Self-regulation, Threat Perception, and Inhibitory Control: an fMRI Investigation of Children with ADHD

Erin Kaseda

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SELF-REGULATION, THREAT PERCEPTION, AND PERCEIVED PARENTAL SUPPORT: AN FMRI INVESTIGATION OF CHILDREN WITH ADHD

by

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Submitted to Brigham Young University in partial fulfillment of graduation requirements for University Honors

Neuroscience Department
Brigham Young University
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Honors Coordinator: Bruce Brown
ABSTRACT

SELF-REGULATION, THREAT PERCEPTION, AND PERCEIVED PARENTAL SUPPORT: AN FMRI INVESTIGATION OF CHILDREN WITH ADHD

Erin Kaseda
Neuroscience Department
Bachelor of Science

This thesis examines the role of perceived parental support on adolescents aged 12-19 who have been diagnosed with attention-deficit/hyperactivity disorder (ADHD). Specifically, the study focused on inhibitory control, one form of cognitive executive control often implicated in ADHD, in three ways: first, through the use of a Go/No-Go task during a functional MRI scan of the brain; second, through the use of a neuropsychological cognitive battery using the NIH Toolbox; and third, through a qualitative interview that examined self-control in school and home contexts. Contrary to the initial hypothesis, parental support was found to be negatively correlated with inhibitory control in emerging adults 18-19.
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Introduction

It is estimated that between 5-10% of children and adolescents in the United States have been diagnosed with attention-deficit/hyperactivity disorder (ADHD) (Evans, Morrill, & Parente, 2010, p. 657). ADHD is a neurodevelopmental disorder that most frequently presents with symptoms of hyperactivity, lack of attention, and difficulty controlling impulses (Reale et al., 2017). These symptoms often create problems in both domestic and academic contexts, affecting peer and family relationships, academic performance, and developmentally appropriate milestones.

Among pediatric populations, social relationships are often negatively impacted and have a significant effect on the child’s quality of life. At school, adolescents with ADHD are likely to be victimized by peers, with 10% reporting being threatened with physical harm at least weekly and 13% reporting being left out of conversations or activities at least weekly (Becker, Mehari, Langberg, & Evans, 2017). At home, parent-child relationships may experience increased conflict and poorer parenting practices (Humphreys, Katz, Lee, & Hammen, 2013, p. 854-855). Interpersonal difficulties among both peers and family members put children with ADHD at risk for comorbid disorders, including depression, anxiety, and oppositional defiant disorder (ODD), and may lead to an increased risk for suicide, the 3rd leading cause of death among adolescents in the United States.

Developmentally appropriate self-regulation allows for social flexibility and goal-oriented motivation, traits often diminished in children with ADHD (Berger, Kofman, Livneh, & Henik, 2007, p. 256). This decreased self-regulation may be one factor involved in poor social relationships for adolescents with ADHD. Some cognitive skills associated with ADHD include working memory, reaction time, and inhibitory control,
which may in turn exacerbate problems with social functioning (Bora & Pantelis, 2016). Interventions that target strengthening inhibitory control during adolescence may decrease the severity of negative behaviors related to inattention and impulsivity. Prior research has suggested that parent involvement may be involved in enhancing social functioning among adolescents with ADHD (Ray, Evans, & Langberg, 2017).

Research strongly suggests that ADHD symptomology and comorbidity with other common disorders, including depression and ODD, have a significant impact on the relationships between adolescents and their parents (Lifford, Harold & Thapar, 2008). Specifically, families where children exhibit a higher percentage of problem behaviors related to ADHD, parents are more likely to be negatively reactive and experience psychological distress (Johnston, 1994). When parent-child relationships are positive, children with ADHD are less likely to develop depressive symptoms later in life (Humphreys et al., 2013).

Prior research has demonstrated the impact of supportive family relationships on health. Specifically, perceived social support has been correlated with improved health outcomes for both physical and mental health, including improved cardiovascular health (Birmingham, Uchino, Smith, Light, & Sanbonmatsu, 2009), lower mortality risk (Holt-Lunstad, Smith, & Layton, 2010), and decreased risk of depression (Cohen & Wills, 1985). Other research has shown that social support networks influence executive control and academic success in children (Bull, Espy, Wiebe, Sheffield, & Nelson, 2010).

