

McNair Scholars Journal

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GRAND VALLEY
STATE UNIVERSITY



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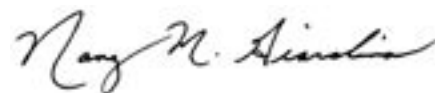
We are proud to present the fourteenth volume of the *Grand Valley State University McNair Scholars Journal*. It is the culmination of intensive research conducted by our student scholars and their faculty mentors through our Ronald E. McNair Scholars Program.

The Ronald E. McNair Scholars Program, now in its 14th year here at Grand Valley State University, provides an opportunity for students and faculty to apply much of what is learned within the classroom by engaging, outside the classroom, in research activities in a particular area of scholarly interest. These research activities provide a journey through the challenges and affirmations of scholarly work and better prepare students for graduate study and the pursuit of a doctoral degree. In addition, GVSU supports the AAC&U position that student engagement in research activities is one of the “high impact” experiences that better prepares students for academic success, transition into careers and the challenges of the 21st century.

Thank you to the faculty mentors who have worked so closely with our McNair Scholars to propel their research skills towards the next level of educational challenges.

Congratulations to the ten McNair Scholars whose research is presented here. Your journey and the challenges you have met during this scholarly activity speak to your talents and persistence in pursuing both your educational and life goals. Thank you for sharing your talents with the university community and continuing the spirit of this program.

Finally, thank you to all the people behind the scenes that work to sustain this program, guide students to success and produce this journal. Your work is valued as well.



Nancy M. Giardina, Ed.D.
Assistant Vice President for Academic Affairs



**GRAND VALLEY
STATE UNIVERSITY**

***“Before you can make a dream come true,
you must first have one.” - Ronald E. McNair, Ph.D.***

Ronald Erwin McNair was born October 21, 1950, in Lake City, South Carolina, to Carl and Pearl McNair. He attended North Carolina A&T State University where he graduated Magna Cum Laude with a B.S. degree in physics in 1971. McNair then enrolled in the prestigious Massachusetts Institute of Technology. In 1976, at the age of 26, he earned his Ph.D. in physics.

McNair soon became a recognized expert in laser physics while working as a staff physicist with Hughes Research Laboratory. He was selected by NASA for the space shuttle program in 1978 and was a mission specialist aboard the 1984 flight of the USS Challenger space shuttle.

After his death in the USS Challenger space shuttle accident in January 1986, members of Congress provided funding for the Ronald E. McNair Post-baccalaureate Achievement Program. The goal is to encourage low-income, first generation students, as well as students who are traditionally underrepresented in graduate schools, to expand their opportunities by pursuing graduate studies.



Ronald E. McNair Post-baccalaureate Achievement Program

The Purpose

The McNair Scholars Program is designed to prepare highly talented undergraduates to pursue doctoral degrees and to increase the number of individuals (from the target groups) on college and university faculties.

Who are McNair Scholars?

The McNair Scholars are highly talented undergraduate students who are from families with no previous college graduate, low-income background or groups underrepresented at the graduate level for doctoral studies. The program accepts students from all disciplines.

Program Services

The McNair Scholars are matched with faculty research mentors. They receive academic counseling, mentoring, advising, and GRE preparation. In addition to the above services, the McNair Scholars have opportunities to attend research seminars, conduct research, and present their findings orally or written via poster presentations. In the first semester of their senior year, the scholars receive assistance with the graduate school application process.

Funding

The Ronald E. McNair Post-baccalaureate Achievement Program is a TRiO Program funded through the United States Department of Education and Grand Valley State University.

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The Social Psychology of Love and Attraction



Princess Braxton-Davis
McNair Scholar



Cheryl Boudreaux, Ph.D.
Faculty Mentor

Love is a universal emotion that has become the basis of marriage and family for many societies, which researchers continue to explore. This research will add to the knowledge of interpersonal romantic attraction, further exposing love's complex nature. Dr. Earl Naumann's survey in his book, *Love at First Sight*, served as a model for the survey utilized in this study. A total of 206 students at a Midwestern university campus were surveyed. Midwestern university students were sampled in two ways: first, an e-mail was sent to the professor of every third class from the Spring semester schedule with at least 10 students in each class, and second, students were asked to participate in the study around campus. Students were at least 18 years of age. They were asked to identify what characteristics drew them to their partner or person of interest.

