Letter from the Editor

Dear Fordham Community,

It is a pleasure to present you with Issue I of Volume VIII of the Fordham Undergraduate Research Journal. This print edition of the journal presents a cross-section of the undergraduate research that is taking place at Fordham. From the humanities to the social sciences to the physical sciences, Fordham undergraduates have made significant contributions to their respective fields and we share those with you here. We hope that you find FURJ as edifying and inspiring as we did in putting it together.

I would now like to draw your attention to the fact that this is only Issue I. This year, by leveraging our online platform, fordham.bepress.com/furj, we will be publishing a second issue that includes further articles of outstanding quality. Though in the past we have been limited by space and time, this year we are doing all that we can to increase the amount of research that we publish and share with the Fordham community. So, please be sure to check out Issue II of Volume VIII, which will be released on May 4, 2018.

We at FURJ would like to express our gratitude to all of the undergraduates who have made this volume possible. To the students who conducted research and submitted to us, your work of wondering, questioning and discovering is enviable. We at FURJ can only hope that your work continues to inspire future students to participate in the rich culture of research at our university. To the students who have worked on a FURJ staff (or two) this volume, thank you for making it all come alive through your reviewing, editing, designing, marketing and most importantly, your passion for FURJ’s mission.

Though we are a journal conceived and produced by undergraduates, we are the beneficiaries of a great deal of support from Fordham faculty members. Thank you to the members of our Faculty Advisory Board for their guidance and to the other Fordham faculty members from across the disciplines who provided reviews of articles for sharing their expertise with Fordham’s undergraduate community. It was a pleasure to collaborate with you all.

Finally, many thanks to Deans Annunziato and Greigore and their offices for all they have done to advance the mission of FURJ at Rose Hill and Lincoln Center, respectively. We consider ourselves quite lucky to have been able to work with administrators who have a passion for undergraduate research and a willingness to aid us however possible.

Yours truly,

Daniel Restifo
Editor-in-chief
Should I Stay or Should I Go: Judicial Recusals and their Impact

Olivia Martinez, FCRH ’20

really like college,” says Dr. Robert Hume, who enrolled in the College of the Holy Cross in the fall of 1994 and has since been immersed in the world of academia when, to him, the most important and rewarding part comes from conducting and publishing original research. After graduating in 1998 with a degree in history, he continued his studies at the University of Virginia, where he received a master’s degree and Ph.D. in political science in 2003 before coming to Fordham in 2005.

Hume is a professor of political science, interested in judicial politics. Specifically, he focuses on the impact of the United States’ judicial system on policy and the effects of judicial behavior on the judicial system. Hume studies why judges make the choices they do and how their behavior affects judicial impact. Furthermore, he examines how current judges bolster social change through the rulings they make.

The concept of fostering social change is central to Hume’s philosophy of teaching. While teaching political science courses about the judicial system of the United States, he is also the Political Science Department Chair and professor of the Fordham Wing Symposium, an Integrated Learning Community in O’Hare Hall. The community participates in a weekly class that focuses on how Fordham students can use their Jesuit education and Ignatian values to ignite social change on campus and in the greater Bronx community. For example, students recently discussed the gentrification of nearby Jerome Avenue. They examined the way gentrification impacts permanent residents and discussed the role Fordham students can play in the process.

Hume recently completed and published two books on judicial politics. The first was released in December 2017 by SUNY Press, entitled Ethics and Accountability on the US Supreme Court: An Analysis of Recusal Practices. The second is a textbook called Judges, Behavior and Policymaking: An Introduction, with Rowman and Littlefield Publishing Group, which came out in January 2018.

In Ethics and Accountability on the US Supreme Court, Hume is interested in understanding the recusal practices of the U.S. Supreme Court Justices. As Hume explains, a recusal is the act of “abstaining a legal hearing because of a conflict of interest.” Through public records, the population can learn when and why judges decide to recuse themselves and understand what’s really going on in the world of politics and show how it affects the policies that govern citizens’ lives.

