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Impact of the Built Environment on Youth Mentorship

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Dickinson College Senior Research Proposal

The Impact of the Built Environment on Youth Mentorship

Motivation. I grew up in rural/suburban Pennsylvania. My house is on an unwalkable road. Even if I wanted to walk, there are no destinations within walking distance. An average day for me, before I got my license, was a bus ride to school, eight hours of school and a bus ride home. When I got home from school, I was stranded in my house until my mom came home to drive me elsewhere. For some of my peers, long commutes kept parents out of the house for the majority of the day. Their kids filled the loneliness and boredom of hours trapped in the house with reckless behavior. I see these behaviors as a public health problem that is a result of the built environment.

Introduction.

A natural mentor is a non-parental figure, 25 years or older, who exists outside of formal mentorship programs and serves as an inspiring educator in the life of a young person (DuBois & Silverthorn, 2005). Klaw et al used the following questions to define a natural mentor in a research survey:

“Other than your parents or whoever raised you, do you have a role model or mentor who you go to for support and guidance? A mentor is not someone around your age or a boyfriend. He or she is an adult who is older than you, who has had more experience than you, and who has taken a special interest in you. This person may be a teacher, a relative, a neighbor, or someone else whom you look up to for support and guidance” (Klaw et. al, 2002).

Natural mentors have resources they can offer youth who are in the process of entering the adult world (Stanton-Salzar, 2011). These resources can range from academic support to knowledge of how to effectively participate in a new sociocultural setting. The resources can be used by youth to see their full potential, to aspire to be something greater than they would have thought possible (DuBois & Silverthorn, 2005). In studies done on populations of young people, a link has been found between presence of natural mentor and positive health behaviors (DuBois & Silverthorn, 2005; Zimmermann, Bingenheimer, Notaro, 2002).

Klaw et al studied the effect of natural mentorship in school completion in a group of adolescent African American mothers. They found that mothers who reported having a natural mentor for two years postpartum were about 3 times more likely to have remained in school or graduated than those who didn't report a natural mentor (Klaw et al, 2002).

Zimmermann et. al were particularly interested in the resiliency of youth dependent on whether or not they had a natural mentor. They wanted to see if youth with a natural mentor were more successful handling the risks of their environment than those without a natural mentor. Risks consisted of peer-related pressure, behavioral norms, psychological distress, etc. They surveyed a more heterogeneous group of 770 inner-city youth, 70% of whom were of African American race. Researchers found that youth in the study who reported having a natural mentor had positive views of school, were more resistant to peer-pressure, and exhibited fewer problem behaviors such as alcohol-use, marijuana-use, violent and non-violent problem behavior (Zimmerman et al. 2002).

Dubois and Silverthorn were interested in looking at the effect of having a natural mentor on a range of health behaviors using data from a larger, more heterogeneous group of youth. They pulled data from Wave I and Wave III of the National Longitudinal Study of Adolescent Health (Add Health). The Add Health Survey is a random sample of 15,197 youths in high schools across the United States, along with few special samples. Wave I was completed in 1995. Wave III interviewed the same respondents in 2001/2002. Information from Wave III of 4,882 randomly chosen respondents was made available for public use and is therefore the data used in the study. They pulled specific data from the available respondents' surveys. Wave III had questions on mentorship. Wave I and III had other information about personal health behaviors, individual risks and environmental risks. Researchers found that respondents who reported having a natural mentor stayed in school/graduated, exhibited healthy physical and psychological well-being and fewer problem behaviors (DuBois & Silverthorn, 2005).

The studies above on natural mentorship demonstrate a connection between having a natural mentor and exhibiting positive health behaviors. Positive health behaviors include decisions like having protected sex, not smoking, not drinking to excess, healthy eating, exercise and continuing education (Cockerman, 2012). The research studies discussed above asked questions about one or more of the listed health behaviors. Their findings show that this specific social relationship plays a role in physical health of young people. The connection to health is why it is important to understand how and why youths find a natural mentor.

Social Capital. Social capital is defined as the features of social organization, such as civic participation, norms of reciprocity, and trust in others, that facilitate

cooperation for mutual benefits (Putnam, 2000). While social capital allows for action on the community level it also delivers resources to individuals within the network (Carpiano, 2006).

Social capital is a layered framework. The first essential layer is composed of structural antecedents. These are characteristics of communities that impact the formation of social ties as well as the resources available within them. The middle layer follows the definition provided for social capital or the networks that facilitate collective action. The final layer refers to the resources available to individuals within the network. The types of resources available to the people of the community are different depending on the community (Carpiano, 2006).

For youth, their social networks are partially characterized by institutional agents, or non-parental adults who can provide resources and support (Stanton-Salazar, 2011). The level of capital (economic, human, cultural) possessed by institutional agents as well as the quantity of them sculpts the power of social capital in the life of a young person (Carpiano, 2006). In this research project, I focus on the factors that facilitate quantity not quality of mentors, while quality could be an important aspect to investigate in further research. If a young person has many institutional agents to select from than their potential for forming the unique bond classified as a natural mentor is higher. Because natural mentors exist outside of formal mentorship program, a natural mentor should come to a young person “naturally” through their social networks (DuBois & Silverthorn, 2005). If a young person has a vibrant social network than there are more people within it for them to connect with.

The layered structure of social capital demonstrates the potential for connection between the structure of a community, the social networks facilitated by a community and the likelihood of creating a relationship from which resources can be extracted like a natural mentor. A contributing factor to the structure of a community is the literal structure or the built environment.

Walkability. In his 2003 study, Leyden studied the relationship between the walkability and mixed-use design of a neighborhood and the social capital in that neighborhood. He hypothesized that neighborhoods rich with social spaces like destinations and sidewalks would facilitate spontaneous, random connection amongst neighbors. That interaction would add to “ a web of public respect and trust, and a resource in time of personal or neighborhood need.” He refers to this potential for connection and support as social capital (Leyden, 2003).

He conducted his study on different neighborhoods in and around Galway, a city in Ireland. He chose this location because of the diversity in types of neighborhoods, from walkable to car-dependent. He received completed surveys from 279 of the 750 homes he distributed to throughout the neighborhoods. In the surveys, people were asked to rate their neighborhood’s walkability as well as their level of social capital. He found that the respondents who reported high walkability and mixed use in their neighborhood were more likely to report high social capital than those who did report high walkability (Leyden, 2003).

Other research projects used similar methods and found similar results. Rogers et al in their 2010 study looked at the varying levels of social capital based on the walkability of different neighborhoods in New Hampshire. They used a similar definition

for social capital as is used in this research project. To assess social capital, respondents were asked about their levels of civic engagement, formally and informally, as well as their level of trust. To assess walkability, similar to Leyden, they asked participants to list the destinations that were within walking distance of their home. The denser community was reported as more walkable. Also, respondents in this neighborhood reported a higher level of social capital. The methods of the pilot study were applied to a larger study of neighborhoods in New Hampshire. The same result was found; participants in denser communities reported higher levels of walkability as well as higher levels of social capital (Rogers et al, 2010).

