with stress broadly influences our health outcome and wellbeing (for review, see Penley, Tomaka, and Wiebe (2002)). Canonically defined as managing the interplay of external and internal demands (Lazarus & Folkman, 1984), coping can be generally summarised into adaptive and maladaptive strategies, in terms of how these help reduce the negative effect of stress, leave it unchanged, or make it worse (Stroebe & Schut, 2001). Even though the effects of coping are highly complex – and vary as a function of the type of stressor as well as the individual’s characteristics (see review, Aldwin, Park, & Spiro, 2007) – many researchers find that people with adaptive coping strategies, such as problem-focused coping, tend to have better overall health outcomes; in contrast, maladaptive coping strategies, such as avoidance and wishful thinking, tend to have worse overall health outcomes (Penley et al., 2002). Given the near ubiquity of stress across life domains (Koenig, Walker, Romeo, & Lupien, 2011), understanding the factors that promote healthier usage of coping strategies has

deep implications for individuals and policy makers alike interested in boosting mental and physical health.

Within psychology, numerous research lines have suggested a myriad of different factors that are likely to influence coping strategies: sociodemographic factors of education and income (Pearlin & Schooler, 1978), personality dispositions of self-confidence and an easy-going manner (Kobasa, Maddi, & Kahn, 1982), contextual factors of negative life events (Barrett, 1979; Dohrenwend & Dohrenwend, 1981; Rabkin, 1980), and family support (Billings & Moos, 1981). One factor that has yet to receive much attention, however, is empathy: the ability to understand and to feel sympathy for others (Davis, 1983). In the present work, I build upon theory on the study of empathy (e.g. Eisenberg & Strayer, 1990) to propose that it can act as a promoter of adaptive coping, and an inhibitor of maladaptive coping. Further, my model suggests that socioeconomic status (SES) plays a key role in moderating this relationship because individuals with different SES would benefit differently from trait empathy. I was guided by three hypotheses: (1) empathy is positively related to healthier coping strategies; (2) this relationship is different among lower SES individuals compared to higher SES individuals – I test competing hypotheses about the directionality of this effect. To test these hypotheses, I conducted a number of correlational studies using both psychological and genetics methods.

4.1.1 Trait Empathy and Coping Strategies

Empathy has long been considered a contributor to positive social interactions, such as in the development of affective bonds and understanding (Eisenberg & Strayer, 1990), as well as caring actions between people (Eisenberg & Strayer, 1987). Empathy involves perceiving the inner feelings of another individual accurately and sensitively, and plays a vital role in nurturing and sustaining relationships, reducing threat and defensiveness, and conveying interest (Hepworth & Larsen, 1990). In research on coping strategies, empathy was found to be related to better relationship-focused coping (B. J. Kramer, 1993; O'Brien & DeLongis, 1996). It was for example thought that caregivers using empathy could imagine what the care receiver is feeling and experiencing, which in turn positively enhance the relationship by

helping the care receiver to feel understood (B. J. Kramer, 1993). Empathic responding may also represent an adaptive way of coping with everyday stress when relationship functioning outcomes are considered (O'Brien et al., 2009).

While existing studies on the relationship between empathy and coping are limited to relationship-focused coping, I reason that empathy would be related to better coping in general because empathy helps in a range of stressful situations. For example, in a study on police officers working with rape and sexual assault survivors, empathy was found to help prevent officers from a burnout (Turgoose, Glover, Barker, & Maddox, 2017). Other research also found that high-empathetic individuals are more likely to help others and have in return stronger social support, which was found to be helpful in relation to coping with stress (Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983). Empathy is also a key factor in social bonding, such as taking care of offspring and affiliating with social groups which creates and maintain social networks, which in turn aides the process of coping (Taylor et al., 2000). Thus, various lines of research show that empathy helps individuals deal with stress, but surprisingly, no study has directly examined how empathy influences coping strategies (outside of relationship-focused coping).

I have hypothesized that empathy should promote better coping, but this can manifest itself by empathy promoting (1) more adaptive coping strategies and/or (2) fewer maladaptive coping strategies. There was little empirical basis to generate a specific prediction about whether empathy will impact one or both clusters of coping strategies; thus, I made no special prediction about the specific manifestation of the empathy's positive impact on coping – but aimed to examine adaptive and maladaptive coping strategies separately to pinpoint the effect.

4.1.2 Relationship Between SES and Coping

Socioeconomic status (SES) is defined as one's material wealth, education, and occupation (Oakes & Rossi, 2003a), and has been found to have great influence on nearly all aspects of an individual's life, including health outcomes and mood-related vulnerabilities. People of higher socioeconomic status (SES) live longer, enjoy better health, and suffer less from

disability, while those of lower SES die younger and suffer a greater burden of disease and disability (J. A. A. Dalstra et al., 2005; Huisman et al., 2005; Link et al., 1993; Mackenbach et al., 1997; M. G. Marmot, Bosma, Hemingway, Brunner, & Stansfeld, 1997; Minkler, Fuller-Thomson, & Guralnik, 2006). In fact, SES is one of the best predictors of morbidity and mortality around the world (Adler, Boyce, Chesney, Folkman, & Syme, 1993).

A few early studies have pointed to an association between SES and reliance on certain coping strategies (Menaghan, 1983). Haan (1977) reported that individuals of high SES are more likely to use more adaptive forms of coping involving flexibility, logical choice, and an adherence to consensual reality, and less likely to rely on defensive strategies involving rigidity and irrationality. Pearlin and Schooler (1978) noted that better educated and more affluent people were less inclined to use selective ignoring in dealing with marital and occupational problems. Billings and Moos (1981) found that better educated respondents were more likely to rely on problem-focused coping strategies and less likely to use avoidance coping.

The SES – coping relationship closely resembles SES – health relationship. In many cases, the associations between SES and health outcomes take the form of a gradient – the higher the SES, the better the health (Adler et al., 1994b; M. Marmot, 2006). It has been hypothesized that this is due to individuals with low SES having less access to health care (see summary, Andersen, Davidson, & Baumeister, 2014) and a more stressful life (Dohrenwend & Dohrenwend, 1970), ultimately leading to worse health outcomes and worse well-being, such as major depression and depressive symptoms (Adler et al., 1994b). In addition to experiencing higher level of stress, individuals with low SES are thought to be more affected by stressful events (Almeida, Neupert, Banks, & Serido, 2005), potentially because they are less likely to have the resources to cope with stress (Adler et al., 1994b). For example, in individuals with arthritis (Berkanovic et al., 1996; Downe-Wamboldt & Melanson, 1995; McIlvane, 2007) and chronic stress (Brantley, O’hea, Jones, & Mehan, 2002), those with lower SES have been reported to respond to their illness or stress with a higher level of maladaptive coping strategies compared to those with higher SES.

However, the early research on SES and coping did not specify the possible difference between objective SES and subjective SES on coping. From the research of SES and health, I expect that there is a stronger relationship between subjective SES and coping than objective SES and coping. Although objective measures of SES are useful in determining individuals' health and well-being, subjective SES, defined as how individuals *perceive* themselves in the society in relation to other people (Cantril, 1943; Centers, 1949; Jackman & Jackman, 1973; Kluegel, Singleton Jr, & Starnes, 1977) is thought to be more helpful in relation to health outcomes. For example, from a study consisting of 5486 participants, researchers found that subjective SES was a better predictor than objective SES of health status and decline in health status over time in middle-aged adults. One possible explanation for these results is that subjective SES is a more precise measure of social position (Singh-Manoux, Marmot, & Adler, 2005). Moreover, in Adler's (1994) study reported above, there was a *stronger* effect on coping strategies and health outcomes compared to objective SES. Therefore, I focus on subjective SES rather than objective SES in the current study.

Based on the above findings about SES effects on health outcome and coping style, I theorized that SES would be positively related to coping – that is, people from higher SES background would tend to employ a healthier constellation of coping strategies than people from low SES groups. As with empathy, this can manifest in two ways: (a) Using more adaptive coping strategies, and (b) using less maladaptive coping strategies.

4.1.3 The Moderating Effect of SES on Trait Empathy and Coping Strategies

Empathy is generally regarded as a positive characteristic; for example, social psychologists use empathy interventions to reduce aggression (Richardson, Hammock, Smith, Gardner, & Signo, 1994), and an extensive line of research has linked empathy with positive outcomes, such as altruism (Batson & Moran, 1999) and social competence (Davis, 1983). Despite these findings, recent research suggests there may be a dark side when over empathizing. For example, in the burnout literature, studies suggest that empathy plays a key role in

the development of negative outcomes including depression and physical exhaustion (e.g., Showalter, 2010). In a representative study of paramedics, individuals who reported more empathic interactions with clients experienced more sleep disturbance than those who were less empathic (Regehr, Goldberg, & Hughes, 2002). Empathy also predicts the onset of depressive symptoms for people with higher levels of social network distress (Schieman & Turner, 2001). The above findings highlight that the role of empathy is more complex than simply promoting positive constructs – thus, I reasoned that my predictions on the positive role empathy has on coping may in fact be also much complex, varying across people.

One possible moderator of the relationship between empathy and coping is SES. The existing literature on SES, empathy, and coping lent itself to two competing hypotheses: the *poor-protection* hypothesis and the *rich-protection* hypothesis. In the poor-protection hypothesis, I suggest that the benefit of empathy on coping is stronger for lower SES individuals than higher SES individuals. This hypothesis derives from the work looking at the negative link between SES and empathy itself. Lower SES individuals are more compassionate (Stellar, Manzo, Kraus, & Keltner, 2012a), more accurate in judging others' emotions (M. W. Kraus, Côté, & Keltner, 2010) and display stronger empathic neural responses (Varnum, Blais, Hampton, & Brewer, 2015). Findings also indicate that lower SES individuals orient themselves to the welfare of others as a mean to adapt to their more hostile environments (Piff, Kraus, Côté, et al., 2010). Because lower SES individuals experience less personal control and depend on others to achieve desired outcomes (Argyle, 1994; Domhoff, 1998), it is suggested that they should display more empathy, as being empathic toward others may be more important for them in coping with stress (Thoits, 1986). Thus, from a functional perspective, people lower in SES display more empathy than the rich because it plays a more vital role in their lives – it's an adaptive response. Therefore, the effects of empathy should be stronger for poorer individuals, leading to the prediction that the empathy – coping relationship will be stronger amongst low SES as compared to high SES people.

In contrast, the *rich-protection* hypothesis suggests that empathy has a stronger influence for the rich than the poor. Higher SES individuals have greater control over resources, reduced dependence on others, and increased ability to behave freely and independently of

others wishes and aspirations (Fiske, 1993; Fiske & Dépret, 1996). Some theorists have proposed that through such elevated personal independence, people are more likely to be guided by their preexisting dispositions (Côté, 2011). This idea was tested on a distinct but related concept: social power. In three studies, Côté et al. found that prosocial orientation was more strongly associated with empathic accuracy when power was high than when power was low. The relationship between prosocial orientation and empathic accuracy was stronger among the dispositionally powerful, people experimentally induced to feel powerful, and high-positioned employees in organizations. This research therefore suggests that the rich may be able to better extract the natural benefits of a trait – such as empathy – since they are more free to do so. Thus, if empathy in general boosts healthier coping, the rich should see an especially strong display of this effect.

4.1.4 Oxytocin as the Biological Antecedent of Empathy

In addition to my exploring empathy through self-report, I aimed to investigate whether the biological antecedent of empathy would also have an influence on coping strategies. Oxytocin, a hypothalamic neuropeptide, has been suggested to be just that. Numerous studies have linked oxytocin to prosociality (K. MacDonald & MacDonald, 2010b), trust (Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005a), empathy (Hurlemann et al., 2010), empathic accuracy (Bartz et al., 2010a), attachment (Buchheim et al., 2009), well-being (Ishak, Kahloon, & Fakhry, 2011), and emotional regulation (Quirin, Kuhl, & Düsing Rainer, 2011). Intranasal administration of oxytocin has been shown to attenuate neuroendocrine stress reactivity (Heinrichs, Baumgartner, Kirschbaum, & Ehlert, 2003), associated with decreased amygdala activation in response to threatening stimuli (Domes, Heinrichs, Gläscher, et al., 2007; Kirsch, 2005) and dampened stress response (Heinrichs, von Dawans, & Domes, 2009).

Here, I examined individual differences in the rs53576 polymorphic site of oxytocin receptor gene (OXTR), which is localized in single copy to chromosome 3 of the human genome (Gimpl, Fahrenholz, & Gene, 2001). In humans, a single-nucleotide polymorphism (SNP) of an adenine (A) or guanine (G) within intron 3 of the OXTR gene (rs53576) has

been associated with difference on empathy and related constructs. For instance, this genetic variation has been associated with the degree of warm and empathic parenting displayed toward offspring; in particular, individuals with one or two copies of the A allele, when compared to those homozygous for the G allele, display less parental sensitivity (Bakermans-Kranenburg & van IJzendoorn, 2008). Individuals with 2 G alleles, have better ability to understand people's emotions (Wu, Li, & Su, 2012), show more compassionate displays toward one's romantic partner (Kogan et al., 2011), have higher trait empathy and empathic accuracy (Rodrigues, Saslow, Garcia, John, & Keltner, 2009), prosocial temperament (Tost et al., 2010), and more engagement in charitable activities (Poulin, Holman, & Buffone, 2012). Moreover, individuals with the GG genotype perform better on an empathic accuracy task than individuals with the AA/AG genotypes, as measured by the "Reading the Mind in the Eyes" Test, report higher dispositional empathy than individuals with the AA/AG genotypes, as measured by Davis Interpersonal Reactivity Index (1983) (Rodrigues et al., 2009). OXTR rs53576 is also closely germane to stress regulation. For example, GG genotype individuals displayed lower physiological and dispositional stress reactivity than AA/AG individuals (Rodrigues et al., 2009), women with the GG genotype of rs53576 felt the most positive affect after the stressor (Moons, Way, & Taylor, 2014), GG genotype individuals displayed significantly higher levels of sympathetic reactivity to psychological stress and lower awakening cortisol levels and less variation in salivary cortisol across the day as compared to A carrier individuals (Norman et al., 2012).

Even though there is a lack of research on a direct test of rs53576 on coping, OXTR rs53576 is associated with the tendency to seek emotional support during periods of distress in individuals for whom explicit support-seeking is culturally normative (Kim et al., 2010). Specifically, individuals with the GG or AG genotypes self-reported on a free recall task a higher tendency to seek social support relative to those with the AA genotype. However, I am unaware of any studies that have generalised the genotype difference on daily stress coping.

It is worth emphasizing that genetic variants usually interact with the environment, individual differences, or culture to influence behaviors. Jay Belsky's psychiatric research on behavior-gene-environment ($G \times E$) interaction suggested individuals with certain genes

could protect themselves in maladaptive environments from using maladaptive coping strategies, and lead to better health outcomes in the end (see summary, Belsky & Pluess, 2009). Caspi et al. (2003) found that individuals with one or two copies of the short allele of the 5-HT T promoter polymorphism exhibited more depressive symptoms, diagnosable depression, and suicidality in relation to stressful life events than individuals homozygous for the long allele, demonstrating that serotonin transporter (5-HT T) gene could function as a buffer for some susceptible individuals. Related to coping, only Americans (and not Koreans) showed an effect for rs53576 in emotional support seeking (Kim et al., 2010): Whereas GG Americans (as compared to GA/AA) engaged in less emotional suppression, GG Koreans engaged in more emotional suppression (Kim et al., 2011). American culture tends to heavily support independent self-construal (Hofstede & Pedersen, 2002); thus, the above cultural differences in the effects of rs53576 are suggestive of a potential moderation effect. I thus hypothesize that the influence of rs53576 genotype on coping may vary across different groups of individuals.

Collectively, the above outline the case for oxytocin in general – and the rs53576 OXTR SNP in particular – being a biological antecedent of individual differences in empathy, and is related to coping with stress. I reasoned that individuals homozygous for the G allele of rs53576 should have higher empathy, and thus (1) use healthier coping strategies, especially in using social support, and (2) show an especially positive relationship between having two copies of the G allele and better coping strategies amongst people with different SES. These hypotheses mirror the above hypotheses for empathy in general.

4.1.5 Present Studies

In the present research, I tested two core hypotheses across 5 studies: (1) that empathy (both operationalized by surveys and differences in rs53576 OXTR) is positively related to healthy coping strategies (more adaptive coping strategies and/or less maladaptive coping strategies), and (2) that people from different SES backgrounds show different relationships between empathy and coping – following either of my two competing hypotheses, poor-protection vs rich-protection.