Hume says, “When professors find there is no good book to teach a class, [you] write one yourself.” Before the idea was picked up by publishers, he would assign advanced studies more appropriate for graduate level courses to his undergraduates. However, when it came to his undergraduate constitutional law class, Hume recognized a need for a comprehensive book to present all methods in a more general and synthetic way. His textbook will provide students with foundational skills to eventually examine these advanced studies accurately.

Hume’s books are characterized by qualitative research paired with what he describes as, “multiple perspectives of analysis to achieve convergence.” From different vantage points and varying methods, Hume’s research presents a single answer to a question. Whether concerned with Supreme Court judges or recusals or providing undergraduates with critical examination skills, the evidence Hume presents allows people to examine and understand what’s really going on in the world of politics and show how it affects the policies that govern citizens’ lives.

When asked if it was hard to publish two books at once, Hume affirmed, “Yes, it was overwhelming.”

But for Hume, the effort is well worth the reward and he is glad with all he has accomplished. “I went to college in 1994 and never left.” Papers have been longer, expectations are higher, and he is now teaching classes instead of taking them, but this whole transformation from student to teacher has occurred naturally. Yes, the process of becoming an academic researcher has been long, tenuous and oftentimes uncertain, but for Hume, “It’s the best job in the entire world.”
Bridging the Gap Between Medicine and Society

Every two minutes, a woman dies of cervical cancer worldwide. This statistic is what drives Dr. Patricia I. Meneses each day to work in his lab at Fordham University, where he studies intracellular trafficking of human papillomavirus, or HPV. HPV is a virus that 85 percent of women will encounter in their lifetime and has been shown to be the causative agent of cervical cancer. The infection is also responsible for many cases of anal carcinoma and certain types of oral cancers. Gardasil, a vaccine proven to reduce the risk of contracting HPV, has been developed in the last decade. However, not enough women are receiving it. Meneses’ work is primarily concentrated in the lab, but he recognizes that educating the public is of equal importance as biological achievements.

After moving to New York City from Chile when he was a child, Meneses completed his undergraduate degree at SUNY Stony Brook. He took four years off to be a pharmaceutical research technician, where he had the opportunity to work at Memorial Sloan Kettering Cancer Center. It was during this time that Meneses decided that he wanted to combine his passions for both research and medicine with a focus on neuroscience. From there he matriculated in the doctoral program at Weill-Cornell Medical College and dedicated his studies toward primary brain tumors, using gene therapy as a tool. While in graduate school, Meneses realized that “neuroscience did not have enough about how viruses worked.” Viruses were used as the tool to deliver therapeutics, i.e., genes, but little was known as to how to make a better viral vector—and thus he decided to join a lab that studied virology. By studying how the virus could make more of itself, scientists can learn how a virus manipulates a cellular system to make more viral particles. Since then, Meneses has continued studying the HPV virus, hoping to find preventive measures against it in order to reduce cervical cancer worldwide.

A typical day in Meneses’ lab has a combination of approximately 30 students, both graduate and undergraduate, working on seven to eight projects, each one dealing with a specific moment in the cellular trafficking process. During his time at Fordham, five significant publications have been released that have continued to drive the field of virology forward. His lab is one of the first to show that HPV is traveling with the mechanism of intracellular vesicles, as well as one of the first to study how a protein on the outside of viruses might be able to maneuver a cell by altering protein expression through transcriptional regulation. Essentially, this work suggests that the virus might be able to manipulate the cell in order to deposit its genetic material into the cell’s nucleus.

In scientific research, Meneses believes that the “simplest question is sometimes the best question.” For this reason, he loves having undergraduates in his lab because they often are more “naive” about the topic than graduate students who have been working in a lab for years. This is not an insult to their intelligence, but rather an admirable quality that allows researchers to keep an open mind about the topic they are studying. Meneses remarks that it is often undergraduates who offer an alternative perspective in the lab, as it “takes someone from the outside who is less experienced to point that out.” Particularly when working with HPV, he encourages his students to approach their work from the perspective of the virus, rather than the host. Playing devil’s advocate in the field of science, particularly when working with HPV, he encourages his students to approach a topic from a new angle that the seasoned researcher might not think to look from. Meneses emphasizes that though he is “the head of the lab, the work gets done because of under-graduates,” they are inquisitive, ask good questions, and often approach a topic from a new angle that the seasoned researcher might not think to look from. Simplicity is key in the field of research, as moving in small incremental steps can help drive the field forward in the long run. Even if you can simply “provide a little hint of what’s happening,” it can combine with other small contributions that arise in the industry to form a bigger picture. That’s why Meneses says he is “grateful to be at an institution whose goal is the betterment of health and society.” He credits his interactions not just with students, but with the security guards, deans, and the maintenance staff with contributing to the work of this institution. Making progress in the field of papillomavirus virology is rewarding in itself, but being able to educate the next generation of scientists, physicians, and advocates is nearly of equal importance.

