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Investigating the Relationship Between Social and Spatial Cognitive Maps in Humans

Parmar, Jassleen

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Investigating the Relationship Between Social and Spatial Cognitive Maps in Humans

by

Jassleen Parmar

A THESIS

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Abstract

The present study aimed to understand the relationship between social and spatial cognitive maps. Speculation on Tolman's original idea of a cognitive map suggests that cognitive maps are not exclusive to physical spaces and may instead include social spaces as well. Participants completed 5 social questionnaires, as well as 5 spatial tasks and the Santa Barbara Sense of Direction Scale. The results showed that participants who had more social competence, social capital, social support, and extraversion perceived themselves to be better at spatially navigating. However, their correlations with the objective spatial tasks showed that they were instead significantly poor at spatially navigating, but the effects were small. There was some discrepancy between the subjective and objective tasks and questionnaires. Overall, the results of this study show that there is a negative relationship between spatial navigation and the social questionnaires used.

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Epigraph

I'm just an idea, nothing concrete.
- Mac Miller

Chapter 1: Introduction

1.1 Spatial Cognitive Maps

Completion of our daily activities depends on how efficiently we can navigate within our environment. Navigating efficiently relies significantly on our ability to form a cognitive map, described by Tolman (1948) as a mental representation of our environment that includes “routes, paths, and environmental relationships”. Knowledge of cognitive maps is based on an original experiment performed by Tolman (1948), where he found that rats could take shortcuts when locating a rewarded place in the environment, evidence that rodents navigate by relying on mental representations of the environment. Tolman had also speculated that human navigation could also involve forming and using a similar cognitive map. To date, there has been a significant amount of studies showing that humans also create and make use of cognitive maps when navigating (Maguire et al., 1999; Newcombe, 2018). Specifically, Jacobs and colleagues (1997) virtually replicated the Morris water maze test (Morris, 1981) originally performed on rodents, and found that humans also use distal cues to determine the position of a hidden platform. Furthermore, they later removed these distal cues, and found that humans can still learn and re-locate places if at least one distal cue remains, but this was disrupted if there was change in the topographical relations among distal landmarks (Jacobs et al., 1998). Thus, navigation in both humans and rodents follows the cognitive mapping theory put forth by O’Keefe and Nadel (1978), providing evidence that both also create and use cognitive maps.

When looking at cognitive mapping in humans, the hippocampus is a heavily researched and supported area. Many studies have tested humans with hippocampal damage and found that they forget spatial information, have difficulties detecting changes in spatial locations, and have difficulties navigating in large-scale environments (Smith & Milner, 1989; Pigott & Milner,

1993, Maguire et al., 1996b). Furthermore, Maguire and colleagues (1996a) performed a study with London taxi drivers and found that drivers with more navigation experience had greater hippocampal gray matter volume. Iaria and colleagues (2007) also tested human participants and found that the posterior hippocampus is involved in using cognitive maps, and the anterior left hippocampus in forming cognitive maps. In addition to the importance of hippocampal involvement, there has also been discussion on whether cognitive maps have a hierarchical structure within the hippocampus. Stevens and Coupe (1978) conducted experiments with humans indicating there may be a hierarchical structure within the mental representations of our environment, and that these structures may be causing directional judgement errors (Hirtle and Jonides, 1985). Furthermore, Kumaran and colleagues (2012) found that the hippocampus is responsible for organizing social and non-social information in a hierarchical manner. They also found that the anterior hippocampus is used when presented with knowledge about hierarchies. This provides evidence that the human hippocampus is responsible for hierarchically organizing multiple streams of information. This is also present in rodents, since Dusek and Eichenbaum (1997) tested rodents when looking at inferential memory and found that when they disconnected hippocampal pathways before odor discrimination, they were less likely to organize stimulus information in an orderly manner. These findings provide evidence that the hippocampus is involved in the formation and utilization of cognitive maps, and that these mental representations could have a hierarchical structure in humans.

1.2 What does a Spatial Cognitive Map look like?

O'Keefe and Nadel (1978) argue that the hippocampus supports an allocentric, third-person/world-centered, view of the environment. This means that individuals use landmarks and the distance between them as cues and reference points to navigate. Thus, an individual can

imagine the environment they are in and begin mentally navigating regardless of where they are physically located within that environment. Their navigation is not dependent on the physical routes present before them, and they have a greater understanding of the entire environment irrespective to their own position. Past research has shown that females are more likely to use Route Based Strategy, a more egocentric approach that focuses on where the individual is physically located in an environment, whereas males are more likely to report using a Survey Based Strategy that is allocentric (Lawton, 1994, 1996). However, questionnaires only provide subjective information, and there are now objective spatial tasks that can measure the accuracy in forming and using a spatial cognitive map.

The Cognitive Map Task created by Arnold and colleagues (2013) assesses the ability to form a spatial cognitive map by using survey knowledge. This task embodies strategies that are necessary to accurately navigate in a large-scale environment and helps to understand if individuals can create a mental representation of the environment they are placed in (Arnold et al., 2013; Tolman, 1948). In addition, the Spatial Configuration Task created by Burles (2014) assesses this as well, but it also measures the ability to use survey knowledge acquired from forming a spatial cognitive map. Together, these two tasks can help measure an individual's ability to both form and use a spatial cognitive map,

1.3 Social Cognitive Maps

Traditionally, cognitive maps have primarily been considered to occupy spatial information. However, recent literature speculates on the existence of different types of cognitive maps. Schiller and colleagues (2015) mention that when we look at the description of cognitive maps assumed by Tolman (1948), it involves “mapping life experiences” instead of only spatial navigation. In addition, Montagrin and colleagues (2018) have speculated that cognitive maps

may be a space that represents social information as well. They speculate that hippocampal activity should reflect the organization of social information in an orderly or hierarchical manner, much like evidence shows it does for spatial information (Montagrin et al., 2018).

Montagrin and colleagues (2018) propose that a particular way social information can be represented in a hierarchical manner is by evaluating relationships through power and affiliation dimensions. The argument for examining the power dimension is supported by a study performed by Muscatell and colleagues (2012), where participants experienced an increase in activation within mentalizing networks, such as the dorsomedial prefrontal cortex, medial prefrontal cortex, and precuneus/posterior cingulate cortex, when they read about the social status of others. Montagrin and colleagues (2018) suggest that this finding supports the existence of orderly representation within a social space, much like there is when representing physical space.

Power and affiliation are also dimensions that are analyzed by Tavares and colleagues (2015) in a virtual space. Participants played a virtual game as a character that moved into a new neighbourhood and had to socialize by making choices that affected either the power or affiliation dimension of each encountered character. These choices mapped a social space within the hippocampus, based on where participants placed each character on either dimension. Eichenbaum (2015) shares that this finding is consistent with the suggestion that the hippocampus is involved in our ability to “navigate life”, as proposed in Eichenbaum and Cohen (2014), and that Tavares and colleagues (2015) may have revealed a cognitive map of social space.

1.4 What does a Social Cognitive Map look like?

Past research has speculated that social cognitive maps represent social information hierarchically (Montagrin et al, 2018). Moreover, Tavares and colleagues (2015) were able to show that social cognitive maps reflect an egocentric view for the position of a family member, friend, or acquaintance in a participant's life. These positions are determined by the social relationship the participant has to each person in their social circle, and Tavares and colleagues (2015) framed social relationships through the interaction of power and affiliation domains. However, social relationships are complicated and may not only be organized through power and affiliation outside a lab setting with real social circles that are not manipulated through a video-game. It is not known whether social cognitive maps can even be formed and used the same way in real-life, or whether there are other social domains that guide the formation and use of social cognitive maps.

When looking at hippocampal BOLD signals during social navigation, Tavares and colleagues (2015) found that participants who were stronger at social navigation were more conscientious and less socially avoidant and neurotic. These traits were measured through the NEO Personality Inventory and the avoidance dimension of the Liebowitz Social Anxiety Scale (LSAS) (Costa & McCrae, 2000; Fresco et al., 2001). Thus, it may be beneficial to look at some of these traits in more depth.

The NEO Personality Inventory includes measures of Extraversion which provide a general sense of how extraverted an individual is and what personality traits contribute to their extraversion the most (Costa & McCrae, 2000). Analyzing Extraversion may help to see if going out more, being friendly and positive, and being assertive are personality traits that affect social cognitive maps in the real-world. Furthermore, it could provide more information on how a

power and affiliation axis could function in the real-world, since two sub-sets of Extraversion are assertiveness and friendliness.

An area of social life that was not looked at by Tavares and colleagues (2015) is Social Capital. Though Social Capital is a term that has many definitions that are constantly debated, it is generally perceived by some researchers as the amount of social resources an individual has (Onyx & Bullen, 2000). However, there has been debate on whether Social Capital is formed from participating in collective groups and having social cohesion (Putnam, 1993), or if it is the result of both a community having appropriate resources and whether an individual within that community can access these resources (Bourdieu & Richardson, 1986; Carpiano, 2006). Furthermore, Putnam (2000) also argues that there are different levels to Social Capital which can include Bridging and Bonding Social Capital. Bridging Social Capital involves social resources that are formed by having connections with individuals who are not immediately close but offer different backgrounds and knowledge, while Bonding Social Capital involves close and intimate connections (Putnam 2000; Williams, 2006). As Putnam's (1993,2000) theories are diverse and argued to be inconsistent at times (Carpiano, 2006), and since it is important to address if a community and social network even has accessible resources, both theories of Social Capital will be used in this paper.

When looking at social cognitive maps, it is not only important to know what communities are included in these maps, but also the nature of these communities and how the individual behaves within them. Thus, inclusion of both Social Capital theories presented by Putnam (1993) and Bourdieu & Richardson (1986) is important. It could help inform if an individual has multiple social cognitive maps for each community they participate in, and if the individuals in each of these communities are organized hierarchically by closeness. In addition, it could also

show if an individual has one social cognitive map that hierarchically is organized by how close they feel to everyone around them, regardless of the community they participate in. Due to this, it would also be important to include a questionnaire that evaluates the state of the social networks an individual has, regardless of the communities they are included in. Thus, a Close Persons Inventory (Stansfeld & Marmot, 1992) can inform on whether an individual has practical and emotional support from their social networks, and if there are any negative aspects to these relationships.

Tavares and colleagues (2015) looked at social avoidance by using the LSAS, and Buhrmester and colleagues (1988) found that most researchers use global questionnaires, such as ones about social anxiety, to measure social competence. This is fine, but it only informs on whether participants are socially anxious. However, if we specifically analyze social competence by measuring how individuals believe they use their social skills in a social setting, it could help to better understand what types of social skills affect our ability to organize and use social cognitive maps. The Close Persons Inventory, combined with a measure of Social Competence, can together inform on the state of the Social Capital an individual has and if the individual possesses the ability to acquire Social Capital through Social Competence. Therefore, inclusion of both theories presented by Putnam (1993) and Bourdieu & Richardson (1986) could lead to greater understanding of how social cognitive maps are formed and how they function.

1.5 Benefits of Exploring Social Cognitive Maps

The concept of a social cognitive map is new. However, we can see dynamic social movement in the hippocampus when characters in a virtual game are positioned on a power and affiliation axis, and we are aware that social status is represented in an orderly manner (Muscatell et al., 2012; Tavares et al., 2015; Montagrin et al., 2018). To receive the greatest

benefit from acknowledging the existence of a social cognitive map, we must learn what aspects of social life are involved in the process of forming and using a social cognitive map.

For example, due to understanding how spatial cognitive maps are formed and used, we know that when an individual has Developmental Topographical Disorientation (DTD), a disorder where individuals have an inability to appropriately orient, it is usually linked to their inability to form a spatial cognitive map (Iaria and Barton, 2010). Literature on spatial cognitive maps has been useful, as it has created an abundance of tasks that can assess orientation and navigation skills, as well as tasks designed to investigate the ability to form and make use of spatial cognitive maps (Bohbot et al., 1998; Hegarty et al., 2006; Iaria et al., 2007; Iaria and Barton, 2010; Liu et al., 2011; Arnold et al., 2013; McLaren-Gradinaru et al., 2020). Thus, we would benefit from learning the aspects of social life that are involved in the formation and use of social cognitive maps, as it could provide more information on various social disorders (Montagrin et al., 2018).

Exploring more on social cognitive maps could also help understand if there is an overlap between how both spatial and social cognitive maps are formed and used. Recent studies have speculated that Tolman (1948) described a map that does not just measure physical space, but rather exists within the hippocampus as a network that helps to “navigate life” and “maps life experiences” (Eichenbaum and Cohen, 2014; Eichenbaum, 2015; Schiller et al., 2015). These definitions could explain a network that works in a similar way to produce both spatial and social cognitive maps, rather than two separate networks for each type of cognitive map. Furthermore, if these cognitive maps are produced by the hippocampus in a similar manner, there is a possibility that having a strong ability to form a spatial cognitive map could also represent having a strong ability to form a social cognitive map.