In Study 1, I first aimed at deciding the structure of coping strategies using exploratory factor analysis. I also tested my hypotheses, as I looked at the main effect of empathy on coping, and how subjective SES interacted with empathy to influence coping. In Study 2, I validated the structure of coping strategies using confirmative factor analysis, and I aimed to replicate the results from Study 1 in a new sample of participants. For both Study 1 and Study 2, I used MTurk for recruitment; however, given the problem of biased participant sample on MTurk (Berinsky, Huber, & Lenz, 2012; Goodman, Cryder, & Cheema, 2013), I recruited for Studies 3 and 4 two other big samples from different resources to replicate the results from Studies 1 and 2. Study 3 was collected through the survey panel Tellwut, and Study 4 was collected through the survey panel Cint – participants answered the same questions as in Study 1 and Study 2. Finally, in Study 5, I looked at the effect of the genetic variations of the rs53576 of the OXTR in a sample of 373 British Caucasian participants recruited from the Cambridge Bioresource center. This last study was aimed to determine the potential biological bases of the moderating role of subjective SES on the relationship between empathy and coping

4.2 Study 1

4.2.1 Method

Participants

Four hundred participants from the United States were recruited via Amazon MTurk for the study, after removing participants who had duplicated entries and those who had incomplete cases, 390 participants (Male = 180, $M_{\text{age}}(SD) = 35.36(10.57)$) were included for the analysis.

Measures

BRIEF Cope. The BRIEF Cope (Carver, 1997) inventory was used to measure people's coping strategies. This inventory has 28 questions and consists of 14 subscales – 2 questions

per subscale (reliability: all primary loadings exceeded .40 and 22 out of 28 were above .60, (Carver, 1997)). Each of the subscale measures a different coping mechanism, namely: self distraction, active coping, denial, substance use, use of emotional support, Use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humor, acceptance, religion, and self-blame. Participants rated on a 4-point likert scale the extent to which they agreed with each statement (from 1 “*Not at all*” to 4 “*Very much*”). Questions included “I’ve been taking action to try to make the situation better” (Active coping), “I’ve been giving up the attempt to cope” (Behavioural disengagement). The questionnaire’s overall Cronbach’s alpha is above .70.

Trait Empathy. I used the Empathic Concern subscale from the Interpersonal Reactivity Index (IRI) (Davis, 1980) to assess individuals’ “other-oriented” feelings of sympathy and concern for unfortunate others. IRI was designed to measure a specific component of generic empathy, reflecting Davis’ conceptualization of empathy as a multidimensional construct involving both cognitive and affective processes. The IRI is a 28 item self-reported empathy measure composed of four 7-item subscales. Each item is answered on a 5-point likert scale ranging from “not true of me at all” (scored 0) to “frequently true of me” (scored 4) The empathic concern subscale is designed to test the capacity to experience feelings of compassion, warmth, and concern in response to other people. Example questions from the empathic concern subscale are like “I often have tender, concerned feelings for people less fortunate than me” and “Sometimes I don’t feel very sorry for other people when they are having problems”. Empathic concern’s Cronbach’s alpha is .80. I averaged the score from 7 items in empathic concern to get a trait empathy score.

Subjective Socioeconomic Status (Subjective SES) I used the subjective socioeconomic status “ladder” task (Adler, Epel, Castellazzo, & Ickovics, 2000a) as a measurement of individuals’ socioeconomic status. Participants were instructed to look at a picture of a ladder and to think of this ladder as representing where people stand in the United States. At the top of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off –

who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the people at the very bottom. “Where would you place yourself on this ladder?” Participants were instructed to select one of the 10 options (1 being the worse off and 10 being the best off).

4.2.2 Results

Analytical Plan

I used R studio 3.1 for my data analysis. To examine the factor structure of the coping strategies, I conducted principal component analysis on the 14 subscales. Once the factors were selected, I ran the analyses in four steps: in Step 1, I tested the relationship of empathy on coping; in Step 2, I considered how empathy and SES influenced coping at the same time; in Step 3, I tested the interaction of empathy and SES on coping; in the last step, I explored the relationship between empathy and coping for high and low SES individuals.

Exploratory Factor Analysis

I built the factor analysis using the 14 subscales using Principle Component Analysis (PCA) with varimax as the rotation method. I chose to build the factors using sub scales following (Carver, 1997) in the development of the COPE questionnaire, and many other studies (see the meta-analysis (Krägeloh, 2011). Cattell’s Scree Test suggested 2, 3, 4 factors. I chose 3 factors as my final factor structure for two main reasons: first, the 4-factor model yielded more double-loadings greater than 0.3, and the 2-factor model generated factors in which subscales in the factors disagree with factors in other studies with 2 factors; second, Krägeloh’s 2011 meta-analysis suggested the median number of factors using subscale-level PCA was three. In my factor analysis, four subscales, venting, humor, religion and self-distraction did not enter any of the three factors because their loadings were lower than 0.40. Four subscales loaded highest on the first factor (eigenvalue = 2.54), accounting for 19% of the total variance: active coping, positive reframing, planning, and acceptance. The

second factor (eigenvalue = 1.94) was composed of 2 subscales and accounted for 15% of the total variance: use of instrumental support and use of emotional support. The third factor composed of four subscales (eigenvalue = 1.64) and accounted for 14% of total variance: denial, substance use, behavioural disengagement, and self-blame. I named the three factors adaptive coping, use of social support (or social support for short), and maladaptive coping, accordingly. I summarized the three factors and the subscales in the following table.

Table 4.1 Three Factors for Coping and Subscales in Each Coping Style

Factor	Subscale	Eigenvalue and adjusted R ² (Square)
1. Adaptive coping	Active coping	Eigenvalue = 2.54; $R^2 = .19$
	Positive reframing	
	Planning	
	Acceptance	
2. Social support	Use of instrumental support	Eigenvalue = 1.94; $R^2 = .15$
	Use of emotional support	
3. Maladaptive coping	Denial	Eigenvalue = 1.64; $R^2 = .14$
	Substance use	
	Behavioural disengagement	
	Self blame	

Table 4.2 Study 1 Participants' Means and Standard Deviations on the Measure of SES, Empathy, and Coping Strategies

	SES	Empathy	Adaptive coping	Social support	Maladaptive coping
<i>M</i>	4.63	2.75	3.14	2.67	1.85
<i>SD</i>	1.65	.89	.48	.75	.55

Main analyses

Before running the regression models, I centered SES and empathy and used these centers rather than raw scores in the regression models.. Results are shown in Table 4.3. M1 shows the results of the model exploring the relationship between trait empathy and coping, M2 shows the results of the model when considering both empathy and subjective SES on coping, and M3 shows the results when including empathy \times SES into the model. As reflected by M1

Table 4.3 Regression models in Study 1

(a) Regression Models for Adaptive Coping in Study 1

	M1 (Empathy)				M2 (Empathy + SES)				M3 (Empathy × SES)			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.169	.026	6.432***	.118, .221	.170	.026	6.558***	.119, .221	.173	.026	6.646***	.122, .224
SES					.049	.014	3.513***	.022, .076	.050	.014	3.576***	.022, .077
Empathy × SES									.019	.016	1.171	-.002, .007
<i>R</i> ²	0.97				.125				.128			
Adjusted <i>R</i> ²	0.94				.120				.121			
<i>F</i>	41.37***				27.46***				18.78***			

p* < .05, *p* < .01, ****p* < .001

(b) Regression Models for Social Support in Study 1

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.245	.041	5.92***	.164, .327	.247	.021	6.224***	.169, .326	.255	.040	6.415***	.177, .334
SES					.125	.021	5.843***	.083, .167	.127	.021	5.968***	.085, .169
Empathy × SES									.048	.024	1.971*	0, .096
<i>R</i> ²	0.083				.125				.128			
Adjusted <i>R</i> ²	0.081				.154				.16			
<i>F</i>	35.05***				36.1***				25.54***			

p* < .05, *p* < .01, ****p* < .001

(c) Regression Models for Maladaptive Coping in Study 1

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	-.080	.031	-2.573*	-.141, -.019	-.081	.031	-2.644**	-.141, -.021	-.088	.030	-2.906**	-.148, -.029
SES					-.058	.016	-3.537***	-.090, -.026	-.060	.016	-3.701***	-.092, -.028
Empathy × SES									-.048	.019	-2.543*	-.084, -.011
<i>R</i> ²	0.017				.048				.064			
Adjusted <i>R</i> ²	0.014				.043				.056			
<i>F</i>	6.619*				9.663***				8.689***			

p* < .05, *p* < .01, ****p* < .001

and M2, I found that both empathy and SES were positively related to adaptive coping and social support, and were negatively related to maladaptive coping. Importantly, as suggested by M3, I found a significant interaction between the two factors for Social support and Maladaptive coping, with a positive interaction for Social support, and a negative interaction for maladaptive coping.

To explore the direction of interaction for social support and maladaptive coping, in the last step, I conducted simple slopes analyses to assess the effect of empathy on coping

strategies at different levels of SES. I specifically analysed how empathy influenced coping for individuals with SES one standard deviation lower than the mean SES (low SES) and for individuals with SES one standard deviation higher than the mean SES (high SES). The simple slope analysis suggests that empathy is positively related with usage of social support for both high SES and low SES people, but that it influences the higher SES ($b = .335$, 95% CI [.218, .452], $SE = .045$, $t(384) = 5.640$, $p < .001$) more than the lower SES individuals ($b = .176$, 95% CI [.070, .282], $SE = .053$, $t(384) = 3.271$, $p = .001$). Empathy was negatively related to the use of maladaptive coping strategies for high SES people, $b = -.167$, 95% CI [-.257, -.078], $SE = .045$, $t(384) = -3.670$, $p < .001$, but not for low SES people, $b = -.009$, 95% CI [-.092, -.028], $SE = .041$, $t(384) = -.243$, $p > .5$. I display two types of figures to visualize the interaction results. Figure 4.1a,4.1c,4.1e displays the interaction results between empathy and SES coping for individuals with +/- 1SD of mean SES, and Figure 4.1b,4.1d,4.1f illustrates a more continuous influence of empathy on coping for different SES levels. I plot the effects for all three types of coping for comprehensiveness. These findings support the rich-protection hypothesis: empathy trait protects the rich from using maladaptive coping and helps them use more social support.

The results of Study 1 are summarized in Table 4.10.

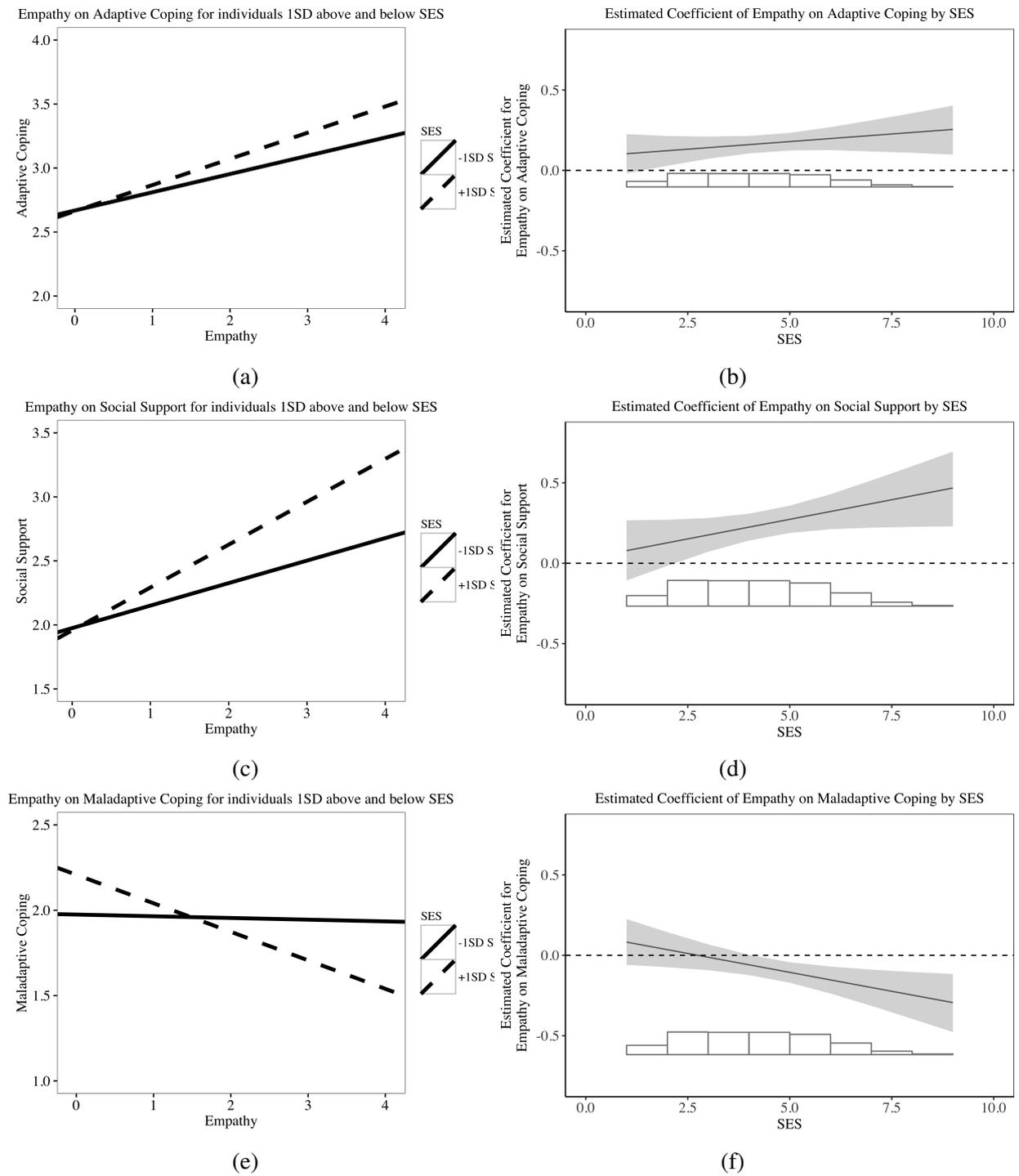


Fig. 4.1 *Left*: Simple slope result for +/- 1SD SES individuals for Study 1. *Right*: Simple slope result for +/- 1SD SES individuals for Study 1.

4.3 Study 2

4.3.1 Method

Participants and Procedure

Another 400 participants from the United States were recruited via Amazon MTurk for the study, after removing participants who had duplicated entries and those who had incomplete cases, 394 participants (Male = 196, $M_{\text{age}}(SD) = 34.70(11.20)$) entered the final analysis. Participants followed the identical procedure and completed identical measures to Study 1.

4.3.2 Results

Analytical Plan

I used Study 2 to validate the factor structure of coping strategies using confirmatory factor analysis (CFA). I then applied the same analysis steps as in Study 1 to test the relationship between empathy and coping strategies, and how SES moderated the effect.

Confirmatory Factor Analysis

The three-factor model fit the data well, $CFI = 0.96$, $RMSEA = 0.08$, $SRMR = 0.06$. The CFA results confirmed the factorial validity of Coping strategies among MTurk users in the United States.

Table 4.4 Study 2 Participants' Means and Standard Deviations on the Measure of SES, Empathy, and Coping Strategies

	SES	Empathy	Adaptive coping	Social support	Maladaptive coping
<i>M</i>	4.78	2.86	3.06	2.67	1.83
<i>SD</i>	1.60	.88	.52	.78	.58

Main Analyses

Similar to Study 1, before running the regression models, I centered SES and empathy, and used the centered scores in my models. I did the same analyses as in Study 1, and

displayed the results in Table 4.5. Similarly to what was found in Study 1, empathy and SES both were positively related to adaptive coping and social support, but negatively related to maladaptive coping, suggesting a positive link between empathy and better coping, and a positive relationship between SES and better coping strategies. However, contrary to Study 1, I did not replicate the positive interaction results between empathy and SES on Social Support and Maladaptive coping; additionally, I found a negative interaction between empathy and SES on adaptive coping.