Meneses admits that he “doesn’t know where he’d be” without the help of undergraduate and graduate students at Fordham. They are inquisitive, ask good questions, and often approach a topic from a new angle that the seasoned researcher might not think to look from. Meneses emphasizes that though he is “the head of the lab, the work gets done because of undergraduates and graduates.” The steps being taken being done at Fordham to further our knowledge of the HPV virus, as well as educate the public, will be another small step toward reducing the statistics regarding cervical cancer.

Despite the great strides Meneses and other virologists are making in the field of preventing HPV, as well as the existence of the Gardasil vaccine, many women around the world are still suffering from cervical cancer. In regions of the world where there is a disparity in healthcare, particularly in Sub-Saharan Africa, the vaccine is simply inaccessible. But this is not only a problem in third world countries; the United States still sees high numbers of women contracting cervical cancer each year. Unlike other parts of the world, this typically does not stem from affordability issues, but a lack of education surrounding the vaccine, as well as the stigma associated with HPV. Consid- ering that lack of awareness is the driving force behind individ- uals not getting vaccinated, the task of educating the public is one that Meneses has taken seriously.

The key, Meneses argues, is educating people about the vacci- ne in a casual but informative way that will make them feel more comfortable about discussing it: “If we can help one person understand that the vaccine is good, that can spread to the next person, and so on.” It starts with simply striking up a conver- sation with someone in a friendly setting; Meneses says that he often will talk to parents at his children’s soccer games about the vaccine. Though it may be a small gesture its one that can “create a ripple effect.” On a larger scale, Meneses also gives talks at local venues, including the Bronx Beer Hall, about the importance of the Gardasil vaccine, as well as the importance of pap smears and protecting yourself. This is what Meneses considers to be the importance of his work in the grand scheme of things, as achievements in “biology [are] obvious,” but what good are they if the public is unaware of their true potential?

Though the world of research is extremely rewarding, Meneses admits that not every day in the lab is easy. He attributes a “combination of luck, hard work, and perseverance” to his successes in the field of academia. “You can’t separate a person from their research,” Meneses says about the life of a scientist. And he embodies this philosophy in the fullest sense, whether it is in the laboratories of Larkin Hall, or educating the public at the local Beer Hall. Research is a marathon, not a sprint, and passion is what drives Meneses to keep thinking and working toward answering the questions that will help us to create both a healthy and well-informed world.
The Historiographical Journey of La Malinche

Josh Anthony, Department of History, Fordham University, NY, NY

The chief translator of Hernán Cortés, a Nahua woman commonly called La Malinche, who possessed many more names, is depicted in drastically different ways by historians stretching from the early 1500s to the present day. While this obscures the truth of her life, complicating her portrayal in Mexican history, it also reinforces the idea that figures like La Malinche were written by her, who must each confront questions of ethnicity, history, and class in this story of an enslaved native woman who was instrumental in the victory of the Spanish invaders. By analyzing the attitudes and biases of the historians who wrote about La Malinche in four seminal books on the conquest of Mexico, this paper seeks to gain a better understanding of the ideologies native to the sociopolitical environment of which they wrote. The idea that the conquistadors who joined the expedition, then perhaps the colony of New Spain would never have existed.

This paper will examine how the figure of Cortés’s interpretation, Malintzin, has been depicted in four different books across almost five hundred years, and what the differences between the depictions of La Malinche tell us about the histories of the historians who wrote them. She was a native woman who provided critical support to the Spanish, and all who wrote about her must answer the question of how her role in the conquest was influenced by her ethnic, gender, and class identities.