1.6 The Present Study

The present study aimed to learn more about social cognitive maps by investigating if there are certain aspects of social life that correlate with spatial navigation ability. As the aforementioned literature suggests, there is some overlap between how spatial and social information is mentally represented, and Tavares and colleagues (2015) successfully formed a social cognitive map in participants by utilizing decisions based on affiliation and power in a virtual game. Specifically, we have a new understanding on how social cognitive maps are formed when decisions are based on either a power or affiliation response. However, this was done within a video-game and utilized characters that participants did not know in their real-life. Thus, it is important to learn if this is applicable in the real-world where we engage with individuals on a greater social scale, and it is also important to learn what social domains besides power and affiliation are used to organize, form, and use a social cognitive map. I aimed to understand this by correlating specific social questionnaires with well-known spatial tasks. If there is an overlap between how social and spatial cognitive maps are formed and used, there should be some significant correlations between these two types of cognitive maps. It is important to note that this study is exploratory, and it aimed to identify social elements that may create social cognitive maps by overlapping with the ability to form spatial cognitive maps. If there is an overlap, these social domains can then be looked at beyond a correlational study with a specific hypothesis.

To achieve this, participants completed questionnaires that represented their ability to navigate social spaces, including social capital, social competence, extraversion, and social support. Participants also completed spatial tasks that represented their ability to navigate physical spaces, including the cognitive map task, mental rotation task, four mountains task, and

spatial configuration task. I also included the Cambridge Face Memory Test as a control task since it provides both social and spatial information. I looked at an overall group consisting of both males and females combined, but then split them by sex for more information since there is an abundance of studies which show that males and females differ on their ability to form and make use of spatial cognitive maps (Newcombe, 2018). Therefore, I expected significant positive correlations between the social questionnaires and the spatial tasks.

Chapter 2: Method

2.1 Participants

I recruited 714 undergraduate students from the psychology program at the University of Calgary. After checking for straightliners and participants who spent less than the average time reading instructions on spatial tasks I excluded 56 participants. I also excluded 106 participants who answered “yes” to having a neuro-condition or did not complete all spatial tasks, since that could bias my results. Another 79 participants were removed because they failed to follow instructions for the Close Persons Inventory. Lastly, I removed 37 more participants who answered N/A to the second part of the Close Persons Inventory or had missing data. Thus, I analyzed 436 participants and their mean and standard deviation for age were 19.80 and 2.883 respectively. There were 208 males and 228 females within that population. All participants were recruited through the online research participation system (RPS) set-up through the University of Calgary. Participants were awarded 2 credits for their participation and all participation was conducted online from home.

Due to this field of research being novel, there was no effective way to perform a power analysis to determine the ideal number of participants for this study. However, I looked at pre-collected data for the Santa Barbara Sense of Direction Scale (SBSODS) and correlated it with

our data from the International Personality Item Pool for Extraversion (Costa & McCrae, 1992) and received a correlation of (Pearson's $r = .183, p < .001$). This suggests it may be fair to at least expect a correlation of .2 for this study. Thus, when looking at correlation sample sizes (Hulley et al., 2013), I expected an r of .20, changed the alpha value to .01, and the beta value to .05 which resulted in having at least 436 participants. Therefore, I collected at least 436 participants to decrease the chances of both Type I and Type II errors occurring. I also attempted to split this number as evenly as possible between both sexes.

2.2 Materials and Procedure

Participants used a computer to complete both the spatial and social packages of the study. Participants completed 5 social scales and 5 spatial tasks using a keyboard at home. All scales and tasks were administered through an online platform, Getting Lost (<https://gettinglost.ca/testplatform>). Administration of the social and spatial tasks were randomized for each participant.

Each participant first completed a consent, demographics, genetics, and ancestry form. The SBSODS was then administered, along with a navigational self-assessment test. Information on genetics and ancestry, as well as information from the navigational self-assessment test, was collected for the purpose of future studies, but was not used in this study. The SBSODS is a 15 item, 7-point Likert scale ranging from 1 – *strongly agree* to 7 – *strongly disagree*, and participants self-reported on their views of their own spatial abilities (Hegarty et al., 2002). The navigational self-assessment test is a 2 item, 7-point Likert scale also ranging from 1 – *strongly agree* to 7 – *strongly disagree*, and measures participants self-reported ability to familiarize faces, facial information, and places. It also measured how often participants use GPS navigation systems. Participants then completed either the social scales package, or the spatial tasks

package, depending on the order of package randomization. Each task and scale within each package were also randomized. The study took around an hour and half to two hours to fully complete.

2.3 Social Questionnaires

Social Capital Questionnaire (SCQ). This questionnaire (see Appendix E) was designed to measure social capital, and evaluated eight factors about each participant's social life, including: participation in a Local Community (7 items), Social Agency (7 items), Feelings of Trust and Safety (5 items), Neighbourhood Connections (5 items), Family and Friend Connections (3 items), Tolerance of Diversity (2 items), Value of Life (2 items), and Work Connections (5 items) (Onyx & Bullen, 2000). The questionnaire is a 36 item, 4-point Likert scale ranging from 1 – (*no, not much, or no, not at all*) – 4 (*yes, definitely, or yes, frequently*). I received subscale scores for this questionnaire. I anticipated several significant correlations with this questionnaire and the spatial tasks. I hypothesized that the more social resources a participant has, the better they were at navigating. I also specifically hypothesized this for participation in a Local Community, as this involves spatially navigating to locations within a local community.

Close Persons Inventory (CPI). This questionnaire (see Appendix C) measured participant's feelings about their current social support including ability to Confide/Emotional Support, whether the support is Practical, and Negative Aspects of close relationships (Stansfeld & Marmot, 1992). The questionnaire asked participants to name up to four individuals who they felt most close to, and they answered the questions based on these individuals. I asked participants to only name two close individuals in their lives. There were 15 items for the first closest person, and then 15 items for the second closest person. These questions were answered

on a 4-point Likert scale ranging from 1 – *not at all* to 4 – *a great deal*. There were then 9 more questions involving contact with family and friends, with answer choices changing depending on the question. This questionnaire provided subscale scores for each of the 3 domains, as well as for each listed close person, and I was able to combine the scores of each individual close person as suggested by Stansfeld & Marmot (1992). I hypothesized that greater Emotional and Practical Support, as well as lower Negative Aspects to a relationship, would result in being better spatial navigators. I predicted this because maintaining strong and positive friendships involves leaving one's home to socialize and spatially navigate.

International Personality Item Pool Extraversion Scale (IPIP-ES). This questionnaire (see Appendix D) assessed participants extraversion through 6 facets, including Friendliness, Gregariousness, Assertiveness, Activity Level, Excitement Seeking, and Cheerfulness (Costa & McCrae, 1992). The scale is a 60 item, 5-point Likert scale ranging from 1 – *very inaccurate* to 5 *very accurate*. There are 10 items for each of the 6 facets of extraversion. I received subscale scores for all 6 facets, as well as a total extraversion score. I hypothesized that the more extraverted a participant was, the better they would be at spatially navigating. Specifically, due to the power and affiliation axis mentioned by Tavares and colleagues (2015), I hypothesized that more assertiveness would correlate positively with spatial tasks.

Interpersonal Competence Questionnaire (ICQ). This questionnaire (see Appendix G) measured social competence, and is also referred to as the Social Style Questionnaire. This specific questionnaire measures five domains of social competence, including Initiating Relationships, Self-Disclosure, Negative Assertion, Emotional Support, and Conflict Management (Buhrmester, et al., 1988). These sub-domains provided insight on how a participant engaged in their social interactions. The questionnaire is a 40 item, 7-point Likert

scale ranging from 1 – *poor at this* to 5 – *extremely good at this*. The questionnaire asked participants to answer all 40 questions for themselves, but to also imagine what their best friend would answer if they too completed the questionnaire. I removed the best friend portion, which was also a suggestion by Buhrmester and colleagues (1988), and only focused on the participant's own answers. Each domain of social competence included eight items, and I received subscale scores for all five domains. I predicted that higher scores on each of the sub-domains would result in greater performance on the spatial tasks. Specifically, since negative assertion is related to the power axis used by Tavares and colleagues (2015), I predicted that higher Negative Assertion would result in greater spatial ability. I also predicted that having greater ability to Initiate Relationships would positively correlate with greater spatial ability, as forming new relationships depends on leaving one's home and spatially navigating to novel and familiar places, as well as having the confidence to initiate conversation.

Internet Social Capital Scale (ISCS). This questionnaire (see Appendix F) measured Bridging and Bonding Social Capital, and it also takes into consideration the effect of the internet on our social lives (Williams, 2006). This scale has two domains, including Bonding Social Capital (10 items) and Bridging Social Capital (10 items). It is a 20 item, 5-point Likert scale ranging from 1 – *strongly agree* to 5 – *strongly disagree*. I received 2 subscale scores, as I combined the online and offline versions. I predicted that having more of each type of social capital would result in greater performance on the spatial tasks. Specifically, I predicted that Bonding Social Capital would correlate with the spatial tasks, since to have strong intimate connections individuals must leave their home and spatially navigate to friends and family.

2.4 Spatial Tasks

The following spatial tasks were part of a battery of tests from the online platform Getting Lost. All tasks were scored based on the number of correct trials completed.

Cognitive Map Task (CMT). This task was designed by Arnold and colleagues (2013) to assess participants ability to remember certain locations in an environment that resembles a city. Participants were shown 1-minute video clips where they moved around an environment and were shown at least two of four target landmarks. After the video, they were presented with an aerial view of the environment they just saw a video of and placed all four target landmarks in their correct location. If the locations were correct, the task was complete. If the locations were incorrect, the participant saw another video. This task had 12 trials.

Spatial Configuration Task (SCT). This task was designed to assess participants ability to remember object locations in a given environment (Burles, 2014). Participants were placed in a space like environment and were shown 5 geometric shapes. The camera placed the participant on one of the shapes, and they were able to see two of the other shapes in the environment, but not the one they were placed on. Participants decided which object the camera had placed them on by understanding where they remembered the two visible shapes to be in the environment, causing them to form a mental representation of the environment. The bottom of the screen showed two object options for the participant to choose from, and they pressed the corresponding number on the keyboard. This task had 60 trials.

Additional Tasks and Control Task. The **Mental Rotation Task (MRT)** was computerized by Vandenberg and Kuse (1978) and was adapted from the design by Shepard and Metzler (1971). Participants were presented with two differently rotated 3D objects in greyscale on a screen, and decided if the objects were the same, mirrored, or completely different. If

objects were the same, participants pressed 1 on the keyboard, if they were different, they pressed 2. This task had 80 trials. The **Four Mountains Task** was originally designed by Hartley and colleagues (2007) to assess participants ability to remember landscapes, and whether they could imagine those specific landscapes from other perspectives. I used the revised version (Burles, 2020). Participants were first shown an image of a landscape and were required to remember it within five seconds. Then, they were shown four different pictures of landscapes, one of which was the original landscape image from a different perspective. Participants decided which of the four images was the original image that was presented by pressing the corresponding number on the keyboard. This task had 20 trials. The control task was the **Cambridge Face Memory Test** and it was designed by Duchaine and Nakayama (2006) to assess participants ability to remember faces. Since this test has shown an association between poor orientation ability and poor ability to recognize familiar faces, it was used as a control task (Corrow et al., 2016). Participants were introduced to a target face showing its left profile, frontal view, and right profile. Then, participants were shown another panel of three different faces and decided which face they were previously shown by pressing the corresponding number on the keyboard.

2.5 Data Analysis

I performed a bivariate correlation to test for correlations between the social questionnaires, SBSODS, and the spatial tasks. All intercorrelations between the spatial tasks can be found in Appendix A. For each of the social questionnaires, I looked at correlations with both females and males together, and then I split the correlations by sex (see Appendix B for all intercorrelations between all social questionnaires).

During data-clean up, I removed participants who did not answer “no” to having a neurological disorder. I also removed participants whose packages glitched, resulting in them being incapable of completing the study. Participants who straightlined tasks by pressing one key consistently or did not spend enough time reading the instructions were also removed for inconsistency. After removal of these participants, I tested for internal consistency reliability by looking at Cronbach’s alpha and all values were at an acceptable level. I also generated item-total correlations to ensure there were no negative values before performing the bivariate correlation. After I had all correlations, I ran the Benjamini-Hochberg procedure on each social questionnaire so that corrections could be applied to all correlations.