Table 4.5 Regression models in Study 2

(a) Regression Models for Adaptive Coping in Study 2

	M1 (Empathy)				M2 (Empathy + SES)				M3 (Empathy × SES)			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.253	.027	9.361***	.200, .306	.257	.027	9.635***	.204, -.309	.253	.026	9.541***	.201, -.305
SES					.054	.014	3.721***	.025, -.083	.052	.014	3.630***	.024, -.081
Empathy×SES									-.035	.016	-2.132***	-.068, -.003
<i>R</i> ²	0.182				.210				.219			
Adjusted <i>R</i> ²	0.180				.206				.213			
<i>F</i>	87.62***				52.17***				36.61***			

p* < .05, *p* < .01, ****p* < .001

(b) Regression Models for Social Support in Study 2

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.321	.042	7.641***	.238, .403	.326	.041	7.898***	.245, .407	.323	.041	7.804***	.241, .404
SES					.086	.023	3.799***	.042, .131	.085	.026	3.738***	.040, .129
Empathy×SES									-.031	.026	-1.222*	-.082, .019
<i>R</i> ²	.130				.161				.164			
Adjusted <i>R</i> ²	.127				.156				.157			
<i>F</i>	58.39				37.41				25.47			

p* < .05, *p* < .01, ****p* < .001

(c) Regression Models for Maladaptive Coping in Study 2

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	-.120	.033	-3.637***	-.185, -.055	-.123	.033	-3.75***	-.187, -.059	-.124	.033	-3.763***	-.189, -.059
SES					-.046	.018	-2.57*	-.082, -.011	-.047	.018	-2.584***	-.082, -.011
Empathy×SES									-.008	.020	-0.406	-.048, -.032
<i>R</i> ²	.033				.049				.049			
Adjusted <i>R</i> ²	.030				.044				.042			
<i>F</i>	13.22				10.01				6.714			

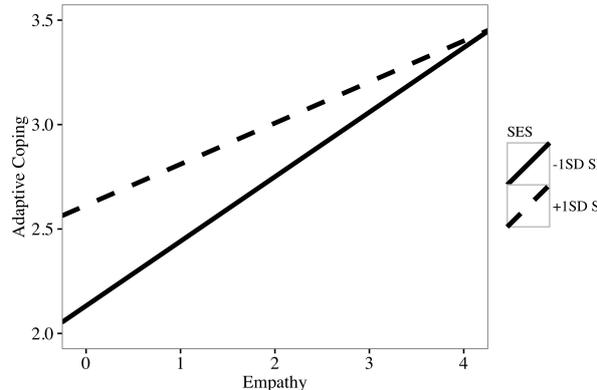
p* < .05, *p* < .01, ****p* < .001

Similar to Study 1, I ran a simple slope analysis of empathy on adaptive coping for individuals with +/-1 SD around mean SES, and results suggest that empathy has a positive

relationship for both lower SES (-1 SD than mean) and higher SES (+1 SD than mean) individuals, but the influence was bigger for the relatively poor, $b = .310$, 95% CI [.238, .381], $SE = .036$, $t(391) = 8.503$, $p < .001$ than the relatively rich, $b = .197$, 95% CI [.121, .273], $SE = .039$, $t(391) = 5.097$, $p < .001$. This finding supports the poor-protection hypothesis, helping the poor to use more adaptive coping.

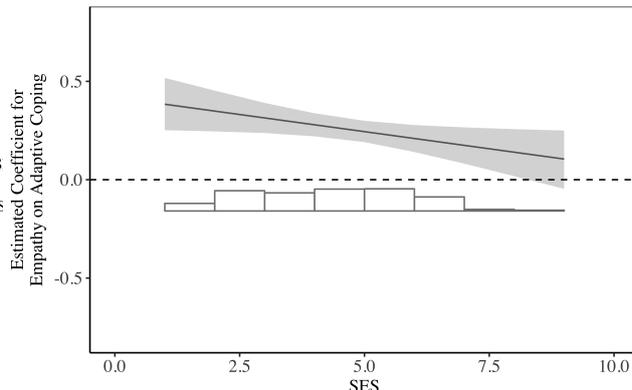
The results of Study 2 are summarized in Table 4.10.

Empathy on Adaptive Coping for individuals 1SD above and below SES



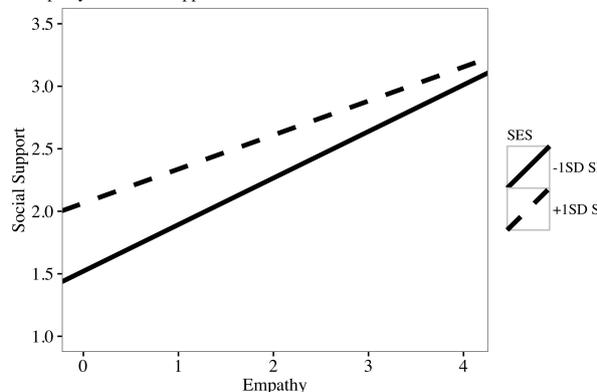
(a)

Estimated Coefficient of Empathy on Adaptive Coping by SES



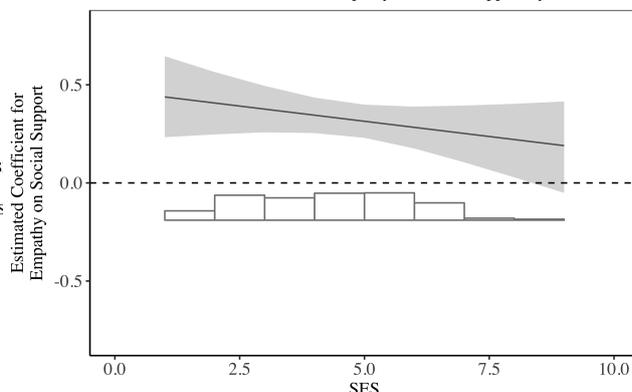
(b)

Empathy on Social Support for individuals 1SD above and below SES



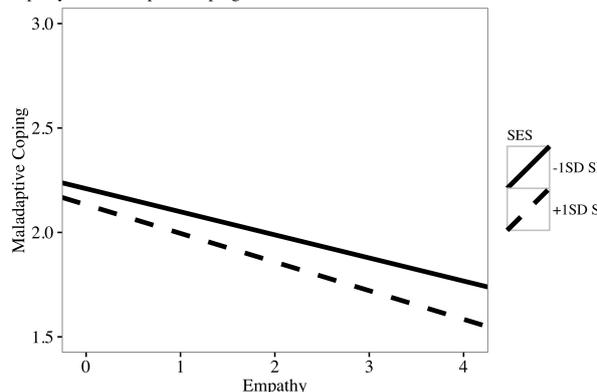
(c)

Estimated Coefficient of Empathy on Social Support by SES



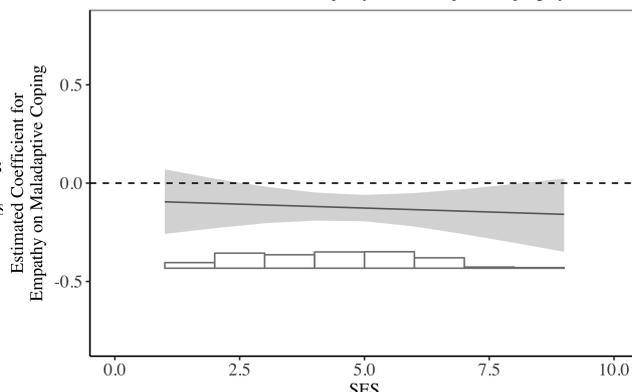
(d)

Empathy on Maladaptive Coping for individuals 1SD above and below SES



(e)

Estimated Coefficient of Empathy on Maladaptive Coping by SES



(f)

Fig. 4.2 *Left*: Simple slope result for +/- 1SD SES individuals for Study 2. *Right*: Influence of Empathy on Coping for Different SES Individuals in Study 2.

4.4 Study 3

4.4.1 Method

Participants

I recruited 2000 participants from the United States via the survey panel Tellwut, after removing participants who had duplicated entries and those who had incomplete cases, 1606 participants (Male = 331, $M_{\text{age}}(SD) = 22.99(13.23)$) entered the final analysis. All procedures and measures were identical to Study 1 and Study 2.

4.4.2 Results

Table 4.6 Study 3 Participants' Means and Standard Deviations on the Measure of SES, Empathy, and Coping Strategies

	SES	Empathy	Adaptive coping	Social support	Maladaptive coping
<i>M</i>	5.04	2.93	2.46	2.21	1.65
<i>SD</i>	1.96	.71	.33	.49	.44

As in Studies 1–2 (see Tables 4.3 and 4.5), I found that empathy was positively related to adaptive coping, social support, and negatively related to maladaptive coping. SES was also positively linked to adaptive coping and social support; however, in contrast to my previous studies, I found a positive, rather than negative, link between SES and maladaptive coping. Yet the empathy \times SES interaction was significant for both social support and maladaptive coping.

In the last step, I explored the effect of empathy on social support and maladaptive coping for high (1SD above mean) and low (1SD below mean) SES individuals. Results suggest that the positive influence of empathy was stronger for the lower SES, $b = .206$, 95% CI [.161, .252], $SE = .023$, $t(1539) = 8.846$, $p < .001$, than higher SES people, $b = .112$, 95% CI [.066, .158], $SE = .023$, $t(1539) = 4.797$, $p < .001$. Empathy was also negatively related to the usage of maladaptive coping, and this effect was stronger for the rich, $b = -.249$, 95% CI [-.290, -.208], $SE = .021$, $t(1539) = -11.87$, $p < .001$, than the poor, $b = -.062$, 95%

Table 4.7 Regression models in Study 3

(a) Regression Models for Adaptive Coping in Study 3

	M1 (Empathy)				M2 (Empathy + SES)				M3 (Empathy × SES)			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.165	.011	14.74***	.143, .187	.173	.011	15.577***	.141, .195	.173	.011	15.572***	.151, .194
SES					.027	.004	6.865***	.020, .035	.027	.004	6.801***	.019, .035
Empathy×SES									-.003	.005	-.542	-.014, .008
<i>R</i> ²	.124				.150				.150			
Adjusted <i>R</i> ²	.123				.149				.148			
<i>F</i>	217.3				135.4				90.36			

p* < .05, *p* < .01, ****p* < .001

(b) Regression Models for Social Support in Study 3

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.147	.017	8.527***	.113, .180	.160	.017	9.406***	.126, .193	.159	.017	9.420***	.126, .193
SES					.046	.006	7.587***	.034, .058	.045	.006	7.358***	.033, .057
Empathy×SES									-.024	.008	-2.919**	-.040, -.008
<i>R</i> ²	.045				.079				.085			
Adjusted <i>R</i> ²	0.044				.078				.083			
<i>F</i>	72.71***				66.47***				47.37***			

p* < .05, *p* < .01, ****p* < .001

(c) Regression Models for Maladaptive Coping in Study 3

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	-.160	.015	-10.45***	-.190, -.130	-.155	.015	-10.092***	-.185, -.125	-.155	.015	-10.245***	-.185, -.126
SES					.019	.006	3.393***	.008, .029	.016	.005	2.929**	.005, .027
Empathy×SES									-.048	.007	-6.480***	-.062, -.033
<i>R</i> ²	0.066				.073				.098			
Adjusted <i>R</i> ²	0.066				.072				.096			
<i>F</i>	109.3***				60.77***				55.59***			

p* < .05, *p* < .01, ****p* < .001

CI $[-.103, -.021]$, $SE = .021$, $t(1539) = -2.949$, $p < .01$. Thus, for social support, I found support for the poor-protection hypothesis, yet for maladaptive coping, I found support for the rich-protection hypothesis.

The results are summarized in Table 4.10. Study 3 partially replicated the results in Study 1 and 2. First, empathy's positive main effect on adaptive coping and social support fully replicated the results in Study 1 and 2. For the empathy \times SES interaction, there was a negative interaction of social support, which was different from Study 1 (positive) and 2 (no significance). There was a positive interaction on adaptive coping and a negative interaction on maladaptive coping, both replicating Study 1 and Study 2. Since Study 3 could not solve the inconsistency problem for the interaction on social support, I decided to change to another survey panel and replicate the same study with another big sample.

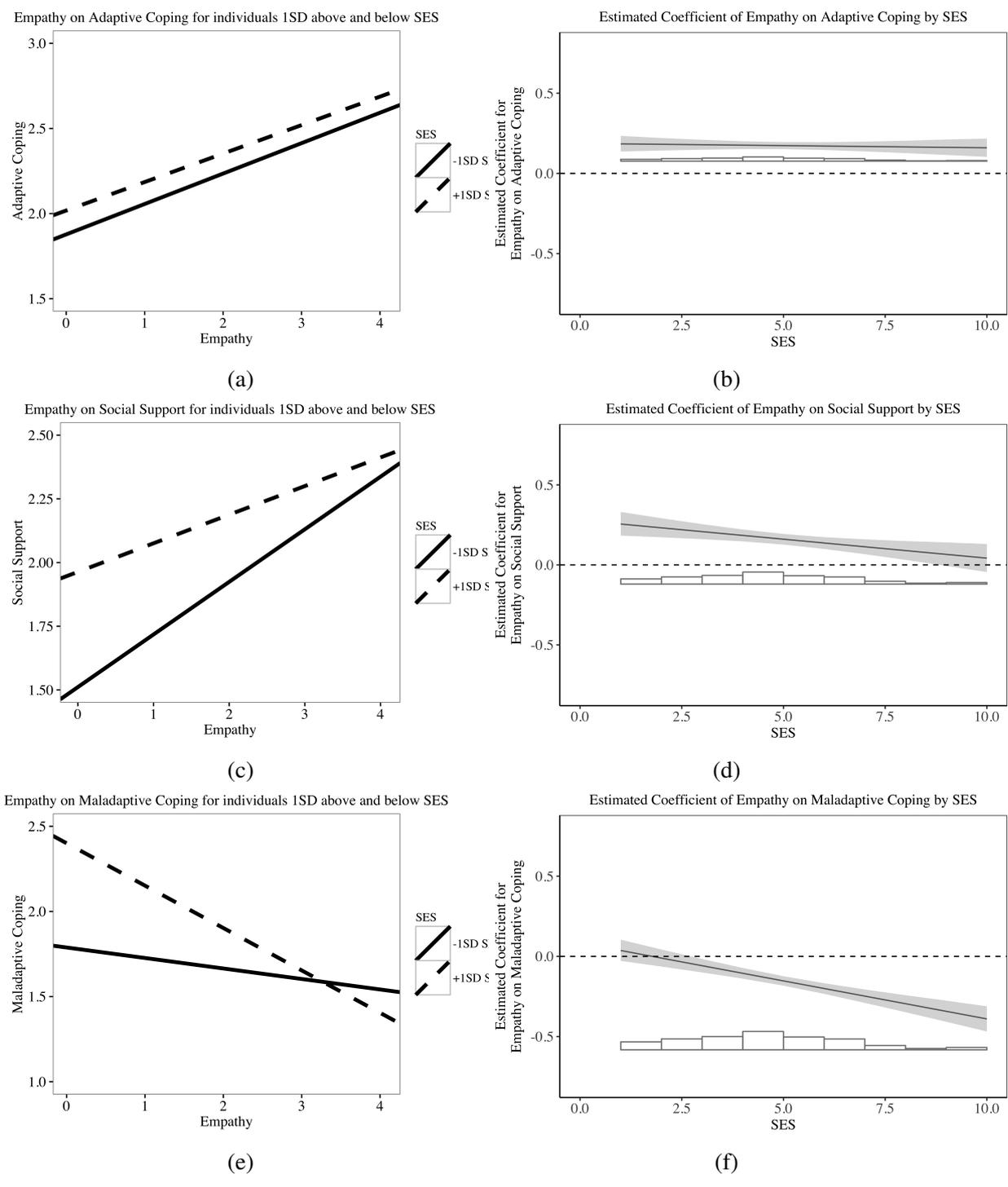


Fig. 4.3 *Left*: Simple slope result for +/- 1SD SES individuals for Study 3. *Right*: Influence of empathy on coping strategies for different SES individuals.

4.5 Study 4

4.5.1 Method

Participants

I recruited 1200 participants from the United States via the survey panel Cint, after removing participants who had duplicated entries and those who had incomplete cases, 1132 participants (Male = 537, $M_{\text{age}}(SD) = 41.06(12.55)$) entered the final analysis. Measures and procedures were identical to the previous studies.