The health and well-being of children with ADHD is not the only factor at play in these parent-child relationships. Studies suggest that the severity of child ADHD symptomology, particularly of behavioral symptoms, is positively associated with
parental depression and stress (Harrison & Sofronoff, 2002). Inattentiveness, a common symptom of ADHD associated with executive function, is also associated with high levels of caregiver strain for parents (Bussing, Gary, Mason, Leon, Sinha, & Garvan, 2003).

Despite the prevalence of research on the detrimental outcomes of ADHD on social relationships, only a small amount of research has been done on whether social support may have a mediating effect on these negative outcomes. Prior research on this topic has examined social support widely (from family, peers, teachers, and other adults) and has used self-report measures on executive function and academic success (Mastoras, Saklofske, Schwean, & Climie, 2015). Low social support is also related to poor cognitive function (Cacioppo & Hawkley, 2009). This study will expand on prior research by looking at the physiological correlates of executive control by collecting functional MRI data while participants diagnosed with ADHD perform a task requiring a strong inhibition response.

The hypothesis is that executive control will be stronger in adolescents with ADHD who perceive high levels of supportiveness (high positivity) in their relationship to their parents, compared to adolescents with ambivalent (high negativity AND high positivity) relationships with their parents.

**Methods**

**Participants**

Participants were 18 adolescents (11 female, 7 male) aged 14-19 (M = 17.3, SD = 1.7). The majority of participants (77.8%) were white, the remainder being non-white Hispanic (16.7%) and Asian (5.5%) and all were from middle to high-income families
(100%). Per criteria described below, all participants met the clinical cutoff for ADHD symptomology via parent rating. Participants were compensated $10 completing the cognitive testing and interview portions of the study, and an additional $30 for completing the fMRI portion of the study.

**Procedures**

This study was reviewed and approved by the Institutional Review Board (IRB) and was conducted according to all ethical standards outlined by the IRB. Potential participants were screened for MRI contraindications and for ADHD symptom severity using the Swanson, Nolan, and Pelham-IV Questionnaire (SNAP-IV) 18-item questionnaire for parents, which has been shown to have high reliability (alpha = .94) and predictive validity (p < .0001; Bussing et al., 2008). Subjects were screened to a clinically significant cutoff. Participants were excluded from participation in the MRI portion of the study if they had a history of neurological or psychiatric diagnoses other than ADHD, or if they had other contraindications for MR scanning, including the presence of metallic implants or claustrophobia. Because the prevalence of comorbid learning disorders with ADHD has been estimated to be as high as 92%, individuals with comorbid learning disorders were not be excluded (Biederman, Newcorn, & Sprich, 1991).

**Functional stimulus.** Twelve participants qualified for the full study and participated in the MRI scan, as well as the cognitive testing and interview portions of the study. These participants participated in a functional go/no-go task (Batterink, Yokum, & Stice, 2010) utilized by Jensen and colleagues (under review) in a previous study. This task was comprised of two testing periods, each lasting approximately seven minutes.
During each testing period, images of healthy (e.g., carrots, lettuce, apples) or unhealthy foods (e.g., a cheeseburger, chocolate cake) were flashed on the screen for 500 milliseconds, interspliced with a neutral grey cross-mark on the screen to establish a functional baseline. This baseline is important in establishing individual neutral and task-specific brain activation among participants. When each food image was presented, participants were instructed to press a button if the food was healthy, and to inhibit that response if the food was unhealthy.

The purpose of this style of task, known as a Go-No/Go task, is to measure inhibitory control, a specific subset of executive functioning. During the task, more healthy foods are presented to the participants than unhealthy foods, resulting in a habitual pressing of the button immediately upon reception of a stimulus image. Because that habit is developing, not pressing the button, or inhibiting the response, becomes effortful. Additionally, because the task simple, there is a high success rate for correct button press responses, and assumed low cognitive load in comprehending and completing the task appropriately. Comparing the functional brain activation in participants between successful button presses, successful inhibited presses, and unsuccessful inhibited presses allows for the study of brain activation during tasks that require an inhibitory response.

