

What helps self-control?

Social relationship characteristics and self-control

by

Xin Guan

A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Science

Approved April 2012 by the
Graduate Supervisory Committee:

Mary Burleson, Chair
Nicole Roberts
Nicholas Schweitzer

ARIZONA STATE UNIVERSITY

May 2012

ABSTRACT

Researchers have found inconsistent effects (negative or positive) of social relationships on self-control capacity. The variation of findings may depend on the aspects of social relationships. In this study, rather than examining overall social relationships and self-control, characteristics in social relationships were clearly defined, including social support, social connection and social conflict, to determine their specific effects on self-control. An online survey study was conducted, and 292 college students filled out the survey. For data analysis, path analysis was utilized to examine the direct effect and indirect effect from social relationships to self-control. Results showed social connection and social conflict may indirectly associate with self-control through stress, but social support does not. It may suggest, in traditional stress buffering model, it is the social connection in social support that really reduce the stress. Concerning the direct effects, social support and social connection were significantly associated with self-control directly, but social conflict does not. This result may support the Social Baseline Theory that positive social relationships have direct regulating effects. Results are good for guidance of experimental manipulation of social relationships in study of social influences of self-control.

ACKNOWLEDGMENTS

I am heartily thankful to my supervisor, Dr. Mary Burlison, whose encouragement, guidance and support from the initial to the final level enabled me to develop an understanding of the subject. Besides, I owe my deepest appreciations to Dr. Nicole Roberts and Dr. Nick Schweitzer. Thanks for being my thesis defense committee members and thanks for any comments and suggestions.

Also, I offer my regards and thanks to all of those who supported me in any respect during the completion of the project.

TABLE OF CONTENTS

| | Page |
|--|------|
| LIST OF TABLES | v |
| LIST OF FIGURES..... | vi |
| INTRODUCTION..... | 1 |
| The Strength Model of Self-Control..... | 1 |
| Social Relationships and Self-control..... | 3 |
| How Do Social Relationships Influence Self-control | 10 |
| Research Questions and Hypothesis..... | 13 |
| RESEARCH METHODS..... | 14 |
| Participants | 14 |
| Procedures | 14 |
| Measures..... | 15 |
| Statistical Analysis..... | 16 |
| RESULTS | 16 |
| Factor Analysis..... | 17 |
| Correlations | 18 |
| Path Analysis..... | 19 |
| DISCUSSION..... | 21 |
| Discussions..... | 21 |
| Limitations and Future Directions | 23 |
| REFERENCES | 25 |
| APPENDIX | |
| A TABLE1..... | 30 |
| B TABLE2..... | 34 |

| APPENDIX | Page |
|----------------------------|------|
| C TABLE 3 | 36 |
| D TABLE 4 | 38 |
| E FIGURE1 | 40 |
| F IRB APPROVAL SURVEY..... | 42 |

LIST OF TABLES

| Table | Page |
|--|------|
| 1. Loadings of UCLA LS and ISEL Items on Two Factors | 31 |
| 2. Descriptive Statistics of the Complete List of Variables Used in the Data Analysis | 35 |
| 3. Zero-Order Correlations Matrix Between Each Variables | 37 |
| 4. Goodness-of-Fit Indexes of Full Model, Mediation Model and Direct Path Model..... | 39 |

LIST OF FIGURES

| Figure | Page |
|---|------|
| 1. Social Effect on Self-Control through Stress | 43 |

What helps self-control?

Social relationship characteristics and self-control

Life requires self-control. We need to control ourselves in almost all daily activities, such as resisting unhealthy food, suppressing emotion, self-presentation, or making choices (e.g., Vohs et al, 2008). Self-control is defined as the capacity for altering one's own response, including thoughts, emotions, and behaviors, to keep in line with standards such as ideals, values, morals, and social expectations (Baumeister, 2002). It's a deliberate, conscious, effortful regulation of oneself that aims at supporting the pursuit of long-term goals (Baumeister, Vohs, & Tice, 2007). Because self-control is a necessary capacity in most aspects of our life, failures of self-control can lead to personal and social problems, such as addiction, drug or alcohol abuse, eating disorder, unwanted pregnancy, debt, aggression, procrastination, and underachievement (Baumeister, Heatherton, & Tice, 1994).

The Strength Model of Self-control

Self-control has state-like qualities. That is, it can be depleted or strengthened on a short-term basis. Researchers have found that self-control operates on a limited resource that can be depleted temporarily through use (Baumeister et al., 1994). Initial use of self-control can cause impaired performance on subsequent self-control tasks, a state referred to as ego-depletion (e.g., Muraven, Tice, & Baumeister, 1998; Baumeister & Vohs, 2007). Stress coping, suppressing thoughts, regulating emotion, fixing attention, overcoming impulses, and interacting with persons of a different race all require self-control and can produce ego-depletion. For example, merely keeping a neutral face while watching an upsetting movie may result in participants' having less physical stamina. Suppression of forbidden thoughts also led to subsequent less persistence in unsolvable anagrams (Muraven et al, 1998).

On the other hand, other research suggests that self-control is more like a trait. Trait self-control predicts desirable outcomes in many areas. Thus, self-control can be seen as a highly adaptive capacity (Baumeister, 2002). Individuals with better self-control have more satisfying relationships, better unified families, fewer psychological problems (e.g., somatization, obsessive-compulsiveness, paranoid thinking), fewer emotional symptoms (e.g., anxiety, hostility, depression), and higher levels of self-acceptance and self-esteem (Tangney, Baumeister, & Boone, 2004). In addition, those with better self-control in childhood dealt with stress more effectively and had higher achievement in adolescence (Shoda, Mischel, & Peake, 1990). Leaders with high self-control are rated more trustworthy and fair by their subordinates (Cox, 2000). So, as Baumeister (2002) pointed out, certain people are more capable of self-control than others, and these individual differences support the view that self-control forms a seemingly stable aspect of personality.

This capacity for self-control can be strengthened in the long term by practice. Muraven, Baumeister, and Tice (1999) found that repeated exercise of self-control, including improving posture, regulating moods, and maintaining a diary of eating, can result in increasing self-control capacity over time. College students who spent two weeks practicing any of these self-control exercises showed significant improvement in overall self-control capacity.

Other interventions, both biological and psychological, can increase self-control capacity in the short term. For example, Gailliot et al (2007) found that consuming a glucose drink after an initial act of self-control could counteract the depletion it caused. In addition, self-control was found to be strongest in the morning after a good sleep, suggesting that sleep and rest also provide a way to replenish self-control (Baumeister, Heatherton, & Tice, 1994). Psychological interventions include inducing a state of

positive emotion such as humor (Tice, Baumeister, Shmueli, & Muraven, 2007), priming participants with an exemplar of a persistent person (Martijn et al, 2007), self-affirmation by expressing one's core values (Schmeichel, & Vohs, 2009) and using attentional strategies, such as distracted by simple calculations during the self-control task (Alberts, Martijn, Nieuvelstein, Jansen, & Vries, 2008).