Other researchers have criticized Leyden's walkability measure and/or used other or additional methods. Carlson et al investigated the role played by neighborhood perception in the relationship between walkability and health. They wanted to see if the built environment acted as a risk regulator, shaping the behaviors that induce health outcomes like walking. To assess walkability, they utilized a similar measure as the one used by Leyden that consisted of selecting destination in walking distance. However, researchers wanted to supplement this measure with one that would reflect participants' perceptions of the built environment rather than just their assessment of the physicality of the environment. So they also asked participants to list destinations that they do walk to as well as the frequency of their trips. This measure was particularly important to their study because of they wanted to know how walkable environments impacted health risk factors like body mass index. BMI is impacted by how much a person walks and how much a person walks is impacted by the perception of the environment (Carlson et al, 2012).

Researchers found that participants who perceived the neighborhood to be more walkable did walk more. In neighborhoods where people walked more, the neighborhood had lower BMI and self-reported health. Additionally, participants who perceived their neighborhood to be walkable walked more making the neighborhood seem even more walkable. Their study conclusions include diagrams of the feedback loops involved in the walking decision-making and its connection to health and built environment (Carlson et al, 2012).

French et al looked at the relationship between sense of community and pedestrian friendly neighborhoods by examining data collected by the Australian RESIDential Environments Project (RESIDE). RESIDE captured data from residents in the Perth metropolitan area about the impact of urban design on health. Sense of community was defined as a “feeling that members have of belonging and being important to each other and a shared faith that members’ needs will be met by the commitment to be together” (French et al, 2014). Sense of community recorded resident’s psychological sense of community and reported it as the mean score of the 16 questions asked. All questions were on a Likert scale from “agree” to “disagree” (French et al, 2014).

To assess walkability, participants were asked how much time they spend walking for leisure or transport. They were also asked to report their perceptions of their neighborhood’s land use mix, street connectivity, density, walking infrastructure, traffic, crime, etc. Researchers supported the studied subjective characteristics with objective research (land use mix, density, connectivity and commercial floor area ratio). Researchers found that participants’ perceived understanding of the walkability of their

environment impacted their sense of community more so than the actuality of their built environment (French et al, 2014).

Study. My research will build upon the field of walkability, social capital and resource extraction from social networks. Literature shows that living in an environment rich with destinations to walk to facilitate the creation of dense social webs characterized by high levels of individual participation and feelings of trust. These dense social webs may then be rich with resources. Youth then are more likely to be connected to resources, reflected in the fact that they are more likely to have a natural mentor.

This relationship pattern excludes conversations about the quality of resources within a dense social web. This would alter how affective a natural mentor would be in altering youth health behaviors. This relationship also excludes the impact of neighborhood perception on accessibility of social spaces. Perhaps a youth has many social spaces that are physically close to them but does not perceive them as accessible. These complex relationships should be explored in future research.

In the scope of this research, I hypothesize that young people growing up in walkable environments are more likely to have access to high levels of social capital. Then, I hypothesize that within the group of youth exposed to high levels of social capital there will be a higher prevalence of youth with natural mentors. Finally, I connect these two ideas by hypothesizing that within the youth living in a walkable environment there will be a higher prevalence of youth with natural mentors because of their access to social capital.

Methods.

Survey. To conduct this study, I surveyed 157 first-years at Dickinson College. Because I surveyed students, I submitted my project to the Institutional Review Board. It passed as an exempt project.

The students were from 12 different first-year seminars of the 42 first-year seminars offered at Dickinson College in the fall of 2014. I randomly chose the 12 seminars by selecting every fourth seminar from an alphabetized list of all the seminars. First-years select their top six choices for seminars the summer before their first-year at Dickinson. Using that list, they are placed in the seminar highest on their list that still has space in it for another student. While there is potential for student bias, each classroom is fairly representative of the population at Dickinson.

I administered the 10-minute survey at the beginning of class (if professors were wary about giving me this amount of time in one of their classes, I offered to speak about my research process to support the purpose of the class). The survey asked them questions about their background, the walkability of the neighborhood in which they grew up, the level of social capital in that neighborhood, and whether or not they had a natural mentor. The questions were coded so that answers could be analyzed quantitatively.

Walkability. I based the walkability questions in my survey on the survey created by Leyden to assess walkability in Galway. I chose this measure intentionally because it is a concise self-reported measure of the social spaces that exist within a community. Because it is self-reported it allows for a reflection of what the person who lives within the community understands as walkable. Additional measures of community perception

were not included within my survey, which allowed for it to be quickly administered to students. However, it limited our level of understanding of complex relationships.

The walkability survey is an additive index. I provided participants with a list of typical destinations and asked them to select all destinations that they could easily reach by walking from their home address (Leyden, 2003). The number of selected destinations was divided by the total number of possible destinations, which was either nine or ten destinations according to whether or not the person had a job at this point in their life (“your job” was one of the destinations). The resulting decimal is called the walk index.

Walk index is on a scale from zero to one. One reflects higher walkability because the participant could reach all or almost all of the destinations offered. Their walk index was therefore a one-to-one ratio.

Walk index was validated by comparing it to the Walkscore of that participant’s address. Walkscore is generated by a website, Walkscore.com, that calculates walkability on a scale from 0-100, based on the number of destinations within a certain distance of an address. I used addresses provided in the survey to find each participant’s Walkscore.

Social Capital. The social capital survey was broken into different aspects of social capital, following the Leyden model (Leyden, 2003). I used Leyden’s model because it was similar to those used in other literature (Hanibuchi, 2012; Kawachi et al, 1997; Rogers et al, 2010). Also, it contained questions addressing important pieces of social capital identified by Robert Putnam, one of the leading social capital theorists. Putnam founded the Saguaro Seminar within the John F. Harvard Kennedy School of Government. The seminar has been working on a social capital short form as an easy way to collect nationwide information about changes in levels of social capital. Questions

asked in the short form were similar to those I asked in my survey (trust, civic participation, and informal participation) (Rogers et al, 2013).

The answers for three of the parts, ‘know your neighbors,’ ‘trust,’ and ‘social participation,’ have answers on a scale of agreement to disagreement. Each participant selects her/his level of agreement with a statement. An example of a question asked is “how trustworthy did you find the people in your community to be? 1) not at all 2) a little trustworthy 3) moderately trustworthy 4) extremely trustworthy.” The level of agreement increases with each option. Each answer contributes its respective number of points to the social capital variable. The number of points correlates to the answer’s position on the scale. An answer closer to agreement contributes more points to the social capital variable, as seen in the example above (Frankfort-Nachmias & Leon-Guerrero, 2015).