**MRI acquisition.** MR scans were obtained using a Siemens 3T scanner and a 12-channel head coil. The structural and functional parameters used were replicated from Jensen et al (under review). Structural: (TE = 2.26ms, TR = 1900ms, field of view = 218 × 250mm, acquisition matrix = 215 × 256, slice thickness = 1mm, voxel size = 0.98 ×
0.98 × 1mm). Functional: TE = 28ms, TR = 3000ms, field of view = 192 × 192mm, acquisition matrix = 64 × 64, slice thickness = 3mm, voxel size = 3 × 3 × 3mm.

**MRI data processing.** Adolescent templates were obtained from the NIH MRI Study of Normal Brain Development (Sanchez, Richards, & Almli, 2013).

**Relationship quality.** The full 18 subjects participated in the relationship quality assessments, cognitive testing, and interview portions of the study. Adolescents completed the Child’s Attitude Towards Father (CAF) and Mother (CAM) Scales (Humphrey, 1997; available by purchase through Walmyr Publishing Company) to assess general relationship quality with both parents. In this measure, participants rated their level of agreement with statements such as, "I feel I can really trust my mother" or "My father does not understand me." Both measures have good reliability (α = .05) and test-retest stability (α = .96) (Humphrey, 1997). They also completed the Social Relationships Index – Parent Child (Appendix A), a modified version of a spousal social support measure. The SRI has a two-factor structure (positivity and negativity) and good internal consistency and test-retest reliability. In prior work with spousal relationships, these separate network measures of positivity and negativity showed temporal stability with significant 2-week test/retest correlations of r=.82 (p<.001) for network positivity and r=.83 (p<.001) for network positivity (Campo et al., 2009). Finally, participants also completed the Index of Family Relations (IFR; available by purchase through Walmyr Publishing Company). This measure is designed to evaluate whole-family relationship problems, and participants were instructed to consider siblings and extended family members important to them while completing this measure. The IFR has high internal
consistency ($\alpha = .95$) and a low Standard Error of Measurement ($3.65$) (Humphrey, 1997).

Because having children with ADHD has been previously associated with marital strains and divorce likelihood (Wymbs, Pelham, Molina, Gnagy, Wilson, & Greenhouse, 2008; Harpin, 2005), the parents of all participants were also invited to complete two measures of marital relationship quality in addition to the IFR. They completed the Short Marital Adjustment Test (MAT), which has been found to have high reliability and be able to distinguish between well-adjusted and maladjusted marriages (Locke & Wallace, 1959; Appendix B) and the Social Relationships Index – Spouse (Campo et al., 2009; Appendix C). Due to a low response rate from the parents of adult children, who did not physically attend the study session, these data are not reported in this paper.

**Cognitive testing.** Cognitive testing was performed using the cognitive battery of the NIH Toolbox. Participants sequentially completed the Pattern Comparison Processing Speed Test, the List Sorting Working Memory Test, and the Flanker Inhibitory Control and Attention Test (Gershon, Wagster, Hendrie, Fox, Cook, & Nowinski, 2013). Adjusted scores were analyzed against CAM, CAF, IFR, and SRI scores using linear regression, controlling for age, sex, and race.

**Interview.** Participants completed a semi-structured interview in order to assess participant's thoughts and perceptions on self-control in a home and school setting and provide a more in-depth look at their relationship with their parents. The questions in this semi-structured interview were based on the qualitative theories used in similar studies of adolescents with ADHD (Charach, Yeung, Volpe, Goodale, & dosReis, 2014) and to assess executive functioning in adolescents (Kiefer, Alley, & Ellerbrock, 2015).
Questions included items such as, "In a typical day, how do you think having ADHD makes things different for you?" and "How comfortable do you feel confiding in your parents?"

The interviews were transcribed and verified by two research assistants and the qualitative data was then analyzed using Nvivo software. The data was coded for items such as comfort confiding in others, perceived self-control in school and at home, and factors that made it easier or more difficult to rely on parents for support. All qualitative coding was performed by two research assistants with a reliability kappa above 0.9.

