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An exploratory study of the need for cognition in children and adolescents

Kristen M. Porter
The University of Toledo

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An Exploratory Study of the Need for Cognition in Children and Adolescents

by

Kristen M. Porter

Submitted to the Graduate Faculty as partial fulfillment of the

requirements for the Master of Education Degree in Educational Psychology

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Dr. Florian C. Feucht, Committee Chair

_____
Dr. Patricia Komuniecki, Dean
College of Graduate Studies

The University of Toledo

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An Abstract of

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In this exploratory study, the Need for Cognition was investigated in children and

adolescents in relation to their metacognition, argumentation, problem-solving, and

epistemological beliefs. This study also looked at gene-environment correlations,

cognitive development, motivation, and grade achievement influences on Need for

Cognition. Furthermore, it looked at how paying close attention to individuals' Need for

Cognition can foster a classroom of critical thinkers. If the students are actively engaging

in thinking and enjoying the learning process, the culture of the classroom can be greatly

enhanced. It can also enhance the achievement of grades for the class. Eight participants

in 4th- 11th grade were interviewed using Cacioppo, Petty, and Kao's (1984) Need for

Cognition Scale. Little research has been done with children and adolescents on their

Need for Cognition. The desire to better understand why Need for Cognition is important

in the classroom for educators as well as children and adolescents is discussed.

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Chapter One

Need for Cognition Introduction

In today's controversy-rich society, children and adolescents are faced with many

challenges. They must make their own decisions and learn the skill to form their own

opinions. Critical thinking is an important skill in these cognitive processes and can be

used in many areas of children's and adolescents lives. If they enjoy engaging in critical

thinking, they will be better equipped to make their own decisions and to form their own

opinions.

Need for Cognition is the understanding of how much individuals enjoy and

engage in thinking (Cacioppo & Petty, 1982). Recognizing that all children and

adolescents are unique in their own ways of Need for Cognition is one step to helping

students inside and outside the classroom to become more interested in proactively

solving academic problems as well as thinking about societal problems. Individuals with

high Need for Cognition enjoy deeper critical thinking skills, which can benefit these

individuals in different areas of their life such as academic learning at school, new

training challenges at work, and diverse and ever-changing extracurricular activities.

Academic learning consists of many different areas that can be affected by

students' Need for Cognition; these areas include metacognition, argumentation,

problem-solving, epistemological beliefs, and grade achievement. Need for Cognition is

important for academic learning because it fosters students' interest in critical thinking

and problem solving. It can also help the individuals form their own understanding about

important concepts, such as historical events or scientific equations and ill-structured

problems. Non-academic or outside of the classroom, students' Need for Cognition is

important for their everyday lives. Extracurricular activities, such as an after school job, (e.g., working as an intern for a political campaign, there needs to be an interest in politics for students to actively engage in critical thinking during the campaign) or sporting activity (e.g., being a captain of a team and making the important play decisions during a game or practice), can be influenced by students' Need for Cognition.

Interestingly, most research conducted on the concept of Need for Cognition has focused on college students and adults as main research participants. Need for Cognition has not been studied in children or adolescents despite its importance for classroom learning, achievement, and the acceleration of cognitive aspects in extracurricular activity. This study explored Need for Cognition in eight children and adolescents following a mixed method approach. The results of the study are discussed in the light of constructs related to Need for Cognition and educational implications are speculated upon.

Chapter Two

Literature

What is Need for Cognition and why does it Matter?

Need for Cognition is how much individuals enjoy thinking and also how deeply individuals engage in thinking (Cacioppo & Petty, 1982). Students who seek out activities that encourage them to engage in thinking shows their Need for Cognition. If students have a high Need for Cognition, they will continually seek out and create an environment that fosters their enjoyment in thinking. Furthermore, students high in Need for Cognition are more likely to make efficient use of metacognition, argumentation, and problem-solving; and they may achieve higher grades. In other words, the higher Need for Cognition in students the better they perform in these areas of cognitive processes (Sigelman & Rider, 2008). Because Need for Cognition has an influential role on an individual's academic learning processes and achievement, it is important to describe, explain, and improve students' Need for Cognition in classroom settings and to assess how they individually differ in valuing effortful thinking. For example, understanding why some students enjoy effortful thinking in a particular school subject, like mathematics, and what motivates them to learn more about that particular topic. Furthermore, educators who understand the concept of Need for Cognition and assess their students' attitude towards it will be better able to strategically create lessons and classroom environments that challenge learners with low Need for Cognition to become more critical thinkers; they will also be able to foster students with high Need for Cognition who continue their engagement in effortful thinking (Feucht, 2010).

In the following section, psychological constructs such as metacognition, text comprehension, argumentation, problem-solving, grade achievement, and social interactions are reviewed, as they play an important role in cognitive processes and have a reciprocal relationship with Need for Cognition.

For example, Kardash and Noel (2000) researched organizational signals–an aspect of reading comprehension, Need for Cognition, and verbal ability in text recall and recognition. Organizational signals are writing devices that highlight the topics of the text and the organization, but do not alter the meaning or content of the entire text. Kardash and Noel's (2000) study examined whether individual differences in Need for Cognition and verbal ability combined with organizational signals would have an impact on individual's recall and recognition of information from the expository text. They found that Need for Cognition was not correlated with organizational signals and had no impact on student recall. However, if no organizational signals were provided, Need for Cognition was positively associated with higher text recall scores. This shows it is possible that the students' metacognition will influence the usage of organizational signals and their ability to recall and recognize important topics. Also, these findings suggest that students low in Need for Cognition do not analyze information as deeply or put as much effort into their thinking as their high Need for Cognition peers. Metacognition is one's own thinking about thinking, or knowing about knowing (Sigelman & Rider, 2008). Metacognition can play a part in problem-solving because if individuals are aware of their own knowledge and skills they can be more strategic about how to solve a problem.