Social Relationships and Self-Control

Are Social Relationships Good or Harmful to Self-Control?

As noted above, self-control has state-like attributes, and it can be influenced by many factors, such as initial use of resources, mood, and rest. Some research suggests social relationships could also impair or enhance self-control in a short term. Finkel and colleagues (2006) examined the influence of a high-maintenance social interaction on a subsequent, unrelated self-control task. Participants were assigned to complete a maze task in coordination either with a confederate who made a lot of errors (high-maintenance), or with a confederate who did not make errors (low-maintenance). Those in the low-maintenance condition preferred a difficult but more likely rewarding task after coordination, while those in the high-maintenance condition tended to choose an easy task, even though it entailed low probability of reward. Taking the easier path is a central correlate of poor self-control as previous research suggested (Gottfredson & Hirschi, 1990).

Richeson and Shelton (2003) also found evidence of ego depletion after certain social interactions, such as discussing delicate, sensitive issues. For example, after white participants had a conversation with a Black confederate regarding a controversial issue, such as racial profiling in light of the September 11th attacks, they showed deficits in an unrelated follow-up test of executive control. This was especially true for highly prejudiced individuals. Some studies showed that self-presentation, such as presenting

oneself modestly to strangers, boastfully to friends, contrary to gender norms, to a skeptical audience, or while being a racial token, led to impaired self-control, suggesting that self-presentation can deplete self-control resources (Vohs, Baumeister, & Ciarocco, 2005). Carmichael & Tyler (2012) found making self-presentation disclosures during an actual interpersonal interaction depleted participants' self-control resources, depending on attachment style and the intimacy level of disclosures.

Social exclusion can also lead to the impaired self-control. For example, people who were told that they would end up alone later in life behaved more aggressively than the control group (Twenge, Baumeister, & Tice, 2001). Participants who were led to anticipate a lonely future life were less able to force themselves to consume a healthy but bad-tasting beverage, or they would quit sooner on a frustrating puzzle than would participants in the control condition (Baumeister, DeWall, Ciarocco, & Twenge, 2005). They also were less able to delay gratification (Twenge, Catanese, & Baumeister, 2003). More immediate social exclusion was manipulated by randomly telling half of participants that no one was interested in working with them on an experimental task, and telling the rest that someone had chosen them as desirable partners. Participants in the rejection condition were less likely to resist fattening snacks (Baumeister, DeWall, Ciarocco, & Twenge, 2005).

Thus, certain types of interpersonal interactions can have negative consequences for self-control capacity. However, the influence of interpersonal relationships on self-control is not all bad. Sarason, Levine, & Basham (1983) found a positive association between students' self-rated social support and their persistence in working on a complex, unsolvable maze. Individuals can engage in effective self-control with the help of goal-relevant social support (Fitzsimons & Finkel, 2010). For example, individuals with strong social support adhere better to health behaviors, such as engaging in more physical

activity, keeping more regular sleep hours, and resisting fattening food (Uchino, 2004). The beneficial effects go further, such that a broad range of personal goals, including academic, career, friendship, and fitness, are more likely to be achieved when one's romantic partner supports and encourages these goals (Rusbult, Finkel, & Kumashiro, 2009; Brunstein, Dangelmayer, & Schultheiss, 1996). Also, Twenge and colleagues (2007) found that a simple manipulation of social connection could eliminate aggression in the social exclusion experiment described above. Simply reminding participants of their social connection, such as asking them to write about a family member or a friend, prevented aggressive behaviors after social exclusion. Even a brief, friendly social interaction with experimenters was able to eliminate aggression. These findings suggest that social support and social connection may be positively associated with both trait and state self-control capacity.

Social Characteristics: Social Support, Social Connection, and Social Conflict

The definitions of social support are often too vague and too broad, and in Barrera's (1986) review of social support concepts, he suggested to distinguish those concepts and abandon the global social support in favor of more specific terminology. Here we will specifically discuss two concepts: perceived social support and social connection.

Perceived social support was conceptualized by Cohen (1985) as the perceived availability of social resources that are responsive to stressful events. There are two points in this social support concept. Firstly, it emphasizes the subjective perception of social resources. It does not quantify the size of social network or the amount of social contacts, but instead it captures one's confidence in availability and adequacy of their social support (Barrera, 1986). Secondly, the social support is responsive to the situation which is appraised as threatening or demanding (Cohen, 1985). Extensive research

documents the benefits of social support; it may attenuate cardiovascular arousal to acute stressors (Gerin, Carl, Levy & Pickering, 1992), inhibit the release of stress hormones (Lepore, Allen & Evans, 1993), prevent psychological maladjustment (Holahan & Moos, 1981), and generally promote well-being, health and longevity (Uchino, Cacioppo & Kiecolt-Glaser, 1996). As for its influence on self-control, instrumental support may free a person from mental or cognitive engagement, thus enabling that person to rest and recover from ego depletion. Emotional support may provoke positive emotions and reduce stress, which would have restorative effects on self-control resources (Baumeister, Faber, & Wallace, 1999).

Social connection refers to the degree of a person's integration in a social environment (Cohen, 1985). One's "psychological sense of community" (Sarason, 1974) depends on social connection, which is the inverse of social isolation (Gottlieb, 1983). It is important to note, however that social connection is more than the size of one's social network. Studies have found that the correlation between the number of social ties and perceived social support was low (c.f., Cohen, 1985). Social connection is more about the quality of social relationships than the quantity.

By nature, humans have a fundamental need to seek positive connections with others (Maner, DeWall, Baumeister & Schaller, 2007). Maslow (1968) listed "love and belongingness needs" in his motivational hierarchy theory. A generalized benefit of social connection is that the social network that persons are embedded in could provide regular positive social experiences, positive mood, recognition of self-worth, and a set of stable, predictable, and socially rewarded roles (Cohen, 1985). As reviewed by Baumeister and Leary (1995), social connection underlies a broad range of cognitive, emotional, and behavioral responses. It can shape thoughts when people interpret situations with regards to their social relationships (e.g., biased pattern of information

processing in favor of their significant others). And the strongest emotions that people experience are often associated with social connections (e.g., happiness, contentment and calm when in a safe relationship; anxiety, depression, and loneliness when excluded). Connection with others can foster social affiliated behaviors (e.g., altruism, cooperation) and reduce unacceptable behaviors. Moreover, Baumeister and Vohs (2007) reviewed the motivations for self-control, and concluded that much of self-control is used for the purpose of being accepted by others (Heatherton & Vohs, 1998).