4.5.2 Results

Table 4.8 Study 4 Participants' Means and Standard Deviations on the Measure of SES, Empathy, and Coping Strategies

	SES	Empathy	Adaptive coping	Social support	Maladaptive coping
<i>M</i>	5.72	3.14	2.86	2.45	1.95
<i>SD</i>	2.15	.69	.69	.86	.73

Statistical analysis procedure was the same as in Study 1–3. I as before centered SES and empathy, and used the centered score in the regression models. In this sample, I found that (1) empathy was positively related to adaptive coping and social support, and negatively related to maladaptive coping. This result fully replicates those in Study 1–3. (2) When considering empathy and SES at the same time, SES was positively related to adaptive coping and social support, which was the same trend for Study 1–3, but also positively related to maladaptive coping, which was the same as in Study 3, but opposite to Study 1–2. (3) When considering SES as a moderator for empathy and coping, I found that it moderated the relationship for all three coping styles. More specifically, there was a negative moderation between SES and empathy for adaptive coping, social support, and maladaptive coping. Detailed results were shown in Table 4.9.

Similar to previous studies, I conducted simple slope analysis for individuals with relatively low (1SD below mean) and relatively high (1SD above mean) SES individuals.

Table 4.9 Regression models in Study 4

(a) Regression Models for Adaptive Coping in Study 4

	M1 (Empathy)				M2 (Empathy + SES)				M3 (Empathy × SES)			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.199	.030	6.618***	.140, .258	.231	.030	7.817	.173, .289	.218	.030	7.382***	.160, .276
SES					.073	.009	7.731***	0.054, .091	.067	.009	7.171***	.049, .086
Empathy×SES									-.054	.014	-3.853***	-.082, -.027
<i>R</i> ²	.040				.091				.104			
Adjusted <i>R</i> ²	.039				.089				.101			
<i>F</i>	43.80***				53.04***				40.77***			

p* < .05, *p* < .01, ****p* < .001

(b) Regression Models for Social Support in Study 4

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	.125	.038	3.273***	.050, .200	.176	.037	4.773***	.104, .248	.158	.037	4.290***	.086, .230
SES					.119	.012	10.175***	.096, .142	.112	.012	9.556***	.089, .135
Empathy×SES									-.076	.017	-4.359**	-.110, -.042
<i>R</i> ²	.010				.098				.114			
Adjusted <i>R</i> ²	.009				.097				.111			
<i>F</i>	10.71*				57.7***				45.32***			

p* < .05, *p* < .01, ****p* < .001

(c) Regression Models for Maladaptive Coping in Study 4

	M1				M2				M3			
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI
Empathy	-.200	.033	-6.14***	-.264, -.136	-.167	.032	-5.220***	-.230, -.105	-1.971	.031	-6.304***	-.258, -.136
SES					.075	.010	7.411***	.055, .095	.064	.010	6.410***	.044, .083
Empathy×SES									-.125	.015	-8.402***	-.154, -.096
<i>R</i> ²	0.034				.082				.140			
Adjusted <i>R</i> ²	0.033				.080				.137			
<i>F</i>	37.70***				47.41***				57.21***			

p* < .05, *p* < .01, ****p* < .001

Empathy was more strongly positively related to adaptive coping for the poor, $b = .334$, 95% CI [.256, .413], $SE = .040$, $t(1059) = 8.407$, $p < .001$, than the rich, $b = .102$, 95% CI [.014, .189], $SE = .045$, $t(1059) = 2.286$, $p = .022$. Empathy also was positively related to using more social support for people with low SES, $b = .322$, 95% CI [.225, .419], $SE = .050$, $t(1059) = 6.494$, $p < .001$, but not high SES, $b = -.006$, 95% CI [-.115, .103], $SE = .0564$, $t(1059) = -.107$, $p > .5$. For maladaptive coping, empathy was negatively related to the usage of maladaptive coping for the rich, $b = -.465$, 95% CI [-.558, -.373], $SE = .047$, $t(1059) = -9.871$, $p < .001$, but not for the poor, $b = .071$, 95% CI [-.011, .154], $SE = .042$, $t(1059) = 1.691$, $p = .09$. These results again lend support to both of my competing

hypotheses: in support of the poor-protection hypothesis, empathy increases the usage of adaptive coping and social support for the poor; and in support of the rich-protection hypothesis, empathy decreases the usage of maladaptive coping for the rich.

Similar to Study 1–3, I display the interaction results in two ways. Figure 4.4a, 4.4c, 4.4e displays the influence of empathy on coping for ± 1 SD SES individuals, and Figure 4.4b, 4.4d, 4.4f displays the coefficient of empathy on coping for individuals with a full range of SES.

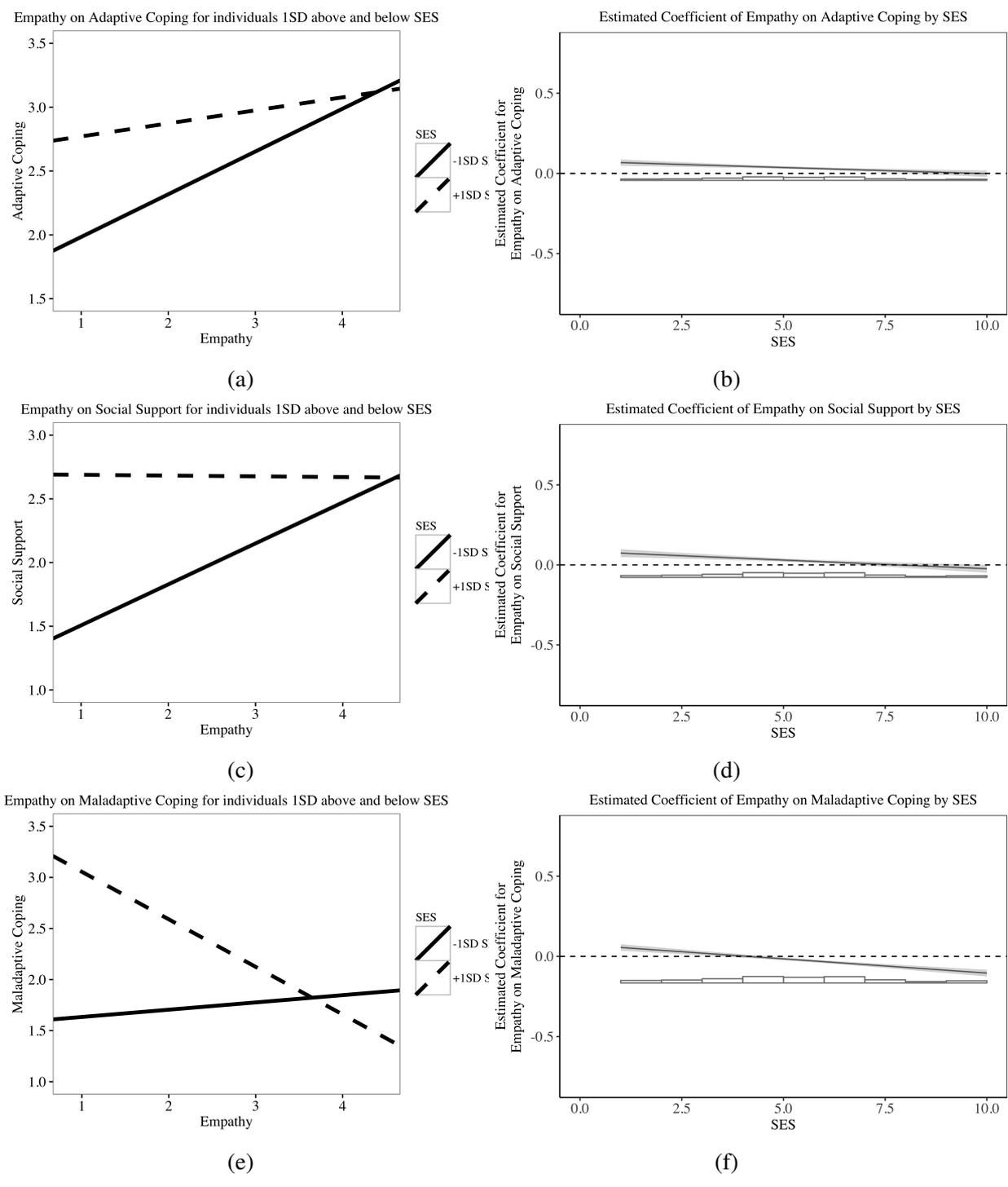


Fig. 4.4 *Left*: Simple slope result for +/- 1SD SES individuals for Study 4. *Right*: Influence of empathy on coping strategies for different SES individuals.

Summary of results from Study 1–4 is listed in Table 4.10.

Table 4.10 Results summary from Study 1 – Study 4

Study	Basic info	Outcome	Adaptive coping	Social support	Maladaptive coping
Study 1	Mturk	Empathy's main effect	+	+	–
	$n = 390$	Interaction	NA	+	–
	male = 180	Simple slope-poor	NA	+	NA
	age = 35.36 (10.57)	Simple slope-rich	NA	++	–
Study 2	Mturk	Empathy's main effect	+	+	–
	$n = 394$	Interaction	–	NA	NA
	male = 196	Simple slope-poor	++	NA	NA
	age = 34.70 (11.20)	Simple slope-rich	+	NA	NA
Study 3	Tellwut	Empathy's main effect	+	+	–
	$n = 1606$	Interaction	NA	–	–
	male = 331	Simple slope-poor	NA	++	–
	age = 22.99 (13.23)	Simple slope-rich	NA	+	--
Study 4	Cint	Empathy's main effect	+	+	–
	$n = 1132$	Interaction	–	–	–
	male = 537	Simple slope-poor	++	+	NA
	age = 41.06 (12.55)	Simple slope-rich	+	NA	–

4.6 Study 5

4.6.1 Method

Participants

Participants were recruited from the Cambridge Bioresource Centre: A panel of over 15,000 volunteers who donated their DNA via blood or saliva sample and who consented in being approached for research studies. For the purpose of the study, 430 participants took part in the survey, 57 entries did not include enough information for analyses, thus were removed from the final analyses, making the final sample size 373 Caucasian White participants (Male = 142, Female = 224 females, 1 whose gender was not reported), $M_{\text{age}}(SD) = 48.46(11.16)$, age ranged 18-72 years old. Participants' OXTR Receptor Genotype was nearly evenly distributed, GG = 123, AG = 126, AA = 124 – this was purposeful as I asked the BioResource to recruit participants in roughly equal numbers across the three genotypes in order to compare them. I did not have access to the patient's database but only collected emails from the participants who consented in taking part in the study. I received participants' genotype information from the BioResource Centre after all participants' personal information (name and email) were deleted. All measures were identical to the previous studies.

Study Procedure

Participants were recruited via emails sent by the Cambridge BioResource Centre. Participants interested in taking part consented electronically and completed a series of online questionnaires. The study was designed and run online. The study took approximately 20 minutes to complete and participants were compensated for their time with a £5.00 Amazon gift card. This study received ethical approval from the University of Cambridge Research Ethics Committee.

Confirmatory Factor Analysis

Compared to Study 1–4, Study 5 was conducted in the UK. To confirm the validity of my three-factor model, I ran another CFA. The three-factor model fit the data well, $CFI = .94$, $RMSEA = .07$, $SRMR = .05$. The CFA results confirmed the factorial validity of coping strategies among a community sample in UK.

Analysis Plan

In previous oxytocin genetic research conducted in western countries, given the limited number of AA individuals, many studies combined AG and AA into the same gene group. Here, I was able to recruit in equal numbers across the genotypes, making it possible to analyze GG, AG and AA as three different gene types. I dummy-coded the oxytocin genotype GG, AG, and AA. Since I had three genotypes, I first used AA genotype as the reference group, creating two variables AG (participants with AG genotype coded as 1, others coded as 0) and GG (participants with GG genotype coded as 1, others coded as 0). This way, I could compare AG and GG to AA individuals. To compare GG vs AG individuals, and AA vs AG individuals, I used AG genotype as the reference group, creating two variables GG (participants with GG genotype coded as 1, others coded as 0) and AA (participants with AA genotype coded as 1, others coded as 0).

I first ran a linear regression to examine whether there was a genetic difference in the level of adaptive coping, social support, and maladaptive coping. I used the dummy-coded genotype as predictor, coping strategies as outcome.

Second, I conducted a series of hierarchical regression analyses to test the gene \times SES interaction hypothesis that SES would moderate the relationship between OXTR (IV) and usage of coping strategies (DV). SES was normally distributed in this sample, so I did not further normalize it but I centered it before the hierarchical regression analysis. At Step 1, OXTR and SES were entered as predictors, coping strategies entered as outcome. At Step 2, OXTR, SES, and the two-way interaction of OXTR and SES were entered as predictors. The moderator effect was indicated by a significant interaction of OXTR genotype and SES on individuals' coping strategies. It is worth mentioning that I did not consider adaptive coping,

social support, and maladaptive coping together in one model because comparing these three coping styles at the same time was not the main aim of this study. Similar to Study 1–4, I did the regression analyses for adaptive coping, social support, and maladaptive coping separately.

Last, for the models with a significant result on the interaction terms, I did simple slope analyses for individuals with low SES (1SD lower than mean SES) and for individuals with high SES (1SD higher than mean SES), to examine how individuals with different genotypes use coping strategies differently if they have different SES.

4.6.2 Results

Participants' descriptive results on SES and coping strategies are shown in Table 4.11.

Table 4.11 Study 5 Participants' Means and Standard Deviations on the Measure of SES, Empathy, and Coping Strategies

	SES	Adaptive coping	Social support	Maladaptive coping
<i>M</i>	6.00	3.33	2.86	1.77
<i>SD</i>	1.46	.40	.76	.50

I first tested whether individuals with different genotype differed on using different coping strategies. my models suggested that genotype did not predict the usage of adaptive coping, $F(2, 357) = 1.291$, $p = .27$, nor maladaptive coping, $F(2, 357) = .200$, $p > .5$. People with different genotypes did differ on using social support, $F(2, 357) = 2.664$, $p = .07$. More specifically, GG ($Mean = 2.99$, $SE = .098$) genotype individuals used significantly more social support than AA ($Mean = 2.78$, $SE = .069$) genotype individuals, $t(357) = 2.152$, $p = .032$, and marginally more than AG individuals ($Mean = 2.82$, $SE = .097$), $t(357) = 1.809$, $p = .071$. Participants' usage of coping strategies in different genotypes was shown in Figure 4.5.

I then explored whether there was the hypothesized gene-SES interaction in coping. For adaptive coping, at Step 1, there was no genotype difference or SES influence on the usage of adaptive coping. At Step 2, when adding the interaction term, as expected, there was an

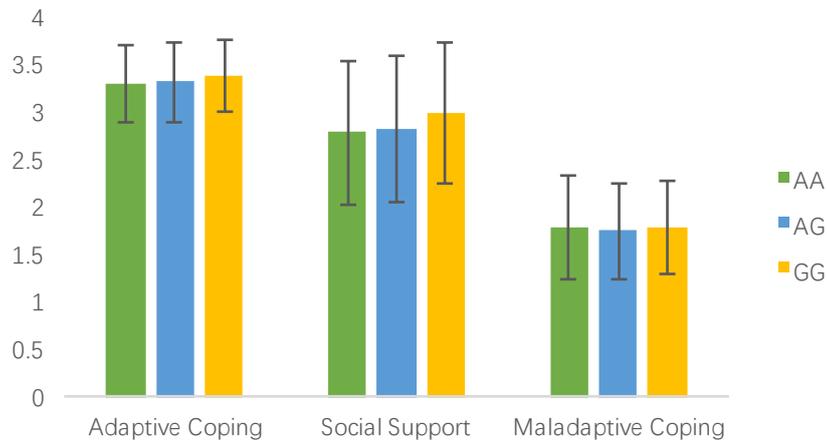


Fig. 4.5 Participants' Usage of Coping Strategies Across Different Genotypes.

interaction between genotype and SES on Adaptive coping. Results were displayed in Table 4.12.

Table 4.12 Hierarchical Regression Results for Adaptive Coping (with AA genotype as reference)

	Step 1				Step 2				Difference between Step 1 and Step 2
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	
SES	.026	.015	1.747	-.003, .055	.082	.026	3.115***	.030, .133	
GG	.077	.053	1.453	-.027, .180	.065	.053	1.243	-.038, .169	
AG	.010	.052	.198	-.092, .113	.006	.052	.112	-.096, .108	
SES×GG					-.082	.037	-2.226*	-.155, -.010	
SES×AG					-.081	.036	-2.263*	-.151, -.011	
<i>R</i> ²	.016				.034				
Adjusted <i>R</i> ²	.007				.020				
F	1.861				2.454*				3.307*

* $p < .05$, ** $p < .01$, *** $p < .001$

My simple slope analyses suggested, for individuals with lower SES (1SD below the mean SES), individuals with GG genotype used more adaptive coping strategies than individuals with AA genotype ($Mean = 3.433$), $b = .185$, 95% CI [.043, .327], $SE = .072$, $t(349) = 2.558$, $p = .01$. There was no difference between individuals with GG, AG, and AA genotypes using adaptive coping ($Mean_{AA} = 3.425$, $Mean_{AG} = 3.342$, $Mean_{GG} = 3.380$, all $ps > .1$) for individuals with higher SES (1SD above the mean SES). Similar to Study 1–4, I

visualize the interaction results in two ways (Figure 4.6). The bar plot shows how individuals with 1SD below mean SES (low SES) and 1SD above mean SES (high SES) with different genotypes used various coping strategies. And the line plot showed how individuals with different genotypes used different coping strategies for those with different SES.