Coutinho, Wiemer-Hastings, Skowronski, and Anne-Britt (2005) studied metacognition and Need for Cognition in relation to problem-solving in undergraduate students. Coutinho et al. were interested in whether individuals with high Need for Cognition would be interested in viewing explanations of how to solve a problem after they had solved it. Their research showed that task performance is positively related to Need for Cognition. That is, individuals with high Need for Cognition tended to obtain explanations to the problems more than the individuals with low Need for Cognition. This was consistent with the idea of feedback and metacognition, and that explanations improve metacognitive abilities. This suggests that if a Need for Cognition culture is established in the classroom, students might also start to make more use of metacognitive strategies.

In the long run the use of metacognition and Need for Cognition seem to feed into grade achievement. For example, if individuals with high Need for Cognition are more likely than their low interest counterparts to master a task due to their awareness of and interest in metacognition, this attitude and behavior could have an important influence on students' grade achievements. Preckel, Holling and Vock (2006), for example, researched students in grades 7-10 with respect to their academic underachievement in relation to Need for Cognition, achievement motivation, and conscientiousness. Academic underachievement was "defined as a discrepancy between ability and expected performance" (Preckel, et al., 2006, p. 403). Preckel et al. found that individuals with high Need for Cognition tend to achieve higher grades because they are seeking information and enjoying engagement in complex reasoning. This, in turn, will also enhance the knowledge the students can accumulate. If students have high Need for

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Cognition they may participate more in the classroom, achieve higher grades, and actively seek new information and knowledge. The contrary was found for students low in Need for Cognition. Preckel et al. (2006) solidifies the need for teachers to establish a culture of critical thinking in their classroom trying to increase the likelihood of their students to enjoy and engage in thinking.

With respect to classroom culture, it is interesting to understand if students' social behaviors are linked to Need for Cognition. For example, Nussbaum and Bendixen (2003) were interested in whether undergraduate students with an extraverted personality and high in Need for Cognition would be more likely to engage in social argumentative discourse. Interestingly, they found that individuals with high Need for Cognition do not need to have extroverted personality traits to engage in effortful thinking. In other words, individuals do not need to engage in social interactions to enjoy thinking or engaging in effortful thinking. There is no correlation between high Need for Cognition and extroverted social behavior.

Emerging Issues

Educational Relevance. Students' enjoyment and engagement in effortful thinking (Cacioppo & Petty, 1982) can improve the level of education they wish to achieve. For educators, it is important to be aware of Need for Cognition in their classrooms. Learners differ in their abilities and interests in critical thinking, it could be difficult to foster a culture of critical thinking in a classroom as a whole. For example, in a particular science project an educator could foster an environment rich in critical thinking by polling each student regarding their main interest in a particular topic and by

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grouping students with low Need for Cognition with students who are high in Need for Cognition. Furthermore, knowing students' Need for Cognition, in non-academic areas, such as sports and after-school programs, can be helpful in identifying jobs or activities that will foster their Need for Cognition. For example, students low in Need for Cognition would need an activity that could encourage them to become high Need for Cognition, such as a lifeguarding job where the individual must focus on learning the skills vital to saving a life. Also, if students are high Need for Cognition they may strive to have an active role on a sports team (i.e., soccer, volleyball) and work toward becoming team captain, where effortful thinking could benefit the team. In other words, curricular and extracurricular activities could be used by educators to further raise the level of Need for Cognition of students and/or maintain a high level.

Need for Research. Currently, there is little research on the Need for Cognition in children and adolescents. Much of the research in Need for Cognition has been conducted on undergraduate college students and adults. If more research on how Need for Cognition affects children and adolescents was conducted, educators could understand their students' enjoyment for thinking and better create an environment that supports high Need for Cognition; encourages students in effortful and critical thinking, assuming Need for Cognition is a psychological construct identifiable in these age groups.

This study explores whether Need for Cognition exists in students in grades 4th – 10th (n = 8) and to what extent they enjoy and engage in thinking (Cacioppo & Petty, 1982). The study also explores potential differences between gender, age, areas of interest, and family members.

Chapter Three

Research Purpose and Questions

The purpose of this study is to explore Need for Cognition in children and adolescents. While research exists that describes Need for Cognition in college-age students and adults, little is known about Need for Cognition during childhood and adolescence. This study investigates the research gap by answering the following research questions:

Do children and adolescents have Need for Cognition? What are their tendencies to engage in and enjoy thinking? Are there differences among individual groups as defined by gender, age/grade level, special interests, and family?

Understanding children and adolescent Need for Cognition could help benefit their desire to engage in effortful thinking in formal and informal settings. For example, this insight could allow educators to foster students' intellectual engagement by providing an environment rich in critical thinking. Using students' Need for Cognition in their non-academic careers is also important and could affect their daily lives.

Chapter Four

Method

Participants

This study used a mixed method design to explore the nature of Need for Cognition in children and adolescents. Convenience sample was used to identify eight children and adolescents as participants for this exploratory study. Four male and four female participants with ages ranging from 9 years old to 16 years old (see Table 1). Several of the participants were siblings; that is 3 families with two sisters, two brothers, and two brothers and a sister. Informal interviews with the parent and participant were used before the formal data collection to better understand participants' demographics, their interests in hobbies, and school subjects (e.g., what is the age of your son/daughter? How does your son/daughter do academically in school? What are your son/daughter's strengths? What are his/her weaknesses? What are his/her interests outside of school? What does your family share as a common interest?).