Chapter 3: Results

3.1 Social Capital Questionnaire

As seen in Table 1, when males and females were combined in the overall group, the bivariate correlation found significant positive correlations with the SBSODS when looking at Local Community engagement, Social Agency, Trust and Safety, and Neighbourhood Connections. The CMT had a significant negative correlation with Local Community engagement and a significant positive correlation with Tolerance of Diversity. I also found a significant negative correlation between the SCT and Work Connections. The MRT had significant negative correlations for Local Community engagement, Neighbourhood Connections, Friends and Family Connections, and Value of Life. The Four Mountains Task had a significant negative correlation with Local Community engagement and the Cambridge Face Memory Test had a significant positive correlation with Tolerance of Diversity. Thus, the SBSODS had significant positive correlations with Local Community Engagement, Social Agency, Trust/Safety, and Neighbourhood Connections. However, all the spatial tasks had

negative correlations with many domains, except for the Tolerate Diversity domain which had a significant positive correlation.

Next, I split the bivariate correlation by males only in Table 2. The SBSODS had a significant positive moderate correlation with Social Agency. I also found significant positive correlations with the SBSODS when looking at Local Community engagement and Trust and Safety. There was also a significant positive correlation for the relationship between the CMT and Tolerance of Diversity. There was a significant negative correlation for the relationship between the MRT and Neighbourhood Connections, as well as between the MRT and Friends and Family Connections. In conclusion, males had significant positive correlations for the SBSODS and CMT. However, they had significant negative correlations for the MRT.

Lastly, I split the bivariate correlation by females only which can be found in Table 3. The SBSODS had a significant positive correlation with Trust and Safety. However, no other correlations survived corrections. In conclusion, females only had a significant positively correlation when looking at the relationship between the SBSODS and the Trust and Safety domain.

Thus, in general when looking at Local Community Engagement, Social Agency, Trust and Safety, and Neighbourhood Connections there were significant positive correlations with the SBSODS. This was applicable to the overall population, as well as to the males only group, but males did not have a significant correlation between the SBSODS and Neighbourhood Connections. Males also had a significant positive correlation when looking at the relationship between Tolerance of Diversity and the CMT. There was a significant negative correlation for the relationship between the MRT and Neighbourhood Connections, as well as between MRT and Family and Friend Connections when looking at males as well. Females only had one

significant finding and it was the positive correlation between Trust and Safety and the SBSODS.

Table 1

Correlations for the Social Capital Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
LC	13.38	5.249	-.137**	-.035	-.161**	-.081	-.129**	.191**
SA	16.55	4.340	-.028	-.075	.079	.009	-.085	.197**
T/S	13.18	2.647	.059	.051	.030	.054	.092	.260**
NC	11.14	2.788	-.068	-.063	-.021	-.038	-.201**	.152**
FFC	8.03	2.245	-.055	-.038	.048	-.030	-.145**	.090
TD	6.67	1.372	.132**	.076	.061	.146**	.029	.019
VL	4.48	1.514	-.044	-.087	-.019	.025	-.126**	.117
W	3.8601	4.64225	-.022	-.132**	.065	-.035	-.103	.044

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain.

Table 2

Correlations for males only on the Social Capital Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
LC	13.47	5.421	-.114	-.071	-.135	-.134	-.170	.228**
SA	16.37	4.426	-.055	-.031	.067	.021	-.023	.314**
T/S	13.95	2.660	.001	.038	.075	.031	.047	.193**
NC	11.18	2.858	-.046	-.059	.014	-.039	-.233**	.130
FFC	8.03	2.310	-.025	-.022	.045	-.051	-.148*	.033
TD	6.50	1.478	.261**	.114	.144	.120	.091	.076
VL	4.55	1.525	-.095	-.138	-.003	.043	-.157	.106
W	3.5433	4.47409	-.046	-.108	.041	-.059	-.076	.155

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain.

Table 3

Correlations for females only on the Social Capital Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
LC	13.31	5.098	-.164	-.001	-.187	-.018	-.096	-.163

SA	16.71	4.264	.003	-.114	.088	-.017	-.136	.124
T/S	12.48	2.440	.064	.040	.011	.181	.037	.212**
NC	11.09	2.728	-.092	-.069	-.053	-.033	-.181	.174
FFC	8.03	2.189	-.083	-.055	.051	-.007	-.147	.149
TD	6.82	1.253	.026	.049	-.035	.146	.007	.025
VL	4.42	1.504	-.008	-.044	-.031	.019	-.118	.113
W	4.1491	4.78200	.010	-.148	.080	-.033	-.109	-.013

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain.

3.2 Close Persons Inventory

As shown in Table 4 which represents the overall group, the CMT had significant negative correlations for its relationship with Practical Support and Negative Relationship Aspects. The SCT also had significant negative correlations for its relationship with Practical Support and Negative Relationship Aspects. There was a significant negative moderate correlation between the MRT and Negative Relationship Aspects. The MRT also had a significant negative correlation with Confiding Emotional Support and Practical Support. The Four Mountains Task had a significant negative correlation with Negative Relationship Aspects. Finally, the

Cambridge Face Memory Test had a significant negative correlation with Negative Relationship Aspects. There were no significant correlations for the SBSODS. Thus, the more Negative Aspects a participant had, the worse they were at spatial tasks. However, participants were also poor at spatial tasks if they had strong Practical and Confiding/Emotional Support.

Next, I split the bivariate correlations by males only as shown in Table 5. There were significant negative correlations for the CMT with Practical Support and Negative Relationship Aspects. The SCT also had significant negative correlations with Practical Support and Negative Relationship Aspects. Additionally, the MRT had a significant negative correlation with Practical Support, and a significant negative moderate correlation with Negative Relationship Aspects. Lastly the Four Mountains Task had a significant negative moderate correlation with Negative Relationship Aspects. There were no correlations for the Cambridge Face Memory Test. Thus, the more Negative Aspects males had, the worse they were at spatial tasks. Furthermore, males were also poor at spatial tasks if they had strong Practical and Confiding/Emotional Support.

As shown in Table 6, I next split the bivariate correlation by females only. The MRT had significant negative correlations for 2 sub-domains of the questionnaire: Practical Support and Negative Relationship Aspects. There was also a significant negative correlation between The Four Mountains Task and Negative Relationship Aspects. Thus, the more Negative Aspects females had, the worse they were at spatial tasks. Furthermore, stronger Practical and Confiding/Emotional Support correlated negatively with spatial tasks.

Table 4

Correlations for the Close Persons Inventory

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
CES	28.604	6.8891	-.021	-.083	.088	.104	-.156**	.053
PS	6.951	3.7170	-.124**	-.174**	-.084	-.032	-.212**	.085
NRA	7.605	3.3990	-.211**	-.154**	-.265**	-.144**	-.298**	-.058

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects.

In conclusion, there were no correlations between the SBSODS and the CPI. The overall population had significant negative correlations between all aspects of the CPI and the MRT. However, males and females separately did not have a significant negative correlation between the MRT and Confiding/Emotional Support. The only other correlation that females had was between the Four Mountains Task and Negative Relationship Aspects, and this correlation was negative. Males and the overall group also had significant negative correlations between the SCT and Practical Support and the SCT and Negative Relationship Aspects. These two groups also had significant negative correlations between Negative Relationship Aspects and the CMT, as well as the Four Mountains Task and Negative Relationship Aspects. Practical Support also had a significant negative correlation with the CMT for both groups. The overall population was the only group that had a significant correlation between the Cambridge Face Memory Task and Negative Relationship Aspects.

Table 5

Correlations for males only on the Close Persons Inventory

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
CES	27.208	7.4668	-.040	-.057	.075	.088	-.067	.141
PS	7.096	3.8086	-.187**	-.206**	-.049	-.004	-.211**	.071
NRA	7.458	3.5515	-.221**	-.202**	-.310**	-.134	-.334**	-.111

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects.

Table 6

Correlations for females only on the Close Persons Inventory

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
CES	29.877	6.0573	.039	-.096	.091	.064	-.195	.076
PS	6.819	3.6348	-.074	-.148	-.114	-.051	-.235**	.085
NRA	7.739	3.2558	-.196	-.101	-.227**	-.173	-.255**	.010

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects.

3.3 The IPIP-ES

As shown in Table 7 representing the overall population, the Extraversion International Personality Item Pool had significant positive correlations when looking at the SBSODS's relationship with Assertiveness, Activity Level, Excitement Seeking, and Total Extraversion. There were no correlations for any of the objective spatial tasks. Furthermore, when I split the bivariate correlations by males only, as seen in Table 8, there were significant positive correlations for the SBSODS with Assertiveness, Activity Level, and Total Extraversion. However, there were still no correlations with any of the objective spatial tasks. Lastly, I split the bivariate correlation by females only as seen in Table 9. There was a significant positive correlation between the SBSODS and Activity Level. No other correlations were found for females.

In conclusion, Extraversion only had significant correlations with the SBSODS and they were all positive. Specifically, the overall group and males only group had many significant positive correlations for the SBSODS, but females only had one significant positive correlation and it was between the SBSODS and Activity Level. There were no correlations for any of the objective spatial tasks.

Table 7

Correlations for the International Personality Item Pool – Extraversion

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Friendliness	33.98	7.683	.011	.006	-.015	.012	-.090	.080
Gregariousness	31.32	8.009	.002	-.044	-.077	-.054	-.119	.045
Assertiveness	32.36	6.792	.012	-.096	-.109	-.016	-.050	.207**

Activity Level	30.08	5.338	-.007	-.108	-.004	-.048	-.005	.220**
ES	33.02	7.177	.043	-.037	-.063	-.060	-.034	.138**
Cheerful	36.56	6.427	.051	.044	.047	.085	.005	-.005
TE	197.3188	30.65487	.025	-.050	-.054	-.019	-.072	.147**

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, ES = Excitement Seeking, TE = Total Extraversion.

Table 8

Correlations for males only on the International Personality Item Pool - Extraversion

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Friendliness	33.88	7.355	-.040	-.002	.059	.006	-.087	.148
Gregariousness	30.92	7.808	-.067	-.094	-.110	-.077	-.179	.031
Assertiveness	32.92	6.598	-.049	-.104	-.059	.022	-.090	.287**
Activity Level	29.56	5.268	-.042	-.128	-.004	-.101	-.049	.280**
ES	33.34	7.443	.039	-.008	-.006	.000	-.045	.168
Cheerful	36.32	6.541	.061	.045	.156	.100	.054	.032
TE	196.9471	30.32405	-.022	-.062	.005	-.009	-.095	.203**

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, ES = Excitement Seeking, TE = Total Extraversion.

Table 9

Correlations for females only on the International Personality Item Pool - Extraversion

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Friendliness	34.07	7.986	.055	.014	-.076	.014	-.092	.036
Gregariousness	31.69	8.189	.068	.005	-.053	-.048	-.050	.083
Assertiveness	31.85	6.939	.048	-.097	-.147	-.032	-.044	.115
Activity Level	30.55	5.369	.40	-.083	-.012	-.024	.072	.231**
ES	32.73	6.928	.039	-.070	-.114	-.117	-.041	.097
Cheerful	36.78	6.328	.050	.047	-.057	.060	-.030	-.020
TE	197.6579	31.01636	.068	-.037	-.106	-.034	-.050	.115

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, ES = Excitement Seeking, TE = Total Extraversion.

3.4 Interpersonal Competence Questionnaire

Table 10 shows all the correlations for the ICQ and the overall group. There was a significant positive moderate correlation between the SBSODS and Asserting Influence. The SBSODS also had a significant positive correlation with Initiating Relationships, whereas the MRT had a significant negative correlation with Initiating Relationships. Thus, participants had

significant positive correlations with the SBSODS and a negative correlation between the MRT and Initiating Relationships domain.

The bivariate correlation was then split by males only, as seen in Table 11. The SBSODS had a significant positive moderate correlation for Asserting Influence. There were also many other significant positive correlations with the SBSODS, including Initiating Relationships, Emotional Support, and Conflict Resolution. The CMT had a significant negative correlation with Initiating Relationships. There was also a significant negative correlation between the MRT and Initiating Relationships. Thus, males had significant positive correlations with the SBSODS. However, they also had significant negative correlations with the Initiating Relationships domain and the CMT and MRT. I also split the bivariate correlation by females only in Table 12. The SBSODS had significant positive correlations with Asserting Influence, but no other correlations survived corrections.

In conclusion, the overall group had significant positive correlations for the SBSODS when looking at Initiating Relationships and Asserting Influence. This was also the same for the males only group, except they also had significant positive correlations for the SBSODS when looking at Emotional Support and Conflict Resolution. Both the overall group and males only group also had a significant negative correlation between the MRT and Initiating Relationships. Males also had a significant negative correlation between the CMT and Initiating Relationships. Females only had one significant correlation and it was between the SBSODS and Asserting Influence, this correlation was positive.