The second part, ‘community participation’, is a series of yes/no questions. The answer ‘yes’ contributes a point to the social capital variable. The points contributed by each answer are added to find the value of the social capital variable for each participant. The social capital score is used to determine whether the participant has low, medium or high social capital. The final scores are on a scale from 1-22. While this piece of the survey was based on the social capital survey created by Leyden, it is not a validated survey instrument because it was sculpted to fit this research project.

Natural mentorship. The natural mentor survey is a yes/no question following models in previous research (Zimmermann, Bingenheimer, Notaro, 2002). It is coded as a binary present/not present. Follow-up questions were asked about the person identified as a natural mentor to ensure the person met the qualifications of “natural mentor.” For

example, participants were asked if the person indicated was a part of a formal mentorship program (Appendix 1).

Income. The survey inquired about annual household income so that this potentially confounding factor could be controlled for in analysis. In the survey, participants chose one of five income ranges within which their family falls (Appendix 1). Each range had a corresponding number that denoted it in analysis.

Race and Ethnicity. The survey provided potential races and ethnicities from which the participant could choose. The participant was encouraged to choose all options that applied to them. Each option was designated with a number. Each number was a double of the preceding number. This way each number or combination of numbers was unique to that race/ethnicity or combination thereof.

Parental education level. The survey provided potential educational degrees that a participant's parent could have accomplished. The participant was encouraged to choose all degrees that corresponded to the highest degrees earned by their parents. Like race/ethnicity, each option was given a unique number that was a double of the preceding number so that each option or combination had a unique number designation.

Analysis. I used crosstabs in SPSS (IBM SPSS statistics 21) to see the distribution of participants. For example, for the relationship between social capital and walkability, the crosstabs showed participants with both high and low walkability and whether they had high or low social capital. In crude analysis, using the crosstabs, I calculated prevalence ratios looking at the prevalence of high social capital (outcome) in the high (exposed) as compared to the low (unexposed) walkability groups. I used the same analysis procedure

to find the prevalence of natural mentors (outcome) in the high (exposed) versus the low (unexposed) social capital groups.

After crude analysis, I attempted to control for confounding factors by stratifying by the factors in question. I stratified by holding the confounding factor being studied constant while creating the contingency tables used in crude analysis. Each contingency table allowed me to calculate the prevalence of the desired outcome in the exposed versus unexposed group for each racial/income/education group.

I then populated a new contingency table with the prevalence of the desired outcome in each confounding/exposure group. For example, in the tables below, a reader can see the prevalence of high social capital in the high walkability/low income group. It can then be compared to the prevalence of social capital in the high walkability/high income group. This allowed me to see if the confounding factor played a role in the studied relationship. The confounders studied were average household income, race and parental education level.

Results.

Distributions.

Walk Index. Because of the design of the walkability assessment, participant's walk indexes were discrete values rather than values on a continuous scale. This created a uniform distribution within the walk index variable where there were no natural breaks creating distinct groups of participants (Figure. 1). So, I dichotomized the data at a point that evenly divided the number of participants amongst the two (high/low) categories.

Low walkability (n=61) was classified as walk indexes between 0 and 0.6. High walkability (n=65) was classified as walk indexes between 0.667 and 1.

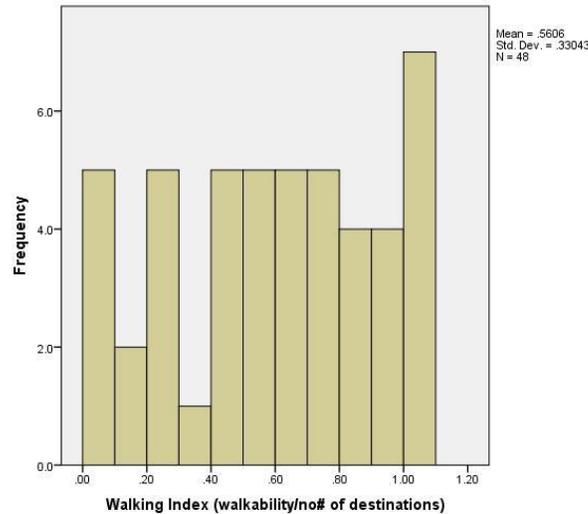


Figure 1. The distribution of participants amongst walk index groups

Social Capital. The results for social capital were distributed normally, which created three distinct groups of people within the data. Therefore, it was trichotomized (Figure 2). Participants were distributed equally in the high, medium and low groups. Low social capital (n=38) is defined as social capital scores between 1 and 14. Medium social capital (n=48) is defined as social capital scores between 15 and 17. High social capital (n=39) is defined as social capital scores between 15 and 22. In analysis, only the high and low social capital groups were used. The variable could then be used in a crosstab. It also ensured the two groups were distinct. However, because I didn't use the data provided by those respondents who reported medium social capital, I lost one third of my data, reducing the power of my analyses.

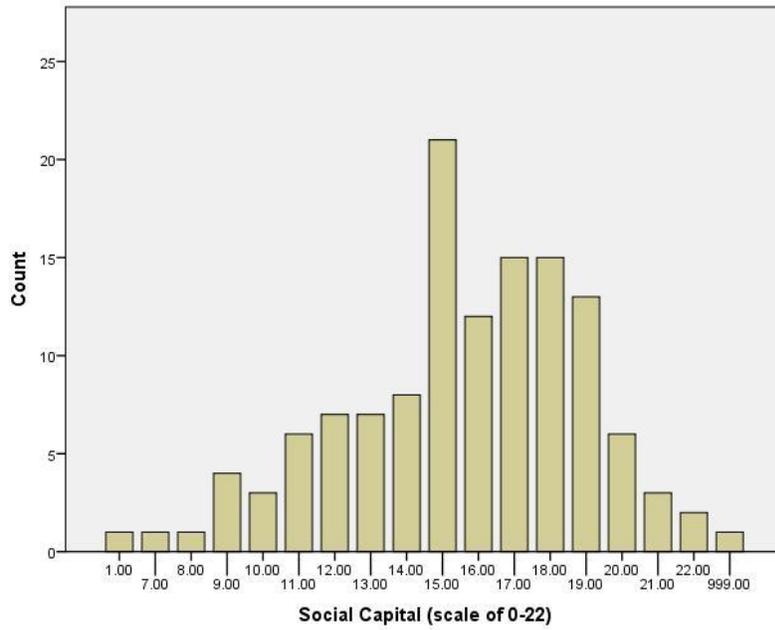


Figure 2. The distribution of participants amongst social capital scores

Average Household Income. Because of the background of students at Dickinson, there were few students in the two lowest income groups (Figure 3). In order to evenly distribute participants amongst the income groups, group 1 and 2 were combined, creating four groups with a more similar number of participants even though the lowest income group still has fewer than the higher three (Table 1).