Just as social connection is advantageous, loneliness appears to be harmful. Cacioppo and Patrick (2008) demonstrated the adverse effects of lacking social connection. Loneliness can impair thinking, will power, and perseverance, emotion regulation capacity, as well as the ability to read social signals and exercise social skills. It can also influence physiological functioning, diminish sleep quality, and increase morbidity and mortality (Hawkley & Cacioppo, 2010).

The relationship between social support and social connection is complicated. Similar to perceived support, social connection is a subjective perception. They overlap to some extent. We cannot perceive social support from people we are not connected with, and when we provide or receive support, the social connection becomes even stronger. Although it is hard to disentangle social connection from social support, they are distinct conceptually and empirically. The relationships between connected people are mutual, but if one perceives social support from others, the relationships may be unidirectional. Moreover, not all social connections will lead to perception of social support. Only when one is facing stressors and in need of social resources, one may perceive support from strongly connected people. Cohen (1985) found social support and social connection are differently related to well-being. Social support contributes to well-being by protecting people from adverse effects of stressful events, while social connection has an overall

beneficial direct effect. However, the global concept of social support has been broadly and confusingly used in previous literatures (Barrera, 1986).

Although humans need social relationships, they have negative aspects, such as social conflict. Negative social interactions are better predictors than supportive interactions of psychological distress, low self-esteem, low interpersonal trust, external control beliefs, and dysfunctional attitudes (Lakey, Tardiff, & Drew, 1994). For example, excessive criticism may lead to a negative view of the self and the social environment, lower one's self-esteem and promote negative moods, all of which are associated with increased psychological distress (Barnett & Gotlib, 1988). Despite this, relatively little is known about the relationships between social conflict and self-control. Some social conflicts are conceptually similar to stressful life events and daily hassles, such as being complained to or criticized. Some may overlap with lack of social support or connection, such as being rejected or left out. Thus, we raised a question concerning the relationship between social conflict and self-control above and beyond stress and positive social relationships.

How and Why Social Relationships Differently Impact Self-Control?

In summary, generally there are two ways that social relationships can influence self-control. Firstly, the social interaction involved in relationships may directly influence psychological resources by requiring effort. Strenuous, challenging interactions, such as self-presentation, taking another's perspective, or social influence, all may require exertion of self-control and thus deplete it temporarily. On the other hand, frequent social interaction, which demands use of theory of mind, planning, social inference, or self-control, is a form of mental exercise that may strengthen the resources for self-control and improve general capacity to resist ego depletion. So, we may hypothesize that in the

short term, social interactions may be depleting and lead to a state of impaired self-control, but in the long term, social relationships may enhance self-control capacity.

Secondly, self-control is determined not only by the available resource, but also depends on individuals' motivation, mood, or belief. Therefore, social relationships may also influence self-control indirectly. For example, enjoyable social relationships may lead to more positive emotions, while social conflicts induce more negative emotions. And emotion is a significant factor in contributing to self-control (Tice, Baumeister, Shmueli, & Muraven, 2007). Relationship partners may serve as exemplars, such that having a relationship with a persistent person motivates increased self-regulation (Martijn et al, 2007). Social relationships also may provoke self-affirmation. When people receive positive feedback or become more aware of their own values, they become more self-controlled (Schmeichel, & Vohs, 2009). So, we may hypothesize that the indirect effects of social relationships may be mediated by several factors such as emotions, and they depend on the specific characteristic of the relationships. In the following section, we will discuss the social support, social connection, and social conflict in light of different theories.

How Do Social Relationships Influence Self-Control?

Social Baseline Theory: Close Social Relationships Save Energy

As stated above, one way that social relationships may influence is to directly impact the resources used for self-control. Accordingly, Coan (2008) proposed Social Baseline Theory (SBT). This theory posits that for social mammals, close proximity to others is the norm, and social proximity is a baseline affect regulation strategy. Social connection can implicitly regulate by decreasing the resource demands of the environment. From the perspective of evolutionary psychology, social species benefit from bonding and interdependence because a trusted companion not only

probabilistically reduces the risk of predation (risk distribution), but also enhances health and safety behaviors (load sharing). For example, in a hive of bees, some of them may be vigilant for environmental threats, while others may find and share the locations of food. In this way, each of them is protected from exhaustion of resources.

Drawing on the biological principle of economy of action, organisms will conserve their resources whenever they can, and SBT suggested that the presence of other people helps to conserve important and metabolically costly resources through baseline regulation of emotion (Coan, 2011). In a functional magnetic resonance imaging (fMRI) study, Coan and colleagues (2006) demonstrated how threat responding decreases as a function of social distance. In their study, women were subjected to the threat of electric shock while holding their partners' hand, a strangers' hand, or no hand at all. Women holding their partners' hands showed least threat-related brain activity. When comforted by strangers, threat related activity increased, and when facing the threat of shock alone, it increased even further. These observations suggested brain response was minimized when a socially connected partner was available. Even though strangers were not as effective as spouse at regulating threat response, they were still effective compared to having no social resources at all. In summary, from the perspective of biology, the human brain can utilize social resources, especially close relationships, to economize its activity.

According to the SBT, the regulating effect of social relationships is a function of both the closeness and the quality of relationships. High-quality close relationships save resources while negative relationships may expend them. Social connection is the baseline factor in close relationships, and social support was found to increase the feeling of social closeness (Gleason et al, 2008). On the other hand, social conflict could be a negative factor in maintaining close relationships.

Stress Buffering: Social Relationships Reduce Detrimental Effects on Stress

Social relationships may also influence self-control through indirect paths. Stress is an important factor in self-control. Coping with stress requires self-control; the person must monitor threatening stimuli (Lazarus & Folkman, 1984), and inhibit or alter negative emotions and arousal (Hancock & Warm, 1989; Hockey, 1984; Schonpflug, 1983). Accordingly, stressed people usually have poorer self-control performance (Glass, Singer, & Friedman, 1969).

Social relationships have strong associations with stress. Literature concerning benefits of social support in stress coping were thoroughly discussed (e.g., Cobb, 1976; Cohen & Wills, 1985). First, support may protect persons from stress by attenuating a stress appraisal response. That is, the perception and appraisal of others may redefine the potential harm posed by a situation and prevent it from being appraised as highly stressful (Cohen, 1985). Secondly, social support may intervene in the process of coping with stressors. Instrumental support may alleviate the impact of stressors by providing a solution to the problems. Emotional support may bolster one's self-esteem and efficacy, or promote positive emotions in the face of stressors (Cohen, 1985).

Because social support buffers stress, it may in turn enhance self-control resources which otherwise would be used to cope with stress.

Conversely, social conflict, such as being criticized by others, is itself stressful. So it is reasonable to believe that social conflict will increase the perceived level of stress and indirectly reduce the availability of self-control resources.