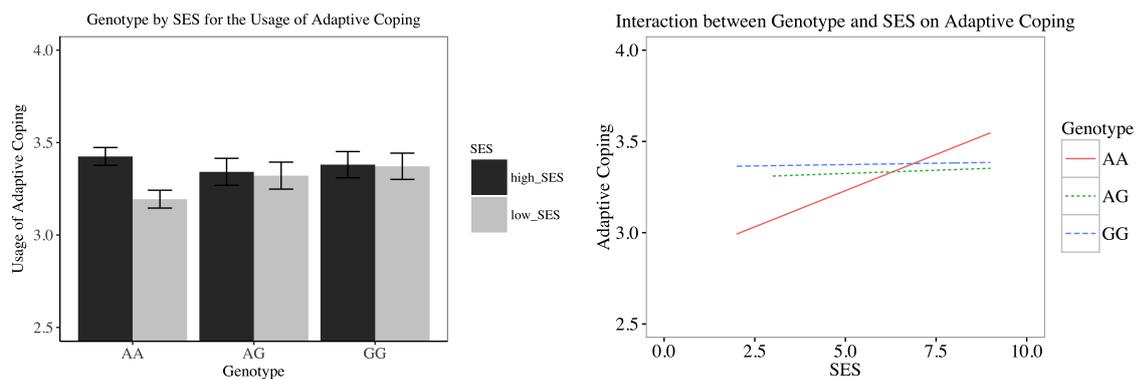


Fig. 4.6 Interaction between Genotype and SES on Adaptive Coping

For the usage of social support, at Step 1, I found no SES influence on using social support, but individuals with GG genotype used more social support than AA individuals, as reflected in the linear regression results reported before. In Step 2, I did not find the Genotype \times SES interaction on social support. Results were reported as in Table 4.13.

Table 4.13 Hierarchical Regression Results for Social Support

	Step 1				Step 2				Difference between Step 1 and Step 2
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	
SES	-.017	.028	-.630	-.072, .037	.034	.050	.695	-.063, .132	
GG	.230	.099	2.332*	.036, .424	.220	.099	2.220*	.025, .414	
AG	.050	.098	.515	-.142, .242	.049	.098	.495	-.144, .241	
SES \times GG					-.065	.069	-.933*	-.202, .072	
SES \times AG					-.084	.067	-1.253	-.217, .048	
R^2	.018				.023				
Adjusted R^2	.009				.009				
F	2.124				1.609				.433

* $p < .05$, ** $p < .01$, *** $p < .001$

Since there was no interaction between genotype and SES, no further simple slope analyses were conducted. For completeness however, I display the results in Figure 4.7.

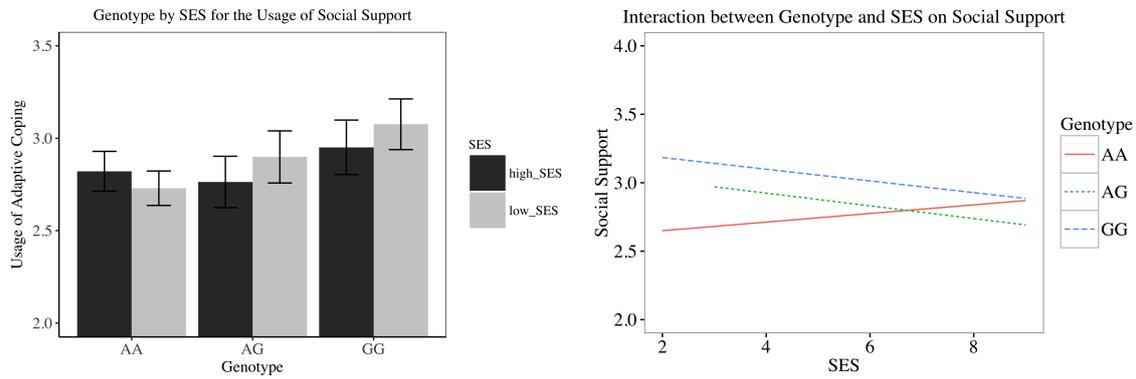


Fig. 4.7 Interaction between Genotype and SES on Social Support

For maladaptive coping, at Step 1, there was no influence of genotype on the usage of maladaptive coping. However, there was a negative relationship between SES and use of maladaptive coping, suggesting that higher SES individuals were less likely to use maladaptive coping strategies. At Step 2, when adding the interaction term, I found the hypothesized genotype \times SES interaction. Comparing Step 2 and Step 1, the difference between these two models was marginally significant, $F(2, 349) = 2.960$, $p = .053$. More specifically, I found the interaction came from AG vs AA (results see Table 3.3), GG vs AG individuals (interaction: $b = -.098$, 95% CI $[-0.185, -0.011]$, $SE = .044$, $t(349) = -2.205$, $p = .028$).

Table 4.14 Hierarchical Regression Results for Maladaptive Coping

	Step 1				Step 2				Difference between Step 1 and Step 2
	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	<i>b</i>	<i>SE</i>	<i>t</i>	95% CI	
SES	-.053	.018	-2.862**	-.089, -.017	-.081	.033	-2.460*	-.145, -.016	
GG	.005	.066	.076	-.124, .134	.010	.066	.148	-.119, .139	
AG	-.015	.065	-.235	-.143, .113	-.025	.065	-.380	-.153, .103	
SES \times GG					-.011	.046	-.246	-.102, .079	
SES \times AG					.086	.044	1.933	-.002, .174	
R^2	.024				.040				
Adjusted R^2	.016				.027				
F	2.875*				2.928*				2.960 ($p = .053$)

* $p < .05$, ** $p < .01$, *** $p < .001$

I conducted simple slope analysis for lower SES (1 SD below mean) and higher SES (1 SD above mean) individuals. Results suggest that for lower SES individuals, GG individuals were marginally more likely to use maladaptive coping than AG individuals ($Mean_{AG} = 1.742$),

$b = 0.177$, 95% CI $[-.011, .364]$, $SE = 0.095$, $t(349) = 1.856$, $p = 0.064$. The simple slope analyses suggest that in my study, even though not significant, AG genotype individuals tended to be least likely to use maladaptive coping compared to GG and AA genotype individuals in the relative lower SES group. In another word, when SES relatively low, individuals with AG genotype protected the individuals from using maladaptive coping strategies.

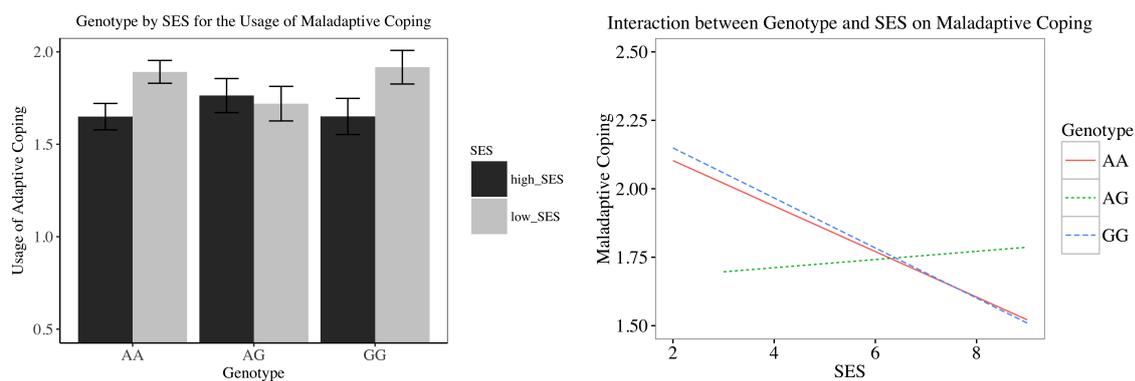


Fig. 4.8 Interaction between Genotype and SES on Social Support

4.7 Discussion

In the present paper, I aimed to explore the relationship between trait empathy and general coping strategies; in addition, I examined how individuals' subjective socioeconomic status moderated the relationship between empathy and coping. I tested my hypothesis in five studies across nearly 4000 participants in United States and United Kingdom, using both questionnaire and genotype analysis. In Studies 1–4 I replicated the same procedure across different recruitment platforms to examine the stability of the results. I asked participants to report their subjective SES and their coping strategies when dealing with daily stress. In Study 5, I asked individuals with oxytocin receptor gene OXTR rs53576 genotypes AA, AG, GG to report their subjective SES and coping strategies, to test the whether the biological antecedent of empathy would also have an influence on coping strategies. Results were mixed. I consistently found that having higher empathy is related to the usage of more adaptive coping strategies and seeking social support, as well as using fewer maladaptive coping

strategies. I also found that the influence of trait empathy on the choice of coping strategies differ between the relatively poor and relatively rich. In Studies 1–4, I found support for both the *poor-protection* and *rich-protection* hypotheses. In particular, for adaptive coping and social support, the poor tended to benefit more from empathy (support for the *poor-protection* hypothesis); however, for maladaptive coping, the rich tended to benefit the most from empathy (*high-protection* hypothesis). It is important to note, however, that these interactions were inconsistent across studies – in some studies, they would result in highly significant effects, whereas in others they would be only trending effects. In Study 5, I found that individuals with GG genotype were more likely to use social support than AG (marginally) and AA individuals. This was in line with previous research (Kim et al., 2010). I also found a Genotype \times SES interaction on adaptive coping and maladaptive coping, which was consistent with Study 1–4.

The inconsistency in the interactions deserves special attention. The interaction and simple slope analysis for the usage of Social Support was the least consistent. There was a positive interaction in Study 1, no interaction in Studies 2 and 5, and a negative interaction in Studies 3 and 4. This inconsistency might be due to the factor itself. There were only two subscales in the social support factor. Even though (Harvey, Billings, & Nilan, 1985) suggested that at least four items per scale are needed to test the homogeneity of items within each latent construct, other researchers recently also suggested that it is possible to retain a factor with only two items if the items are highly correlated (i.e., $r > .70$) and relatively uncorrelated with other variables (Worthington & Whittaker, 2006). In my sample in Study 1, the “use of emotional support” subscale and “use of instrumental support” subscale were highly correlated, $r > .80$. This might have partly contributed to the inconsistent interaction results on Social support.

For the negative interaction results on adaptive coping and maladaptive coping, I found significant interactions in Studies 2 and 4 for adaptive coping, and interactions in Studies 1, 3, and 4 for maladaptive coping. In Studies 1–2, I recruited participants from Amazon MTurk. Even though Amazon MTurk has been popular among social scientists, researchers have pointed out the potential problems with these samples, such as 10% of workers are

responsible for completing 41% of tasks, and that more experienced workers are more familiar with classic paradigms within behavioral sciences (e.g., Chandler, Mueller, and Paolacci (2014); see also Fort, Adda, and Cohen (2011)), which suggests that their prior experiences may influence their responses in research studies. Even though in my studies, I did not use popular research paradigms such as moral dilemmas, the key questionnaire measuring trait empathy, Interpersonal Reactivity Index (IRI) was a popular one. This may have partly contributed to the inconsistent results in Studies 1–2. For Study 3, I did not find an interaction between empathy and SES on adaptive coping, but the interaction for social support and maladaptive coping were the same as in Study 4. Participants in Study 3 were recruited from the survey panel Tellwut; however, the average age was significantly lower than those recruited from MTurk (around 35) and Cint (around 41). The gender imbalance may also be a problem for the sample in Study 3 (21% men). Even though after controlling for gender and age, results did not change, there might be other problems in the sample of Study 3 that are equally skewed, but not measured.

The questionnaire results in studies 1–4 suggest that there was indeed a relationship between empathy and people’s usage of coping strategies; thus, in Study 5, I intended to examine whether there was a biological foundation under this relationship. I chose to test whether the oxytocin receptor gene rs53576, long suggested to relate to one’s empathy level, would influence individuals’ coping strategies. Individuals with different genotypes did not differ on the usage of adaptive coping or maladaptive coping; however, individuals with GG genotype were more likely to use social support than individuals with AG and AA genotypes. I also found a genotype \times SES interaction on adaptive coping and maladaptive coping. Moreover, in line with Study 1 to 4, low SES individuals with rs53576 GG genotype were more likely to use adaptive coping strategies than AA individuals, but there were no differences between genotypes amongst high SES participants. For maladaptive coping, even though there was a genotype \times SES interaction, participants with GG genotype performed similarly to AA genotype individuals, and lower SES participants with AG genotype used fewer maladaptive coping strategies than lower SES participants with GG and AA genotypes. This effect is inconsistent with the rest of the results in several ways. First, I had previously

found that empathy was negatively related to maladaptive coping strategies, yet the rs53576 results follow a more inverted U-shaped curve (with AG being associated with lower levels of maladaptive coping compared to AA and GG). Second, I had consistently found a negative interaction between SES and empathy for maladaptive coping; however, the interaction was positive between AG and SES. Given this inconsistency, there is clearly a need to replicate these results before making any strong conclusions about the effects of rs53576 on coping (and how SES moderates this link).

The current research has several implications for theory and research in the coping literature. This is the first project to explore the relationship between empathy and daily coping styles. In previous research, empathy's influence on coping was limited to relationship-focused coping only, and in the stress and burnout literature, there were inconsistent results as to whether empathy would help or worsen work burnout. Supporting my first hypothesis that empathy is positively related to better coping strategies, my research consistently suggests that individuals high in empathy use more adaptive coping and social support, and less maladaptive coping. This result suggests a direction for health research and practice: improving empathy may help people use more adaptive and fewer maladaptive coping strategies. My results also supported my second hypothesis: empathy's beneficial influence on coping was not uniform across all individuals; rather, empathy interacted with SES to influence coping. I proposed the *poor-protection* and *rich-protection* hypotheses, and the results suggest that both hypotheses yield accurate predictions, depending on the specific coping strategies considered. The specificity suggests different pathways for improving people's coping toolkits. For instance, for lower SES people, I suggest it might be most prudent to focus on reducing their maladaptive coping strategies through interventions – since empathy on its own seems ineffective amongst this group for reducing maladaptive coping. On the other side, for people with high SES, it would be sensible to focus on the adaptive coping strategies through interventions, even among the highly empathic.

This study was also the first to explore whether individuals with different oxytocin receptor gene, with genotype GG, AG and AA, differ in using coping strategies. I found that individuals with GG genotype were more likely to use Social support than individuals

with AG and AA genotypes. To my knowledge, there is no previous study exploring how the genotype rs53576 influences individuals' coping strategies, and my findings suggested that having two G alleles could help the relatively poor to use more Adaptive coping when facing stress.

My project has several limitations. Most obviously, I did not fully replicate the results throughout Study 1–4. There might be two reasons for this. First, as discussed earlier, all the participants I recruited in studies 1–4 were through online survey panels and were from three different survey panels. Participants recruited from Amazon MTurk had an average age around 35 years old, participants from Tellwut had an average age of 23 years old, and those from Cint had an average age 41 years old. Even though when controlling for age, the results held in all studies, participants' difference may not have been limited to the age differences. Indeed, there is likely a key moderator I did not measure. This may lead to the inconsistent results in the questionnaire studies. Second, participants were asked to report how they coped with their daily stress. In previous literature on coping, participants were asked to report how they cope with certain stress, such as disease or care giving. Because in the present project participants were asked about daily stress in general rather than a particular stress, participants may have been referring to different types of stress when answering the question, which may have contributed to the inconsistent results in studies 1–4. Future studies may limit the examination to a certain situation and examine whether the same effect holds.

A second limitation was the correlational nature of all the studies, preventing me from drawing causal conclusions. I could not conclude that empathy was the reason that participants used more adaptive coping strategies and social support, and fewer maladaptive coping strategies. To draw a causal link between empathy and tendency to use different coping strategies, lab experiments are needed for future studies.