Table 1:

Participant's Demographics

Participant	Family	Age (years)	Gender	Grade Average
P1	A	15	Female	A
P2	A	13	Female	A
P3	B	12	Female	A
P4	C	9	Female	B
P5	C	14	Male	B-/C+
P6	C	16	Male	B-/C+
P7	D	14	Male	D
P8	D	16	Male	A/B

Participant 1. Participant 1 (P1) was a 15-year-old white female from an upper middle class family. She excelled in school, while also being very involved in sports. She played four different sports throughout the year. P1 had a grade average of A. The shared family interest was athletics as well as academics.

Participant 2. Participant 2 was a 13-year-old female. She was from an upper middle class white family. Her sibling was P1. Participant 2 excelled in school; P2 played several sports throughout the year. She was very focused during the interview. She seemed very eager to answer all the questions. P2 had a grade average of A. The shared family interest was athletics as well as academics.

Participant 3. P3 was a 12-year-old female. She was from an upper class white family. She was an outstanding student, enjoyed going to school and was eager to learn new things. She was an excellent reader and excited to participate in the interview. P3 had an estimated school grade average of A.

Participant 4. P4 was a 9-year-old female from a middle class white family. She performed at an average level in school. She enjoyed reading. P4 had an estimated school grade average of B. Much of her time spent watching her two older brothers (P5 and P6) play sports. The shared family interest was athletics.

Participant 5. P5 was a 13-year-old white male. He was from a middle class family. Much of his time was spent playing sports. He was an average student in school. His brother and sister were P4 and P6. P5 had an estimated school grade average of B-/C+. The shared family interest was athletics.

Participant 6. P6 was a 16-year-old white male. He came from a middle class family. According to his parent he was more worried about playing sports and excelling in hockey than he was about his grades in school. P4 and P5 were his siblings. P6 had an estimated school grade average of B-/C+. The shared family interest was athletics.

Participant 7. P7 was a 13-year-old white male. He was from a lower-middle class family. P7 has a history of behavioral problems and has struggled in school. His brother was P8. P7 had an estimated school grade average of D. The shared family interest was ballet.

Participant 8. P8 was a 16-year-old white male. He was from a lower-middle class family. He did well in school; he attended a school for the arts in grades 9th-12th. He enjoyed reading and had been doing ballet for several years. P7 was his brother. P8 had an estimated school grade average of A/B. The shared family interest was ballet.

Interview

Interviews were used to get an understanding of the participants' Need for Cognition. An interview is a conversation between two or more people where questions are asked by the researcher to obtain information from the participant (Flick, 1998). Set of semi-structured interview questions was developed based on the Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984). The semi-structured questions revolved around the 18 statements of the scale allowing the researcher to ask ad hoc questions for participants to clarify and elaborate on their answers. This approach allowed the researcher to more flexibly adjust the adult version of the Need for Cognition scale to the cognitive and language development of children and adolescents. Furthermore, participants were asked

to explain the level of how much they would agree or disagree with each statement and to provide an example from their everyday life to illustrate their level of Need for Cognition (See Appendices A, B and C).

Need for Cognition Scale

The Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984) which was used to guide the semi-structured interviews, consists of 18 statements along a 4-point likert scale (i.e., I strongly agree, I agree, I disagree, and I strongly disagree). In addition to the semi-structured interview questions, the scale was used to measure the participants' agreement or disagreement regarding enjoyment and engagement in thinking (see Appendix C).

Materials and Procedure

The materials that were used for the study included: the interview protocol with the semi-structured interview questions and statement, audio voice recorder, pen for taking notes on the interview protocol and the assent and consent forms. A computer was used to transfer the audio files from the voice recorder to a CD-ROM and to conduct the transcription of the interviews.

The first step was to set up an interview time with each participant to meet at their home. At the interview, the researcher introduced herself to the parents and participants. Then, she briefly explained the goals of the study and asked questions concerning the participant's demographics, academic achievement, and areas of interest (i.e., informal interview). Next, the consent and assent forms were completed by the parents and the participants. After all the above steps were completed, the individual participants and the

researcher went into the data collection using the interview protocol encompassing the semi-structured questions and statements of the scale.

The interview went as follows: first, the participants were asked to explain the statement and what it meant to them. Next, the participants were to rate the statement whether they strongly agree, agree, disagree, or strongly disagree. Finally, the participants were asked to provide a novel example that would occur in their everyday life, as it relates to why they agreed or disagreed with the statement. After the interview the researcher thanked the participants and their parents for allowing me their time to be interviewed.

Data Analysis

After data collected the interviews were transcribed and analyzed following these steps. The first step was to calculate the Need for Cognition scores for each participant. The scores of the participants reflect how much they enjoy and engage in thinking. The scores were calculated by scoring each statement on a scale of 1 to 4. The score for each question depended on participant responses regarding the degree to which they agreed or disagreed with the statements; it was then divided by the number of statements to calculate the average (i.e., mean score). Table 2 shows the scale that was used to rank the scores.

Table 2:

Need for Cognition Scale

Need of Cognition Score	Likelihood to engage in and enjoy thinking
1 to 1.5 points	Participant is not at all likely to engage in and enjoy thinking
1.6 to 2.5 points	Participant is not likely to engage in and enjoy thinking
2.6 to 3.5 points	Participant is very likely to engage in and enjoy thinking
3.6 to 4.0 points	Participant is extremely likely to engage in and enjoy thinking

In the second step, a descriptive profile was written based on the participants' explanation of the statement, their level of verbal agreement, and their everyday example of Need for Cognition. During the final step the participants were compared and contrasted with each other regarding their Need for Cognition.