Approximately 67 females and 32 males participated in the study. Of those individuals, there were 75% who identified as Caucasian (N=153), 12% African-American (N=25), 2% Hispanic (N=5), 1.5% Asian/Pacific Islander (N=3), 1% Native American/Inuit (N=2), and 5% Other (N=12). The majority of students (81%) indicated that they were currently or have previously been in love. Most students reported that they met their partner/person of interest in an educational setting or through a mutual friend. A high frequency of students (79%) responded that the personality was the most significant factor in their attraction to the other person (from a list of traits: physical attractiveness, personality, career achievement/talent). Surprisingly, the smile was rated highest among the university students (93%) as the most physically attractive feature in

their partner/person of interest. Running a close second (90%) for the strongest factor in their attraction to the other person was good looking/attractive. The personality traits that students regarded as being most influential in their attraction were fun (98%), humor (94%), and kindness (90%). Chi-Squared test of significance was used to analyze the results. The item that asked respondents, "What was the outcome of that experience with love?" was used as a response variable with which to correlate all of the other variables. Only one variable, "Are you now or have you ever been in love?", was found to be significant from the Chi-Squared analysis.

Therefore, whether or not the outcome of the experience of love was a relationship depended on the student being currently or previously in love.

Exploring Men's Intimate Relationships (with Feminism): Another Side of Feminist Consciousness



Joi Dupler
McNair Scholar



Rachel Campbell, Ph.D.
Faculty Mentor



Danielle DeMuth, Ph.D.
Faculty Mentor

Research on feminist consciousness and its corresponding benefits has largely been conducted on women. Many feminists find this problematic because it neglects feminist men and the favorable outcomes that have been empirically linked to strong feminist identities for men. In this study, I examined men's feminist consciousness and explored whether correlations exist between men's feminist consciousness, their partners' and peers' attitudes towards feminism, and the overall health of their long-term monogamous relationships. Several different measures of consciousness were utilized, including "Self-identification" (Gurin, 1980), "Feminist Analysis" (Henderson-King & Stewart, 1997) and "Sensitivity to Sexism" (Henderson-King & Stewart, 1997).

Additionally, previously developed measures were used to assess the relationship health of nonfeminist and feminist men. Relationship health was measured on three different components: relationship quality, relationship stability, and relationship equality (Rudman & Phelan, 2007). It was anticipated that men who exhibited higher levels of feminist consciousness would also report higher relationship health than their nonfeminist counterparts. It was also expected that feminist men would report perceiving that their friends and partners held parallel attitudes towards feminism. A survey of undergraduates at a mid-sized university tested these hypotheses and found no correlations between relationship health and feminist consciousness. However, when men self-reported identification as feminist, results revealed that men who identified more strongly as feminist were more likely to identify their partners as feminists and were also more likely to report stronger quality within their relationships than men who

identified weakly as feminist. Results confirmed that self-identifying feminist men reported their peers as being likeminded, to the extent that the peers of feminist men were more likely to react disapprovingly to sexism or misogyny and showed a greater acceptance of individuals who adopt feminist identities. Further research should examine the complexity behind male feminist identities to develop new measuring strategies in understanding this discrepancy between self-identification and consciousness, and how men experience feminist consciousness.