A third limitation was that I did not consider cultural variance in the link between empathy and coping strategies. A whole body of research has explored how individuals from different cultures may seek help and support when facing stress; for example, a review of studies on culture and social support presents evidence that Asians and Asian Americans are more reluctant to explicitly ask for support from close others than are European Americans

because they are more concerned about the potentially negative relational consequences of such behaviors (Kim, Sherman, & Taylor, 2008). In this study, all of my participants were recruited from Western countries (US and UK), limiting my results within the individualistic cultures. Future research should explore whether the influence of empathy on coping, and the interaction of empathy and SES, replicates in collectivistic cultures.

My exploration for the genetics influence on coping was also preliminary. Even though I partly replicated results from studies 1–4 on the both the main effect and interaction effect on coping, it is worth mentioning that many genetic studies fail to replicate (Ioannidis, Ntzani, Trikalinos, & Contopoulos-Ioannidis, 2001), and ideally, a genetic study would have sample sizes in the thousands. To solve this problem, future researchers may consider the method of meta-analysis, taking stock of the available evidence, especially in domains with diverging sample sizes and contrasting outcomes (Bakermans-Kranenburg & van IJzendoorn, 2008).

Finally, future research is needed to understand the mechanism behind the moderation effect. I have hypothesized why this moderation might occur, but I have not tested the exact reasons. Future research should further explore why empathy had different protection mechanisms for the lower vs higher SES individuals.

To conclude, my project was the first one to explore how trait empathy influenced coping with daily stress, and how this relationship differs among the poor vs the rich. Results of this project are beneficial for healthcare, stress, wellbeing and burnout research area, as well as for policy makers. Future researchers may explore the causal relationship between empathy and coping, as well as in a closer look at coping in different scenarios, cultures, etc.

Chapter 5

Oxytocin Increases Emotional Theory of Mind, But Only for The Low Socioeconomic Status Individuals

5.1 Introduction

Oxytocin, a neuropeptide synthesized in the hypothalamus, has generated substantial interest in psychology as well as within the popular press as a potential biological substrate of social processes (see Bartz, Zaki, Bolger, & Ochsner, 2011a for review). Dubbed the “love hormone”, oxytocin has been linked to social cognition and functioning in animals and humans, in processes such as empathy, empathic concern, trust, prosociality, and well-being (Dölen, Darvishzadeh, Huang, & Malenka, 2013; Hicks et al., 2012; Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005b; Lim & Young, 2006; Lukas et al., 2011; Onaka, Takayanagi, & Yoshida, 2012). This has made oxytocin a prime candidate for playing a key role in the underlying mechanisms behind many socio-emotional behaviours, such as being able to recognize and understand other people’s emotions, also known as emotional theory of mind (eToM, Baron-Cohen & Belmonte, 2005). In the present work, I focus on eToM in particular because of it is a basic ingredient in many higher order social processes. Numerous studies have investigated the link between oxytocin and eToM, but the results have been heavily

mixed – with some studies finding a positive relationship, while numerous failing to find a main effect (see review, Leppanen et al. (2017)). Although the inconsistencies in results could be partly explained by the fact that studies have used small sample sizes, a variety of tasks, and looked at a set of diverse populations (males, females, healthy, clinical, etc), Bartz et al. (2011a) proposed that the main reason for non-replicable effects in the oxytocin literature is moderation by context and individual differences (Bartz, Zaki, Bolger, & Ochsner, 2011c).

There is some evidence that suggests that the inconsistent results in the oxytocin-eToM literature can be explained by socio-emotional differences (e.g., empathy, Feeser et al. (2015)), and those who are low in the socio-emotional sensitivity benefit most from oxytocin application. Here I propose an additional moderator: Socio-economic status (SES). SES, how individuals perceive themselves in the society in relation to other people (Cantril, 1943), is closely related to nearly all aspects of life such as health, academic performance, and child and brain development (Bradley & Corwyn, 2002; Sirin, 2005b; Sobal & Stunkard, 1989). Individuals low in SES have fewer resources, limited access to health care and education, more stress in their life, and are subject to worse health outcomes (i.e., Adler et al. (1994b)). Therefore, low SES individuals have greater needs than the high SES individuals for more interdependence and better interpersonal skills. Based on this greater need, it is unsurprising that researchers have documented that low SES individuals are better at empathic accuracy and mentalising ability than their high SES counterparts (M. W. Kraus, Huang, & Keltner, 2010).

I thus proposed the Mitigation SES hypothesis: SES negatively moderates the link between oxytocin and eToM, in that low subjective SES individuals show an especially pronounced positive effect of oxytocin on eToM as compared to high SES individuals. To test my hypothesis, I aimed to (1) replicate previous findings that intranasal oxytocin spray improved eToM and the effect was moderated by context factors such as test item difficulty, then (2) examine the moderating effect of SES on the oxytocin-eToM. To do so, I conducted a double-blind, between-subjects nasal spray experiment following the most widely used methods in the literature to ensure consistency with previous work.

5.1.1 Oxytocin and Emotional Theory of Mind

Past studies on oxytocin and eToM have generated inconsistent results. So far, nine peer-reviewed published articles have examined this relationship. Three of them found a main effect (Cardoso, Ellenbogen, & Linnen, 2014; Domes, Heinrichs, Michel, Berger, & Herpertz, 2007; Feeser et al., 2015) and six did not (Leppanen et al., 2017; Luminet, Grynberg, Ruzette, & Mikolajczak, 2011; Radke & de Bruijn, 2015; Riem, Bakermans-Kranenburg, Voorthuis, & van IJzendoorn, 2014; Woolley et al., 2014, 2016). All but one study used the RMET as a measure of eToM, making it the most widely used task. Five of them looked at moderating factors, such as task difficulty, participants' trait empathy, and level of alexithymia (alexithymia is a personality construct characterized by the subclinical inability to identify and describe emotions in the self) (Sifneos, 1973). Not all studies considering the moderating effect also contributed to the inconsistent findings for this topic.

In the first ever study, (Domes, Heinrichs, Michel, et al., 2007) conducted a double-blind, randomized, placebo-controlled, within-subject design experiment on 30 healthy male volunteers. They found that oxytocin improved performance on the RMET compared with placebo, and this effect was limited to difficult but not to easy items. Recently, two studies have specifically attempted to replicate Domes' original study. Feeser et al. (2015) conducted a double-blind, between-subjects, placebo-controlled experiment on 71 male participants. They used the same research method as Domes', and similarly, they found that oxytocin overall improved emotional ToM, and when looking closer only for difficult but not for easy items. They also explored individual differences and found that oxytocin specifically enhanced mentalizing accuracy in participants with lower empathy scores. The second direct replication study was conducted on 24 males (Radke & de Bruijn, 2015). In this randomized, placebo-controlled, double-blind, within-subjects design study, the authors found that oxytocin did *not* overall affect mind-reading, neither in general nor when considering specific item characteristics. However, they found that individuals low in emotional empathy showed greater improvement after oxytocin administration compared to placebo on RMET score. These studies therefore confirmed that oxytocin improves the ability to infer the mental state of others from cues in the eye region for difficult trials (context

as a moderator) (Feeser et al., 2015) and that individual differences such as empathy seem to moderate this relationship (Feeser et al., 2015; Radke & de Bruijn, 2015).

Besides these two direct replications of Domes' original study, five other studies tested the relationship between oxytocin and RMET on healthy participants indirectly (Leppanen et al., 2017; Luminet et al., 2011; Radke & de Bruijn, 2015; Riem et al., 2014; Woolley et al., 2014, 2016). Luminet et al. (2011) found that alexithymia moderated this relationship as individuals with higher alexithymia scores (which means low emotional recognition ability) were the ones benefiting the most from oxytocin. Riem et al. (2014) found that the effect of oxytocin on RMET were only present in individuals reporting higher levels of maternal love withdrawal. Finally, neither Woolley et al. (2014, 2016) or Leppanen et al. (2017) found any main effect of oxytocin on RMET.

There may be several explanations for the incongruent results found in the above literature. First, the experiment designs were different across studies: Participants' gender, between- or within-subjects design, and the time between nasal spray and the task time (see supplementary material Table 1 for details) all varied. Second, the sample size of all the studies were relatively small: Within-subject design studies had number of participants ranging from 20 to 33, and between-subject design studies had number of participants ranging from 50 to 84, which meant that none of the studies reached 80% power (Faul, Erdfelder, Lang, & Buchner, 2007). Finally, only five studies considered moderating effects, trying to explain the influence of oxytocin on emotional ToM with individual differences (personality and empathy) and context differences (easy or difficult items).

5.1.2 Relationship between SES and eToM

Researchers in sociology and social psychology have long explored the influence of SES on social cognition and behaviours. SES permeates social life, determining participation in social institutions (Oakes & Rossi, 2003b), relating to preferences for artistic and cultural symbols (Bourdieu, 1985), influencing language and word usages (Bernstein, 1960) and vulnerability to health problems and coping strategies (Adler et al., 1994b). Recently, researchers started to explore how SES influences eToM and other related interpersonal interaction ability.

The case for lower SES individuals having higher emotional processes and mentalising is predicated on the thesis that low SES individuals (compared to their high SES counterparts) have greater needs to accurately interpret the intentions of others (Thomas, 1972; Henley, 1977; M. W. Kraus, Piff, Mendoza-Denton, Rheinschmidt, & Keltner, 2012b; Magee & Smith, 2013). Higher mentalizing ability is especially adaptive for lower SES individuals because their welfare may depend on discerning the intentions, moods, desires, and attitudes of those with higher status. People with low SES can use the knowledge they acquire in this manner to predict the behaviour of higher others and thereby adjust their own behaviour (Hall, Mast, & Latu, 2015). Empirical data supports this analysis. For example, one paper (M. W. Kraus, Côté, & Keltner, 2010) reported that the high school educated participants were better able to accurately identify the emotions in facial expressions than college educated participants in a standard measure of empathic accuracy: When participants were manipulated to feel like they were of lower social class, they performed better than the upper-class individuals on the RMET; Lower subjective SES participants, were more accurate in judging specific emotions of their partner relative to upper-class participants in a mock job interview study.

Lower SES individuals' better empathic accuracy and higher mentalising ability may come from their dependence on forces in the external social context than their higher SES counterparts (e.g., Keltner, Gruenfeld, and Anderson (2003b); M. W. Kraus and Keltner (2009b)). Because of this increased dependence, lower SES individuals tend to focus their attention disproportionately on the context and, in particular, on other people. This makes SES a potential moderator in the oxytocin-eToM relationship.

5.1.3 SES as a potential moderator for oxytocin-emotional ToM relationship

Several studies have now documented that the impact of oxytocin on social cognition and behaviours is stronger for those who are relatively low in baseline socio-emotional levels. For example, Bartz et al. (2010b) reported that oxytocin effects on empathic accuracy are proportional to the level of autistic traits of the participants. The authors conclude that oxytocin

only improves empathic accuracy for participants who are less socially proficient at baseline. Quirin et al. (2011) demonstrated that the effect of oxytocin on stress-contingent cortisol release depends on baseline emotion regulation abilities, and individuals with low emotion regulation abilities benefit from oxytocin application (Quirin et al., 2011). Supporting this notion, Leknes et al. (2012) showed that differences in baseline emotional sensitivity predict the effects of oxytocin on the accuracy rate for hidden emotional expressions. In particular, they found that participants with low performance-based emotional sensitivity showed greater task improvement following oxytocin application. And as mentioned before, participants with low empathy score benefited most in RMET under oxytocin condition compared to placebo condition (Feeser et al., 2015; Radke & de Bruijn, 2015).

These research results are in accordance with the opinion that oxytocin administration may increase sensitivity to social salience cues and that the interpretation of these cues may be influenced by interpersonal factors such as socio-emotional levels. Other interpersonal factors include sex and hormonal status (for review see K. S. MacDonald (2012)), attachment style (Bartz et al., 2010b), or the presence of psychiatric symptoms (Pedersen et al., 2011). Yet no study has yet directly tested whether individuals' SES moderates the effect of oxytocin application. Since oxytocin application improves the performance of eToM, and those with lower baseline benefit most from oxytocin, I hypothesize that low subjective SES individuals would show an especially pronounced positive effect of oxytocin on emotional ToM, and that individuals high in subjective SES would show either a reduced or negligible effect.

5.1.4 Present study and hypotheses

In the present study, I tested three aims. First, I aimed to replicate previous findings on the relationship between oxytocin administration and emotional ToM measured by RMET. Because only three out of nine previous studies had found a main effect, I did not expect to find a main effect either. I also aimed at replicating the moderating effect of item difficulty in Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015) – in particular, whether oxytocin boosted accuracy for difficult, but not easy, items. Second, I tested the relationship between subjective SES and emotional ToM measured by RMET. I used subjective SES as

a measurement of SES because my participants in this study were mainly recruited from University of Cambridge, which were mainly students, thus their income and education level could not correctly represent their SES. I hypothesized that lower SES individuals had enhanced performance on RMET after oxytocin application.

To test these three aims, I employed a between-subjects study in which 147 Caucasian male participants were randomly allocated to either oxytocin or placebo condition, and did the RMET. Participants also reported their subjective SES by placing themselves on the “ladder” task.

5.2 Method

5.2.1 Participants

One hundred and forty-seven Caucasian male participants ($M_{\text{age}} = 24.54$; $SD_{\text{age}} = 5.75$) living in Cambridge, UK took part in the study. Only male participants were included because previous studies have reported inconsistent gender effects following OXT application (Domes et al., 2010; Kubzansky, Mendes, Appleton, Block, & Adler, 2012; Lischke et al., 2012). Participants were invited via various mailing lists, including lab pools and student lists, posters distributed around the city and university buildings, social media, and words of mouth. Inclusion criteria included being Caucasian, male, between 18 and 55 years old, not diagnosed with any psychological problems in the past 5 years, being fluent in English, and not taking any medication regularly. Participants taking temporary medication for cough/cold/hay fever were asked to take part in the study at least one week after they stopped taking the medication. They were asked to abstain from food and drink (other than water) for 2 hours before the experiment and from alcohol, smoking, and caffeine for 24 hours before the experiment. Each participant was paid £25 for taking part in the study. Ethical approval was granted by the Cambridge Research Ethics Committee.

5.2.2 Procedure

The study used a randomized, double-blind, between-subject experimental design. Participants were individually tested on a single visit during which they received either oxytocin or placebo. 73 participants were in the oxytocin group and 74 participants were in the placebo group. Before the experimental session, participants received a full description of the study via email and were asked to complete an online consent form followed by a battery of questionnaires, including a question on their subjective SES. Only data on their subjective SES was reported in the current paper. Upon arrival, the experimenter obtained written consent and asked the participant to verbally describe the aims of the study, the experimental procedure and potential risks to ensure that participants were aware of what the study entailed. A medical doctor then briefly talked to the participant to confirm details of their medical history and their suitability for the study, and instructed the participant on how to self-administer a single dose of 24 IU oxytocin (three puffs per nostril, each with 4IU OT) or placebo intra nasally. This amount was the same as Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015) studies. To monitor any potential adverse reactions to oxytocin, participants had their blood pressure measured three times during the study: once after signing the consent form (before receiving the spray), once 35 minutes after having received the spray, and a third time at the end of the study. After the oxytocin administration, participants waited in a quiet room, and the battery of tasks started 40-min after the spray had been administered, in accordance with other studies. The whole tasks lasted for about 45min, and the RMET¹ was administered around 60min after the spray had been administered. This waiting time is similar to previous studies investigating the effect of oxytocin on human behavioral effects (Riem et al., 2014).

“Reading the Mind in the Eyes Test”

I measured participants’ theory of mind using the “Reading the Mind in the Eyes Test”. The test consisted of 36 photographs of the eye region expressing a complex mental state.

¹Apart from the RMET, participants completed a series of tasks related to social cognition and behaviour. All other tasks and questionnaires were included to test hypotheses that are not relevant to the current study, and these results will not be reported in this paper.

The RMET requires participants to infer internal states of another individual from subtle differences in the eye region. The test's validity has been proven in clinical studies with autistic patients (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Craig, Hatton, Craig, & Bental, 2004; Guastella et al., 2010), as well as in healthy subjects (Gunther Moor et al., 2011; Hysek, Domes, & Liechti, 2012)

Participants read the following instructions: "For each set of eyes, choose and circle which word best describes what the person in the picture is thinking or feeling. You may feel that more than one word is applicable but please choose just one word, the word which you consider to be most suitable. Before making your choice, make sure that you have read all 4 words. You should try to do the task as quickly as possible but you will not be timed. If you really don't know what a word means you can look it up in the definition handout."