Chapter Five

Results

In this section, the results of the interviews are presented for each participant individually, including their Need for Cognition score and their descriptive summary. Then, a comparison between the participants on how their Need for Cognition was similar and how it differed from one another. In this section the family context and interests such as, favorite school subject and athletics, of the participants was accounted for in the analysis. Finally a summary of these results is provided.

Individual Participants

Participant 1: Family A: 15-year-old female. P1 scored an average of 2.6 points on the Need for Cognition Scale. This means she was very likely to engage in and enjoy thinking. The everyday examples of P1's Need for Cognition corresponded with her Need for Cognition score. For example, in statement 7 (i.e., I only think as hard as I have to; reversed coded) P1 disagreed with the statement and proceeded to explain: "I kind of like to over analyze everything, in school mostly, like when doing projects and such." This example demonstrates that she enjoyed putting extra effort and critical thinking into her school projects. To provide a second example, P1 stated that "In school I would rather know I'm thinking getting to the top than doing nothing and getting to the top." This was her everyday example to illustrate her agreement with statement 10 (i.e., The idea of relying on thought to make my way to the top appeals to me). This example supported that P1 enjoyed engaging in thinking to be

successful. Both of these examples illustrate that P1 has a high Need for Cognition. Furthermore, P1 was interested in the critical thinking processes that were part of the interview. She was actively engaged and thinking critically about each question. Her focus continued through the entire interview. Based on the 18 everyday examples P1 provided throughout the interview, she seemed to be an individual who seeks out an environment that is rich with critical thinking and engages in effortful thinking. P1 was the older sibling of P2.

   Participant 2: Family A: 13-year-old female. P2 scored an average of 2.8 points on the Need for Cognition Scale. This means she was very likely to engage in and enjoy thinking. The Need for Cognition score of P2 is a reflection of her Need for Cognition shown through her everyday examples. For example, P2 agreed with statement 2 (i.e. I like to have the responsibility of handling a situation that requires a lot of thinking) and stated "Well like Sudoku puzzles or in sports you know what you have to do, but you still have to like to think about it and plan how it's all going to go". This supported her Need for Cognition in her desire to be responsible for her actions in critical thinking. P2 agreed with statement 18 (i.e., I usually end up deliberating about issues even when they do not affect me personally) and stated, "If my friend is going through something easy or hard in life I put myself in their shoes and think what would I do in that situation". P2 confirmed that she was high Need for Cognition in this everyday example by engaging in critical thinking. Both examples aligned with P2's score and demonstrated that she had a high Need for Cognition. Additionally, P2 was very interested in participating in the interview. She was very engaged in critical thinking throughout the entire interview. She gave clear examples for all the statements, paused after hearing the statement to critically think

about her response. P2 answered all the questions on her own. Her responses to each statement were very articulate and detailed. Based on the many different examples provided throughout the interview, P2's daily life seemed to be continually filled with effortful thinking.

Participant 3: Family B: 12-year-old female. P3 scored an average of 2.75 points on the Need for Cognition Scale. That means she was very likely to engage in and enjoy thinking. P3's everyday examples corresponded with her high Need for Cognition. P3 disagreed with statement 3 (i.e., Thinking is not my idea of fun; reversed coded) stating "We did a project in school and you had to think really hard to do stuff and it was like still a lot of fun". Her response was clear in her need to engage in critical thinking. P3 also disagreed with statement 8 (i.e., I prefer to think about small, daily projects to long-term ones; reversed coded) stating "We had this weather project and it took all week and it was really fun, I liked to think about it". This everyday example from P3 emphasized her desire to be a critical thinker, actively seeking ways to engage in effortful thinking. Furthermore, P3 was very interested in participating in the interview. She was focused and thinking critically throughout the entire interview. She thought it was exciting to be asked to participate in an interview requiring critical thinking. The excitement for the interview kept her focused and critically thinking about each statement and how each statement fit in her everyday life. Based on the examples provided throughout the interview, P3 constantly seemed to seek an environment that allowed her to think critically.

Participant 4: Family C: 9-year-old female. P4 scored an average of 2.5 points on the Need for Cognition Scale. That means she was not likely to engage in and enjoy thinking. P4 agreed with statement 4 (i.e. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities; reversed coded) and she replied "I don't want to put as much thinking into something". This was an example that there is a lack of interest in critical thinking in her daily life. P4 agreed with statement 3 (i.e., Thinking is not my idea of fun; reversed coded) by stating "I don't like thinking about math or school when I am home playing". This illustrated a weak desire to engage in effortful thinking tasks. Both examples described her medium to low Need for Cognition. Although P4 was initially excited to be part of the interview, her motivation to engage in effortful thinking quickly diminished during the interview. Her medium to low Need for Cognition became evident in her quick responses and lack of desire to engage in critical thinking during the interview. Based on her everyday examples throughout the interview, P4 did not seem to seek out an environment filled with critical thinking. Her engagement in effortful thinking seemed to lack throughout many areas of her daily life.