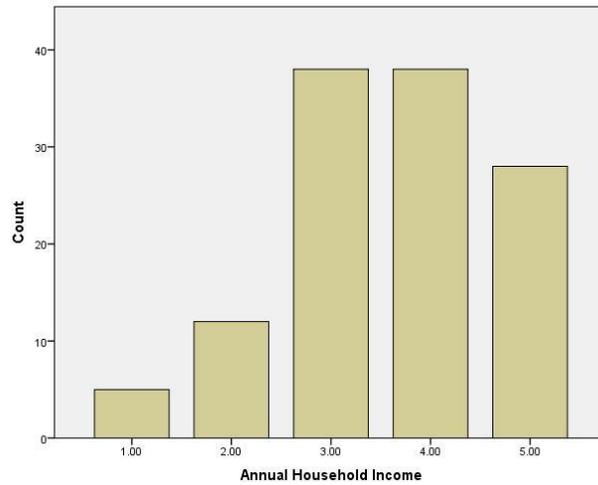


Figure 3. Distribution of people among average household income groups

Table 1. Income breakdown for each group used in analysis

Group 1	<50,000	n=17
Group 2	50,000-100,000	n=38
Group 3	>100,000-200,000	n=38
Group 4	>200,000	n=28

Race. Race was unevenly distributed (Figure 4). Most people surveyed self-identified as Caucasian (category 1). Other races and ethnicities had few people within their categories. In order to preserve statistical power, I grouped participants as white (n=98) or non-white (n=27).

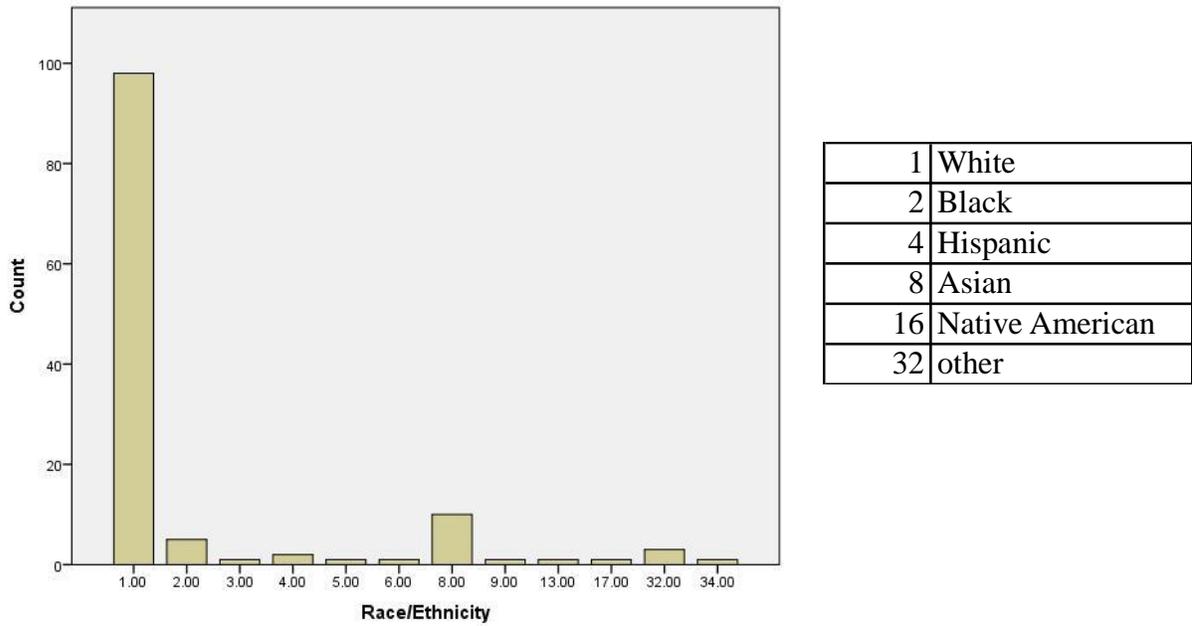


Figure 4. Distribution of participants amongst racial and ethnic categories

Parental Education Level. Parental education level was unevenly dispersed between the survey options. Therefore it was dichotomized as bachelors’ degree (1-12, n=59) or less and masters’ degree or more (16-31, n=67). With this break, there were a similar number of people in each category.

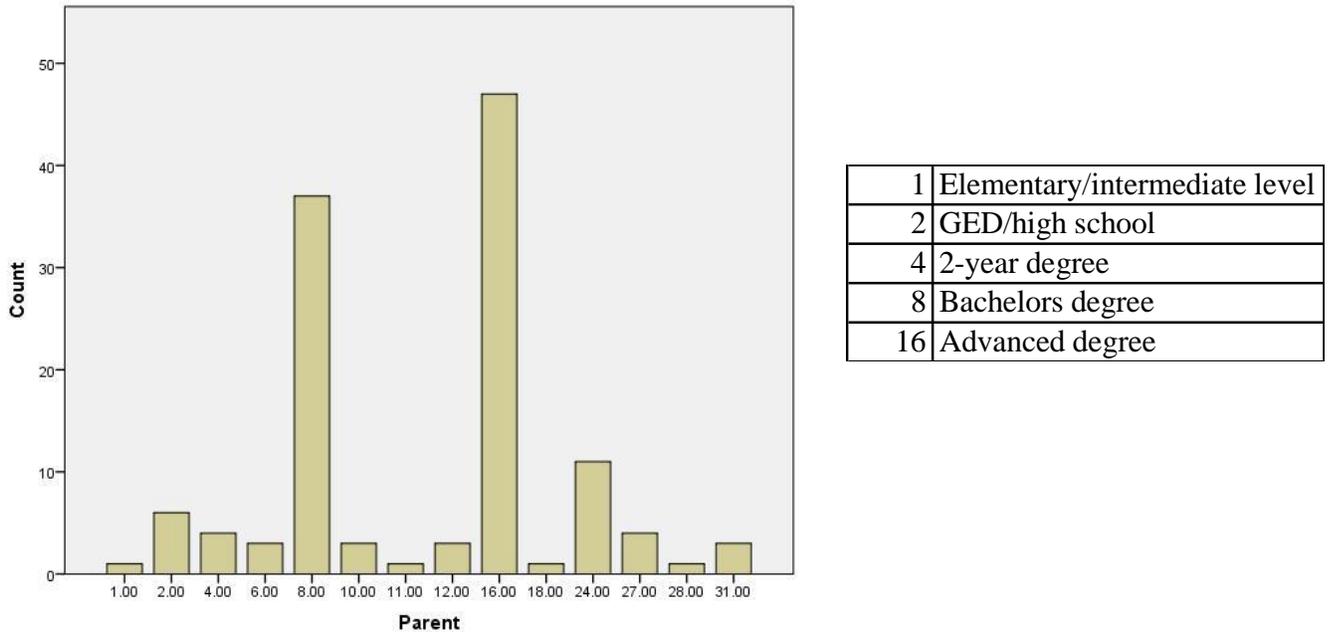


Figure 5. Distribution of participants amongst the parental education options

Walkscore & walk index. I looked at the relationship between the two different measures of walkability, Walkscore and walk index. Because both measures are based on destinations within walking distance of an address, there is some relationship between them. Although, the relationship is not as strong as expected (Figure 6, $R^2 = 0.319$). This may be because walk index is based on what people perceive to be within a walkable distance. Perceived walkability will vary amongst individuals based on a number of variables to their own tolerances for walking to the safety of their neighborhoods. Therefore, when compared to Walkscore, which is based on objective spatial analysis, it can be expected there would be some difference.