Table 10

Correlations for the Interpersonal Competence Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
InitRelat.	24.69	6.895	-.072	-.040	-.078	-.068	-.180**	.200**
EmotSup.	30.61	5.278	-.017	.023	.058	.055	-.075	.118
AssrtInfl.	27.11	5.460	-.004	-.047	-.099	-.100	-.087	.304**
SelfDisclosure	24.08	7.106	-.063	-.008	-.066	-.009	-.111	.051
Conflict Resol.	27.92	5.362	.038	.098	.014	.085	.018	.120

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table 11

Correlations for males only on the Interpersonal Competence Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
InitRelat.	25.01	7.007	-.205**	-.100	-.090	-.101	-.244**	.226**

EmotSup.	29.75	5.616	-.044	.088	.018	.019	.000	.287**
AssrtInfl.	28.42	5.442	-.133	-.086	-.085	-.103	-.127	.321**
SelfDisclosure	24.34	7.299	-.157	.001	-.152	-.032	-.140	.065
Conflict Resol.	28.36	5.323	-.056	.124	-.008	.055	.027	.192**

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table 12

Correlations for females only on the Interpersonal Competence Questionnaire

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
InitRelat.	24.40	6.794	.040	.013	-.064	-.020	-.139	.167
EmotSup.	31.40	4.829	.042	-.030	.088	.050	-.100	.044
AssrtInfl.	25.90	5.203	.068	-.035	-.100	-.029	-.147	.203**
SelfDisclosure	23.85	6.934	.016	-.020	.018	.028	-.098	.024
Conflict Resol.	27.51	5.378	.106	.067	.040	.143	-.020	.026

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

3.5 Internet Social Capital Scales

The correlations for the ISCS can be found in Table 13 and represent the overall group. There was a significant negative correlation for the Four Mountains Task and Bonding Social Capital. There were no other significant correlations with spatial tasks or Bridging Social Capital. Next, I split the bivariate correlations by males only in Table 14. There was a significant negative correlation between Bonding Social Capital and the SBSODS, but no other correlations. Lastly, in Table 15 I split the bivariate correlation by females only. None of the correlations survived corrections, so there were no significant results.

Thus, the overall group had a significant negative correlation between Bonding Social Capital and the Four Mountains Task, while the males only group had a significant negative correlation between Bonding Social Capital and the SBSODS. The females only group had no significant correlations that survived corrections.

Table 13

Correlations for the Internet Social Capital Scales

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Bonding	21.86	7.306	-.001	.027	-.140**	-.083	.025	-.050
Bridging	20.45	6.802	.015	.068	-.037	-.094	.035	-.075

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Table 14

Correlations for males only on the Internet Social Capital Scales

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Bonding	22.23	7.422	.022	-.002	-.116	-.003	.005	-.189**
Bridging	20.88	6.991	-.011	.056	-.027	-.004	.013	-.164

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Table 15

Correlations for females only on the Internet Social Capital Scales

Task	<i>M</i>	<i>SD</i>	CMT	SCT	4MTN	CFMT	MRT	SBSODS
Bonding	21.53	7.199	-.031	.051	-.159	-.158	.028	.048
Bridging	20.07	6.616	.028	.074	-.041	-.179	.015	-.030

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Chapter 4: Discussion

The purpose of this study was to investigate whether there is a relationship between social and spatial cognitive maps. I did this by looking at the correlations between spatial tasks and facets of specific social questionnaires. In this study, I found evidence that certain social skills and resources do affect how participants perform on objective spatial tasks, as well as on a self-report measure of spatial ability, but most results have small effects.

4.1 Spatial Capital and Internet Social Capital

The Social Capital Questionnaire had the most correlations out of all the questionnaires used, as predicted by my hypothesis. The results support the hypothesis that individuals who socialize more and have greater connections are more likely to be better at spatial navigation. However, the SBSODS is a subjective self-assessment tool, rather than an objective task that can investigate whether someone is truly good at navigating. This explains why the correlations for the spatial tasks, particularly the CMT, MRT, and Four Mountains Task, go the opposite way when compared to the correlations with the SBSODS.

Onyx & Bullen (2000) found that the longer an individual remains in one community, the stronger their Neighbourhood Connections will be. I hypothesized that greater Neighbourhood Connections, Family and Friend Connections, Work Connections, and Local Community involvement would produce greater accuracy on the spatial tasks, especially since gaining this level of Social Capital involves leaving your own home to a great degree to learn about your community and build connections. Spiers and Maguire (2008) share that when individuals travel

within familiar environments they navigate in an “automatic pilot” way. Specifically, individuals do not think about navigation while they are navigating, since no decisions on where to go are made. Patai and Spiers (2021) also hypothesized that the default-mode network (DMN), a network of brain regions that has greater activation when thought is internal instead of external, has greater activation when travelling familiar environments due to mind-wandering and a lack of active navigation decisions being made. This could present a possible reason for why Local Community involvement and having greater Neighborhood, Family and Friend, and Work Connections correlate negatively with some of the spatial tasks, as achieving this type of social capital involves following familiar routes, as opposed to activating and exercising the regions in the brain that are involved in active spatial navigation. Furthermore, participants who found Value in Life had poor accuracy on the MRT. Amati and colleagues (2018) share that having stronger primary connections whom you visit often is linked to an increase in life satisfaction. Perhaps, this explains why Value of Life holds similar results.

Interestingly, participants who had Tolerance of Diversity also had greater accuracy on the CMT. Questions relating to Tolerance of Diversity involved believing that multiculturalism makes life better, and that the participant enjoys living amongst people of different lifestyles (Onyx & Bullen, 2000). Butrus and Witenberg (2013) found openness to experiences to be a predictor of tolerance of diversity when participants were presented with a story about another person’s negative beliefs on a different race. Furthermore, DeYoung and colleagues (2005) found that the dopaminergic brain system regulates reward responses which positively influences exploration and is represented by individuals who are extraverted and have openness to experiences. If openness to experiences is a strong predictor of tolerance and diversity, then we may expect participants who are tolerant of diversity to seek new experiences. These new

experiences may expose participants to diverse opinions and individuals, as well as push participants away from their familiar routes and habits, exercising brain regions involved in active spatial navigation.

Participants who had Trust and Safety believed they were good at spatially navigating. This means that when participants felt they could trust others, walk down their neighbourhood street in the dark, and lived in a safe neighbourhood they were more likely to self-report having stronger spatial navigation ability. This is particularly important, as males are predicted to have better spatial navigation ability than females, but it is often overlooked that feelings of personal safety have a negative correlation with spatial anxiety, especially for females (Lawton and Kallai, 2002). If participants do not feel safe in their neighbourhoods, they will have spatial anxiety, thus resulting in navigating less.

The Internet Social Capital Scale also showed similar results as the Social Capital Questionnaire, except this scale also included networks made online. I predicted that greater Bonding and Bridging Social Capital would create better navigators, and this was false. When males had greater Bonding Social Capital: strong, close, intimate relationships, they were more likely to self-report poor spatial ability. There was also poor accuracy on the Four Mountains Task for the overall group when there was greater Bonding Social Capital, which means these results support those seen in the Social Capital Questionnaire. This suggests that there is a relationship between having close relationships and poor spatial ability, except this time I was also able to see that on the SBSODS.

4.2 Close Persons Inventory

For the CPI I predicted that having Practical and Confiding/Emotional Support would make participants better navigators, and that having high Negative Aspects would result in poor

navigators. The CPI was the only questionnaire that did not have correlations with the SBSODS after corrections. The questionnaire assessed how close participants felt to those in their primary networks by looking at whether their network of 1-2 people provided practical support, whether they were able to confide in them and have emotional support, and whether there were any negative aspects of the support (Stansfeld and Marmot, 1992). Results for this questionnaire were similar to those present in the Social Capital Questionnaire.

Practical Support consisted of 3 questions which asked participants if they needed any help from their primary network in the last year and whether they were able to receive that help. The more Practical Support a participant had, the worse their accuracy on the CMT, SCT, and MRT. Furthermore, the Confiding and Emotional Support domain assessed whether participants had helpful, trustworthy, reliable, and positive primary networks with whom they were able to experience hobbies and interests. It also assessed how often participants wanted to/did confide in their network, and whether their network confided back. Individuals who had high scores in this domain had poor accuracy on the MRT. The descriptions of these domains mirror the description of having strong Family and Friend Connections from the SCQ. These measures certainly suggest a difference in a general social network and primary network. Perhaps, there is a difference between the level of novelty we seek with our primary network compared to with our general social network which consists of varying individuals with different backgrounds. Indeed, there is a certain spatial routine that is established when strengthening ties with friends in the primary network. Moreover, different social and spatial routines are necessary to meet new individuals part of the broader social network, especially since they are not seen as frequently in the same places as primary friends, family, neighbours, and work connections.

Interestingly, the more Negative Aspects of support a participant had, the worse their accuracy was on all the spatial tasks, as predicted by my hypothesis. Questions addressing Negative Aspects consisted of whether the participants primary network provided worries, stress, and problems; whether speaking with their primary network about personal matters made things worse; and whether participants would have appreciated more practical help and more ability to confide in their primary network. This means that not only does having Social Capital affect the ability to spatially navigate, but the quality of that Social Capital also matters. Stansfeld and Marmot (1992) found that Negative Aspects had a small, but significant, correlation with neuroticism, and Burles and colleagues (2014) also found that low neuroticism scores are correlated with a stronger ability to form a cognitive map. Furthermore, Tavares and colleagues (2015) also found that low neuroticism correlated with the ability to form a social cognitive map. Thus, these findings may further support this.

4.3 The IPIP-Extraversion Scale

My prediction for the IPIP-ES was that the more extroverted a participant was (within the facets and the total score), the better navigator they were. If participants were Assertive (took charge, were leaders, great influencers), had a high Activity Level (busy, on the go, manage many things), were Excitement-Seeking (adventurous, loud, reckless), and/or overall had high Extraversion, they self-reported having greater spatial ability. Similar to my results, Condon and colleagues (2015) found that the SBSODS positively correlated with Extraversion when looking at the Big Five traits (Goldberg, 1992; Goldberg, 1999). Indeed, it is surprising that while there were many correlations for Extraversion on the self-report measure, none survived corrections for the objective spatial tasks. It is also interesting that Extraversion seemed to apply to males more than females in this study. Lynn & Martin (1997) found that of the 37 countries they

analyzed, men had higher Extraversion than females, and of these countries Canada was one where men scored higher. Furthermore, Vianello and colleagues (2013) also found that men scored higher on Extraversion. Thus, perhaps Extraversion is a personality trait that does not greatly affect females in comparison to males when looking at social and spatial cognitive maps.

Depue and Collins (1999) share that it is common belief amongst trait psychologists to view one key characteristic of Extraversion as being interpersonal engagement, which consists of affiliation and agency. Specifically, enjoying close bonds and being assertive and socially dominant, characteristics that I did analyze within this study. The Social Agency domain on the SCQ and Assertiveness on the IPIP-ES yielded significant positive correlations with the SBSODS, but not with any spatial tasks. I also looked at close bonds by analyzing Negative Aspects of Relationships; Family, Friend, Work, and Neighbourhood Connections; and Practical/Emotional Support, all of which negatively correlated with the spatial tasks. This is interesting, because despite the spatial tasks used in this study yielding significant negative results for interpersonal engagement, and no significant results for agency beyond the SBSODS, Tavares and colleagues (2015) were able to create a social cognitive map utilizing both these characteristics when participants played a videogame where they answered questions in an affiliative or assertive manner. Perhaps, there are some separate key characteristics that define spatial and social cognitive maps. Furthermore, this difference may be present because Tavares and colleagues (2015) found two social domains that helped “form” a social cognitive map, but this was only possible under a video-game setting that did not include people who participants knew and engaged with in person. Furthermore, many of the social questionnaires I used are aspects of social life that mainly involve the “outcome” of being social or evaluating what type of social resources and social networks a participant has. This is important, as the spatial tasks

that I used also involve the formation and use of spatial cognitive maps, rather than their outcomes. However, this would be difficult to do for a social cognitive map since it is still speculative, and the only existence of a social cognitive map that was found was in a video-game that did not include many aspects of social life.