Participant 5: Family C: 14-year-old male. P5 scored an average of 2.4 points on the Need for Cognition Scale. That means he was not likely to engage in and enjoy thinking. P5 had a medium to low Need for Cognition. P5 agreed with statement 7 (i.e., I only think as hard as I have to; reversed coded) and responded "Don't stress out, don't push yourself by thinking too much". This demonstrated his medium to low Need for Cognition. He did not seem enjoy thinking excessively. P5 strongly agreed with

statement 8 (i.e., I prefer to think about small, daily projects to long-term ones; reversed coded) and explained that "You have to live life as it goes on". This response showed a lack of interest in effortful thinking, he did not elaborate on his idea of small projects over long-term ones. Furthermore, P5 had a difficult time engaging in the interview as a critical thinker. During the interview he was fidgety and quick to answer, this matched his lack of desire to enjoy and engage in effortful thinking. Overall, it became evident in the interview that P5 would not engage in effortful thinking in his daily life and would not normally seek out an environment rich in critical thinking.

Participant 6: Family C: 16-year-old male. P6 scored an average of 2.3 points on the Need for Cognition Scale. P6 seemed to have a low Need for Cognition. This means he was not likely to engage in and enjoy thinking. P6 agreed with statement 3 (i.e., Thinking is not my idea of fun; reversed coded) and stated "In school you have to think, I'd rather play sports". P6 seemed to have a low Need for Cognition demonstrating in his response a lack of desire to participate in effortful thinking. P6 agreed with statement 6 (i.e., I would rather do something that requires little thought than something that is sure to challenge my thinking abilities; reversed coded) his response was "I like taking the easy way out of things". This demonstrated a lack of interest in engaging in critical thinking. Throughout the whole interview he was quickly answering the questions and did not think critically while responding to the questions. Based on the everyday examples he provided throughout the interview, P6 seems to avoid situations that will cause him to engage in effortful thinking. He only puts as much effort forth needed to get him through the problem.

Participant 7: Family D: 14-year-old male. P7 scored an average of 2.5 points on the Need for Cognition Scale. P7 had a medium to low Need for Cognition. This meant he was not likely to engage in and enjoy thinking. P7 agreed with statement 3 (i.e., Thinking is not my idea of fun; reversed coded) and responded "Playing video games is better than thinking or better than thinking about school". This illustrated a lack of interest in engaging in critical thinking. P7 agreed to statement 17 (i.e., It's enough for me that something gets the job done; I don't care how or why it works; reversed coded) he stated "Math problems I do really fast and then I have to explain them but I can't and I don't want to try". This example demonstrates that he had the ability to critically think (i.e., able to do math problems) but that he had a lack of interest in critically thinking (i.e., doing the problem quickly and no desire to explain it). Each of these examples aligned with his medium to low Need for Cognition. Moreover P7 did not seem interested in being part of the interview. He had a lack of motivation to engage in effortful thinking throughout the interview. Based on the everyday examples he provided throughout the interview, he did not actively seek out an environment filled with effortful thinking.

Participant 8: Family D: 16-year-old male. P8 scored an average of 2.6 points on the Need for Cognition Scale. That means he was very likely to engage in and enjoy thinking. P8 had a high Need for Cognition. P8 agreed with statement 1 (i.e., I would prefer complex to simple problems) and stated "School and dance I'd rather it be harder because it makes me better". His agreement to statement 1 displayed his desire to critically think. Note that he went to an alternative school of the arts. P8 strongly agreed to statement 6 (i.e., I find satisfaction in deliberating hard and for long hours) he responded "when driving, you need to think hard about what you are doing before you do

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it". This matched again with his desire to engage in effortful thinking. These examples illustrated P8 had high Need for Cognition. Furthermore P8 seemed to quickly engage himself in the interview as a critical thinker. He was focused and determined throughout the interview. He demonstrated his high Need for Cognition throughout the interview in which he provided well thought through responses to the statements. Through his everyday examples that he provided throughout the interview, P8 seemed to desire and seek out an environment rich in critical thinking to foster his high Need for Cognition.

Table 3:

Participant's Need for Cognition

Participant	Family	Age (yrs)	Gender	Grade Average	Need for Cognition Results			
					Need for Cognition Score	Interview Examples	Seeks out Environment rich in thinking	Area of Interest
P1	A	15	Female	A	2.6	High	Likely	School Subjects
P2	A	13	Female	A	2.8	High	Likely	School Subjects,
P3	B	12	Female	A	2.75	High	Likely	School Subjects, Athletics
P4	C	9	Female	B	2.5	Medium/Low	Not likely	Athletics
P5	C	14	Male	B-/C+	2.4	Medium/Low	Not likely	Athletics
P6	C	16	Male	B-/C+	2.3	Low	Not likely	Athletics
P7	D	14	Male	D	2.5	Medium/Low	Not likely	Athletics
P8	D	16	Male	A/B	2.6	High	Likely	School Subjects, Athletics

Prevailing Themes among the Participants

Grade average and Need for Cognition score, the type of environment the participants seek out, and the similarities between family members are a few of the prevailing themes that were found. See Table 3 for a summary overview of the individual participants' results.

Two different areas could be identified as an area of interest in the participants' every day examples; these areas were school subjects and athletics. Participants who scored medium/low Need for Cognition had the tendency to provide thinking examples in the area of athletics. Participants that had a high Need for Cognition sought out examples of academic environments, such as school subjects. Most of the male participants (3 out of 4) gave examples that were focused more on athletics; most female participants (3 out of the 4) focused their examples around academic aspects of school subjects.

Students (i.e., P1, P2, P3, and P8) who excelled in school and stated that they enjoyed school scored higher on the Need for Cognition scale. P1, P2, P3, and P8 had a grade average of A or A/B and had a high Need for Cognition. These students were actively engaged in effortful thinking during the interview. In contrast, students P4, P5, P6, and P7 had a medium/low or low Need for Cognition with a grade average of B/C or D. Furthermore, P4, P5, P6, and P7 had a low interest in critical thinking throughout the interview. It was clear during the interview when the participant stopped trying to engage in effortful thinking and just answered the questions to end the interview.