According to the definition of social connection, it provides the regular social resource that is not in responsive of stress, we may not expect it buffers stress.

Research Questions and Hypotheses

For the present study, the main purpose was to understand the associations between characteristics of social relationships and self-control. We distinguish three specific

social characteristics (social connection, social support and social conflict), and examine how each relates to self-control. Understanding of these social characteristics (especially social support and social connection) may be difficult because few studies have utilized a standard measure according to the specific social concepts (Lakey, Tardiff, & Drew, 1994). Moreover, the relationships between these concepts are unclear. Thus, the first question of our study is to explore the social components in the measures we use.

Based on social baseline theory, positive social relationships may directly conserve, while negative social relationships expend the resources otherwise available for self-control. Thus, the second question is: What are the direct effects of those social characteristics? We hypothesize that social conflict will directly decrease self-control resources; while social connection will increase self-control resources.

Based on the stress buffering hypothesis, the third question is what are the indirect effects of those social characteristics? It is well known that social support is an established resource used for stress coping. We hypothesize that social support will indirectly influence self-control by buffering adverse effects of stress events, which may otherwise lead to underperformance of self-control. Conversely, social conflict, as a stressor itself, will increase perceived stress of participants and decrease self-control capacity. Further, the influence of social connection on self-control will not be mediated by stress.

Research Methods

Participants

Two hundred and ninety-two college students filled out the survey (75.7% were female, 24.3% were male). Four of them completed less than half of the questionnaire, and their data were excluded. Ages ranged from 18 to 60 years, (mean= 25.5 yrs, SD=6.65 yrs). As for their nationality, 22.6% were Latino/Hispanic, 71.9% were

Caucasian, 7.3% were African/African American, and 10.4% were Asian/Asian American. Among them, 96.1% were undergraduate students and 3.9% were graduates. In-state student made up 74.6% of the sample, while out-of-state and international students were 23.2% and 2.1%. More than half (58.1%) of the participants were in a relationship currently (mean year=4.31 yrs, SD=4.22 yrs) with mean satisfaction of 3.29 (range from 1 to 5). The mean number of family members were 5.19 (SD=1.98) and number of close friends were 4.72 (SD=.48). As for their financial status, most of the participants have enough money for basic needs and usually have some extra.

Procedures

Participants were recruited the subject pool using the SONA system. Students who signed up for completion of this survey were compensated with one research credit. The survey was programmed and delivered through SurveyMonkey.

Measures

Social support. The *Interpersonal Support Evaluation List (ISEL)* was used to assess social support. It was developed by Cohen, Mermelstein, Kamarck, and Hoberman (1985) as a global measure of perceived social support across four domains (appraisal, belonging, self-esteem, and tangible help). There 10-item subscales (belonging, appraisal, and tangible help) which were closely related to social interaction were used in this survey. The appraisal subscale measures perceived availability of emotional social support (e.g., “there is at least one person I know whose advice I really trust”). The belonging subscale measures the perceived availability of people with whom one can be connected (e.g., “when I feel lonely, there are several people I can talk to”). The tangible subscale measures the perceived availability of material or tangible help (e.g., “if I needed help fixing an appliance or repairing my car, there is someone who would help me”). The ISEL was shown to have great reliability in the present sample ($\alpha=.963$).

Social connection. The revised UCLA Loneliness Scale was originally designed to measure loneliness, but to measure social connection, we reversed the scoring of loneliness, since the lowest level of loneliness actually indicates the most social connection (Cacioppo, 2007). It is a 20-item general measurement of loneliness developed by Russell, Peplau, and Ferguson (1978) (e.g., “I feel left out”, or “there are people I feel close to”). Because the scoring was reversed, higher scores indicate less loneliness, and greater social connection. Reliability was high in our sample ($\alpha=.932$).

Social conflict. The Inventory of Negative Social Interactions (INSI), a 40-item scale, developed by Lakey et al (1994) was used to measure the other aspect of social relationships: social conflict. Questions are about how people made life more difficult for the participants in the past month (e.g., “criticized you”). Responses options range from not at all to about every day. It had incremental validity in predicting stress and psychological symptoms in the original study, and had great reliability in our present sample ($\alpha=.966$).

Stress. To measure perceived stress, the 10-item Perceived Stress Scale (PSS), developed by Cohen (1983) was used. Questions asked about the frequency of general stress events in the last month (e.g., in the last month, how often have you found that you could not cope with all the things that you had to do?). Responses ranged from *never* to *very often*. The PSS is the most widely used psychological instrument for perceived stress, and has established reliability and validity. In this sample, reliability was adequate ($\alpha=.892$).

Self-control capacity. Short Self-Regulation Questionnaire (SSRQ; Carey, Neal, & Collins, 2004) is a 31-item scale, adapted from a 64-item original questionnaire (Brown et al, 1999). SSRQ assessed general self-regulation capacity and it was also supported by high reliability ($\alpha=.928$ in the present sample) and validity in young adults.

Statistical Analysis

To understand the constructs of social support and social connection, measured respectively by the Interpersonal Support Evaluation List (ISEL) and the revised UCLA Loneliness Scale, items from the two scales were combined and factor analysis was conducted using SPSS 16.0.

To understand the simple associations between social relationships and self-control, correlation were conducted using SPSS 16.0.

To understand the direct and indirect effects of how social relationships could predict self-control, path analysis was conducted using MPlus 6.11.

Results

Factor Analysis

To understand the latent variables underlying the measurements, we conducted a confirmatory factor analysis, which is typically used in testing factors which are hypothesized to be responsible for the common variability among a set of scores (Hoyle, 2000). Twenty items from the UCLA Loneliness scale and 30 items from the ISEL were combined and submitted to principal-factors with communalities estimated using the squared multiple correlations. Extraction method is the principal axis factoring and rotation method is the Promax rotation with Kaiser Normalization. Based on the scree plot and interpretability of the factor structure, we extracted two factors, which correspond to the constructs we measured, and they can explain 46.76% of total variance. After rotation, one factor accounts for 24.0% of variance, and the other one accounts for 22.7% of variance.