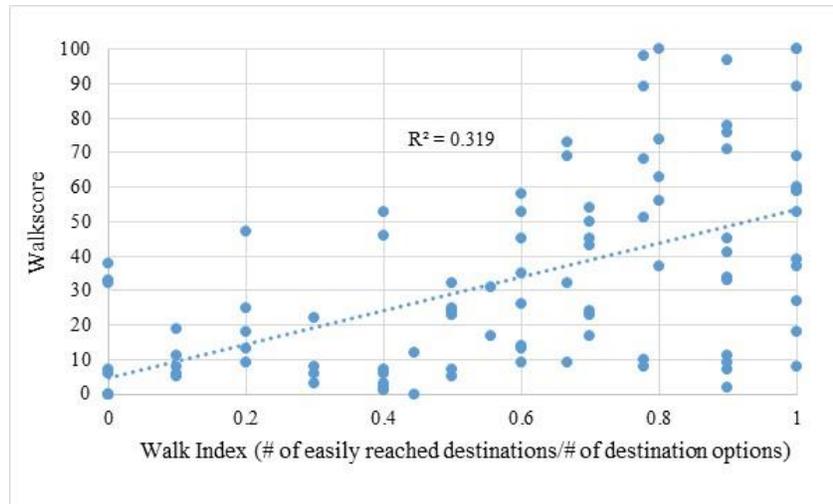


Figure 6. The distribution of Walkscore as compared to walk index

Crude Analysis.

The crude analysis showed that those living in high walkability neighborhoods were about 40% more likely to have higher social capital, although the relationship was not statistically significant (Table 1; prevalence ratio, 1.37; 90% CI, 0.88-2.14; n=125).

Table 1. Prevalence of people with high SC in those with high WI versus low WI

		Exposure		Total
		Low WI (-)	High WI (+)	
Outcome	Low SC (-)	20	18	38
	Medium SC	25	23	48
	High SC (+)	16	23	39
Total		61	64	
Prevalence Ratio			1.37	

I also found that those with high social capital were 60% more likely to have a natural mentor (Table 2; Prevalence ratio, 1.57; 90% CI, 1.14-2.16; n=77). Because the null is not included in the confidence intervals, this relationship is statistically significant (Rothman, 2012).

Table 2. Prevalence of people with a NM in those with high SC versus low SC

		Exposure			Total
		Low SC (-)	Medium SC	High SC (+)	
Outcome	No NM (-)	20	17	10	47
	NM (+)	18	31	29	78
Total		38	48	39	
Prevalence Ratio				1.57	

I found little crude relationship between walk index and natural mentorship. Those with higher walk indexes were only 6% more likely to have a natural mentor. This relationship was not found to be statistically significant (Table 3; Prevalence ratio, 1.06; 90% CI, 0.8489-1.3369; n=126).

Table 3. Prevalence of people with a NM in those with high WI versus low WI

		Exposure		Total
		Low WI (-)	High WI (+)	
Outcome	No NM (-)	24	23	47
	NM (+)	37	42	79
Total		61	65	
Prevalence Ratio			1.07	

Stratified analysis.

Walk index & social capital. In stratified analysis, I created a contingency table of only those participants with natural mentors that also showed their walk index/social capital category.

Within the high and low walkability groups, I used a prevalence ratio to see whether participants with high social capital were more likely to report having a natural mentor than those who reported low social capital, as I saw in the crude analysis. Within both the group that reported high and low walkability, those who also reported high

social capital were more likely to have a natural mentor than those who reported low social capital. This was especially apparent within the high walkability group; those who reported high social capital were 112% more likely to have a natural mentor. In contrast, in the low walkability group, those who reported high social capital were only slightly more likely to have a natural mentor. This relationship was also not found to be statistically significant (Table 4; High WI: Prevalence ratio, 2.12; 90% CI, 1.27-3.54; n=64; Low WI: Prevalence ratio, 1.14; 90% CI, 0.72-1.8; n=36).

I then examined the relationship between walk index and natural mentorship by controlling for social capital. Within both the high and low social capital groups, I looked at the prevalence of participants with natural mentors who also reported high walkability as compared to those who reported low walkability.

Within the group that reported low social capital, participants who also reported high walkability were less likely to have a natural mentor than those who reported low walkability, although this relationship was not found to be statistically significant (Table 4; Prevalence ratio, 0.71; 90% CI, 0.39-1.27; n=38).

The opposite pattern occurred in the group that reported high social capital. Those who reported high walkability were more likely to have a natural mentor than those who reported low walkability. This relationship was found to be nearly statistically significant (Table 4; Prevalence ratio, 1.32; 90% CI, 0.9265-1.8856; n=39). In the crude analysis, where social capital wasn't controlled for, these two patterns cancelled each other out and made it seem there was no relationship between walk index and natural mentorship.

Table 4. Prevalence of people with a NM in those within SC/WI categories

	Low WI (-)	High WI (+)
Low SC (-)	11/20 (55%)	7/18 (39%)
Medium SC	16/25 (64%)	15/23 (65%)
High SC (+)	10/16 (63%)	19/23 (83%)
Prevalence Ratio	2.12	

Income. The first potential confounder controlled for was income. When looking within the group of people who reported high walkability, those within the highest income group were 64% (nearly significantly) more likely to have high social capital than the lowest income group (group 2) for which I had data. When looking within the group of people who reported low walkability, those within the highest income group were non-significantly 50% more likely to have high social capital than those within the lowest income group (group 1) for which I had data (Table 5; High WI: Prevalence ratio, 1.64; 90% CI, 0.96-2.81; n=37; Low WI: Prevalence ratio, 1.5; 90% CI, 0.26-8.55; n=21). The data is much less clear for respondents who reported low walkability because there is no clear trend in prevalence of high social capital from high income to low income. However, these findings allude to the fact that income plays some role, outside of walkability, in access to high social capital.