Results

Functional MRI results. At the time of publication, functional MRI results were not yet available. For inquiries about the final results of this portion of the study, please contact the author.

Relationship quality and cognitive results. Participants reported overall low relational distress with their mothers (M=28.1/100) and their fathers (M=32.2/100). The majority of participants also reported feeling supported by both their mother and their father (80%), with only 5.5% of participants reporting an aversive relationship with at least one parent.

Participants overall scored above average for national norms set at a score of 100 in all three exams: inhibitory control (M=103.4, SD=7.6), working memory (M=111.6, SD=11.9), and processing speed (M=122.7, SD=10.0), with the lowest recorded scores on the inhibitory control test.

Across the entire participant group, there was no significant association between cognitive performance and family relationship quality. However, among the ten
emerging adults (18-19), all university freshmen or sophomores, performance on the inhibitory control test was negatively correlated with perception of maternal support ($p = .03$), perception of paternal support ($p = .04$), and perception of overall family functioning ($p = .05$). There was no significant effect of family support on working memory or processing speed for any age group.

**Qualitative findings.** Major topics (nodes) coded for along with a representative quote are included in Table 1 below.

<table>
<thead>
<tr>
<th>Node Description</th>
<th>Representative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact of ADHD on Participant</td>
<td>“When I learned I have ADHD it’s kind of like, my brain works differently from other people and so there are some challenges that come with that…I also needed to find the positive things that are associated with ADHD.”</td>
</tr>
<tr>
<td>Self-Control in a School Setting</td>
<td>“I think the biggest part has become socially. Like being able to know when and when not to say things. And like when I’m being too much.”</td>
</tr>
<tr>
<td>Self-Control in a Home Setting</td>
<td>“Self-control is being able to do what’s expected of me.”</td>
</tr>
<tr>
<td>Parent Attitudes and Reactions</td>
<td>“At first they were like, ‘Oh, it’s just something that kids do, they don’t pay attention.’ And then when…I grew up, then they were like, ‘No other girl does that. Why are you like that?’”</td>
</tr>
<tr>
<td>Parent-Child Relationship Quality</td>
<td>“When they did find out [that I had ADHD], I think it was for them a sigh of relief, oh okay, we understand why you’re getting a B in a class instead of an A, type of thing. So it took a little pressure off.”</td>
</tr>
<tr>
<td>How Parents Can Help Support</td>
<td>“Believe me more when I say, this is really hard for me.”</td>
</tr>
<tr>
<td>Who Go to for Advice and Support</td>
<td>“First I try and see if there are things I can improve just on my own.”</td>
</tr>
</tbody>
</table>

Table 1

When asked how comfortable they felt sharing their feelings with or confiding in their parents, only 33% of subjects reported feeling very comfortable, while 27% reported
feeling not at all comfortable. Participants who reported low levels of supportiveness from their parents also reported rarely or never turning to one or more parents for support or advice regarding self-control. When asked who they tend to go to for advice or support, whether in or out of their families, a full 30% of subjects reported that there is no one that they are likely to go to.

Participants also reported on specific actions their parents take that affect their comfort in confiding in their parents. When asked what made it difficult for them to confide in their parents, participant responses included: “I can’t tell them the things I feel guilty about…it’s scary;” “Trying to tell my parents I did something bad feels like putting a bullet in my head. It’s just terrifying;” “If they give me advice that I think [was] a little bit too judgmental, I’ll probably not come back to them;” “We don’t have real conversations because I’m a philosophy major, I do a lot of discussing things. My dad’s a soldier in the military, he does a lot of order things;” “Ever since I was eight, I was convinced I had, like, dyslexia or something, I’m still convinced about that. And I was always trying to tell [my mom] just listen to me…and she just always was like, no, you’re crazy, just do what you have to do. So that was a lot harder. Still kind of is;” and “There’s just kind of a difference in perspective.”