There was a similarity among siblings within each family in their level of Need for Cognition. In two families, the siblings had a tendency to have the same level of Need for Cognition. For example, P1 and P2, both members of Family A, are in high Need for Cognition, while P4, P5, and P6, members of Family C, are medium/low in Need for Cognition. However,

the two students of Family D seem to be an exception to this theme; that is, P7 has a low Need for Cognition, while P8 has a high Need for Cognition.

Summary

Students (i.e., P1, P2, P3 and P8) who were excelling in school seemed to score higher on the Need for Cognition scale. On the other hand, students with low Need for Cognition had a lower average grade achievement and were less interested in academic areas, such as athletics. Most of the families with siblings participating in the interviews had similar scores and were more likely to share similar interests. Participants also shared similar grade averages compared to their Need for Cognition score. Overall, participants with a high Need for Cognition shared better grade averages as well as similar areas of interest; they are also more likely to seek out an environment rich in critical thinking. While participants who scored low in Need for Cognition are not likely to seek out an environment rich in thinking and have a lower grade average with their main interest being athletics over school subjects.

Chapter Six

Discussion and Conclusion

In this section, I discussed the results in light of the previously reviewed literature. I will address the participants' Need for Cognition and its relation to their cognitive development, motivation, grade achievement, and their gene-environment correlation. With respect to the gene-environment correlation, I compared Families A, C, and D, in particular. That is, these three families had an interest in athletics; however, Family A's main focus was first on academic success (P1 and P2 enjoy effortful thinking), whereas Family C had a strong focus on athletics. Family C's P5 and P6 both were active in hockey and put forth much more effort toward hockey than their academics. It appeared that in this study the parents' attitudes influenced the adolescents' attitudes toward how they felt about academics. I argued that parents might have had an influence on the Need for Cognition in their children. The discussion concluded with educational implications for Need for Cognition.

Discussion

Cognitive Development. First, it appears important to discuss how Need for Cognition might be influenced by the cognitive development of the participants. Piaget proposed a four stage model of cognitive development. Piaget believed that humans of different ages think in a qualitatively different way (Inhelder & Piaget,1958).Stage one is the sensorimotor stage, beginning at birth and continuing until the child is approximately 2 years of age; this is where the child begins to use their senses and motor actions to understand the world around them (Sigelman & Rider, 2008). Stage two is the preoperational stage and starts around 2 years of age

continuing until the child is about 7 years of age. During the preoperational stage, the child is focused on their perspective and begins to pretend play, but their thoughts are not yet logical (Sigelman & Rider, 2008). The third stage in Piaget's Stages of Cognitive Development is Concrete Operations. This stage starts around 7 years of age and continues until the child is approximately 11 years of age. In this stage the child can begin to complete concrete, logical operations, hence, the name of this stage. The child is able to solve practical, real-world problems with a trial-and-error approach; however, they still have difficulties with abstract reasoning (Sigelman & Rider, 2008). All of the participants of this study were in or near the formal-operational stage of Piaget's stages of Cognitive Development. The formal-operational stage of development is the fourth stage and typically begins around 11 or 12 years of age and continues on (Ormrod, 2011). The formal-operational stage is where logical reasoning processes occur. The adolescent is now able to apply reasoning to abstract ideas and to concrete objects (Ormrod, 2011).

Seven of the 8 participants were in their formal-operational stage and were able to practice critical thinking. In other words, because these participants were developmentally able to apply critical thinking, they could develop an appreciation for Need for Cognition. Three out of the four female participants scored high in Need of Cognition and were motivated and interested in working on answering the questions for the interview. The male participants were the opposite; three out of the four male participants had a low Need for Cognition score, were uninterested in answering the questions, and their answers were short and quick.

One female participant had not reached the formal-operational stage of development at the time of the data collection and, therefore, may not yet be fully able to think critically. This could

explain why she was medium to low Need for Cognition. It is unclear why only 1 out of the 4 male participants was high Need for Cognition. One speculation could be that the context of his alternative school, a school focusing on the arts, might have stimulated his Need for Cognition in academic areas as well as dance. This might have also been a matter of motivation.

Motivation. The participants' engagement with the interview as well as how they answered the questions seemed to be driven by their level of motivation to think critically. In general, the concept of motivation can be divided into two areas: intrinsic and extrinsic motivation (Ormrod, 2011). If an individual is intrinsic motivation, they are motivated by factors within themselves (Ormrod, 2011). If the factors are separate from themselves, they are more likely to have extrinsic motivation (Ormrod, 2011). For example, P2 listened closely to the questions, asked to have them repeated, and responded only after she had thought about her response for several seconds. P2 has an intrinsic motivation because she wanted to be actively participating in the interview. She wanted to be successful, not because of a grade or outside reward, but success for herself. P3 also wanted to do well; she has good grades and likes to excel at any task that is put in front of her. She would also have an intrinsic motivation because she enjoyed thinking critically during the interview and taking her time to answer the questions the best she could.

P1 actively participated in the interview and thought about the answers, but her reward for doing well was not a personal goal. P1 was extrinsically motivated because she was seeking a reward for doing well during the interview. Similarly, P8 also scored high on the Need for Cognition scale, but did not do this for personal satisfaction it was to be successful at a task. While P1, P2, P3, and P8 are still motivated to be successful at particular tasks their motivation

comes from different reasons, whether it is personal or seeking recognition for their motivation is the difference. Overall, it can be speculated that motivation and Need for Cognition influence each other. More research is needed to identify correlations and potential differences between intrinsic and extrinsic forms of motivation.