4.4 Interpersonal Competence Questionnaire

My prediction for the ICQ was that higher scores would mean participants were better navigators. Participants who self-reported being good navigators had high Social Competence, specifically when looking at whether participants can initiate relationships (making plans, carrying conversations, being interesting, meeting unfamiliar people etc.), provide emotional support (making others feel better and understood), assert their influence (taking charge, sticking up for themselves, voicing concerns), and resolve conflict. However, males ended up performing worse on the CMT and MRT when they were good at initiating relationships. This means that having Social Capital, the quality of Social Capital, and the participant's ability to access Social Capital all affect spatial navigation. This is interesting, because I hypothesized that individuals who are good at initiating relationships feel secure, making them more social. Buhrmester and colleagues (1988) found that self-esteem correlated most strongly with initiating relationships. They also found that being good at initiating relationships negatively correlated with having social sensitivity, specifically having knowledge of social norms and "reading social situations" (Riggio, 1986; Riggio & Reichard, 2008). Reading social situations does involve understanding different perspectives, much like spatial tasks do with visual, spatial, and orientation perspectives, but more research needs to be performed to understand if there is any relationship between these perspectives and characteristics as it is strictly speculative.

4.5 Limitations and Future Directions

Indeed, this study has limitations. Firstly, the study is completely correlational, thus I am not capable of drawing causational conclusions from my results. In addition, the results had small effects, so the social domains used in this study might not help form or use a social cognitive map. Future studies could replicate what Tavares and colleagues (2015) did while also using the social questionnaires I mentioned in this study to see if there are experimental and correlational similarities. However, it is important that future studies use real people that participants know, as there are many aspects of social life that are not included in a controlled video-game. If this is replicated with real-people, then the idea of a social cognitive map could be less speculative. This study also only grasped a small portion of social skills, social life, social support, and social resources. There may be other areas of social networks and social psychology that relate better to spatial cognitive maps, and that might better map the differences between how individuals both form and use social cognitive maps. Another limitation of this study is that I did not look at different spatial navigation strategies and how they may also correlate with different aspects of social life. This may be interesting for future studies to look at, as there is a difference in which strategy is used and the level of spatial anxiety it induces (Lawton & Kallai, 2002).

Once there is an established idea of which aspects of social networks and social psychology are directly involved with social cognitive maps, future studies should attempt to learn which of these aspects are only involved in the formation of social cognitive maps, while also looking at which aspects are only involved in the use of social cognitive maps. This may be important, since there are also different aspects of the brain that are used for forming and using a spatial cognitive map (Iaria et al., 2007).

4.6 Conclusions

The present study investigated the relationship between social and spatial cognitive maps. Tavares and colleagues (2015) were able to form a social cognitive map in their participants by guiding decisions in a video-game either based on power or affiliation. However, due to the novel nature of social cognitive maps, this study left many things answered, such as what areas of social life are directly involved with creating and using social cognitive maps beyond power and affiliation decision-making, and how do these results apply to real relationships. The present study highlighted this by correlating spatial tasks with different aspects of social life to see if these two types of cognitive maps have an overlap. I found that being open to diversity and individuals of different backgrounds resulted in participants performing well on the CMT. In addition, I found that the more intimate connections a participant had, the worse they were at spatially navigating. I also found that participants who had social resources and positive social networks self-reported being good navigators, yet their accuracy on the objective spatial tasks was poor. Thus, there may be a difference between how social outcomes relate to self-perception of spatial ability compared to how social outcomes relate to performance on spatial tasks. Overall, these results have highlighted certain areas of social life that future studies can look at when investigating social cognitive maps and has also stressed that it is important to separate the aspects of social life that form a social cognitive map in comparison to the aspects that help use it.

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Appendix A

Table A1

Intercorrelations between all spatial tasks for males and females combined.

Task		CMT	4MTN	SCT	CFMT	MRT	SBSODS
CMT	Pearson	1	.328**	.384**	.222**	.474**	.130**
	Correlation						
	Sig. (2-tailed)		.000	.000	.000	.000	.007
4MTN	Pearson	.328**	1	.241**	.259**	.386**	.078
	Correlation						
	Sig. (2-tailed)	.000		.000	.000	.000	.104
SCT	Pearson	.384**	.241**	1	.155**	.428**	.117*
	Correlation						
	Sig. (2-tailed)	.000	.000		.001	.000	.014
CFMT	Pearson	.222**	.259**	.155**	1	.240**	-.024
	Correlation						
	Sig. (2-tailed)	.000	.000	.001		.000	.612
MRT	Pearson	.474**	.386**	.428**	.240**	1	.110*
	Correlation						
	Sig. (2-tailed)	.000	.000	.000	.000		.022
SBSODS	Pearson	.130**	.078	.117*	-.024	.110	1
	Correlation						
	Sig. (2-tailed)	.007	.104	.014	.612	.022	

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Table A2

Intercorrelations between all spatial tasks for males.

Task		CMT	4MTN	SCT	CFMT	MRT	SBSODS
CMT	Pearson	1	.341**	.387**	.302**	.536**	.000
	Correlation						
	Sig. (2-tailed)		.000	.000	.000	.000	.999
4MTN	Pearson	.341**	1	.294**	.344**	.441**	.032
	Correlation						
	Sig. (2-tailed)	.000		.000	.000	.000	.643
SCT	Pearson	.387**	.294**	1	.176*	.406**	.063
	Correlation						
	Sig. (2-tailed)	.000	.000		.011	.000	.369
CFMT	Pearson	.302**	.344**	.176*	1	.352**	-.013
	Correlation						
	Sig. (2-tailed)	.000	.000	.011		.000	.847
MRT	Pearson	.536**	.441**	.406**	.352**	1	.050
	Correlation						
	Sig. (2-tailed)	.000	.000	.000	.000		.473

SBSODS	Pearson	.000	.032	.063	-.013	.050	1
	Correlation						
	Sig. (2-tailed)	.999	.643	.369	.847	.473	

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Table A3

Intercorrelations between all spatial tasks for females.

Task		CMT	4MTN	SCT	CFMT	MRT	SBSODS
CMT	Pearson	1	.327**	.377**	.180**	.401**	.201**
	Correlation						
	Sig. (2-tailed)		.000	.000	.006	.000	.002
4MTN	Pearson	.327**	1	.197**	.166*	.362**	.143*
	Correlation						
	Sig. (2-tailed)	.000		.003	.012	.000	.031
SCT	Pearson	.377**	.197**	1	.153*	.448**	.149*
	Correlation						
	Sig. (2-tailed)	.000	.003		.021	.000	.025
CFMT	Pearson	.180**	.166*	.153*	1	.189**	.044
	Correlation						
	Sig. (2-tailed)	.006	.012	.021		.004	.508

MRT	Pearson	.401**	.362**	.448**	.189**	1	.078
	Correlation						
	Sig. (2-tailed)	.000	.000	.000	.004		.242
SBSODS	Pearson	.201**	.143*	.149*	.044	.078	1
	Correlation						
	Sig. (2-tailed)	.002	.031	.025	.508	.242	

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

Note. CMT = Cognitive Map Task, 4MTN = Four Mountains Task, SCT = Spatial Configuration Task, CFMT = Cambridge Face Memory Test, MRT = Mental Rotation Task, SBSODS = Santa Barbara Sense of Direction Scale.

Appendix B

Table B1

Intercorrelations with Social Capital Questionnaire for males and females

Task	LC	SA	T/S	NC	FFC	TD	VL	W
LC	1	.175**	.178**	.399**	.210**	.186**	.194**	-.009
SA	.175**	1	.113*	.302**	.267**	.208**	.263**	.758**
T/S	.178**	.113*	1	.389**	.201**	.139**	.270**	-.013
NC	.399**	.302**	.389**	1	.445**	.241**	.370**	.126**
FFC	.210**	.267**	.201**	.445**	1	.093	.272**	.131**
TD	.186**	.208**	.139**	.241**	.093	1	.025	.005
VL	.194**	.263**	.270**	.370**	.272**	.025	1	.156**
W	-.009	.758**	-.013	.126**	.131**	.005	.156**	1
CES	.068	.219**	.107*	.292**	.305**	.181**	.182**	.149**
PS	.163**	.213**	.095*	.281**	.187**	.102*	.203**	.121*
NRA	.114*	.047	.004	.199**	.200**	-.035	.090	.047
Friendliness	.125**	.183**	.207**	.344**	.369**	.092	.302**	.084
Gregariousness	.140**	.131**	.160**	.346**	.413**	.103*	.251**	.052
Assertiveness	.261**	.299**	.134**	.235**	.239**	.049	.241**	.094*
Activity Level	.183**	.298**	.110*	.225**	.244**	.073	.230**	.177**
ES	.141**	.132**	.135**	.262**	.336**	.120*	.112*	.040
Cheerful	.101*	.105*	.140**	.297**	.319**	.103*	.309**	.019
TE	.212**	.251**	.203**	.391**	.441**	.123**	.326**	.100*
InitRelat.	.295**	.273**	.218**	.448**	.398**	.087	.322**	.079

EmotSup.	.210**	.283**	.110*	.310**	.278**	.303**	.149**	.036
AssrtInfl.	.247**	.255**	.201**	.255**	.206**	.033	.210**	.020
SelfDisclosure	.087	.170**	.187**	.244**	.236**	.129**	.203**	.034
Conflict Resol.	.167**	.180**	.146**	.211**	.158**	.197**	.122*	-.014
Bonding	-.075	-.202**	-.153**	-.251**	-.291**	-.102*	-.262**	-.087
Bridging	-.195**	-.214**	-.201**	-.283**	-.274**	-.341**	-.152**	-.064

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B2

Intercorrelations with Social Capital Questionnaire for males

Task	LC	SA	T/S	NC	FFC	TD	VL	W
LC	1	.313**	.227**	.475**	.238**	.228**	.281**	.087
SA	.313**	1	.238**	.408**	.285**	.251**	.330**	.758**
T/S	.227**	.238**	1	.407**	.314**	.287**	.216**	.011
NC	.475**	.408**	.407**	1	.471**	.340**	.347**	.252**

FFC	.238**	.285**	.314**	.471**	1	.220**	.276**	.155*
TD	.228**	.251**	.287**	.340**	.220**	1	.091	-.016
VL	.281**	.330**	.216**	.347**	.276**	.091	1	.207**
W	.087	.758**	.011	.252**	.155*	-.016	.207**	1
CES	.098	.263**	.217**	.340**	.318**	.228**	.143*	.158*
PS	.174*	.196**	.077	.329**	.247**	.129	.184**	.135
NRA	.147*	.078	-.018	.278**	.237**	-.015	.134	.097
Friendliness	.117	.168*	.337**	.339**	.424**	.208**	.264**	.085
Gregariousness	.132	.115	.275**	.364**	.454**	.266**	.194**	.072
Assertiveness	.288**	.326**	.235**	.236**	.253**	.151*	.256**	.158*
Activity Level	.158*	.324**	.188**	.123	.185**	.141*	.194**	.241**
ES	.189**	.194**	.205**	.305**	.394**	.258**	.070	.118
Cheerful	.067	.064	.183**	.192**	.315**	.154*	.236**	.051
TE	.213**	.259**	.326**	.365**	.472**	.273**	.272**	.156*
InitRelat.	.306**	.299**	.299**	.476**	.491**	.162*	.298**	.114
EmotSup.	.298**	.292**	.272**	.351**	.361**	.322**	.193**	.003
AssrtInfl.	.296**	.339**	.219**	.241**	.250**	.111	.213**	.110
SelfDisclosure	.165*	.128	.232**	.294**	.287**	.242**	.204**	-.056
Conflict Resol.	.244**	.145*	.113	.155*	.193**	.176*	.089	-.085
Bonding	-.119	-.183**	-.213**	-.230**	-.336**	-.111	-.221**	-.021
Bridging	-.240**	-.199**	-.280**	-.332**	-.330**	-.393**	-.125	-.037

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B3

Intercorrelations with Social Capital Questionnaire for females

Task	LC	SA	T/S	NC	FFC	TD	VL	W
LC	1	.038	.133*	.321**	.182**	.144*	.107	-.094
SA	.038	1	.017	.198**	.250**	.154*	.203**	.758**
T/S	.133*	.017	1	.394**	.099	.052	.323**	-.001
NC	.321**	.198**	.394**	1	.419**	.139*	.392**	.016
FFC	.182**	.250**	.099	.419**	1	-.050	.270**	.112
TD	.144*	.154*	.052	.139*	-.050	1	-.036	.012
VL	.107	.203**	.323**	.392**	.270**	-.036	1	.118
W	-.094	.758**	-.001	.016	.112	.012	.118	1
CES	.043	.161*	.115	.257**	.306**	.076	.256**	.123
PS	.151*	.234**	.099	.232**	.127	.083	.219**	.114
NRA	.080	.011	.053	.118	.161*	-.068	.048	-.005

Friendliness	.134*	.196**	.112	.350**	.322**	-.022	.336**	.082
Gregariousness	.149*	.143*	.093	.332**	.377**	-.072	.306**	.029
Assertiveness	.237**	.283**	.005	.233**	.227**	-.035	.224**	.053
Activity Level	.211**	.271**	.097	.325**	.301**	-.020	.274**	.114
ES	.091	.072	.046	.216**	.276**	-.026	.152*	-.026
Cheerful	.136*	.144*	.129	.402**	.322**	.039	.382**	-.013
TE	.211**	.244**	.108	.416**	.413**	-.034	.377**	.052
InitRelat.	.284**	.252**	.128	.420**	.307**	.016	.343**	.054
EmotSup.	.122	.270**	.033	.279**	.193**	.251**	.120	.050
AssrtInfl.	.203**	.206**	.072	.276**	.172**	.005	.199**	-.031
SelfDisclosure	.005	.215**	.136*	.193**	.184**	.013	.200**	.119
Conflict Resol.	.091	.220**	.146*	.263**	.125	.245**	.146*	.055
Bonding	-.033	-.218**	-.132*	-.274**	-.248**	-.083	-.306**	-.140*
Bridging	-.151*	-.224**	-.170*	-.236**	-.218**	-.275**	-.184**	-.083

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety

Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections

Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work

Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR =

Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. =

Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence,

Conflict Resol. = Conflict Resolution.