Photographs were presented one at a time with a grey background in the centre of the computer screen. Each photograph remained on the screen until the participant made a response. Four mental states labels (one target label and three distractor labels) were simultaneously presented on the screen. Participants were instructed to identify the mental state.

One practice trial was conducted at the beginning of the task to ensure participants understood the task properly. Participants could proceed to the formal task only if they answered the practice trial correctly. Participants repeated the practice trial until they answered it right then they moved on to the formal test. Each photograph was only shown once during the task. The maximum score of the test is 36 and the minimum is 0.

For each trial, the HIT rate (percent correct answers) was recorded. In order to investigate oxytocin effects as a function of task difficulty in line with Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015), I split the 36 items of the RMET into two subsets of easy and difficult items. I ranked the correct rate for each item, from low to high and decided the relatively easy and difficult items based on the following criteria: Items with correct rate lower than 80% were regarded as "difficult" items (including 19 items), correct rate higher than 80% were regarded as "easy" items (including 17 items). This criterion was in line with

Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015) in which he divided the 36 items into two subsets of easy and difficult items.

Subjective SES

Participants reported their subjective SES using the “ladder task” (Adler, Epel, Castellazzo, & Ickovics, 2000b). Participants were instructed to look at a picture of a ladder and to “Think of this ladder as representing where people stand in the United Kingdom. At the top of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off – who have the least money, least education, and the least respected jobs or no job. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the people at the very bottom. Where would you place yourself on this ladder?” Participants were instructed to select one of the 10 options (1 being the worse off and 10 being the best off).

5.3 Results

Statistical Analysis

I used R studio 3.1 for my data analysis.

To achieve the first aim of replicating previous research results that oxytocin would improve RMET, I ran a linear regression. I dummy coded oxytocin condition 1 = oxytocin and 0 = placebo. In order to test whether item difficulty influenced the oxytocin-RMET relationship, I ran two linear regressions for the relatively difficult and the relatively easy items. To test the second aim whether there was a relationship between SES and emotional ToM, I ran another linear regression. To test the moderation effect, I ran a regression between oxytocin and RMET, and adding the interaction between oxytocin and SES in the regression model.

Test of hypotheses

Participants' RMET mean score was 28.48 ($SD = 2.87$, range: 19-34); SES mean score was 6.83 ($SD = 1.56$, range: 2-10). Participants' SES in the two groups did not differ, $Mean_{(oxy)} = 6.92$, $Mean_{(placebo)} = 6.74$, $t(145) = -0.677$, $p = .50$.

To test the first hypothesis and to replicate previous results that oxytocin improved RMET, I ran a linear regression with drug condition as predictor and RMET as outcome. In line with my hypothesis, there was no main effect of drug on RMET, $b = -0.034$, 95%CI $[-.97, .90]$, $SE = .474$, $t(145) = -.072$, $p = .94$. In order to replicate the previous results that oxytocin would improve the HIT for difficult but not easy items, I ran two separate linear regression, with dependent variables the mean HIT for easy and difficult items separately, and the independent variable the drug condition. Correct rate for easy items (mean HIT = .88) was significantly higher than difficult items (mean HIT = .71), $t(146) = 15.80$, $p < .001$. However, I could not replicate Domes' and Feeser's result that oxytocin improved RMET for the difficult items, but not for the easy items. Neither the HIT for difficult ($b = -0.014$, 95%CI $[-.052, .024]$, $SE = .020$, $t(145) = -.72$, $p = .47$) nor easy items ($b = 0.014$, 95%CI $[-.013, .040]$, $SE = .013$, $t(145) = 1.019$, $p = .31$) were influenced by oxytocin application. Oxytocin's influence on RMET easy and difficult items was visualised in Figure 5.1.

To test the hypothesis that SES moderated oxytocin – emotional ToM link, I ran a regression model, with the dependent variable total RMET score, the independent variables to be drug condition, subjective SES (mean centered), and the interaction term of SES and drug condition. This model revealed an interaction of group (oxytocin vs. placebo) and SES on emotional ToM, $b = -.74$, 95%CI $[-1.34, -.15]$, $SE = .30$, $t(143) = -2.47$, $p = .01$. In this model, there was no main effect of drug condition, $b = -.07$, 95%CI $[-.99, .85]$, $SE = .47$, $t(143) = -.15$, $p > .5$. There was a main effect of SES, $b = .58$, 95%CI $[.15, 1.01]$, $SE = .22$, $t(143) = 2.67$, $p < .01$. This result proved my third hypothesis that subjective SES indeed moderated the oxytocin – emotional ToM relationship.

In the last step, to test the competing hypotheses that oxytocin would benefit the relatively low SES or high SES individuals, I ran a simple slope to explore the direction. I created two levels of subjective SES: centered around 1SD below the mean (SES = 5.28) and 1SD above

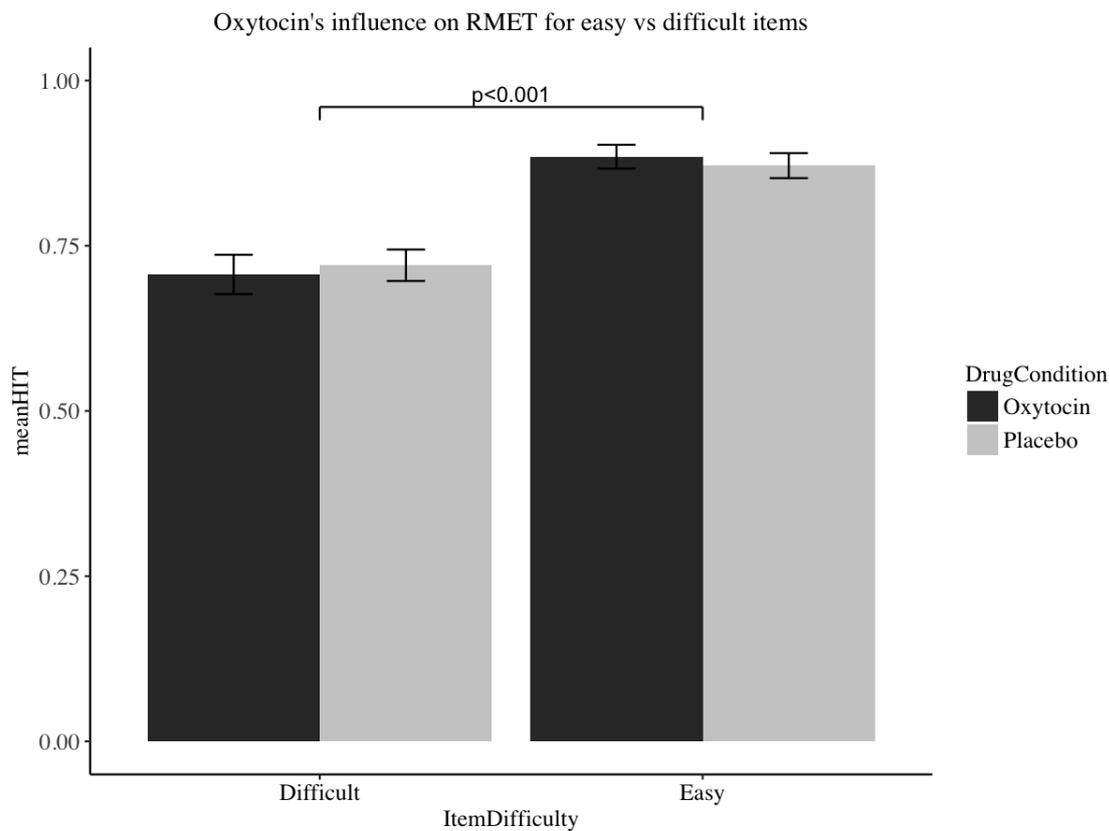


Fig. 5.1 Mean percentage of correct answers for drug condition and item difficulty.

the mean ($SES = 8.42$). I then ran two more variants of the interaction model described above, each time using the new SES term in each model. By doing so, the main effect of oxytocin in each model with the new SES term indicates the effect of oxytocin for people with each SES level. Simple slope results suggested an opposite influence of oxytocin on emotional ToM for individuals 1SD above and below mean SES. Oxytocin marginally decreased RMET for 1SD above mean SES individuals, $b = -1.23$, 95%CI $[-2.54, .08]$, $SE = .66$, $t(143) = -1.86$, $p = .07$. Oxytocin had no influence on RMET for 1SD below mean SES individuals, $b = 1.09$, 95%CI $[-.22, 2.39]$, $SE = .66$, $t(143) = 1.649$, $p = .10$. Since oxytocin's influence on individuals with 1SD above and below mean SES had an opposite trend, I ran another two regression models centering 2SD above ($SES = 9.9$) and below ($SES = 3.7$) mean SES. Results suggested that oxytocin would decrease RMET performance for 2SD above mean SES individuals, $b = -2.39$, 95%CI $[-4.45, -.32]$, $SE = 1.05$, $t(143) = -2.28$, $p = .02$, and increase RMET for 2SD below mean SES individuals, $b = 2.25$, 95%CI $[.18, 4.31]$,

$SE = 1.04$, $t(143) = 2.15$, $p = .03$. These results suggested that oxytocin had a positive influence on RMET for people with relatively low SES (ranking themselves on the SES ladder less than 5), and a negative influence on RMET for people with the highest SES (ranking themselves on the SES ladder above 9).

I graphically depicted the moderation effect in Figure 5.2 and Figure 5.3. Figure 5.2 showed oxytocin's influence on RMET for +/-1SD SES individuals and Figure 5.3 Oxytocin's influence on RMET for different SES individuals. Blue line shows the influence of oxytocin on RMET, green line and red line represent 95% upper and lower confidence interval.

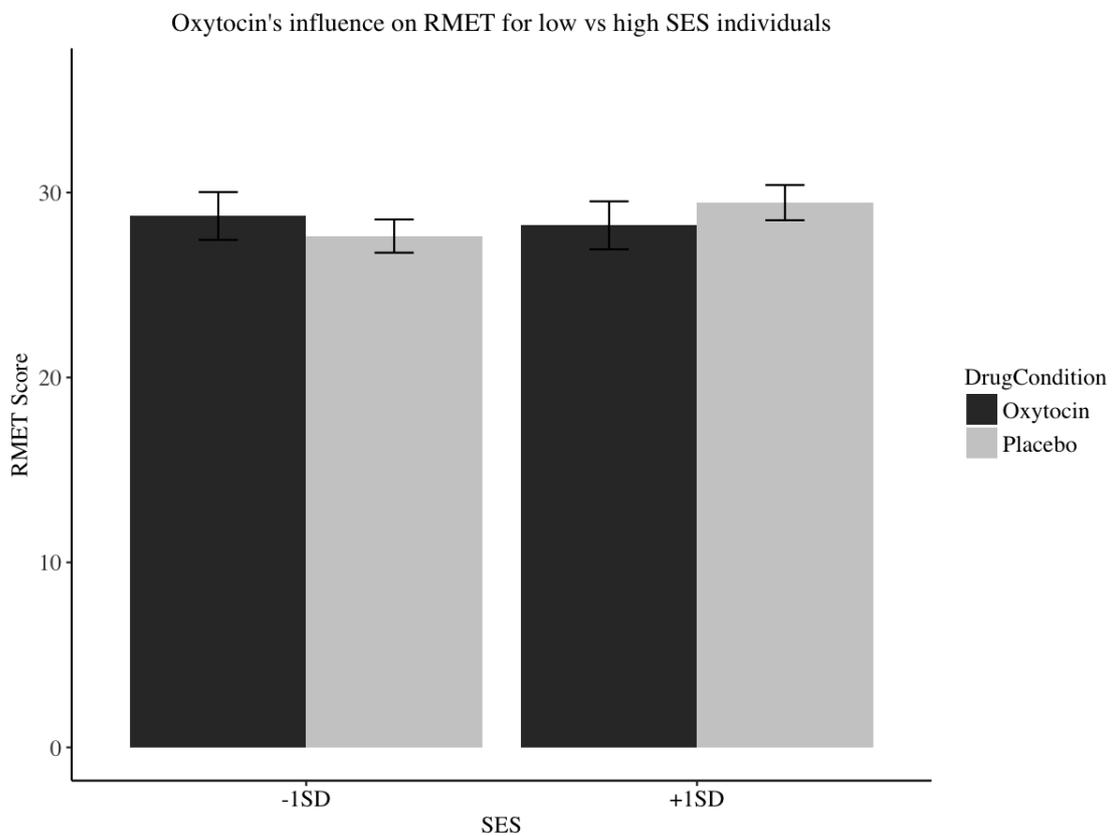


Fig. 5.2 Oxytocin's influence on RMET for +/-1SD SES individuals.

5.4 Discussion

The present study aimed at investigating the effect of oxytocin on emotional ToM measured by RMET to replicate previous results that oxytocin increased emotional ToM, and increased

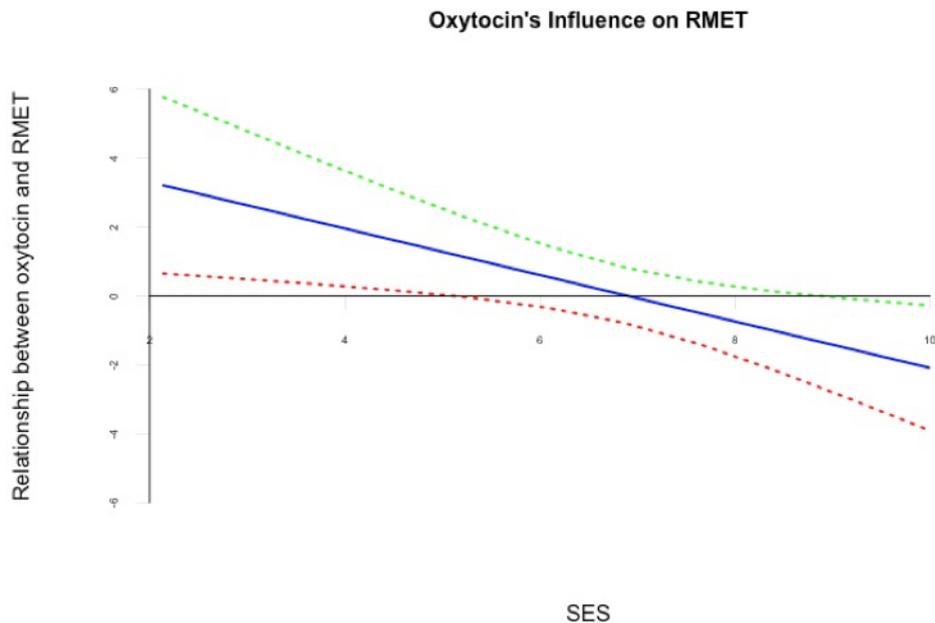


Fig. 5.3 Oxytocin's influence on RMET for different SES individuals. Blue line shows the influence of oxytocin on RMET, green line and red line represent 95% upper and lower confidence interval.

performance on difficult but not easy items. Moreover, I aimed to explore the moderating effect of SES between oxytocin and emotional ToM. I ran a between-subjects oxytocin nasal spray study on 147 Caucasian white male participants. In line with my hypothesis, I did not find that a single dose of intranasally administered oxytocin enhanced emotional ToM. I also did not find that oxytocin enhanced RMET performance on the difficult compared to the easy items. I did not find a correlation between subjective SES and emotional ToM. However, as hypothesised, I found a negative moderating effect of SES on the oxytocin-emotional ToM relationship. More specifically, individuals with lower subjective SES had enhanced RMET under oxytocin vs control condition. It is worth noting that participants in the oxytocin group and the placebo group did not differ in subjective SES. This ruled out the possibility that the effects are biased by group differences in baseline SES scores.

Consistent with my hypothesis, and supporting a previous failure of replicating Domes et al.'s 2007 original results (Radke & de Bruijn, 2015), oxytocin did not improve the recognition accuracy of emotions during an emotional ToM task, nor did it show an effect for

difficult items. The null result of overall oxytocin-emotional ToM relationship was consistent with previous studies ((Radke & de Bruijn, 2015; Woolley et al., 2014, 2016), etc, see Supplementary materials). My failure to replicate the main effect and the moderating effect of item difficulty for emotional ToM was not due to a longer time from drug administration until the start of the RMET (45min for Domes et al. and Feeser's et al vs 60min in my study) because I found the hypothesised SES moderating effect. One possibility may be of the ceiling effect: My participants had an overall better performance of RMET compared to both Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015) studies. For example, in Domes' study, the mean overall HIT for RMET was 70.9% and in Feeser's study was 72.5%; and in my study, it was 80%. I suggest that oxytocin may be only able to enhance mentalising performance up to a certain point. For instance, in Domes' 2007 study, participants' HIT of RMET under control condition was around 69% (vs ours 79%), oxytocin condition 72% (vs ours 79%), the performance in the control condition was already higher than the oxytocin condition in Domes' study (Participants' RMET performance in different studies was summarized in Table 2 in the supplementary material).