The loadings of each factor are shown in Table 1. Looking into the specific items, all items in UCLA Loneliness Scale load higher than 0.4 or lower than -.4 only on the first factor, which may correspond with the concept of social connection, as the UCLA

Loneliness Scale indicates. However, the loadings of ISEL items are not so consistent. All items from tangible subscales were highly loaded on the second factor only, which corresponds closely to the concept of social support. One item from appraisal subscale and one out of ten items from belonging subscale load on both factors. . These items seemed to reflect the overlap of social connection and social support and cannot conceptually differentiate the two constructs, such as “There are several different people I enjoy spending time with”. To better differentiate the social concepts, we excluded these two items from further analysis. Two items from appraisal subscale and four items from belonging subscale loaded highly only on the first factor so they may better indicators of social connection. Therefore, in further analysis, we included these items as the measure of social connection. From the factor analysis, we may conclude, there are indeed some conceptual differentiations in social connection and social support. But the measure of social support (ISEL) may also include some items that reflect social connection, especially in the appraisal and belonging subscales. Therefore, we reorganized the two measures of social connection and social support according to the loadings on two factors. Items loaded highly only on the first factor were assumed as social connection measures, while items loaded highly only on the second factor were assumed as social support measures. Others were excluded from further analysis.

Correlations

Table 2 presents a summary of the measures after reorganization used in the data analysis, together with a brief description of the coding details, reliability coefficients of each scale after reorganization of social support and social connection measures, and the mean scores and standard deviations of each variable.

Table 3 presents all zero-order correlations between all measured variables. Stress was significantly related to all the other variables, indicating stress is an important factor

in self-control and interpersonal relationships. Social relationship characteristics are highly correlated. Social support is positively correlated with social connection ($r=.798$, $p<.001$) and negatively correlated with social conflict ($r=-.502$, $p<.001$). Social support and social connection were positively correlated with self-control, while social conflict was negatively correlated with self-control (all $p<.001$).

Path analysis

To obtain a better understanding of the pathways through which social relationships affect self-control, we utilized path analysis. The advantage of these analyses over conventional regression analyses is that path analyses allowed us to examine the direct and indirect effects of social relationships on self-control simultaneously. In addition, path analysis allows covariance between independent variables to be specified. To determine the model fit, goodness-of-fit indexes were given, for example, the chi-square, the root mean square error of approximation (RMSEA), and the comparative fit index (CFI). Models with acceptable fit were defined with a nonsignificant chi-square, an $RMSEA<.06$, and a $CFI>.95$ (Hu & Bentler, 1999).

Path analyses were carried out using Mplus Version 6.11 software (Muthen & Muthen, 1998-2011). Three models were examined. Full model included social relationships as predictors, stress as the mediator and self-control (Model 1) as the outcome. Mediation-only models (Models 2) and direct effect only models (Models 3) were also examined. Table 4 presents the goodness-of-fit indexes of all models. Because the full model was fully saturated, the fit cannot be evaluated. So the direct effect from social conflict to self-control was set to 0, since social conflict was not considered as a baseline social resource which directly associated with self-control. Using $RMSEA<.06$ or a $CFI>.95$ as a cutoff, the mediation only model ($RMSEA=.166$, $CFI=.855$) and direct

effect only model (RMSEA=.255, CFI=.397) are not good enough to represent the data relationships, and the combined model with both direct and indirect effects was examined.

Figure 1 shows both direct and indirect effects from social relationships to self-control capacity. The total effects from social support to self-control capacity was not significant, $t=1.707$, $p=.088$, but direct effect was significant, $\beta=.184$, $t=2.520$, $p=.012$. Holding all else constant, for every unit increase of social support, self-control increases by .184. Social support was positively although not significantly associated with stress. Thus, the indirect effect from social support to self-control through stress was negative and not significant, $t=-1.405$, $p=.16$.

The total effect from social connection to self-control capacity was significant, $t=4.326$, $p<.001$. Both direct and indirect effects also were significant. Social connection directly predicted self-control, $\beta=.226$, $t=2.815$, $p=.005$. For every unit increase of social connection, self-control increases by .226, holding all else constant. It could indirectly affect self-control through stress, $t=3.474$, $p=.001$.

The total effect from social conflict to self-control capacity was also significant, $t=-4.317$, $p<.001$, but only indirect effect through stress was evaluated while direct path was set to zero, so the indirect effect was the same with the total effect.

In summary, this model indicates that three social relationship variables all associate with self-control capacity, but through different paths. Social support has direct effect only, social conflict has indirect effect only, and social connection has both effects.

Discussion

Relationships between Social Support and Social Connection

As reviewed by Cohen and Wills (1985), positive effects of social support are attributable both to an overall beneficial effect of support (direct effect model) and a process of protecting persons from adverse effects of stress events (stress buffering

model). They found evidence for both models, but when social support was measured using different constructs. The direct beneficial effect could occur when social support is conceptualized as ‘integration in a large social network’, which provides persons with regular positive experience and a set of socially rewarding roles. The stress buffering model is supported when social support measures assess the perceived availability of interpersonal resources that could be used for stress coping. In Barrera’s (1986) review of social support concepts, he also pointed out the distinctions between measures of social embeddedness, perceived support, and enacted support. Studies have found positive or negative relationships to life stress and distress using different social support measures. The broad definition and conceptual confusion regarding social support may be the reason why it has mixed meaning and effects on stress, distress or self-control.

To disentangle these effects, in our study, we separately assessed the ‘integration’ or ‘embeddedness’ aspect of social support (social connection) and perceived support. According to the factor analysis, social support and social connection have some differences as well as similarities in measures. It seems the feeling of social connection may be contained in perceived social support, but it is hard to say whether the feeling of social connection can promote social support, or receiving social support creates social connection.

We found that they play different roles in self-control. Social connection was both directly and indirectly associated with self-control through stress, while social support was only directly associated with self-control. In predicting stress, we didn’t find evidence of social support’s benefit above and beyond social connection. This is not supporting stress buffering hypothesis, in which social support is supposed to be negatively related with stress. Although we did find negative zero-order correlation between social support and stress, their relationship is not significant in path analysis,

when taking social connection taking into consideration simultaneously. One possibility is that the social connection is a part of social support. As can be seen in the factor analysis, social connection measures loaded on the first factor only, while social support measures loaded on both. After taking the first factor out of social support measures, it is not stress buffering anymore. Thus, it is possible that it is social connection in social support which reduces stress.

Other than stress, social support research has found great benefits from social support in relation to psychological symptoms, well-being, and health outcomes (Cohen, 1985; Uchino, Cacioppo & Kiecolt-Glaser, 1996; Thoits, 1985). In the further study of social support, it is necessary to clearly define and differentiate the multidimensionality of support, and to specify in hypotheses about the relationship between types of support and adaptational outcomes.

Limitation and Future Directions

Measurement

Measurements are the most important components in survey study because we are discussing the relationships between latent variables using measured items. So if the measures are not capturing the core of the constructs, it may be misleading to discuss the variables' relationships. In our study, the overlapping conceptualization of social connection and social support is a big issue. Measurement of these two constructs becomes a problem. Firstly, although the Loneliness Scale has been used by researchers in social connection studies (Cacioppo, 2008), we have to consider that whether social connection and loneliness are in one continuum, or in two dimensions. Secondly, because

of the broad definition and multifaceted of social support, it is hard to exclude social connection in measures of social support. In our measure of social support, appraisal and belonging subscale may have overlap with social connection. Future study of social relationships should have a better definition of these concepts, and may examine their outcomes separately. Thirdly, although we differentiated two factors according to the factor analysis, we can conclude what the factors really indicate. Although all items in connection items tapped into the first factor, it is still possible that the factor is measuring other construct.