*Table B4**Intercorrelations with Close Persons Inventory for males and females*

Task	CES	PS	NRA
CES	1	.381**	.297**
PS	.381**	1	.468**
NRA	.297**	.468**	1
LC	.068	.163**	.114*
SA	.219**	.213**	.047
T/S	.107*	.095*	.004
NC	.292**	.281**	.199**
FFC	.305**	.187**	.200**
TD	.181**	.102*	-.035
VL	.182**	.203**	.090
W	.149**	.121*	.047
Friendliness	.309**	.108*	.052
Gregariousness	.218**	.116*	.132**
Assertiveness	.186**	.106*	.060
Activity Level	.133**	.074	-.023
ES	.061	.072	.089
Cheerful	.264**	.077	-.025
TE	.268**	.127**	.072
InitRelat.	.267**	.227**	.211**

EmotSup.	.374**	.182**	.012
AssrtInfl.	.142**	.182**	.083
SelfDisclosure	.349**	.133**	.188**
Conflict Resol.	.179**	.107*	-.037
Bonding	-.420**	-.144**	-.038
Bridging	-.263**	-.073	-.004

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B5

Intercorrelations with Close Persons Inventory for males

Task	CES	PS	NRA
CES	1	.412**	.387**
PS	.412**	1	.536**
NRA	.387**	.536**	1
LC	.098	.174*	.147*

SA	.263**	.196**	.078
T/S	.217**	.077	-.018
NC	.340**	.329**	.278**
FFC	.318**	.247**	.237**
TD	.228**	.129	-.015
VL	.143*	.184**	.134
W	.158*	.135	.097
Friendliness	.332**	.100	.110
Gregariousness	.216**	.126	.174*
Assertiveness	.253**	.075	.067
Activity Level	.076	.006	-.090
ES	.094	.067	.036
Cheerful	.279**	.061	-.024
TE	.287**	.104	.074
InitRelat.	.292**	.233**	.300**
EmotSup.	.400**	.142*	.047
AssrtInfl.	.269**	.190**	.116
SelfDisclosure	.340**	.146*	.307**
Conflict Resol.	.274**	.142*	.020
Bonding	-.409**	-.141*	-.094
Bridging	-.323**	-.083	-.075

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B6

Intercorrelations with Close Persons Inventory for females

Task	CES	PS	NRA
CES	1	.380**	.182**
PS	.380**	1	.403**
NRA	.182**	.403**	1
LC	.043	.151*	.080
SA	.161*	.234**	.011
T/S	.115	.099	.053
NC	.257**	.232**	.118
FFC	.306**	.127	.161*
TD	.076	.083	-.068
VL	.256**	.219**	.048
W	.123	.114	-.005

Friendliness	.300**	.117	-.001
Gregariousness	.213**	.112	.088
Assertiveness	.160*	.129	.060
Activity Level	.165*	.145*	.034
ES	.043	.074	.150*
Cheerful	.245**	.096	-.029
TE	.257**	.150*	.070
InitRelat.	.271**	.218**	.124
EmotSup.	.294**	.245**	-.042
AssrtInfl.	.110	.167*	.074
SelfDisclosure	.392**	.118	.068
Conflict Resol.	.118	.069	-.087
Bonding	-.434**	-.151*	.023
Bridging	-.180**	-.068	.076

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B7

Intercorrelations with IPIP-Extraversion Scale for males and females

Task	Friend.	Gregarious.	Assert.	AL	ES	Cheerful	TE
Friendliness	1	.705**	.538**	.243**	.365**	.601**	.808**
Gregariousness	.705**	1	.496**	.271**	.600**	.489**	.838**
Assertiveness	.538**	.496**	1	.458**	.428**	.446**	.759**
Activity Level	.243**	.271**	.458**	1	.270**	.224**	.518**
ES	.365**	.600**	.428**	.270**	1	.437**	.716**
Cheerful	.601**	.489**	.446**	.224**	.437**	1	.728**
TE	.808**	.838**	.759**	.518**	.716**	.728**	1
LC	.125**	.140**	.261**	.183**	.141**	.101*	.212**
SA	.183**	.131**	.299**	.298**	.132**	.105*	.251**
T/S	.207**	.160**	.134**	.110*	.135**	.140**	.203**
NC	.344**	.346**	.235**	.225**	.262**	.297**	.391**
FFC	.369**	.413**	.239**	.244**	.336**	.319**	.441**
TD	.092	.103*	.049	.073	.120*	.103*	.123**
VL	.302**	.251**	.241**	.230**	.112*	.309**	.326**
W	.084	.052	.094*	.177**	.040	.019	.100*
CES	.309**	.218**	.186**	.133**	.061	.264**	.268**
PS	.108*	.116*	.106*	.074	.072	.077	.127**
NRA	.052	.132**	.060	-.023	.089	-.025	.072
InitRelat.	.670**	.575**	.522**	.274**	.367**	.417**	.655**

EmotSup.	.382**	.278**	.368**	.254**	.162**	.294**	.393**
AssrtInfl.	.300**	.252**	.669**	.374**	.265**	.249**	.469**
SelfDisclosure	.471**	.368**	.317**	.104*	.171**	.267**	.399**
Conflict Resol.	.235**	.151**	.236**	.136**	.140**	.214**	.252**
Bonding	-.298**	-.202**	-.197**	-.110*	-.016	-.265**	-.250**
Bridging	-.302**	-.242**	-.159**	-.149**	-.145**	-.261**	-.289**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, Friend. = Friendliness, Gregarious. = Gregariousness, Assert. = Assertiveness, AL = Activity Level, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B8

Intercorrelations with IPIP-Extraversion Scale for males

Task	Friend.	Gregarious.	Assert.	AL	ES	Cheerful	TE
Friendliness	1	.694**	.578**	.187**	.427**	.611**	.816**
Gregariousness	.694**	1	.513**	.255**	.625**	.429**	.827**
Assertiveness	.578**	.513**	1	.454**	.456**	.462**	.780**

Activity Level	.187**	.255**	.454**	1	.288**	.137*	.484**
ES	.427**	.625**	.456**	.288**	1	.418**	.749**
Cheerful	.611**	.429**	.462**	.137*	.418**	1	.701**
TE	.816**	.827**	.780**	.484**	.749**	.701**	1
LC	.117	.132	.288**	.158*	.189**	.067	.213**
SA	.168*	.115	.326**	.324**	.194**	.064	.259**
T/S	.337**	.275**	.235**	.188**	.205**	.183**	.326**
NC	.339**	.364**	.236**	.123	.305**	.192**	.365**
FFC	.424**	.454**	.253**	.185**	.394**	.315**	.472**
TD	.208**	.266**	.151*	.141*	.258**	.154*	.273**
VL	.264**	.194**	.256**	.194**	.070	.236**	.272**
W	.085	.072	.158*	.241**	.118	.051	.156*
CES	.332**	.216**	.253**	.076	.094	.279**	.287**
PS	.100	.126	.075	.006	.067	.061	.104
NRA	.110	.174*	.067	-.090	.036	-.024	.074
InitRelat.	.598**	.569**	.551**	.225**	.438**	.352**	.634**
EmotSup.	.396**	.285**	.442**	.239**	.237**	.318**	.434**
AssrtInfl.	.302**	.289**	.701**	.437**	.324**	.245**	.508**
SelfDisclosure	.449**	.402**	.303**	.106	.179**	.233**	.391**
Conflict Resol.	.198**	.195**	.310**	.143*	.240**	.257**	.305**
Bonding	-.285**	-.172*	-.280**	-.050	-.036	-.299**	-.256**
Bridging	-.359**	-.331**	-.266**	-.152*	-.241**	-.300**	-.380**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, Friend. = Friendliness, Gregarious. = Gregariousness, Assert. = Assertiveness, AL = Activity Level, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B9

Intercorrelations with IPIP-Extraversion Scale for females

Task	Friend.	Gregarious.	Assert.	AL	ES	Cheerful	TE
Friendliness	1	.715**	.510**	.290**	.312**	.593**	.801**
Gregariousness	.715**	1	.492**	.280**	.586**	.543**	.848**
Assertiveness	.510**	.492**	1	.482**	.400**	.441**	.748**
Activity Level	.290**	.280**	.482**	1	.264**	.300**	.549**
ES	.312**	.586**	.400**	.264**	1	.461**	.688**
Cheerful	.593**	.543**	.441**	.300**	.461**	1	.754**
TE	.801**	.848**	.748**	.549**	.688**	.754**	1
LC	.134*	.149*	.237**	.211**	.091	.136*	.211**
SA	.196**	.143*	.283**	.271**	.072	.144*	.244**

T/S	.112	.093	.005	.097	.046	.129	.108
NC	.350**	.332**	.233**	.325**	.216**	.402**	.416**
FFC	.322**	.377**	.227**	.301**	.276**	.322**	.413**
TD	-.022	-.072	-.035	-.020	-.026	.039	-.034
VL	.336**	.306**	.224**	.274**	.152*	.382**	.377**
W	.082	.029	.053	.114	-.026	-.013	.052
CES	.300**	.213**	.160*	.165*	.043	.245**	.257**
PS	.117	.112	.129	.145*	.074	.096	.150*
NRA	-.001	.088	.060	.034	.150*	-.029	.070
InitRelat.	.736**	.588**	.494**	.330**	.293**	.485**	.677**
EmotSup.	.379**	.265**	.334**	.250**	.095	.263**	.360**
AssrtInfl.	.320**	.254**	.645**	.382**	.200**	.284**	.462**
SelfDisclosure	.494**	.342**	.328**	.109	.161*	.304**	.408**
Conflict Resol.	.270**	.122	.164*	.145*	.037	.180**	.209**
Bonding	-.310**	-.226**	-.132*	-.159*	.001	-.229**	-.243**
Bridging	-.253**	-.157*	-.072	-.137*	-.052	-.219**	-.203**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety

Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections

Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work

Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR =

Negative Relationship Aspects, Friend. = Friendliness, Gregarious. = Gregariousness, Assert. =

Assertiveness, AL = Activity Level, ES = Excitement Seeking, TE = Total Extraversion,

InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B10

Intercorrelations with Interpersonal Competence Questionnaire for males and females

Task	InitRelat.	EmotSup.	AssrtInfl.	SelfDisclosure	Conflict Resol.
InitRelat.	1	.491**	.524**	.451**	.347**
EmotSup.	.491**	1	.471**	.331**	.526**
AssrtInfl.	.524**	.471**	1	.283**	.459**
SelfDisclosure	.451**	.331**	.283**	1	.237**
Conflict Resol.	.347**	.526**	.459**	.237**	1
LC	.295**	.210**	.247**	.087	.167**
SA	.273**	.283**	.255**	.170**	.180**
T/S	.218**	.110*	.201**	.187**	.146**
NC	.448**	.310**	.255**	.244**	.211**
FFC	.398**	.278**	.206**	.236**	.158**
TD	.087	.303**	.033	.129**	.197**
VL	.322**	.149**	.210**	.203**	.122*
W	.079	.036	.020	.034	-.014
CES	.267**	.374**	.142**	.349**	.179**
PS	.227**	.182**	.182**	.133**	.107*
NRA	.211**	.012	.083	.188**	-.037

Friendliness	.670**	.382**	.300**	.471**	.235**
Gregariousness	.575**	.278**	.252**	.368**	.151**
Assertiveness	.522**	.368**	.669**	.317**	.236**
Activity Level	.274**	.254**	.374**	.104*	.136**
ES	.367**	.162**	.265**	.171**	.140**
Cheerful	.417**	.294**	.249**	.267**	.214**
TE	.655**	.393**	.469**	.399**	.252**
Bonding	-.216**	-.289**	-.165**	-.330**	-.235**
Bridging	-.265**	-.311**	-.157**	-.168**	-.239**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B11