Breaking Stereotypes by Obtaining a Higher Education: Latinas' Family Values and Traditions on the School Institution



Andrea Gómez Cervantes
McNair Scholar



Lisa Hickman, Ph.D.
Faculty Mentor

Latinos are the fastest growing minority in the United States, yet the number of Latinos in professional careers has not increased dramatically. Additionally, Latinas may be stereotyped as individuals who are simply not interested in obtaining a college education. Little research has focused specifically on the Latina experience: what draws Latinas to obtain a college education, thus preparing them for professional careers. There may be various factors affecting the decision making process of college enrollment for young Latinas. Thus, their experiences in the family and the school institution may affect their decision-making process for higher education. This study examined the college decision-making process of Latinas through analysis of family values and traditions and the impact of the educational institution in such decisions. Theoretical frameworks, including Cultural and Social Capital, Symbolic Interactionism, Labeling Theory, and Critical Race Theory, were used to process and understand results uncovered here. Through use of both quantitative and qualitative methodologies, I analyzed secondary data and conducted one-on-one interviews. I employed the Educational Longitudinal Study data set, focusing on Latina female students in tenth grade during the year of 2002. I also conducted one-on-one interviews with eight 18-19 year old Latinas. Results from the qualitative interviews indicate a shift from traditional to nontraditional roles and the importance of family support for higher education. Mixed results from the secondary data set demonstrate that within the school institution, the role of teachers in Latinas' decisions to attend college is complex and unclear. Barriers as well as opportunities that affect this decision for young Latinas are also discussed.

The results of this study indicate that further research on Latinas' experiences in the educational institution and their family values and traditions at home is needed to better understand the decision-making process for higher education.

The Geomorphic Settings of Known Archaeological Sites in the Lower Grand River Valley, Ottawa County, Michigan



Nathaniel J. Hansen
McNair Scholar



Patrick M. Colgan, Ph.D.
Faculty Mentor

To predict undiscovered archaeological sites in the Lower Grand River, we mapped known archaeological sites using color and infrared aerial photos, digital raster graphics, and digital elevation models. The study area consisted of ten townships near the Grand River that have reported archaeological sites on record at the Michigan Office of the State Archaeologist. One hundred and eighty archaeological sites were input into the base map. We interpreted the geomorphic settings of sites using this preliminary geographic information system. We found both spatial and temporal patterns in site location.

The Lower Grand River Valley is cut into Quaternary glacial sediments that formed during the retreat of the Laurentide ice sheet ~16,000 to 13,000 years before present (B.P.). During deglaciation, the Grand River Valley was probably formed as a proglacial valley carrying meltwater from the retreating Saginaw Lobe. Initially the glacial Grand River was graded to Glacial Lake Chicago. Next, the Grand River incised due to a regional lowering of the water level. This change in water level is called the Chippewa low stand and affected the study area ~9,000 B.P. The first inhabitants were the Paleo-Indian culture, which occupied the valley ~11,000 B.P. By 10,000 B.P., the climate of the region supported deciduous forests. This corresponds with the start of the Archaic period, which ended ~2,500 B.P. Between ~6,000 and 5,000 B.P., a transgression of lake waters inundated much of the Lower Grand River Valley during the Nipissing high stand. By ~4,000 B.P., Lake Michigan had reached its current level, resulting in down cutting of the Grand River. The evidence for this is a stream terrace at elevations between 590 and 610 feet a.m.s. For the last 4,000 years, the base

level of the river has stayed relatively the same, and lake levels have fluctuated by about two meters. The following Woodland (~3,000 to 400 B.P.) and Historic periods had a climate similar as present, with much less variation than during deglaciation.

The frequency of sites decreases from higher elevations to lower elevations. A majority of the sites are found near the many tributaries to the Grand River. Younger sites are more common than older sites. The extent of occupation of the Paleo-Indian culture in the study area of this study is limited to a few sites. Paleo-Indian sites occupy uplands near the Grand River and stream terraces. Archaic sites exist on the uplands near the river, and deglacial to middle Holocene stream terraces. It is probable that some of the Archaic sites were destroyed, inundated, or buried during the Nipissing high stand. Woodland sites are found on all surfaces.

Historic sites exist on uplands and the modern flood plain. The high number of sites located on the uplands suggests that the uplands should be considered in future archaeological investigations. Most of the sites are associated with resource gathering and camps, while larger, more permanent village sites were located in close proximity to the river.