Method and Statistical Analysis Limitation

The biggest limitation of the survey study is the interpretation of results. In our study, all variables were measured at one time, so no causal conclusion can be made. Although we run path analysis, and try to determine the effect of prediction and mediation, the results of analyses based on cross-sectional data are unlikely to accurately reflect the longitudinal mediation effects (Maxwell & Cole, 2007), so the causal relationships between these variables are still need to be examined in longitudinal data. Daily diary method is good for this purpose. We can assess the daily-based social interactions, and how many difficulties they have in emotion regulation or self-control attempts or failures every day. Such research can be done in obese population, or people who need to stay away from drugs, cigarette, or alcohol. Or in future study, experimental studies can also be used to examine the state of self-regulation after manipulation of social interactions. Knowing that social connection may have positive association with self-control capacity is not enough, it is better to examine the state of self-control or state of ego depletion influenced by social connection in lab, so that to test the possible benefit of social connection.

REFERENCES

- Alberts, H.J.E.M., Martijn, C., Nievelstein, F., Jansen A., & Vries N.K. (2008). Distracting the self: shifting attention prevents ego depletion. *Self and Identity*, 7(3), 2008.
- Barrera, M. (1986). Distinctions between social support concepts, measures, and models. *American Journal of Community Psychology*, 14(4), 413-445.
- Baumeister, R.F., Heatherton, T.F., & Tice, D.M. (1994). Losing control: How and why people fail at self-regulation. San Diego, CA, US: Academic Press.
- Baumeister, R.F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497-529.
- Baumeister, R.F., Bratslavsky, E., Muraven, M., & Tice, D.M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, 74(5), 1252-1265.
- Baumeister, R.F., Faber, J.E., & Wallace, H.M. (1999). Coping and ego depletion. In Snyder C.R., Coping: the psychology of what works, Chapter 3, 50-67.
- Baumeister, R.F. (2002). Ego depletion and self-control failure: An energy model of the self's executive function. *Self and Identity*, 1(2), 129-136.
- Baumeister, R.F. (2002). Self-control failure, impulsive purchasing, and consumer behavior. *Journal of Consumer Research*, 28(4), 670-676.
- Baumeister R.F., DeWall, D.N., Ciarocco, N.H., & Twenge J.M. (2005). Social exclusion impairs self-regulation. *Journal of Personality and Social Psychology*, 88(4), 589–604.
- Baumeister, R.F., & Vohs, K.D. (2007). Self-regulation, ego depletion, and motivation. *Social and Personality Psychology Compass*, 1(1), 115–128.
- Baumeister, R.F., Vohs, K.D., & Tice, D.M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, 16(6), 351-355
- Beckes, L. & Coan J.A (2011). Social baseline theory: the role of social proximity in emotion and economy of action. *Social and Personality Psychology Compass*, 5(12), 976-988.
- Brunstein, J.C., Dangelmayer, G., & Schultheiss, O.C. (1996). Personal goals and social support in close relationships: effects on relationship mood and marital satisfaction. *Journal of Personality and Social Psychology*, 71, 1006-1009.

- Cacioppo, J.T., & Patrick, W. (2008). Loneliness: human nature and the need for social connection. W.W. Norton & Company.
- Carey, K.B., Neal D.J., & Collins S.E. (2004). A psychometric analysis of the self-regulation questionnaire. *Addictive Behaviors*, 29(2), 253-260.
- Carmichael K., Tyler, J.M. (2012). The impact of self-presentational intimacy and attachment on depletion of the self's regulatory resources. *Social Influence*, 7(2), 51-63.
- Coan, J.A., Schaefer H.S., Davidson R.J. (2006). Lending a hand, social regulation of the neural response to threat. *Psychological Science*, 17(12), 1032-1039.
- Coan, J.A. (2010). Adult attachment and the brain. *Journal of Social and Personal Relationships*. 27(2), 210-217.
- Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, 38(5), 300-314.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.
- Cohen, S., & Wills, T.A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310-357.
- Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.), *Social support: Theory, research, and application*. The Hague, Holland: Martinus Nijhoff.
- Diaz R.M., Neal, C.J., & Amaya-William, M. (2005). The social origins of self regulation. *Vygotsky and education*, 127-154.
- Finkel, E.J., Campbell, W. K., Brunell, A.B., Dalton, A.N., Scarbeck, S.J., & Chartrand, T.L. (2006). High-maintenance interaction: Inefficient social coordination impairs self-regulation. *Journal of Personality and Social Psychology*, 91(3), 456-475.
- Fitzsimon G.M., & Finkel E.J. (2010). Interpersonal influences on self-regulation. *Current Directions in Psychological Science*, 19(2), 101-105.
- Gailliot, M.T., Baumeister, R.F., DeWall, C.N., Maner, J.K., Plant, E.A., Tice, D.M. Brewer, L.E., & Schmeichel, B.J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, 92(2), 325-336.
- Gerin, W., Carl, P., Levy R., & Pickering T.G. (1992). Social support in social interaction: a moderator of cardiovascular reactivity. *Psychosomatic Medicine*, 54(3), 324-336.

- Gleason M.E., Iida M., Shrouf P.E., & Bolger N. (2008). Receiving support as a mixed blessing: evidence for dual effects of support on psychological outcomes. *Journal of Personality and Social Psychology*, 94(5), 824-838.
- Gottfredson, M. R., & Hirschi, T. (1990). A general theory of crime, Stanford, CA: Stanford University Press.
- Gross J.J., & John O. (2003). Individual differences in two emotion regulation processes: implications for affect, relationships, and well-being. *Journal of Personality and Social Psychology*, 85(2), 348-362.
- Hawkley, L.C., Cacioppo, J.T. (2010). Loneliness matters: a theoretical and empirical review of consequence and mechanisms. *Annals of Behavioral Medicine*, 40, 218-227.
- Holahan, C.J., Moos, R.H. (1981). Social support and psychological distress: a longitudinal analysis. *Journal of Abnormal Psychology*, 90(4), 365-370.
- Hoyle, R.H. (2000). Confirmatory factor analysis. Handbook of applied multivariate statistics and mathematical modeling, San Diego, CA, US: Academic Press, 465-497.
- Maner, J.K., DeWall, C.N., Baumeister, R.F., Schaller, M. (2007). Does social exclusion motivate interpersonal reconnection? Resolving the “porcupine problem”. *Journal of Personality and Social Psychology*, 92(1), 42-55.
- Lepore, S.J., Allen K.M., & Evans, G.W. (1993). Social support lowers cardiovascular reactivity to an acute stressor. *Psychosomatic Medicine*, 55(6), 518-524.
- Martijn, C., Alberts, H., Merckelbach H., Havermans R., Huijts A., & Vries, N. (2007). Overcoming ego depletion: the influence of exemplar priming on self-control performance. *European Journal of Social Psychology*, 37(2), 231–238.
- Maxwell, S.E., & Cole D.A. (2007). Bias in cross-sectional analyses of longitudinal mediation. *Psychological Methods*, 12(1), 23-44.
- Muraven, M., Tice, D.M., & Baumeister, R.F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74(3), 774-789.
- Muraven M., Baumeister R.F. & Tice D.M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *The Journal of Social Psychology*, 139(4), 446 – 457.
- Muraven, M., & Baumeister, R.F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*, 126(2), 247-259.