When asked what made it easier for them to confide in their parents, participant responses included: “No matter the topic, even the big ones, they will always kind of try and help me through it;” I’ve definitely been able to ask them questions or challenge them;” “I guess she just tries to be there which is, the effort’s really nice;” “[My dad] is very good at accepting feedback and giving advice;” and “[My dad’s] gone to two or
three therapy sessions to start finding out what’s really going through my head, and like, he’s becoming more patient.”

**Discussion**

Understanding adolescents’ own perception of parental support and factors that make it difficult for them to confide in their parents has significant potential for clinicians in creating family-based interventions and therapies for adolescents with ADHD. Many participants discussed the impact that official diagnosis had on their relationship with their families. For example, one participant expressed that receiving a definitive diagnosis helped her to stop feeling stupid and, in particular, made her mother much more patient with and accepting of her academic struggles. Another expressed that having her parents attend therapy with her increased their understanding of the way that she perceived the world and thus had improved their relationship.

Emerging adults with ADHD face special challenges in adjusting to university and independence particularly in terms of inhibitory control. However, contrary to our expectations, greater perceptions of parental support were not associated with better inhibitory control in these emerging young adults. Some research indicates higher network support can actually increase stress via feeling of intrusiveness and obligation. It may be that emerging adults view their parents’ support as intrusive, rather than helpful.

There is some prior research to support this explanation. One study suggests that overinvolved parenting can actually increase anxiety among adolescents, and that adolescents who exhibit oppositional behaviors that may be associated with ADHD are more likely to experience overinvolved parenting practices (Hudson & Rapee, 2001).
Further research is needed to elucidate the impact of perceived parental intrusiveness on child outcomes.

Another potential explanation for this unexpected finding is that if adolescents cannot or do not receive logistical support from their parents, they are more likely to turn to other resources to learn their own techniques to support themselves through their weaknesses. It is possible that supportive parents make serve as a compensatory mechanism for adolescents with ADHD, and individuals who lack that family support must learn their own methods to compensate. This theory is anecdotally supported by one qualitative interview in which the participant mentioned that they had only received a formal diagnosis of ADHD after coming to university, and that the majority of the logistical support she received came from university counseling services through the accessibility office.

**Limitations and Future Directions**

This was a small study skewed towards older adolescents and emerging adults. Younger adolescents, in the transition from elementary school to the greater independence and peer influence of middle school, may be even more susceptible to effects of social support and thus are a population that needs to be more closely examined in future research. Recruiting this population may be difficult due to dependence of potential subjects on parents and a likely bias towards families with overall positive relationships. Additionally, we observed that a high percentage of potential participants screened for the study were disqualified for the presence of comorbid anxiety and depression. Because these common mental illnesses may be prevalent among adolescents with ADHD and, in particular, among adolescents with negatively impacted family
relationships, further research should be done to examine mediating effects on broad psychological burden of children, adolescents, and young adults.

Another limitation of this study was the use of a control population only for the fMRI portion of the study, and not for the cognitive testing or for the interviews. Although we were able to analyze within-group differences between adolescents with ADHD based on available parental support, further research needs to be done on the differences in parent-child interactions and social network size between adolescents with ADHD and their typically developing peers. Although the control population for the MRI portion of the study was age and gender matched to the ADHD participants, recruitment strategies differed and recruitment was spaced out approximately 1.5 years. Thus, underlying effects may account for some differences seen between the control and the ADHD subject pools. To ameliorate these potential effects, all control scans were reanalyzed using the same adolescent brain template and significance cutoffs as in the ADHD scans.

The findings about factors that influence adolescents’ comfort in confiding in their parents may be useful for clinicians engaging young patients with ADHD in family- and behavioral-based therapies. Among older adolescents and emerging adults, future work should examine the potential negative impacts of parental support and involvement on cognitive development and best practices in aiding in the successful transitions to adulthood and greater independence. Additionally, the finding that a third of subjects do not have peers or other adults that they feel comfortable going to for support is significant for school-based interventions that may focus on facilitating access to peer or counselor support.
References


Bora, E. & Pantelis, C. (2016). Meta-analysis of social cognition in attention-


Appendix A

Thinking about when you need **support, such as advice, understanding, or a favor** …

1. How positive is your mom?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

2. Not thinking about how positively you reported your mom to be, how upsetting is your mom when you need support, advice, understanding, or a favor?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