Kappa Opioid Regulation of Stress-Related Behavior



Erin Harshberger
McNair Scholar



Glenn Valdez, Ph.D
Faculty Mentor

Anxiety disorders affect roughly 40 million American adults in a given year. Those suffering from anxiety disorders often experience additional stress-linked illnesses, such as depression. Previous research has shown that stress exposure increases levels of the endogenous neuropeptide dynorphin, which the kappa opioid system is selectively activated by. This study examined the role of the kappa opioid system in regulating stress-related behavior using the elevated plus-maze. Behavioral stress responses were examined in male Wistar rats following i.p. administration of opioid agonist U-50,488 (0 or 10 mg/kg). Subjects were pretreated with the kappa opioid antagonist nor-binaltorphimine (nor-BNI) 24 hours prior to testing in the elevated plus-maze (0 or 20 mg/kg). Injections of 10 mg/kg U-50,488 significantly decreased percent open arm time compared to controls, an effect reversed by pretreatment with 20 mg/kg nor-BNI ($F(1,44) = 6.10, p < 0.05$). A main effect of nor-BNI was found on the total number of arm entries ($F(1,44) = 11.73, p < 0.05$). Further analysis revealed that pretreatment with nor-BNI led to an increased number of arm entries in rats injected with U-50,488. The nor-BNI sensitivity of the behavioral responses suggests an activation of the kappa opioid receptors by a stress-induced release of dynorphin. The results indicate a relationship between kappa opioid receptors and stress-related behaviors and illustrate the potential therapeutic value of targeting the kappa opioid system in the treatment of anxiety and other stress-related disorders.

Group and Individual Performance on a Creativity Task: The Constraining Effects of Examples



Chelsea Sage
McNair Scholar



Christine Smith, Ph.D.
Faculty Mentor

Research has demonstrated that individuals provided with examples in a creative idea generation task tend to fixate on the most salient aspects of the examples and incorporate those features into their own creative products. The purpose of this study is to ascertain the extent to which this occurs within the context of interacting groups. The process by which groups generate creative products under two conditions was investigated, with examples provided and without. Groups were also compared to participants working alone. Participants were asked to create new creatures and toys either after having seen examples or not. They were then asked to choose their favorite toy and creature drawing.

Participants who saw examples before beginning to draw created toy drawings with more features of examples than those who did not see examples. Individuals also created toy drawings with more fixated features than did groups. Participants who saw examples also chose toy drawings with more fixated features as their best than those who did not see examples. Groups who saw examples chose best drawings with significantly fewer fixated features than groups who did not see examples. Conversely, individuals who saw examples chose drawings with significantly more fixated features than those who did not. The first three creature drawings that groups created were compared to the fourth, fifth, and sixth creature drawings. Those who saw examples first created three creatures with more fixated features, but there was no effect of examples on the fourth, fifth, and sixth creatures drawn. The possible reasons for discrepancies between toy and creature drawings are discussed, as well as direction for future research.

Transmission of Quantum Information via Laguerre Gaussian Modes



Aaron Schutza
McNair Scholar



Richard Vallery, Ph.D.
Faculty Mentor

A new era of technology is fast approaching in which quantum computation may become a reality. In the near future, technical applications may require a method of correlating two isolated quantum systems. This would require a signal carrier to be a quantum entity itself. We survey the quantum states of photons as a medium for encoding information. A communication scheme using the modulation of spatial modes and polarization states on free space or fiber optics is proposed. The Laguerre-Gaussian spatial mode is studied with these applications in mind. The different Laguerre-Gauss modes are interpreted as being eigenstates of orbital angular momentum with an infinite and discrete eigenspectrum. A single photon communication scheme using this expanded state space would have a much higher information density than previously possible. An experimental investigation of the Laguerre-Gauss beams was carried out. We studied photographic slide film as a means of creating computer generated holograms with the intent of making Laguerre-Gauss beams with laser light. Holographic diffraction gratings were created in order to generate Laguerre-Gauss modes of varying quantum number n . These computer generated holographic patterns were printed on poster board and transferred to the slide film with an SLR camera. The spatial mode phase characteristics were studied with a Mach-Zehnder interferometer. Using the interferometer, we were able to recover the holographic interferogram when a first order maximum was interfered with a reference beam.