Intercorrelations with Interpersonal Competence Questionnaire for males

Task	InitRelat.	EmotSup.	AssrtInfl.	SelfDisclosure	Conflict Resol.
InitRelat.	1	.524**	.574**	.481**	.332**

EmotSup.	.524**	1	.595**	.375**	.578**
AssrtInfl.	.574**	.595**	1	.300**	.545**
SelfDisclosure	.481**	.375**	.300**	1	.230**
Conflict Resol.	.332**	.578**	.545**	.230**	1
LC	.306**	.298**	.296**	.165*	.244**
SA	.299**	.292**	.339**	.128	.145*
T/S	.299**	.272**	.219**	.232**	.113
NC	.476**	.351**	.241**	.294**	.155*
FFC	.491**	.361**	.250**	.287**	.193**
TD	.162*	.322**	.111	.242**	.176*
VL	.298**	.193**	.213**	.204**	.089
W	.114	.003	.110	-.056	-.085
CES	.292**	.400**	.269**	.340**	.274**
PS	.233**	.142*	.190**	.146*	.142*
NRA	.300**	.047	.116	.307**	.020
Friendliness	.598**	.396**	.302**	.449**	.198**
Gregariousness	.569**	.285**	.289**	.402**	.195**
Assertiveness	.551**	.442**	.701**	.303**	.310**
Activity Level	.225**	.239**	.437**	.106	.143*
ES	.438**	.237**	.324**	.179**	.240**
Cheerful	.352**	.318**	.245**	.233**	.257**
TE	.634**	.434**	.508**	.391**	.305**

Bonding	-.219**	-.305**	-.272**	-.280**	-.210**
Bridging	-.312**	-.327**	-.263**	-.231**	-.167*

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B12

Intercorrelations with Interpersonal Competence Questionnaire for females

Task	InitRelat.	EmotSup.	AssrtInfl.	SelfDisclosure	Conflict Resol.
InitRelat.	1	.485**	.485**	.421**	.356**
EmotSup.	.485**	1	.455**	.304**	.518**
AssrtInfl.	.485**	.455**	1	.265**	.368**
SelfDisclosure	.421**	.304**	.265**	1	.240**
Conflict Resol.	.356**	.518**	.368**	.240**	1
LC	.284**	.122	.203**	.005	.091
SA	.252**	.270**	.206**	.215**	.220**
T/S	.128	.033	.072	.136*	.146*

NC	.420**	.279**	.276**	.193**	.263**
FFC	.307**	.193**	.172**	.184**	.125
TD	.016	.251**	.005	.013	.245**
VL	.343**	.120	.199**	.200**	.146*
W	.054	.050	-.031	.119	.055
CES	.271**	.294**	.110	.392**	.118
PS	.218**	.245**	.167*	.118	.069
NRA	.124	-.042	.074	.068	-.087
Friendliness	.736**	.379**	.320**	.494**	.270**
Gregariousness	.588**	.265**	.254**	.342**	.122
Assertiveness	.494**	.334**	.645**	.328**	.164*
Activity Level	.330**	.250**	.382**	.109	.145*
ES	.293**	.095	.200**	.161*	.037
Cheerful	.485**	.263**	.284**	.304**	.180**
TE	.677**	.360**	.462**	.408**	.209**
Bonding	-.218**	-.266**	-.092	-.385**	-.268**
Bridging	-.225**	-.282**	-.088	-.110	-.320**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. =

Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence,
Conflict Resol. = Conflict Resolution.

Table B13

Intercorrelations with Internet Social Capital Scale for males and females

Task	Bonding	Bridging
Bonding	1	.472**
Bridging	.472**	1
LC	-.195**	-.075
SA	-.214**	-.202**
T/S	-.201**	-.153**
NC	-.283**	-.251**
FFC	-.274**	-.291**
TD	-.341**	-.102*
VL	-.152**	-.262**
W	-.064	-.087
CES	-.420**	-.263**
PS	-.144**	-.073
NRA	-.038	-.004
Friendliness	-.298**	-.302**
Gregariousness	-.202**	-.242**
Assertiveness	-.197**	-.159**

Activity Level	-.110*	-.149**
ES	-.016	-.145**
Cheerful	-.265**	-.261**
TE	-.250**	-.289**
InitRelat.	-.216**	-.265**
EmotSup.	-.289**	-.311**
AssrtInfl.	-.165**	-.157**
SelfDisclosure	-.330**	-.168**
Conflict Resol.	-.235**	-.239**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B14

Intercorrelations with Internet Social Capital Scale for males

Task	Bonding	Bridging
Bonding	1	.460**

Bridging	.460**	1
LC	-.119	-.240**
SA	-.183**	-.199**
T/S	-.213**	-.280**
NC	-.230**	-.332**
FFC	-.336**	-.330**
TD	-.111	-.393**
VL	-.221**	-.125
W	-.021	-.037
CES	-.409**	-.323**
PS	-.141*	-.083
NRA	-.094	-.075
Friendliness	-.285**	-.359**
Gregariousness	-.172*	-.331**
Assertiveness	-.280**	-.266**
Activity Level	-.050	-.152*
ES	-.036	-.241**
Cheerful	-.299**	-.300**
TE	-.256**	-.380**
InitRelat.	-.219**	-.312**
EmotSup.	-.305**	-.327**
AssrtInfl.	-.272**	-.263**

SelfDisclosure	-.280**	-.231**
Conflict Resol.	-.210**	-.167*

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. = Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence, Conflict Resol. = Conflict Resolution.

Table B15

Intercorrelations with Internet Social Capital Scale for females

Task	Bonding	Bridging
Bonding	1	.481**
Bridging	.481**	1
LC	-.033	-.151*
SA	-.218**	-.224**
T/S	-.132*	-.170*
NC	-.274**	-.236**
FFC	-.248**	-.218**
TD	-.083	-.275**

VL	-.306**	-.184**
W	-.140*	-.083
CES	-.434**	-.180**
PS	-.151*	-.068
NRA	.023	.076
Friendliness	-.310**	-.253**
Gregariousness	-.226**	-.157*
Assertiveness	-.132*	-.072
Activity Level	-.159*	-.137*
ES	.001	-.052
Cheerful	-.229**	-.219**
TE	-.243**	-.203**
InitRelat.	-.218**	-.225**
EmotSup.	-.266**	-.282**
AssrtInfl.	-.092	-.088
SelfDisclosure	-.385**	-.110
Conflict Resol.	-.268**	-.320**

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

Note. LC = Local Community Domain, SA = Social Agency Domain, T/S = Trust and Safety Domain, NC = Neighbourhood Connections Domain, FFC = Friends and Family Connections Domain, TD = Tolerance of Diversity Domain, VL = Value of Life Domain, W = Work Connections Domain, CES = Confiding Emotional Support, PS = Practical Support, NR = Negative Relationship Aspects, ES = Excitement Seeking, TE = Total Extraversion, InitRelat. =

Initiating Relationships, EmotSup. = Emotional Support, AssrtInfl. = Asserting Influence,
Conflict Resol. = Conflict Resolution.

Appendix C

Close Persons Inventory/Questionnaire SOCIAL LIFE

- 1 This section concerns people in your life who you feel close to and from whom you can obtain support (either emotional or practical) including close relatives and good friends.

How many people do you feel very close to? (It does not matter where they live or whether you have seen them recently.)

PLEASE WRITE NUMBER IN THIS BOX

Who have you felt closest to in the last 12 months? Please describe in terms of their relationship to you: (e.g. WIFE, SON, AUNT, BOYFRIEND, MALE FRIEND, FEMALE FRIEND). Remember those are just examples and we would like you to write in whoever you feel closest to. If you feel close to more than one person, please list two below:

WRITE IN THE PEOPLE YOU ARE CLOSEST TO HERE:

Closest Person _____

Second Person _____

Only one person on each line, please.

On the next page please tell us how you would rate the practical and emotional support each of the people you have listed above provides for you.
(Each column refers to **one** of the people you listed above).

Rate each person on the scale from 1 - 4 to show how well they have provided each stated type of support from (a - o) **IN THE LAST 12 MONTHS**.

Not at all A little Quite a lot A great deal

1 2 3 4

for example:-

If the person you are closest to is your wife and the second a male friend, the columns on the next page might look like this:-

Write in the people you are closest to here:-

	Closest Person	Second Person
	<i>Wife</i>	<i>Male Friend</i>
a) How much in the last 12 months... did this person give you information, suggestions and guidance that you found helpful?	4	2

e.g. "a great deal" from wife, "a little" from friend. Of course, **these are only examples**. Please complete each question (a) - (o) on the 1 - 4 scale for the person or two people you listed above.

Rate each person on the scale from 1 - 4 to show how well they have provided each stated type of support:
 1 = not at all. 2 = a little. 3 = quite a lot. 4 = a great deal

Write in the people you are closest to here:	Closest Person	Second Person
a) How much in the last 12 months... did this person give you information, suggestions, and guidance that you found helpful?		
b) How much in the last 12 months... could you rely on this person (was this person there when you needed him/her?)		
c) How much in the last 12 months... did this person make you feel good about yourself?		
d) How much in the last 12 months... did you share interests, hobbies and fun with this person?		
e) How much in the last 12 months... did this person give you worries, problems and stress ?		

This section is about **confiding** in people, that is talking frankly or sharing feelings with them.
 Rate each person on the scale from 1 - 4 to show well they have provided each stated type of support:
 1 = not at all. 2 = a little. 3 = quite a lot. 4 = a great deal.

Write in the people you are closest to here:-	Closest Person	Second Person
f) How much in the last 12 months... did you want to confide in (talk frankly, share feelings with) this person?		
g) How much in the last 12 months... did you confide in this person?		
h) How much in the last 12 months... did you trust this person with your most personal worries and problems?		
i) How much in the last 12 months... would you have liked to confide more in this person?		
j) How much in the last 12 months... did talking to this person make things worse?		
k) How much in the last 12 months... did he/she talk about his/her personal worries with you?		

This section is about major and minor **practical** support. Rate each person on the scale from 1 - 4 to show how well they provided each type of support:
 1 = not at all. 2 = a little. 3 = quite a lot. 4 = a great deal.

Write in the people you are closest to here:-	Closest Person	Second Person
l) How much in the last 12 months... did you need practical help from this person with major things (e.g. look after you when ill, help with finances, children)?		
m) How much in the last 12 months... did this person give you practical help with major things?		
n) How much in the last 12 months... would you have liked more practical help with major things from this person?		
o) How much in the last 12 months... did this person give you practical help with small things when you needed it? (e.g. chores, shopping, watering plants, etc.)		

- 2 a) Are there any relatives outside your household with whom you have regular contact (either by visit, telephone or letters)? (Not necessarily the same person each time).

Please circle one answer for each question.

If you have no relatives outside your household, please go to Question 3

Almost daily	About once a week	About once a month
Once every few months	Never/almost never	No relatives outside household

- b) How often do you regularly **visit** or are **visited** by these relatives?

Almost daily	About once a week	About once a month
Once every few months	Never/almost never	No relatives outside household

- c) How many relatives do you see once a month or more?

None	1-2	3-5	6-10	More than 10
------	-----	-----	------	--------------

- 3 a) Are there any friends or acquaintances with whom you have regular contact (either by visit , telephone or letters)?
Not necessarily the same person each time

Almost daily

About once a week

About once a month

Once every few months

Never/almost never

- b) How often do you regularly **visit** or are **visited** by these friends or acquaintances?

Almost daily

About once a week

About once a month

Once every few months

Never/almost never

- c) How many friends and acquaintances do you see once a month or more?

None

1-2

3-5

6-12

More than 10

- 4 a) Are you an active member of: social or recreational groups, trade unions, commercial groups, professional organisations, political parties, sports clubs, cultural groups, pressure groups, etc?

Yes

No

If Yes,

- b) Taking all the above organisations together, how many hours in an average month do you devote to activities of these organisations?

hours

Appendix D

6 facet – 60 item version of IPIP extraversion scale.

E1: FRIENDLINESS (.87)

- + keyed Make friends easily.
 Warm up quickly to others.
 Feel comfortable around people.
 Act comfortably with others.
 Cheer people up.
- keyed Am hard to get to know.
 Often feel uncomfortable around others.
 Avoid contacts with others.
 Am not really interested in others.
 Keep others at a distance.