Within each income group, I examined how the prevalence of high social capital changed based on walkability. In the highest income category, people who reported high walkability were 200% more likely to report high social capital (Table 5; Prevalence ratio, 3; 90% CI, 1.02-8.8; n=28). But in the lowest income category for which I had data, those who reported high walkability were no more likely to report high social capital than those who reported low walkability. However, this relationship was not found to be

statistically significant (Table 5; Prevalence ratio, 0.98; 90% CI, 0.44-2.18; n=38). This shows that having high income supports the hypothesized relationship between walkability and social capital. However, it may not be the same in other income groups, although I cannot say definitively because the relationships were not statistically significant.

Table 5. The prevalence of high SC in WI/income groups

	Income 1	Income 2	Income 3	Income 4
Low WI (-)	1/7 (14.3%)	6/15 (40%)	5/22 (22.7%)	3/14 (21.4%)
High WI (+)	0/10 (0%)	9/23 (39.1%)	5/16 (31.3%)	9/14 (64.3%)

Race & Ethnicity. The second potential confounder I controlled for is race. First, I held race constant. When looking within the group of people who reported white race, those who also reported high walkability were 77% more likely to also have reported high social capital (Table 6; Prevalence ratio, 1.77; 90% CI, 1.14-2.73; n=97). Within the group of respondents that reported nonwhite race, those who also reported high walkability were 60% less likely to also have high social capital. However, this relationship was not found to be statistically significant (Table 6; Prevalence ratio, 0.4; 90% CI, 0.04-3.69; n=28).

Within the group of people who reported high walkability, those who also reported white race were 900% more likely to report high social capital than those of nonwhite race. Within the group of people who reported low walkability, those who also reported white race were 126% more likely to report high social capital than those of nonwhite race. This relationship was not found to be statistically significant (Table 6; High WI: Prevalence ratio, 10; 90% CI, 1.97-50.65; n=64; Low WI: Prevalence ratio,

2.26; 90% CI, 0.47-11; n=61). This shows that race affects access to social capital in high walkability populations. It alludes to a similar, weaker relationship in low walkability populations. However, I can draw no conclusion because the results were not significant.

Table 6. The prevalence of respondents with high SC in WI/racial groups

	White	Nonwhite
Low WI (-)	15/53 (28.3%)	1/8 (12.5%)
High WI (+)	22/44 (50%)	1/20 (5%)

In contrast, within racial groups, social capital and natural mentorship have the same relationship seen in crude analysis. Within both the group that reported white race and nonwhite race, those who reported high social capital were around 40% more likely to report having a natural mentor than those who reported low social capital. Although the prevalence ratio within the group that reported nonwhite race wasn't found to be significant (Table 7; White: Prevalence ratio, 1.39; 90% CI, 0.97-1.98; n=59; Nonwhite: Prevalence ratio, 1.33; 90% CI, 0.37-4.79; n=18).

However, when looking within high or low social capital groups, respondents who report white race are about 50% more likely to report a natural mentor than those of nonwhite race. However, neither of these relationships were found to be statistically significant (Table 7; High SC: Prevalence ratio, 1.51; 90% CI, 0.47-4.89; n=39; Low SC: Prevalence ratio, 1.45; 90% CI, 0.78-2.7; n=38). It appears, regardless of race, social capital has the same relationship with natural mentorship as hypothesized. While race does appear to play some role, the relationships were not found to be significant, making it difficult to draw firm conclusion.

Table 7. The prevalence of respondents with a NM in SC/racial groups

	White	Nonwhite
Low SC (-)	12/22 (54.5%)	6/16 (35.5%)
High SC (+)	28/37 (75.7%)	1/2 (50%)

Parental education level. The final potential confounder I investigated is parent's level of education, which played little role in the relationship between walk index and social capital. Within both parental education groups, those who reported high walkability were about 30% more likely to also report high social capital. However, neither of these relationships were found to be statistically significant (Table 8; Bachelors: Prevalence ratios, 1.27; 90% CI, 0.61-2.64; n=59; Masters: Prevalence ratios, 1.35; 90% CI, 0.77-2.37; n=67).

Table 8. The prevalence of high SC in WI/parental education groups

	Bachelors degree or less	Masters degree or more
Low WI (-)	7/31 (22.6%)	9/30 (30%)
High WI (+)	8/28 (28.6%)	15/37 (40.5%)

Parent's level of education also played little role in the relationship between social capital and prevalence of natural mentors. Within both education groups, those who reported high social capital were about 50% more likely to also report a natural mentor (Table 9; Bachelors: Prevalence ratios, 1.59; 90% CI, 1.03-2.45; n=41; Masters: Prevalence ratios, 1.5; 90% CI, 0.9-2.51; n=36).

Within the both the low and high social capital groups, those whose parents receive an education of masters' degree or higher are just as likely to report having a natural mentor as those whose parents received a bachelors degree or less. However, neither of these relationships were found to be statistically significant (Table 9; High SC:

Prevalence ratios, 1.02; 90% CI, 0.74-1.41; n=39; Low SC: Prevalence ratios, 1.08; 90% CI, 0.6-1.95; n=38).

Table 9. The prevalence of people with a NM in SC/parents education groups

	Bachelors degree or less	Masters degree or more
Low SC (-)	12/26 (46.2%)	6/12 (50%)
High SC (+)	11/15 (73.3%)	18/24 (75%)

Discussion.

I hypothesized that individuals living in walkable areas have more social capital because of their access to social spaces. With this high level of social capital, they have access to more institutional agents and therefore have a greater probability of creating a natural mentorship relationship. Their likelihood of having a natural mentor is hinged on living in a walkable environment that allows for high social capital.

After crude analysis, it seemed participants who reported high walkability were more likely to have reported high social capital than those who reported low walkability. Also, participants that reported high social capital were more likely to report having a natural mentor than those who reported low social capital. This supports my hypothesis.

Finally, those who reported high walkability were only slightly more likely to report having a natural mentor than those who reported low walkability. This relationship was also not found to be statistically significant. Because there was little relationship between these two variables, I wanted to see the role played by both social capital and walkability. This way I could test my third hypothesis, the relationship between high walkability and prevalence of natural mentorship facilitated by high social capital.

After stratification, I looked at the role played by social capital while holding walkability constant. In both the low and high walkability groups, those with high social capital were more likely to have a natural mentor than those with low social capital which is in line with my hypothesis. However, within the high walkability group, those with high social capital were much more likely to have a natural mentor than those with high social capital in the low walkability group. Furthermore, the relationship was only significant for those within the high walkability group. Because my hypothesis only pertained to those with high walkability, this finding supports my hypothesis. It also alludes to the fact that, regardless of walkability, high social capital influences natural mentorship while those within high walkability environments are more strongly influenced. However, no strong conclusions can be made.

Then I held social capital constant and looked at the role of walkability in prevalence of natural mentorship. In the low social capital group those with high walkability were less likely to have a natural mentor in contrast to my hypothesis. This relationship was not found to be statistically significant.