This showed that the phase characteristics of our Laguerre-Gauss beams matched theoretical predictions.

Developing Evolutionary-Based Domain-Specific Loyalty Scales



Kraig S. Shattuck
McNair Scholar



Robert O. Deaner, Ph.D.
Faculty Mentor

Loyalty, defined as showing allegiance to a person or entity, has been shown to differ across contexts and domains. In particular, a recent study (Beer & Watson, 2009) found that individuals who are highly loyal to friends may not be the same individuals who are highly loyal to groups, and vice versa. Nevertheless, the reason(s) that loyalty is domain-specific has not been explored.

We propose that progress in answering this question can be made by taking an evolutionary perspective. This perspective suggests that loyalty will differ across domains in accordance with the challenges our ancestors faced during their evolutionary history. Based on this logic, we hypothesize that there are four different evolutionarily-relevant domains of loyalty: friend, romantic partner, kin, and group loyalty. In addition, we hypothesize that modern forms of loyalty (e.g., national, sports team, and consumer loyalty) are byproducts of loyalty domains that developed during human evolutionary history. We tested these hypotheses by developing seven psychometric loyalty scales—each putatively assessing a different domain—and investigated whether there was significant individual variation across them. We assessed each hypothesized loyalty domain using 11–18 self-report items (e.g., “I am always ready to come to the aid of a friend”; “I would never turn my back on a family member, even if it cost me the respect of others”). We recruited participants through online advertising; they completed the surveys online. We obtained 137 finished surveys (85 female, 52 male). We found good internal consistency for all seven scales, with Cronbach’s Alphas ranging from 0.88 to 0.96. Moreover, factor analysis indicated that the scales were distinct, each loading on its own factor, supporting the hypothesis of distinct loyalty domains. As

predicted, some modern scales moderately correlated with the evolutionarily relevant scales. Most notably, consumer loyalty and national loyalty correlated moderately with group loyalty, suggesting that they are by-products of it. Contrary to our prediction, sports team loyalty was unrelated to group loyalty. Additionally, we also predicted the occurrence of sex differences in some loyalty domains, based on the fact that ancestral men and women generally faced somewhat different social challenges. Consistent with this, we found evidence for gender differences in two of the domains: women reported significantly greater friend and romantic partner loyalty.

This research illustrates the utility of an evolutionary perspective and should help future studies identify the contextual and dispositional factors contributing to loyalty. In particular, the evolutionarily informed loyalty scales we developed could be employed by consumer researchers and social psychologists of various theoretical orientations. We hope to use them to address the issue of loyalty to sports teams.

Teaching Play Activities to Children with Autism

Comparing Adult and Peer Models



Lisa Shattuck
McNair Scholar



Jamie Owen-DeSchryver, Ph.D.
Faculty Mentor

Video modeling has been shown to be effective for teaching a variety of skills to children with autism. However, few researchers have investigated the types of models that lead to better outcomes, e.g., whether the age of the model impacts performance. Early work by Bandura suggested that individuals were more likely to model behaviors if the model was similar to the observer. From this perspective, we would expect that children with autism would respond better to peer models than adult models. This study was therefore designed to evaluate the effectiveness of peer versus adult video models to teach play skills to preschoolers with autism.

Two preschool children with autism were selected to participate in the study. Both children had previously been diagnosed with an autism spectrum disorder, and both showed emerging verbal skills. Prior to initiating the study, experimenters created videos of peer and adult models playing appropriately with toys (farm toys, music toys, and food toys). Brief segments of appropriate play were then clipped together to show a series of appropriate play actions and statements.