- Richeson J.A., & Shelton J.N. (2003). When prejudice does not pay: effects of interracial contact on executive function. *Psychological Science, 14*(3), 287-290.
- Rusbult, C.E., Finkel, E.J., & Kumashiro, M. (2009). The Michelangelo phenomenon. *Current Directions in Psychological Science, 18*, 305-309.
- Russell, D., PePlau A.L., Ferguson M.L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment, 42*(3), 290-294.
- Sarason, I.G., Levine, H.M., Basham, R.B., & Sarason, B.R. (1983). Assessing social support: The social support questionnaire. *Journal of Personality and Social Psychology, 44*(1), 127-139.
- Schmeichel, B.J., Vohs, K.D., & Baumeister, R.F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology, 85*(1), 33-46.
- Schmeichel, B.J., & Vohs, K.D. (2009). Self-affirmation and self-control: Affirming core values counteracts ego depletion. *Journal of Personality and Social Psychology, 96*(4), 770-782.
- Shoda, Y., Mischel, W., & Peake, P.K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: identifying diagnostic conditions. *Developmental Psychology, 26*(6), 978-986.
- Tangney, J.P., Baumeister, R.F., Boone A.L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271-322.
- Twenge, J.M., Baumeister, R.F., Tice, D.M., & Stucke, T.S. (2001). If you can't join them, beat them: Effects of social exclusion on aggressive behavior. *Journal of Personality and Social Psychology, 81*(6), 1058-1069.
- Twenge, J.M., Catanese K.R., Baumeister, R.F (2003). Social exclusion and the deconstructed state: time perception, meaninglessness, lethargy, lack of emotion, and self-awareness. *Journal of Personality and Social Psychology, 85*(3), 409-423.
- Twenge, J.M., Zhang, L., Catanese K.R., Dolan-Pascoe B., Lyche, L.F., & Baumeister R.F. (2007). Replenishing connectedness: Reminders of social activity reduce aggression after social exclusion. *British Journal of Social Psychology, 46*(1), 205–224,
- Tice, D.M., Baumeister, R.F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology, 43*(3), 379-384.
- Tice, D.M., Bratslavsky E. (2000). Giving in to feel good: the place of emotion regulation in the context of general self-control. *Psychological Inquiry, 11*(3), 149-159.

- Uchino, B.N., Cacioppo J.T., Kiecolt-Glaser, J.K. (1996). The relationship between social support and physiological processes: a review with emphasis on underlying mechanisms and implications for health. *Psychological Bulletin*, *119*(3), 488-531.
- Uchino, B.N. (2004). *Social support and physical health: understanding the health consequences of our relationships*. New Haven, CT: Yale University Press.
- Vohs, K.D., Baumeister, R.F., & Ciarocco, N. J. (2005). Self-regulation and self-presentation: regulatory resource depletion impairs impression management and effortful self-presentation depletes regulatory resources. *Journal of Personality and Social Psychology*, *88*(4), 632-657.
- Vohs, K.D., Baumeister, R.F., Schmeichel, B.J., Twenge, J.M., Nelson, N.M., & Tice, D.M. (2008). Making choices impairs subsequent self-control: A limited-resource account of decision making, self-regulation, and active initiative. *Journal of Personality and Social Psychology*, *94*(5), 883-898.
- Webb, T.L., & Sheeran, P. (2003). Can implementation intentions help to overcome ego-depletion? *Journal of Experimental Social Psychology*, *39*(3), 279-286.

APPENDIX A

TABLE 1

LOADINGS OF UCLA LS AND ISEL ITEMS ON TWO FACTORS

Table 1
Loadings of UCLA LS and ISEL Items on Two Factors

| UCLA Items | factor 1 | factor 2 |
|---|----------|----------|
| I feel in tune with the people around me. | -.579 | -.018 |
| I lack companionship. | .641 | .065 |
| There is no one I can turn to. | .725 | .003 |
| I do not feel alone. | -.420 | .085 |
| I feel part of a group of friends. | -.675 | .076 |
| I have a lot in common with the people around me. | -.581 | -.106 |
| I am no longer close to anyone. | .788 | -.011 |
| My interests and ideas are not shared by those around me. | .513 | .070 |
| I am an outgoing person. | -.464 | -.004 |
| There are people I feel close to. | -.629 | -.101 |
| I feel left out. | .761 | -.126 |
| My social relationships are superficial. | .484 | .094 |
| No one really knows me well. | .745 | -.070 |
| I feel isolated from others. | .778 | -.036 |
| I can find companionship when I want it. | -.400 | -.023 |
| There are people who really understand me. | -.681 | -.099 |
| I am unhappy being so withdrawn. | .526 | -.030 |
| People are around me but not with me. | .780 | -.114 |
| There are people I can talk to. | -.734 | -.047 |
| There are people I can turn to. | -.753 | -.001 |
| ISEL items | Factor1 | Factor 2 |
| ISEL_ appraisal | | |
| There is no one that I feel comfortable talking to about intimate personal problems. | .467 | .220 |
| There are several people that I trust to help solve my problems. | -.471 | -.178 |
| There really is no one who can give me an objective view of how I'm handling my problems. | .467 | .220 |
| When I need suggestions on how to deal with a personal problem, I know someone I can turn to. | .344 | .442 |
| If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it. | -.301 | -.570 |
| There is at least one person I know whose advice I really | .185 | .524 |