The opposite relationship was found to be true in the high social capital group. Those who also had high walkability were more likely to have a natural mentor. This is again in line with my hypothesis. It was also found to be nearly statistically significant. The fact that these two relationships move in opposite directions explains why there was so little relationship found between walk index and natural mentorship in the crude analysis.

Furthermore, the high walkability only increased the likelihood of having natural mentors within the high social capital group. This finding supports my hypothesis that

high walkability has a connection to natural mentorship because it facilitates high social capital.

The relationship between walkability, social capital and natural mentorship is not easily understood. This study makes some progress showing potential connection between walkable environments that facilitate high social capital that then facilitates the creation of natural mentorship relationships. However, it is hard to understand what is going on for participants who live in walkable environments but have low social capital. Clearly walkability doesn't promise high social capital. There are other factors or structural antecedents that inhibit the creation of social capital. The neighborhood they live in could be walkable but dangerous or have few social services. I began to pick apart the role played by other socioeconomic factors by controlling for confounders.

In stratified analysis on the role played by income, the hypothesized relationship between walk index and social capital was supported within the population in the highest income group. Those who reported having high walkability were more likely to have also reported high social capital than those who reported low walkability.

However, for the population of people in the lowest income group for which I had sufficient data, those who reported high walkability were no more likely to report high social capital than those who reported low walkability. This finding was not statistically significant. This alludes to the idea that income changes the relationship between walkability and social capital. However, no conclusions can be made.

Also, regardless of walkability, high-income participants were more likely to have high social capital than low-income participants. This shows that people living in similarly walkable environments are not equally as likely to have high social capital

because they may be of different income groups. It also alludes to the idea that income impacts access to high social capital regardless of walkability. However, no firm conclusions can be drawn.

Within those of white race, respondents who reported high walkability were more likely to have high social capital. This is in line with my hypothesis and the relationship found in crude analysis. However, within those who reported nonwhite race, respondents who reported high walkability were less likely to report high social capital. This relationship was not statistically significant. However, this distinction suggests that race alters the relationship between walkability and social capital.

This finding is supported by analysis done within those who reported high walkability. Those who also reported white race were much more likely to report high social capital than those who reported nonwhite race. This suggest that people living within similarly walkable environments are not equally as likely to have access to high social capital because they may be of different races.

In contrast, it seemed that social capital and natural mentorship exhibited the hypothesized relationship within both white and nonwhite racial groups. Respondents who reported high social capital were about 40% more likely to have a natural mentor for both white and nonwhite groups. However, neither relationship was found to be statistically significant. This alludes to the idea that, as seen in my hypothesis, high social capital impacts access to natural mentorship, regardless of race.

Also, when looking within the high and low social capital respondents, respondents of white race were about 50% more likely to report having a natural mentor than those of nonwhite race. But both of these relationships were also not found to be

statistically significant. It is therefore difficult to make conclusions about the impact of race on access to natural mentorship. It could be that those of white race have some advantage that those of white race do not have regardless of whether or not they have high social capital.

Within stratified analysis of parental education levels, when looking within respondents of the two different levels of education, it seemed walkability still had the hypothesized relationship with social capital. Also, it seemed social capital still had the hypothesized relationship with natural mentorship. However, none of these relationships were found to be statistically significant. It alludes to the idea that parental education does not confound the crude relationship found between the three variables.

Limitations. Further research is essential to continue exploring this complex web of relationships. As stated above, I asked limited questions so that the survey did not take long to complete. This allowed me to capture a little information from many participants. However, it gives me a limited understanding of drivers in the relationships. For example, I did not ask any follow up questions about walkability. So while people listed destinations within walking distance, I do not know if they felt those were spaces that were accessible to them. I could have supported my walkability survey with questions about where people do actually walk and with what frequency (Carlson et al, 2012). Also, I did not ask follow up questions about a participant's natural mentor to better understand the quality of the resources provided to the youth. My research focused on the quantity of social capital rather than exploring the quality.

Furthermore, while my social capital measure was similar to those used in other research projects, it is hard to say whether it is a true reflection of the level of social capital people have access to. There may be other questions or other ways to ask the same questions that would have elicited different results. Perhaps, for different groups of people, understanding of social capital looks completely different. If I had asked more questions of fewer participants, in an interview style, I may have been able to gain more insight into these areas.

My participant pool was small generally. Specifically, I had very little data about certain groups of people like those of lower income categories as well as of races other than white. Along these lines, several of my findings were not statistically significant. Prevalence ratios would be stronger if there were more people surveyed. Oversampling of certain populations of people, like those of nonwhite race or low income, could be a way to combat the small sample sizes.

My participants were also from communities all over the United States. So, while I am looking at community level phenomenon like social capital or walkability, I only have a single person's assessment of those phenomena. My study allows me to see how the individual attainment of a natural mentor is influenced by their self-reported walkability and social capital. However, it doesn't provide depth at the community level. A stronger study would focus on one geographic area. Therefore, it would use the average of individual level data to understand community level phenomenon.

Also, I was limited by my analysis education. Stratification was a crude way to control for potentially confounding factors. However, I was unable to see their interactions when combined because of the limitation of stratification as well as my low

number of participants. A stronger method of analysis would have been a multiple regression or something similar.

Conclusion.

This research project focuses on one particular product of social opportunity or natural mentorship. I chose this particular social outcome because of the connection between natural mentorship and positive health behaviors. It is important to understand how health behaviors are products of social opportunity. Also, it is important to understand how social opportunity is constructed. In this research I have attempted to see how opportunity for natural mentorship is enhanced at the individual level if that individual is part of a walkable community.

My results indicate that those in walkable communities are more likely to have natural mentors if they also have high social capital. Also, that the relationship between high social capital and natural mentorship is much stronger for those who also live in walkable environments. This supports my hypotheses that built environment is a creator for the particular social opportunity or natural mentorship.

I also found that only those of high income or white race conformed to the crude relationship between walkability and social capital. Respondents of privileged status who lived in more walkable communities reported higher levels of social capital. The same wasn't found to be true for those of nonwhite race or low income. The construction of social capital is either different or disrupted for individuals of low income or nonwhite race. Social capital may be nonexistent because of their social status or it may have a

completely different definition that was not properly assessed in this project. This is an interesting area for further research.

Future Research. In future research, I would suggest several ideas. A deeper understanding of the role race and income play in the relationship between walkable environments and social capital would strengthen this field. This could be done through interviews with people of nonwhite race or low income. Interviews could ask in depth questions about how people participate in their community. If we understood the existence of social capital within low income or nonwhite groups with a greater depth, it could change the way we assess social capital. Also, a project based in one geographic area that attempts to generate community level conclusions about how community structure impacts natural mentorship in that neighborhood would add strength to the field.