E2: GREGARIOUSNESS (.79)

- + keyed Love large parties.
 Talk to a lot of different people at parties.
 Enjoy being part of a group.
 Involve others in what I am doing.
 Love surprise parties.
- keyed Prefer to be alone.
 Want to be left alone.
 Don't like crowded events.
 Avoid crowds.
 Seek quiet.

E3: ASSERTIVENESS (.84)

- + keyed Take charge.
 Try to lead others.
 Can talk others into doing things.
 Seek to influence others.
 Take control of things.
- keyed Wait for others to lead the way.
 Keep in the background.
 Have little to say.
 Don't like to draw attention to myself.
 Hold back my opinions.

E4: ACTIVITY LEVEL (.71)

- + keyed Am always busy.
 Am always on the go.
 Do a lot in my spare time.
 Can manage many things at the same time.

React quickly.

- keyed Like to take it easy.
 Like to take my time.
 Like a leisurely lifestyle.
 Let things proceed at their own pace.
 React slowly.

E5: EXCITEMENT-SEEKING (.78)

- + keyed Love excitement.
 Seek adventure.
 Love action.
 Enjoy being part of a loud crowd.
 Enjoy being reckless.
 Act wild and crazy.
 Willing to try anything once.
 Seek danger.
- keyed Would never go hang gliding or bungee jumping.
 Dislike loud music.

E6: CHEERFULNESS (.81)

- + keyed Radiate joy.
 Have a lot of fun.
 Express childlike joy.
 Laugh my way through life.
 Love life.
 Look at the bright side of life.
 Laugh aloud.
 Amuse my friends.
- keyed Am not easily amused.
 Seldom joke around.

Appendix E

Social Capital Questionnaire

Social Capital

In the following questions **please circle the most appropriate response 1, 2 3 or 4**

1. Do you feel valued by society?

<i>No, not much</i>			<i>Yes, very much</i>
1	2	3	4
2. If you were to die tomorrow, would you be satisfied with what your life has meant?

<i>No, not much</i>			<i>Yes, very much</i>
1	2	3	4
3. Have you ever picked up other people's rubbish in a public place?

<i>No, never</i>			<i>Yes, frequently</i>
1	2	3	4
3. Some say that by helping others you help yourself in the long run. Do you agree?

<i>No, not much</i>			<i>Yes, very much</i>
1	2	3	4
5. Do you help out a local group as a volunteer?

<i>No, not at all</i>			<i>Yes, often (at least once a week)</i>
1	2	3	4
6. Do you feel safe walking down your street after dark?

<i>No, not much</i>			<i>Yes, very much</i>
1	2	3	4
7. Do you agree that most people can be trusted?

<i>No, not much</i>			<i>Yes, very much</i>
1	2	3	4
8. If someone's car breaks down outside your house, do you invite them into your home to use the phone?

<i>No, not at all</i>			<i>Yes, definitely</i>
1	2	3	4
9. Can you get help from friends when you need it?

<i>No, not at all</i>			<i>Yes, definitely</i>
1	2	3	4
10. Does your area have a reputation for being a safe place?

<i>No, not at all</i>			<i>Yes</i>
1	2	3	4
11. If you were caring for a child and needed to go out for a while, would you ask a neighbour or help?

<i>No, not at all</i>			<i>Yes, definitely</i>
1	2	3	4

12. Have you visited a neighbour in the past week?
No, not at all 1 2 3 *Yes, frequently* 4
13. Have you attended a local community event in the past 6 months (eg, church fete, school concert, craft exhibition)?
No, not at all 1 2 3 *Yes, several (at least 3)* 4
14. Are you an active member of a local organisation or club (eg, sport, craft, social club)?
No, not at all 1 2 3 *Yes, very active* 4
15. Does your local community feel like home?
No, not at all 1 2 3 *Yes, definitely* 4
16. In the past week, how many phone conversations have you had with friends?
None 1 2 3 *Many (at least 6)* 4
17. How many people did you talk to yesterday?
None at all 1 2 3 *Many (at least 10)* 4
18. Over the weekend do you have lunch/dinner with other people outside your household?
No, not much 1 2 3 *Yes, nearly always* 4
19. Do you go outside your local community to visit your family?
No, not much 1 2 3 *Yes, nearly always* 4
20. When you go shopping in your local area are you likely to run into friends and acquaintances?
No, not much 1 2 3 *Yes, nearly always* 4
21. If you need information to make a life decision, do you know where to find that information?
No, not at all 1 2 3 *Yes, definitely* 4
22. In the past 6 months, have you done a favour for a sick neighbour?
No, not at all 1 2 3 *Yes, frequently (at least 5 times)* 4
23. Are you on a management committee or organising committee for any local group or organisation?
No, not at all 1 2 3 *Yes, several (at least 3)* 4

24. In the past 3 years, have you ever joined a local community action to deal with an emergency?

No, not at all

1

2

3

Yes, frequently (at least 5 times)

4

25. In the past 3 years have you ever taken part in a local community project or working bee?

No, not at all

1

2

3

Yes, very much

4

26. Have you ever been part of a project to organise a new service in your area (eg, youth club, scout hall, child care, recreation for disabled)?

No, not at all

1

2

3

Yes, several times (at least 3)

4

27. If you disagree with what everyone else agreed on, would you feel free to speak out?

No, not at all

1

2

3

Yes, definitely

4

28. If you have a dispute with your neighbours (eg, over fences or dogs) are you willing to seek mediation?

No, not at all

1

2

3

Yes, definitely

4

29. Do you think that multiculturalism makes life in your area better?

No, not at all

1

2

3

Yes, definitely

4

30. Do you enjoy living among people of different life styles?

No, not at all

1

2

3

Yes, definitely

4

31. If a stranger, someone different, moves into your street, would they be accepted by the neighbours?

No, not easily

1

2

3

Yes, definitely

4

The following five questions are for those in paid employment. If you are not in paid employment thank you for participating.

32. Do you feel part of the local geographic community where you work?

No, not at all

1

2

3

Yes, definitely

4

33. Are your workmates also your friends?

No, not at all

1

2

3

Yes, definitely

4

34. Do you feel part of a team at work?

No, not at all

1

2

3

Yes, definitely

4

35. At work do you take the initiative to do what needs to be done even if no one asks you to?

No, not at all

1

2

3

Yes, definitely

4

36. In the past week at work, have you helped a workmate even though it was not in your job

description?

No, not at all

1

2

3

Yes, several times (at least 5)

4

Appendix F

Internet Social Capital Scales

5-point Likert Scale: Strongly Agree to Strongly Disagree

Bonding Subscale

1. There are several people online/offline I trust to help solve my problems. *
2. There is someone online/offline I can turn to for advice about making very important decisions.*
3. There is no one online/offline that I feel comfortable talking to about intimate personal problems. (reversed)*
4. When I feel lonely, there are several people online/offline I can talk to.
5. If I needed an emergency loan of \$500, I know someone online/offline I can turn to.*
6. The people I interact with online/offline would put their reputation on the line for me.
7. The people I interact with online/offline would be good job references for me.
8. The people I interact with online/offline would share their last dollar with me.
9. I do not know people online/offline well enough to get them to do anything important.
10. The people I interact with online/offline would help me fight an injustice.

Bridging Subscale

1. Interacting with people online/offline makes me interested in things that happen outside of my town.
2. Interacting with people online/offline makes me want to try new things.
3. Interacting with people online/offline makes me interested in what people unlike me are thinking.
4. Talking with people online/offline makes me curious about other places in the world.
5. Interacting with people online/offline makes me feel like part of a larger community.
6. Interacting with people online/offline makes me feel connected to the bigger picture.
7. Interacting with people online/offline reminds me that everyone in the world is connected.

8. I am willing to spend time to support general online/offline community activities.
9. Interacting with people online/offline gives me new people to talk to.
10. Online/Offline, I come in contact with new people all the time.

Appendix G

Subject Version of Social Style Questionnaire (ICQ-R40.sub)

Interpersonal Competence Questionnaire

Instructions: Answer the questions for each of the people listed on the right. **Best Friend** refers to your best same-sex friend (that you listed earlier). On each blank line write a number from 1 to 5. Look at the bottom of the page to see what each number means.

	You	Best Friend
1. How good is this person at asking someone new to do things together, like go to a ball game or a movie?	_____	_____
2. How good is this person at making someone feel better when they are unhappy or sad?	_____	_____
3. How good is this person at getting people to go along with what he or she wants?	_____	_____
4. How good is this person at telling people private things about himself or herself?	_____	_____
5. How good is this person at resolving disagreements in ways that make things better instead of worse?	_____	_____
6. How good is this person at going out of his or her way to start up new relationships?	_____	_____
7. How good is this person at being able to make others feel like their problems are understood?	_____	_____
8. How good is this person at taking charge?	_____	_____
9. How good is this person at letting someone see his or her sensitive side?	_____	_____
10. How good is this person at dealing with disagreements in ways that make both people happy in the long run?	_____	_____
11. How good is this person at carrying on conversations with new people that he or she would like to know better?	_____	_____
12. How good is this person at helping people work through their thoughts and feelings about important decisions?	_____	_____

- 1 = **Poor at this;** would be so uncomfortable and unable to handle this situation that it would be avoided if possible.
- 2 = **Fair at this;** would feel uncomfortable and would have some difficulty handling this situation.
- 3 = **O.K. at this;** would feel somewhat uncomfortable and have a little difficulty handling this situation.
- 4 = **Good at this;** would feel comfortable and able to handle this situation very well.
- 5 = **EXTREMELY good at this;** would feel very comfortable and could handle this situation very well.

Subject Version of Social Style Questionnaire (ICQ-R40.sub)

	You	Best Friend
13. How good is this person at sticking up for himself or herself?	_____	_____
14. How good is this person at telling someone embarrassing things about himself or herself?	_____	_____
15. How good is this person at resolving disagreements in ways so neither person feels hurt or resentful?	_____	_____
16. How good is this person at introducing himself or herself to people for the first time?	_____	_____
17. How good is this person at helping people handle Pressure or upsetting events?	_____	_____
18. How good is this person at getting someone to agree with his or her point of view?	_____	_____
19. How good is this person at opening up and letting someone get to know everything about himself or herself?	_____	_____
20. How good is this person at dealing with disagreements in ways so that one person does not always come out the loser.	_____	_____
21. How good is this person at calling new people on the phone to set up a time to get together to do things?	_____	_____
22. How good is this person at showing that he or she really cares when someone talks about problems?	_____	_____
23. How good is this person at deciding what should be done?	_____	_____
24. How good is this person at sharing personal thoughts and feelings with others?	_____	_____
25. How good is this person at dealing with disagreements in ways that don't lead to big arguments.	_____	_____
26. How good is this person at going places where there are unfamiliar people in order to get to know new people?	_____	_____

- 1 = **Poor at this;** would be so uncomfortable and unable to handle this situation that it would be avoided if possible.
- 2 = **Fair at this;** would feel uncomfortable and would have some difficulty handling this situation.
- 3 = **O.K. at this;** would feel somewhat uncomfortable and have a little difficulty handling this situation.
- 4 = **Good at this;** would feel comfortable and able to handle this situation very well.
- 5 = **EXTREMELY good at this;** would feel very comfortable and could handle this situation very well.

Subject Version of Social Style Questionnaire (ICQ-R40.sub)

	You	Best Friend
27. How good is this person at helping others understand their problems better?	_____	_____
28. How good is this person at voicing his or her desires and opinions?	_____	_____
29. How good is this person at telling someone things that he or she does not want everyone to know?	_____	_____
30. How good is this person at getting over disagreements quickly?	_____	_____
31. How good is this person at making good first impressions when getting to know new people?	_____	_____
32. How good is this person at giving suggestions and advice in ways that are received well by others?	_____	_____
33. How good is this person at getting his or her way with others?	_____	_____
34. How good is this person at telling someone his or her true feelings about other people?	_____	_____
35. How good is this person controlling his or her temper when having a conflict with someone?	_____	_____
36. How good is this person at being an interesting and fun person to be with when first getting to know people?	_____	_____
37. How good is this person at listening while others "let off steam" about problems they are going through?	_____	_____
38. How good is this person at making decisions about where to go or what to do?	_____	_____
39. How good is this person at telling someone what he or she personally thinks about important things?	_____	_____
40. How good is this person at backing down in a disagreement once it becomes clear that he or she is wrong?	_____	_____

1 = **Poor at this;** would be so uncomfortable and unable to handle this situation that it would be avoided if possible.

2 = **Fair at this;** would feel uncomfortable and would have some difficulty handling this situation.

3 = **O.K. at this;** would feel somewhat uncomfortable and have a little difficulty handling this situation.

4 = **Good at this;** would feel comfortable and able to handle this situation very well.

5 = **EXTREMELY good at this;** would feel very comfortable and could handle this situation very well.