During baseline, the examiner placed the toy sets on the floor of the room in random order and gave the child the instruction, "Let's play." The child was videotaped for three minutes playing with the toys. During intervention sessions, participants were conducted in a manner similar to baseline, except that at the start the child was seated at a table and observed videos of either peer models or adult models playing appropriately with the toys. We assessed the effects of the intervention by scoring children's play behaviors and play verbalizations and

comparing changes in these behaviors using a multiple baseline design. Results indicate that there was an effect of video modeling. Both children showed a noticeable improvement in play behaviors when the intervention was implemented, and one child showed improvement in play verbalizations. When adult and peer modeling conditions were compared, results showed that one child had a preference for adult models; specifically, his play behaviors increased differentially in adult model, as opposed to child model, conditions. We speculate that it is possible that this difference emerged because adult models more explicitly showcased the target behaviors, making it easier for those behaviors to be imitated. The current project serves to add to the growing body of research that supports the use of video modeling to teach young children with autism to engage in play skills.

Given the importance of play skills in leading to positive social, cognitive, and developmental outcomes, it is important to direct targeted efforts toward teaching and promoting play in young children with autism. Video modeling is one intervention that can efficiently and successfully improve skills in this area. Although our knowledge of the features of video models that make this intervention most impactful is only emerging, this study, coupled with future research on model characteristics, will help to determine how practitioners can successfully impact outcomes for preschoolers with autism.

Applying Anthropology to Water Quality Assessment: An Investigation of pH and Nitrates in Drinking Water



Jordan B. Sparks
McNair Scholar



Elizabeth Arnold, Ph.D.
Faculty Mentor



Heather Van Wormer, Ph.D.
Faculty Mentor

This study focuses on the demographic factors that influence people's perceptions of their drinking water quality. Water quality is a global concern—the contamination of water sources occurs in both underdeveloped and industrialized countries. One would assume that an industrialized society such as the United States would have virtually no water quality issues; however, this is not the case. In the United States, safe drinking water standards are set by the United States Environmental Protection Agency (USEPA), yet throughout the country—including West Michigan—people are exposed to certain contaminants, such as nitrates, above the normal limit. One of the goals of this research is to assess pH and nitrates in drinking water and to compare the results to both regional and national levels. This study also includes a critique of current public policies and water quality awareness in an effort to recommend public policy to improve water quality awareness. I hypothesize three things: 1) the pH and nitrate levels will exceed the maximum contaminant level (MCL), 2) households will overall be satisfied with the quality of their drinking water, and 3) the perception of water quality is positively correlated with homeowner educational level and household income. One hundred and five drinking water samples were collected from homes throughout West Michigan. Testing for the presence of nitrates was done using a standard nitrate kit, and the pH was measured using a pH meter. The accepted range for the pH of drinking water is 6 to 8.5. There were six samples that exceeded 8.5. The standard range for nitrates in drinking water is 0 to 10 mg/L. Only one sample, which came from a private well and was measured at 12mg/L, contained nitrates above the USEPA safety range. Even though these results do not support my hypothesis,

I believe that it would be important in future research to focus on the water quality in private wells. The second and third hypotheses introduced earlier are not supported by the data. My second hypothesis was that overall households would be satisfied with the quality of their drinking water. After analyzing the data, this hypothesis was not supported. Furthermore, I was surprised by the number of people who had no comment concerning their drinking water. The third hypothesis was that the perception of water quality is positively correlated with homeowner educational level and household income. This hypothesis was not supported by the data because almost all of the respondents have the same educational level—the majority answered “some college” and above. Household income per year also did not have an influence on people's perceptions of their water quality.



About the TRiO Programs

To fight the war on poverty, our nation made a commitment to provide education for all Americans, regardless of background or economic circumstances. In support of this commitment, Congress established several programs in 1965 to help those from low-income backgrounds and families with no previous college graduates (first generation). The first three programs established were Talent Search, Upward Bound, and Student Support Services. Thus, they are known as the TRiO Programs.

Since then, other programs have been added, including Upward Bound Math and Science, Educational Opportunity Center, The Training Authority, and in 1989, The Ronald E. McNair Post-Baccalaureate Achievement Program. The goal of all of the programs is to provide educational opportunity for all.

The Ronald E. McNair Post-Baccalaureate Achievement Program is designed to prepare highly talented undergraduates to pursue doctoral degrees. In addition, the goal is to increase the number of students from low-income backgrounds, first generation college students, and under-represented minorities on college and university faculties.

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