| | | |
|---|--------|--------|
| trust. | | |
| There is someone I can turn to for advice about handling problems with my family. | -0.366 | -0.378 |
| There really is no one I can trust to give me good financial advice. | -0.356 | -0.430 |
| There is someone I could turn to for advice about making career plans or changing my job. | .049 | .729 |
| I feel that there is no one I can share my most private worries and fears with. | .048 | -0.797 |
| ISEL_ tangible | | |
| If I needed help fixing an appliance or repairing my car, there is someone who would help me. | .006 | -0.688 |
| If I needed a ride to the airport very early in the morning, I would have a hard time finding someone to take me. | -0.166 | .787 |
| If I were sick and needed someone (friend, family member, or acquaintance) to take me to the doctor, I would have trouble finding someone. | -0.082 | .704 |
| If I needed a place to stay for a week because of an emergency (for example, water or electricity out in my apartment or house), I could easily find someone who would put me up. | -0.016 | -0.594 |
| If I were sick, I could easily find someone to help me with my daily chores. | -0.039 | -0.628 |
| If I needed an emergency loan of \$100, there is someone (friend, relative, or acquaintance) I could get it from. | .193 | -0.878 |
| If I was stranded 10 miles from home, there is someone I could call who would come and get me. | .166 | -0.902 |
| If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me. | .021 | .642 |
| If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, garden, etc.). | .040 | .666 |
| It would be difficult to find someone who would lend me their car for a few hours. | -0.062 | .784 |
| ISEL_ belonging | | |
| When I feel lonely, there are several people I can talk to. | -0.526 | -0.262 |

| | | |
|--|-------|-------|
| I often meet or talk with family or friends. | -.472 | -.140 |
| I feel like I'm not always included by my circle of friends. | .463 | .250 |
| If I wanted to have lunch with someone, I could easily find someone to join me. | -.348 | -.384 |
| There are several different people I enjoy spending time with. | .153 | .644 |
| If I wanted to go on a trip for a day (e.g., to the mountains, beach, or country), I would have a hard time finding someone to go with me. | -.206 | -.558 |
| If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me. | .232 | .480 |
| Most people I know do not enjoy the same things that I do. | .542 | .125 |
| I don't often get invited to do things with others. | -.221 | -.549 |
| If I wanted to have lunch with someone, I could easily find someone to join me. | .199 | .565 |
| No one I know would throw a birthday party for me. | -.526 | -.262 |

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization

a. 2 factors extracted. Rotation converged in 3 iterations.

APPENDIX B

TABLE 2

DESCRIPTIVE STATISTICS OF THE COMPLETE LIST VARIABLES

Table 2
Descriptive Statistics of the Complete List of Variables

| Variables | measures | Coding details | Mean (N=288) | Standard deviation | Alpha |
|----------------------|----------------------------|--|-----------------|-----------------------|-------|
| Social connection | UCLA+ISEL (20 +8 items) | Higher score, more social connection. Range 1~4 | 3.20 | .56 | .949 |
| Social conflict | INSI (40 items) | Higher score, more social conflict. Range 1~5 | 1.74 | .66 | .966 |
| Social support | ISEL (20 items) | Higher score, more social support. Range 1~4 | 3.25 | .55 | .941 |
| Stress | PSS (10 items) | Higher score, more stressed. Range 1~5 | 2.83 | .71 | .894 |
| Self-control | SSRQ (31 items) | Higher score, better self-control. Range 1~5 | 3.80 | .55 | .939 |

APPENDIX C

TABLE 3

ZERO-ORDER CORRELATIONS MATRIX OF VARIABLES

Table 3
Zero-order Correlations Matrix of Variables

| | PSS | SSRQ | UCLA | INSI |
|------|---------|---------|---------|---------|
| SSRQ | -.551** | | | |
| UCLA | -.429** | .544** | | |
| INSI | .454** | -.411** | -.554** | |
| ISEL | -.307** | .481** | .798** | -.502** |

Note: * $p < 01$, ** $p < .001$.

APPENDIX D

TABLE 4

GOODNESS-OF-FIT INDEXES OF FULL MODEL, MEDIATION MODEL AND
DIRECT PATH MODEL

Table 4
Goodness-of-Fit Indexes of Full Model, Mediation Model and Direct Path Model

| Models | Chi-square | RMSEA | CFI |
|--------|--------------------|-------|------|
| 1 | $\chi^2(1)=.191$ | .00 | 1.00 |
| 2 | $\chi^2(3)=26.559$ | .165 | .855 |
| 3 | $\chi^2(4)=84.33$ | .263 | .496 |

RMSEA=root mean square error of approximation; CFI=comparative fit index

APPENDIX E

FIGURE 1

FULL MODEL OF SOCIAL EFFECT ON SELF-CONTROL THROUGH STRESS

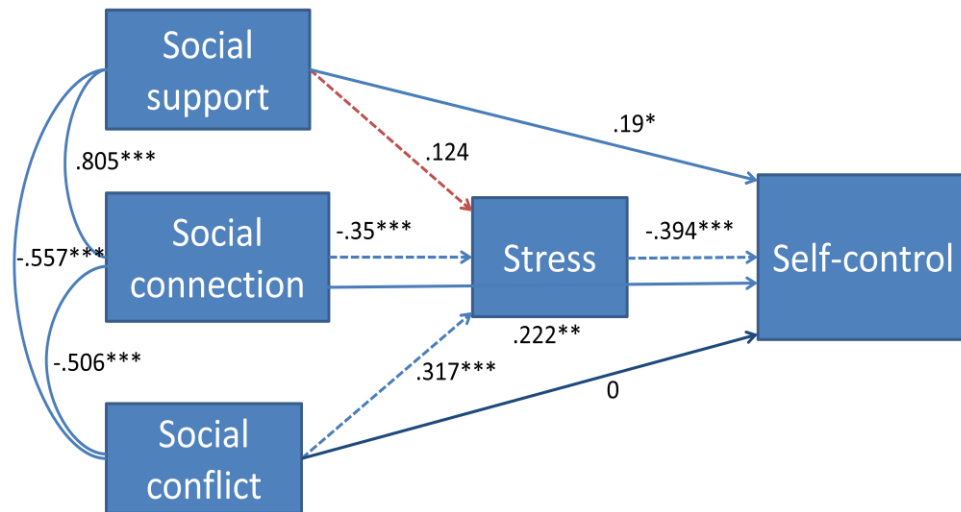


Figure 1 Full Model of Social Effect on Self-Control through Stress

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

Dash are indirect effects, solid lines are direct effects.

The total effects from social support to self-control capacity was not significant, $t=1.707$, $p=.088$

The total effect from social connection to self-control capacity was significant, $t=4.326$, $p<.001$

The total effect from social conflict to self-control capacity was also significant, $t=-4.317$, $p<.001$

APPENDIX F
IRB APPROVAL SURVEY

To: Mary Burleson
FAB

From: Mark Roosa, Chair
Soc Beh IRB

Date: 09/02/2011

Committee Action: **Exemption Granted**

IRB Action Date: 09/02/2011

IRB Protocol #: 1109006810

Study Title: Social connection and self-regulation

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2).

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.