For the second aim, my study was the first to show a socio-economical moderating effect on the relationship between oxytocin and emotional ToM. More specifically, I found that oxytocin only enhanced the performance for individuals who consider themselves being worse off compared to the general population, and decreased the performance for those who considered themselves as the top on the social ladder. It is worth mentioning that in the interaction model, there was a positive main effect of subjective SES on RMET. In line with the literature that oxytocin's beneficial function on social cognition was more profound for those who have the relatively low socio-emotional score individuals, I found that oxytocin enhanced emotional mentalising for those who have relatively socio-economical position individuals. Lower SES individuals lack resources in their life thus understanding others' emotions and intentions are of more significance to them than their richer peers.

My study has several limitations that are worth considering. First, I only tested the effect on male participants. Previous studies have reported gender differences in oxytocin-dependent effects (Domes et al., 2010; Lischke et al., 2012), indicating that my results might

not generalize to women. Future studies may consider whether the same effect applies to women. Second, in my study, most of my participants were young, very highly-educated students from University of Cambridge, this renders the difficulty of using objective SES as a measurement of their position in the society. Thus regarding the assessment of SES in this sample, it is important to acknowledge the subjectivity of self-reported SES. My design would have benefited from considering both objective and subjective SES from a community sample.

To conclude, my study could not replicate the oxytocin-emotional ToM main effect nor the item-difficulty moderating effect founded in Domes, Heinrichs, Michel, et al. (2007) and Feeser et al. (2015) studies, but this failure of replication was the same as in Radke and de Bruijn (2015) and Riem et al. (2014). It should be noted that my results do not invalidate the link between oxytocin and emotional ToM. Instead, they underline the importance of replication studies for advancing our understanding of factors that may or may not affect the reproducibility of research outcomes. Given the small sample size for social psychology studies, I did not find a link between subjective SES and emotional ToM. The novelty of my study lied in the investigation of SES's moderating effect for oxytocin's influence on social cognition and social behaviour, in this case, emotional ToM. Oxytocin enhanced emotional ToM, but only for the relatively lower SES individuals. Future research may consider the moderating effect of SES of oxytocin on other social cognition and social behaviours.

5.5 Supplementary Materials

Table 5.1 Summary of Past Research on Oxytocin – Emotional ToM

Paper	Participants	Oxytocin IU	Time in between	Experiment Design	Number of Participants	Participant gender	Tasks used	Main effect	Moderation	Moderation type
Domes et al. 2007	Healthy	24 IU	45min	within-subject	$N = 20$	male	RMET	Yes	item difficulty	context
Luminet et al. 2011	Healthy	32 IU	45min	between-subject	$O = 30, P = 20$	male	RMET	No	Alexithymia score	personality/emotion
Cardoso et al. 2014	Healthy	24 IU	120min	between-subject	$O = 42, P = 40$	42 women, 40 men	MSCEIT	Yes	NA	NA
Riem et al. 2014	Healthy	16 IU	60min	between-subject	$O = 25, P = 25$	female	RMET	No	love withdrawl	socio-emotion
Wooley et al. 2014	Healthy	40 IU	30min	within-subject	$N = 31$	male	RMET + TASIT	No	NA	NA
Feeser et al. 2015	Healthy	24 IU	45min	between-subject	$O = 36, P = 35$	male	RMET	Yes	item difficulty; participants' EQ	context, empathy
Radke et al. 2015	Healthy	24 IU	50-65min	within-subject	$N = 24$	male	RMET	No	item; participants' Empathy Concern	socio-emotion
Wooley et al. 2016	Healthy	40 IU	45min	within-subject for healthy participants	$N = 34$	male	RMET + TASIT	No - RMET; Yes - TASIT	NA	NA
Leppanen et al. 2017	Healthy	40 IU	15min	within-subject	$N = 29$	female	RMET	No	NA	NA
Current study	Healthy	24 IU	60min	between-subject	$O = 73, P = 74$	male	RMET	No	SES	SES

Table 5.2 Comparison of Past Studies and Current Study on Correct Rate for RMET Easy and Difficult Items

	Overall RMET		Easy items		Difficult items	
	control	oxt	control	oxt	control	oxt
Domes et al., 2007	69%	72%	84%	85%	55%	60%
Feeser et al., 2015	70%	75%	77%	76%	64%	73%
Current study	79%	79%	87%	88%	72%	71%

Chapter 6

Discussion

My thesis had three aims: First, I aimed to further explore the prosociality – benefits link, adding to our existing knowledge about prosociality. More specifically, I tested whether donations attracted social capital, whether trait empathy was related to better coping strategies, and whether increases in oxytocin improved emotional mentalising. Second, I aimed to examine whether everyone equally benefits from having prosocial traits and conducting prosocial acts. There have been very few studies considering individuals' socioeconomic status (SES) as a moderator and those studies had largely inconsistent results. Across my studies, I found that lower SES individuals benefit more than their higher SES counterparts in gaining social capital and increasing interpersonal relationship from prosociality; however, both lower SES and higher SES individuals benefited in better coping strategies from being empathetic, but in different ways. Lastly, based on the results, I aimed to add a further explanation to the SES-prosociality paradox. I suggested that the reason lower SES individuals are more prosocial is partly because they can benefit more from the prosocial traits and prosocial acts.

Summary of results

In Chapter 2 and Chapter 3, I explored whether prosocial acts such as donations would bring social capital, measured by weak ties, and whether different SES individuals benefit

equally from donating. The reason I separated the study into two chapters was because even though it is generally recognised that higher SES attracts social ties, there has been no empirical research directly testing whether it is the rich who actively reach out to expand their social ties or if it is the poor actively building up social ties. Understanding this difference would be helpful in explaining the SES-prosociality paradox. Across Chapters 2 and 3, I analysed data collected from subjective surveys, online chatroom experiment, and existing data from Twitter. I found that, higher SES indeed attracted weak ties, and compared to higher SES individuals, lower SES individuals were more likely to initiate and accept weak ties. Furthermore, as I hypothesized, prosocial acts like donations generally attracted social capital: People who donated had more Facebook friends than those who don't donate; people who are perceived to be prosocial are also perceived as more likable. Moreover, individuals' SES moderated this donation – social capital relationship: For the lower SES individuals, being prosocial brings more weak ties to them, compared to not prosocial; for the higher SES individuals, acting prosocially does not bring more weak ties to them.

In Chapter 4, I tested whether trait empathy is related to better coping strategies for daily stresses, and whether this prosociality – wellbeing relationship is universal for different SES individuals. To explore this question, I ran five studies. In Study 1 - Study 4, I recruited more than 3000 participants and tested the relationship between their subjective reported trait empathy and their coping strategies. In Study 5, I tested the biological basis of prosociality by examining the effect of the oxytocin receptor gene (OXTR) on coping strategies. Across five studies, I also used subjective SES as a moderator. Results from these five studies suggested that higher trait empathy is related to the usage of better coping strategies – using more adaptive coping and social support, as well as using less maladaptive coping. More interestingly, individuals from both lower and higher SES backgrounds benefit from higher trait empathy, but in different ways. Higher trait empathy is related to more usage of adaptive coping for lower SES individuals, and less usage of maladaptive coping for higher SES individuals. This difference could not be explained by different SES individuals using more/fewer adaptive or maladaptive coping strategies in general because in the five studies in Chapter 4, we did not find a consistent SES – coping strategies pattern. Due to

relatively small sample for the genetics study, the OXTR – coping relationship only partly replicated the results in Study 1-4. Individuals with the GG genotype for the OXTR – found in previous research to be more empathic – were more likely to use social support than AG or AA individuals; amongst people with low SES, individuals with GG genotype used more adaptive coping strategies than AG or AA individuals.

In Chapter 5, I tested intranasal administration of oxytocin would boost emotional theory of mind (eTOM) ability measured by the “Read the Mind in the Eyes Test”. One hundred and forty-seven Caucasian white male participants in the United Kingdom took part in the study, half of which were randomly selected into the experiment group, and the other half in the control group. I found that oxytocin (as compared to placebo) did boost eTOM, but this was only true for people from low SES backgrounds. This finding further reinforced the notion that prosociality, even its biological antecedents, appears to be most beneficial for people from lower SES backgrounds.

Theoretical and practical implications

These results across the empirical chapters have several important theoretical and practical implications for the study of prosociality. For Chapters 2 and 3, first, I found a direct link between acting prosocially and having more social ties. Second, I found that lower SES individuals were not only more active in reaching out to build up social connections, but their prosocial acts also brought them more connections. My findings in Chapter 2 suggest that lower SES individuals are more likely to send and accept friend requests; this was in line with existing theory that lower SES individuals, compared to their higher SES counterparts, are more communal-oriented and more interdependent (M. W. Kraus, Côté, & Keltner, 2010; M. W. Kraus, Piff, et al., 2012a; Piff, Stancato, Martinez, Kraus, & Keltner, 2012). Findings in Chapter 3 suggested that acting prosocially would add more social capital for the poor but not the rich. Results across Chapter 2 and Chapter 3 indicated that there are at least two ways to attract social capital: Possessing wealth and acting prosocially. Higher SES will naturally attract social capital; but for lower SES individuals, besides reaching out actively,

acting prosocially provides an additional path. These results from Chapter 2 and Chapter 3 have theoretical contributions to understanding the SES-prosociality paradox: Because acting prosocially does not bring extra social capital to the rich (even though it does not hurt), and the rich may not need certain social capital (for example, larger number of friends), the higher SES individuals may not need to act prosocially. On the contrary, lower SES individuals acting prosocially can bring them social capital otherwise they cannot attract.

Unlike the studies in Chapter 3, Chapter 4 suggested that even though SES could moderate the prosociality – wellbeing relationship, it is not only the poor who reap the most benefits from prosocial traits, but rather, both higher and lower SES individuals benefit, but through different mechanisms. This finding was also in line with our hypothesis that individuals from all SES background would have better wellbeing associated with greater prosociality. Even though we could not use this result (both the poor and the rich benefit from prosocial traits) to explain the SES-prosociality paradox, it has important practical meanings. Having higher prosocial traits is protective for individuals from all SES backgrounds in coping with stress, but the mechanism is different: lower SES individuals would benefit by using more adaptive coping strategies but higher SES individuals would benefit by using fewer maladaptive coping strategies.

In Chapter 5, similar to the findings in Chapter 3, I found that lower SES individuals benefited more from boosting oxytocin experimentally. Even though I did not replicate the previous result that oxytocin overall improves emotional theory of mind, I successfully showed our key hypothesis that SES moderates the prosociality-interpersonal relationship link. Given the communal and interdependent characteristics of lower SES individuals, lower SES individuals appear to be more influenced by the oxytocin administration and increase their eTOM abilities. These results indirectly supported our result-oriented explanation for the SES-prosociality paradox: Since lower SES individuals benefit more from being prosocial – here having improved mentalising ability from the oxytocin implementation – than their higher SES counterparts, they in the long run get more prosocial.

Limitations and future directions

There are some limitations in our body of research. For the studies in Chapter 2 and Chapter 3, first, due to the correlational nature of the study, I could not draw a decisive causal relationship between prosociality and social capital. However, in the second study in Chapter 3, I did rule out the “proactive” hypothesis (higher prosocial individuals are more proactive for social connections), and found support for the “attractive” hypothesis (higher prosociality attracts social connections). Even so, a controlled lab experiment is needed to further test whether prosociality leads to increase of social capital. Second, we only used “money donation” as a single metric measuring prosociality, and weak-ties as a measurement of social capital. Money donation is a good measurement of prosociality; and individuals who regularly donate, may also involve in other prosocial acts, and may also be high on prosocial traits such as empathic concern (Verhaert & Van den Poel, 2011). However, whether other types of prosocial behaviours would also attract social capital, and whether different measures of SES would also moderate the prosociality-social capital link, are need to be further tested.

For the conclusions drawn from Chapter 4, the biggest question is why the lower SES and the higher SES individuals benefited from prosociality on wellbeing through different mechanisms? One possible reason is that individuals from different SES background meet different types of stress in their daily lives. As documented in the stress literature, lower SES is reliably associated with a number of important social and environmental conditions that contribute to chronic stress burden, including crowding, crime, noise pollution, discrimination, and other hazards or stressors. In other words, chronic stress may capture much of the variance in health and social outcomes associated with harmful aspects of lower social status. Low SES is generally associated with distress, prevalence of mental health problems, and with health-impairing behaviours that are also related to stress compared to higher SES individuals (Baum et al., 1999). It is not clear whether in general, different SES individuals use different coping strategies for the same type of stress, or whether different SES individuals use the same coping strategies for different type of stress. We definitely need more understanding about the SES – stress – coping relationship to explain why different SES individuals would apply different paths benefiting from prosociality. Another limitation of Chapter 4 is due to

the nature of questionnaire we used, we asked participants how they cope with their daily stress. We did not ask participants how they cope with certain stress, for example, the stress from chronic diseases, from work, or from care-giving. Even though our results found a general moderating pattern across five studies, it is worth testing when refining specific types of stress, whether the results could still be replicated.

In Chapter 5 we used oxytocin vs placebo as an experimental manipulation for introducing prosocial vs control situations. The advantage of this experiment setting is that it solves the problem that it is difficult to introduce prosocial vs control group via experiment settings in the lab scenario. Even though the study of oxytocin and human social behaviours have emerged in the past decades and many studies have linked oxytocin nasal spray to human social behaviours, both in clinical groups and healthy participants (see reviews, Graustella & MacLeod, 2012; K. MacDonald & MacDonald, 2010a). However, the mechanism of oxytocin on prosocial behaviours has been proved to be related to context and individual differences (Bartz, Zaki, Bolger, & Ochsner, 2011b). Moreover, in recent years there are also discussions on whether intranasal oxytocin could actually get into the brain and change human social behaviours (Lane, Luminet, Nave, & Mikolajczak, 2016; Nave, Camerer, & McCullough, 2015). Given the complex nature of oxytocin's influence on human social behaviours, future research may use other experimental settings to test whether prosocial trait or prosocial behaviours lead to better mentalising, and in the new situation, whether SES also moderates the link.

Across all the studies in my thesis, I used various measurements for prosociality including both prosocial acts, prosocial traits, and the biological antecedents of prosociality. I also used both objective SES and subjective SES across the studies. The reasons for using the broadly defined prosociality and SES was to first build up a direction of the under-explored research area, rather than focusing on a small specific point. Based on findings of this body of research, future research needs to refine the exact area of prosociality and different measures of SES, to have a deeper understanding the moderating effect of SES on the prosociality-benefits relationship. One limitation in my thesis is that in all the studies, we only recruited users from western world (US and UK). In anthropology, researchers have

long suggested that people from Western, educated, industrialized, rich and democratic (WEIRD) societies – especially American undergraduates in psychology – are some of the most psychologically unusual people on Earth (Henrich et al., 2010). Even though we have tried our best to expand our participant sample from campus to community, and from different survey panels, the conclusions from our results are still limited to individuals from the western world. Individuals from individualistic cultures like UK and US are more independent, and individuals from collectivistic cultures like eastern Asian are more interdependent. Therefore, people from “eastern” and “western” world may reap different benefits from the same prosocial action. For example, helping a sick family member may be valued more in the society in the collectivistic cultures than individualistic cultures, thus the same prosocial acts potentially could bring more social capital for the individual in collectivistic culture than in the individualistic culture; lower SES individuals may benefit more from a prosocial act in a collectivistic culture than in an individualistic culture.

Conclusion

My thesis focused on the social capital, well-being, and interpersonal relationship benefits individuals gain from prosocial traits and prosocial acts. At the same time, I explored how SES moderates the prosociality-benefits relationship. Overall, I found that prosociality can bring various benefits and individuals from different SES may reap different benefits depending on specific benefits. These results may provide another explanation for the SES-prosociality paradox but need further examination. Future research should consider fining the specific area of prosociality, benefits, and SES, as well as expanding the current results to other cultures.

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