To test the validity of this research, a similar method could be employed with different questions. The Saguaro Seminar's social capital short form or another validated social capital measure could be used instead of the one I generated. Also, questions could be added to the walkability measure to ensure researchers understand the role played by perception of environment. Finally, a stronger method of analysis could be used. For example, a linear or multiple regression would allow for the understanding of the connection between variables.

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Appendix 1.

Survey.

Consent Form. You have been asked to participate in a research study conducted by Madison Beehler, a student in the Department of Environmental Science at Dickinson College in Carlisle, PA. This faculty supervisor for this study is Greg Howard a professor in the Department of Environmental Science at Dickinson College. The purpose

of this research is to study the impact of the built environment on youth mentorship. During this study, you will be asked to take a 10 minute survey about your background, the walkability of the location in which you spent the majority of your young adult life, the social capital in this location as well as the presence of natural mentors in your life. We do not anticipate any risks or discomforts to you from participating in this research. You will receive no direct benefit or compensation from your participation in this study; however, the possible benefits to others include a deeper understanding of the role of the built environment on youth health behaviors. Any data you provide in this study will be kept confidential unless disclosure is required by law. In any report we publish, we will not include information that will make it possible to identify you or any individual participant. Specifically, only Madison Beehler, and research advisor, Greg Howard, will have access to personal information. Any master list that includes the participant's name and a code linking the name to the data will be kept secure and separately from the collected data. After analysis is performed, all identifiable information about participants will be destroyed. The IRB requires Madison Beehler, to keep consent forms for 3 years, but following that timeline all consent forms will also be destroyed. Your participation is voluntary and you may refuse to participate without penalty. Furthermore, you may skip any questions or tasks that make you uncomfortable and may discontinue your participation at any time without penalty. In addition, the researcher has the right to withdraw you from participation in the study at any time. Please ask any questions you have now. If you have questions later, you should contact Madison Beehler, at 484-467-2336 or beehlerm@dickinson.edu. If you have questions or concerns about your rights as a participant in this study, you may contact the Dickinson College Institutional Review Board at (717) 245-1309. Additional contact information is available at: <http://www.dickinson.edu/academics/resources/institutional-review-board/>

I HAVE READ THE ABOVE INFORMATION. ANY QUESTIONS I HAVE ASKED HAVE BEEN ANSWERED. I AGREE TO PARTICIPATE IN THIS RESEARCH PROJECT AND I WILL RECEIVE A COPY OF THIS CONSENT FORM.

PARTICIPANT'S SIGNATURE

DATE

Answer the following question based on the characteristics of the place where you spent the majority of your time as a young adult (ages 13-17):

Background Information:

1. What is the address of the place (house, school, etc.) where you spent the majority of your young adult life before Dickinson (ages 13-17)?
2. What type of high school did you attend? (Select all that apply)
 - public private boarding
3. What is your annual household income?
 - \$20k and under
 - \$20-50k
 - \$50-100k
 - \$100-200k
 - More than \$200k
4. Do you consider this place to be primarily....

- High-income community
 - Middle-income community
 - Low-income community
 - there was an even mix of all incomes
5. What is the highest level of education that has been completed by your parents/guardians? (Select all that apply)
- Elementary/intermediate level education
 - High School
 - 2-year degree
 - Bachelors degree
 - Advanced degree
6. With which race/ethnicity do you identify? (Choose all that apply)
- White
 - Black
 - Hispanic
 - Asian
 - Native American
 - other:
7. With which gender do you identify?
- male
 - female
 - other:
8. Did you have access to a car as a young adult?
- yes
 - no
9. Were you able to drive (based on ability and whether or not you had a license)?
- yes... for how many years while you were living in this location? _____
 - No
10. How many miles did you drive a day (with yourself or someone else as the driver)?
- none
 - under 20 miles
 - 20-50 miles
 - 50-100 miles
 - more than 100 miles
11. How often did you use public transportation?
- Regularly (every week if not everyday), it was my main form of transportation
 - Now and then (once a month), when it was easier than driving my car
 - Never or rarely (once or twice a year), driving a personal vehicle was much easier
12. If given the option, would you choose to....

- Live in a place where you could walk to a diversity of destinations
- Live in a place where you drove to all destinations

Walkability Information:

Answer the following question based on the characteristics of the place where you spent the majority of your time as a young adult (ages 13-17):

Please mark the places you could reach on foot (assuming you were able) without too much trouble:

- a restaurant a pharmacy my job (I didn't have a job)
- my friend's house my school a grocery store a park/recreation space
- a church/place of worship a convenience store
- Nowhere. It's difficult to get anywhere on foot

Social Capital Information:

Answer the following question based on the characteristics of the place where you spent the majority of your time as a young adult:

1. Think about the neighborhood or area in which you spent the majority of your young adult life. In general, how well do you feel you know your neighbors?
 - Not at all
 - Just a little
 - Moderately well
 - Extremely well

2. Did you volunteer for organizations (church, neighborhood groups, non-profits, etc.)?
 - yes
 - no

3. Were you a member of organizations (team, club, etc.)?
 - yes
 - no

4. How trustworthy did you find the people in your community to be?
 - Not at all
 - A little trustworthy
 - Moderately trustworthy
 - Extremely trustworthy

5. How helpful did you find the people in your community to be?
 - Not at all

- A little helpful
- Moderately helpful
- Extremely helpful

6. How fair did you find the people in your community to be?

- Completely unfair
- Fair on few occasion
- Fair on most occasions
- Fair in all occasions

7. How often did you get together with friends (**people not related to you**)?

- never or rarely (less than 12 times a year)
- now and then (1-3 times a month)
- regularly (every week)

8. How often did you go out to a store or restaurant with friends (**people not related to you**)?

- never or rarely (less than 12 times a year)
- now and then (1-3 times a month)
- regularly (every week)

9. How often did you host friends, neighbors, community members, etc. (**people not related to you**)?

- never or rarely (less than 12 times a year)
- somewhat regularly (1-3 times a month)
- regularly (every week)

10. How often did you visit the home of friends, neighbors, community members, etc. (**people not related to you**)?

- never or rarely (less than 12 times a year)
- somewhat regularly (1-3 times a month)
- regularly (every week)

Natural Mentor Information:

Was there an adult 25 years or older whom you considered to be your mentor? That is, someone you could go to for support and guidance or if you needed to make an important decision, or who inspires you to do your best?

yes no

Was this person related to you?

no

yes..... If you answered yes, was there another adult 25 years or older who you considered to be your mentor and who was **not** related to you? That is, someone you could go to for support and guidance or if you needed to make an important decision, or who inspires you to do your best?

yes no

Was this person part of a program designed specifically to offer mentorship to youth (ex. Big Brother/Big Sister)?

yes no the person was related to me

How did you reach this person most of the time?

by long distance communication (phone, email, etc.)

by car

walking

public transportation

other

the person was related to me

Thank-you for your participation!