From a human development perspective, as adolescents grow they become less and less concerned with their academic achievement; that is, they no longer are motivated for personal satisfaction, they are only doing well because of the reinforcement of the grades (Stipek, 1984). This phenomenon seems to be reflected in the data set. Looking at Table 3 P1 and P8 have high Need for Cognition; however, their Need for Cognition score was lower than younger participants' (P2 and P3) high Need for cognition score. For example, P1 (15) and P8 (16) have a 2.6 high Need for Cognition score while the younger participants, P2 (13) and P3 (12) have a 2.8 and 2.75 high Need for Cognition score. It could be speculated that older students' likelihood to engage and enjoy thinking might decrease with age due to lack of motivation, in particular when during puberty, while younger students might be (still) more motivated intrinsically.

Grade Achievement. Need for Cognition was found to be a predictor for grade achievement. Preckel and colleagues (Preckel, Holling, & Vock, 2006) found that individuals with high Need for Cognition tend to achieve higher grades because they are seeking information and enjoying engaging in complex reasoning. Within the participants of this study, it was found that high Need for Cognition was similarly reflected in high grade averages, as well as, medium/low Need for Cognition was reflected with lower grade averages. To illustrate, P1, P2, P3, and P8 actively seek out environments that engage them in effortful thinking. This is shown through their Need for Cognition scores, and their grade averages of A or A/B. These

participants are high in Need for Cognition, as well as, high in their grade achievement. On the other side, P4, P5, P6, and P7 have medium/low Need for Cognition scores, as well as, a grade average of B/C to D. This finding aligns with Preckel, Holling and Vock (2006) research study and confirms that individuals high in Need for Cognition tend to achieve better grades because they are seeking information and enjoying engaging in complex reasoning. Grade achievement is an important part of any student's academic career. Knowing about its link to Need for Cognition will allow educators to be better able to plan lessons and improve grade averages among their students. It seemed that through the interviews that participants' need for cognition depended on how much they enjoyed their school as a learning environment.

Gene-Environment Correlation. Shared environmental influences are common experiences that make individuals in the same household similar to each other (Sigelman & Rider, 2008). For example, P5 and P6 shared many similar characteristics to each other; they both really enjoyed playing hockey. Nonshared environmental influences are those experiences that made the individual different from one another. P7 and P8 lived in the same household; however, attended different schools. P8 really enjoyed school while P7 struggled with school.

In regards to Need for Cognition Gene-Environment correlations can tell us the type of environment that might be right to foster a Need for Cognition in the individual in order to promote critical thinking. Gene-Environment correlations tell us that people who have different genes will encounter different environments (Sigelman & Rider, 2008). Gene-environment correlations are another important concept that could be explained through a student's Need for Cognition. Gene-environment correlations are how an individual's genes and their environment

are interrelated (Sigelman & Rider, 2008). There are three different types of gene-environment correlations: passive, evocative, and active.

Passive gene-environment correlation is the idea that an individual has certain traits and qualities passed onto them from their parents (Sigelman & Rider, 2008). If the parents enjoy engaging in thinking it is likely they will pass this high Need for Cognition quality on to their children. In Family A, the parents are focused on academics. The mother is a teacher and the father is a lawyer, therefore, they might have passed their high Need for Cognition onto P1 and P2. However, in Family C there is a strong athletic interest and, therefore, it could speculated that these parents have passed this interest on to the children over interest in academia.

The second gene-environment correlation is evocative. Evocative gene-environment correlation is the concept that the child will evoke the environment they are surrounded by (Sigelman & Rider, 2008). If children enjoy engaging in thinking, they can induce an environment full of critical thinking and problem solving. For Family A, P1 and P2 seemed to have a clear interest in critical thinking, and have an enjoyment in the engagement of effortful thinking which might have been fostered by their parents. Both P1 and P2 showed enjoyment in thinking during the interview by sharing their enjoyment in school projects that were challenging and by their grade averages of A. P1 and P2 seemed to evoke the environment of enjoyment of effortful thinking. P5 and P6 seemed to evoke the environment of athletics. Both showed a clear interest in hockey and grades were secondary to their main interest. This assumption is supported by the family, including P4 who attended the sporting events, and participates in her own athletics.

The third correlation is the active gene-environment correlation, where children actively seek the environment they want (Sigelman & Rider, 2008). In regards to Need for Cognition this means that if children enjoy engaging in thinking, they will seek out the environment that continually engages them in thinking skills. In this study, the participants were active in their environment. P4 and P5 actively seemed to seek out the sports club environments. This was shown with the everyday examples of athletics as their area of interest. Their Need for Cognition scores reflected their lack of enjoyment in engaging in effortful thinking outside of the athletic clubs.

A family can pass certain characteristics on to the children, but as the children grow into a formal-operational stage of development they will become more active participants in the environments they seek. P7 and P8 vary in Need for Cognition, yet they were brothers living in the same household. P8 actively sought out an environment rich in critical thinking, while P7 seemed to struggle to find enjoyment in school or critical thinking. It could be hypothesized that P8 evoked an environment rich in critical thinking due to his interest in school. P7 and P8 also attend a different school which was a non-shared environment. This could be one reason why they differed in their Need for Cognition. On the other hand, P1, P2, and P3 played sports, they seemed to more actively seek out an environment that engages them in critical thinking rather than an environment that did not. Several of their examples during the interview reflected an interest in engaging in effortful thinking. For example, P3 stated enjoying large projects that take time and much effort to complete.