3. How mixed or conflicted are your thoughts and feelings for your mom?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

4. How unpredictable is your mom to you?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

5. How likely are you to go to your mom for advice, understanding or a favor?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely
6. How positive is your dad?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

7. Not thinking about how positively you reported your dad to be, how upsetting is your dad when you need support, advice, understanding, or a favor?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

8. How mixed or conflicted are your thoughts and feelings for your dad?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

9. How unpredictable is your dad to you?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

10. How likely are you to go to your dad for advice, understanding or a favor?
    1. Not at all
    2. A little
    3. Somewhat
    4. Moderately
    5. Very
    6. Extremely
Appendix B

1. Which best describes the degree of happiness, everything considered, of your present marriage?

<table>
<thead>
<tr>
<th>Very Unhappy</th>
<th>Happy</th>
<th>Very happy</th>
</tr>
</thead>
</table>

State the approximate extent of agreement or disagreement between you and your mate on the following items.

<table>
<thead>
<tr>
<th>Item</th>
<th>Always Agree</th>
<th>Almost Always Agree</th>
<th>Occasionally Disagree</th>
<th>Frequently Disagree</th>
<th>Almost Always Disagree</th>
<th>Always Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Handling Family Finances</td>
<td></td>
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<tr>
<td>3. Matters of Recreation</td>
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<tr>
<td>4. Demonstration of Affection</td>
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<td></td>
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<tr>
<td>5. Friends</td>
<td></td>
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<td>6. Sex Relations</td>
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<td>7. Conventionality (right, good, or proper conduct)</td>
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<tr>
<td>8. Philosophy of Life</td>
<td></td>
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<tr>
<td>9. Ways of dealing with in-laws</td>
<td></td>
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</tbody>
</table>

10. When disagreements arise, they usually result in:
    (a) husband giving in  (b) wife giving in  (c) agreement by mutual give and take

11. Do you and your mate engage in outside interests together?
    (a) all of them  (b) some of them  (c) very few of them  (d) none of them

12. In leisure time do you generally prefer:
    (a) to be "on the go"  (b) to stay at home

    Does your mate generally prefer:
    (a) to be "on the go"  (b) to stay at home

13. Do you ever wish you had not married?
    (a) frequently  (b) occasionally  (c) rarely  (d) never
14. If you had your life to live over again, do you think you would:
   (a) marry the same person  (b) marry a different person  (c) not marry at all

15. Do you ever confide in your mate:
   (a) almost never  (b) rarely (c) in most things (d) in everything
Appendix C

Thinking about when you need *support, such as advice, understanding, or a favor* ... 

1. How positive is your spouse/partner? 
   1. Not at all 
   2. A little 
   3. Somewhat 
   4. Moderately 
   5. Very 
   6. Extremely 

2. Not thinking about how positively you reported your spouse/partner to be, how upsetting is your spouse/partner when you need support, advice, understanding, or a favor? 
   1. Not at all 
   2. A little 
   3. Somewhat 
   4. Moderately 
   5. Very 
   6. Extremely 

3. How mixed or conflicted are your thoughts and feelings for your spouse/partner? 
   1. Not at all 
   2. A little 
   3. Somewhat 
   4. Moderately 
   5. Very 
   6. Extremely 

4. How unpredictable is your spouse/partner to you? 
   1. Not at all 
   2. A little 
   3. Somewhat 
   4. Moderately 
   5. Very 
   6. Extremely 

5. How likely are you to go to your spouse/partner for advice, understanding or a favor? 
   1. Not at all 
   2. A little 
   3. Somewhat 
   4. Moderately 
   5. Very 
   6. Extremely
Thinking about when your spouse needs support, such as advice, understanding, or a favor …

6. How positive are you?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

7. Not thinking about how positively you reported yourself to be, how upsetting are you when your spouse needs support, advice, understanding, or a favor?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

8. How mixed or conflicted are your thoughts and feelings?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely

9. How unpredictable are you?
   1. Not at all
   2. A little
   3. Somewhat
   4. Moderately
   5. Very
   6. Extremely