To summarize, the exploratory study at hand showed that children and adolescents seem to have need for cognition and are able to express their attitude towards critical thinking when

they were at the formal operational level of cognitive development. Furthermore, it could be speculated that participant's motivation to engage in critical think seemed to decrease during puberty. Interestingly, it appeared that the association between Need for Cognition and grade achievement described in the existing literature seem to be reflected in the sample of this study. That is participants' high in need for cognition seemed to have better grades. Last but not least, it could be speculated that the family environment participants were exposed to or chose as a learning environment influenced their need for cognition. Some gender differences were found. That is most female participants seemed to score higher in Need for Cognition. More research is needed to be able to draw conclusions beyond this small, exploratory sample.

Educational Implications

Need for Cognition is important for teachers and educators for several reasons. If they can generate a learning environment that encourages critical thinking, then students' attitude towards Need for Cognition might increase as well. This could have a positive influence on their grade achievements. If the students are high Need for Cognition they may participate more in the classroom and will actively seek new information and knowledge.

If an educator is not aware of the students' Need for Cognition, it can bring the level of the students' Need for Cognition down and result in bright students who are uninterested in school or engaging in effortful thinking. At a formal-operational level each student in a classroom is able to understand the concept of, and to practice, effortful thinking. It is important to know what type of motivation students possess, whether it is intrinsic or extrinsic, in order to create the Need for Cognition environment for the evocative students, as well as, the active students (Ormrod, 2011).

If the educators are aware of these differences, they can begin to foster Need for Cognition in their classroom by creating programs and lessons that engage the unique thought processes of all the students. Being aware of the differences and creating programs that cater to the different styles of learning such as visual, audio, or hands-on learning is an important way to foster the learning of all students. Most importantly, keep focused on how the students in the classroom are interacting with each lesson and method of teaching and adjust the lessons and methods to help suit their engagement in thinking. As educators it is important to remember that the students should not adapt to the method of teaching, but the method of teaching should adapt to the students learning process (Ormrod, 2011).

Limitation and Future Research

The limitations for this study were the small sample size and a non-representative sample. Therefore, no generalizations can be made beyond the participants. More research should be completed to better understand Need for Cognition in children and adolescents'. It is important to continue to study Need for Cognition in children and adolescents to try and understand how to create an engagement in critical thinking why they do or do not engage in thinking, and what can motivate the children or adolescents to actively engage in thinking.

Conclusion

This study investigated the construct of Need for Cognition in children and adolescents. It showed that students have Need for Cognition which differs in its extent from low to high Need for Cognition as well as the area that is of interest to them, ranging from school subjects to extracurricular activities (e.g., science or ballet). If teachers understand the concept of Need for Cognition and make it part of their student assessment they could develop classroom learning

environments that focus and foster critical thinking for all students. This would mean that teachers need to account for this diversity of interest among the students to engage in and enjoy thinking. Therefore, it is important for teachers to recognize when, how, and why students will begin to actively engage in thinking to promote a classroom environment that allows their students to actively or evocatively seek engagement in effortful thinking. This demonstrates the importance to continue researching Need for Cognition in this age group and to further explore why it matters to classroom education.

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Example Questions

These are the questions used to explore the Need for Cognition revolving around each statement of the Need for Cognition scale (e.g. statement #8). Each time the same questions were used.

#8: I prefer to think about small, daily projects to long-term ones.
A) What do you think this sentence means?
B) Please tell me how much you agree or disagree with this sentence. Do you strongly agree, do you agree, do you disagree, or do you strongly disagree? (Point to the rating scale below).
I strongly agree   **I agree**   **I disagree**   **I strongly disagree** ◯   ◯   ◯   ◯
C) *Could you give me an example from your own life to explain your choice/agreement/disagreement?*

Example Transcript

This is an example transcript on how participant 2 answered the questions revolving around the Need for Cognition statement number 8.

#8: I prefer to think about small, daily projects to long-term ones.
A) What do you think this sentence means?   "You kind of plan one day at a time, then you think about the small ones and then you consider the long ones."
B) Please tell me how much you agree or disagree with this sentence. Do you strongly agree, do you agree, do you disagree, or do you strongly disagree? (Point to the rating scale below).
I strongly agree   **I agree**   **I disagree**   **I strongly disagree**   ◯   ⊗   ◯   ◯
C) *Could you give me an example from your own life to explain your choice/agreement/disagreement?*   "In sports, when you are playing a game you want to win the game, but if you are in a tournament, you need to win each game first to win the tournament, or the season you have to focus on each game before the big goal can be reached."

Appendix C

Need for Cognition Scale

These are all 18 statements of the Need for Cognition Scale (Cacioppo, Petty, & Kao, 1984).

1. I would prefer complex to simple problems.

2. I like to have the responsibility of handling a situation that requires a lot of thinking.

3. Thinking is not my idea of fun.*

4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.*

5. I try to anticipate and avoid situations where there is a likely chance I will have to think in-depth about something.*

6. I find satisfaction in deliberating hard and for long hours.

7. I only think as hard as I have to.*

8. I prefer to think about small, daily projects to long-term ones.*

9. I like tasks that require little thought once I've learned them.*

10. The idea of relying on thought to make my way to the top appeals to me.

11. I really enjoy a task that involves coming up with new solutions to problems

12. Learning new ways to think doesn't excite me very much.*

13. I prefer my life to be filled with puzzles that I must solve.

14. The notion of thinking abstractly is appealing to me.

15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.*

17. It's enough for me that something gets the job done; I don't care how or why it works.*

18. I usually end up deliberating about issues even when they do not affect me personally.