Malintzin is known by many different names; this paper will refer to her as Doña Marina, perhaps the most common signal different character portrayals of the same person. In The Conquest of Mexico, written in the late 1500s, the aging conquistador Bernal Díaz describes Doña Marina, a "great lady and a Caci que [an Indian nobleperson]" whose understanding of Nahuatl was "almost five hundred years, and what the differences between the perspectives, using "the story of one woman's life" as a means to explore "indigenous experience in her era."

This paper will analyze how the following histories have responded to their predecessors while keeping in mind the sociopolitical climate in which each was written.

Doña Marina: The Complicated Respect of Bernal Díaz

Bernal Díaz’s lengthy history, one of our most treasured primary sources regarding the conquest of Mexico, was almost never written. The poor encomendero Doña Marina had lived to boast that he possessed the necessary “eloquence and rhetoric” to match the graces of the "heroic events" he had himself been a part of.

When he came across the history of the conquest published by Francisco López de Gómez, Cortés’s personal chaplain and another important interpreter of La Malinche, he declared that his work must be the focus of the histories of the Spanish invaders. He himself wrote the first narrative of the conquest in which Doña Marina’s role was possibly even greater than her own role in the narrative of the conquest.

Although Cortés respected Doña Marina enough to give her son the name Charles V, a narrator like a Caci que [a native nobleman] and though outdated we should still see his work less as a traditional narrative and more as scholar’s exposition or the available

The Lovely Indian Mistress: Prescott's Interpretation of Doña Marina

With the publication of William H. Prescott’s History of the Conquest of Mexico in 1843, the story of the Cortés and the Aztecs, and of La Malinche, received an exaggerated and romanticized treatment. Prescott believed that his history rested on the "two pillars" and that the interpretation of the conquest sympathetic to La Malinche, would never have existed.

Prescott’s Interpretation of Díaz

While Díaz implies his goal is simply to correct the falsehoods of chronicles like Gómara, Cortés’s personal chaplain and though outdated we should still see his work less as a traditional narrative and more as scholar’s exposition or the available

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León-Portilla wrote and only recounting the full story of her reunion with her transparent when he tells the story of the Cholula massacre, portray the indigenous people Cortés fought with and against blames him for violence of the siege. 37 Prescott believes Díaz’s story about Marina’s social sta-

were much less important than Cortés’s “winning arts of rhet-

cion,” and emphasizes that her “silver tones” (beautiful voice) is selectively constructing a nationalist vision with which he is

good spirit during the harsh condition of the battles against the

LA MALINCHE

Tlaxcalteca, the adjective he uses to summarize her behavior is ing one aspect of Díaz’s narrative, but León-Portilla makes no

doubts her ability to extoll the Gospel as a garbled “double ver-

LA MALINCHE grew very angry;” even the greed of the conquistadors

LA MALINCHE had symbolized “the female traitor…who rejects

the bloody worship of the Aztecs.” Although Prescott paraphrases a passage from Díaz describ-

- tor to her own country and people, just as people in his own

mestizaje

Broken Spears was published in Mexico in 1959, the year before “a decade of mass viol-

LA MALINCHE is able to argue that Malintzin might have “bargained for a hus-

LA MALINCHE is a traitor in Miguel León-Portilla’s anti-colonialist

LA MALINCHE was now socially secure. By the 1560s, when the Spaniards

LA MALINCHE is constructed as a villain.6

LA MALINCHE is a nobody, and because they possessed the skills necessary to do the vital and Malintzin’s journey through the historiography of the con-

LA MALINCHE had become famous and wealthy, was now socially secure. In the late sixteenth century, she was mostly ignored for two hundred years before gaining a role as a traitorous temptress in Mexican literature after independence was won from Spain. Only in the last fifty years have historians begun to question how fair or accurate that description is; however, this revi-

LA MALINCHE is a traitor in Miguel León-Portilla’s anti-colonialist

LA MALINCHE and uses her superior knowledge of native culture to discern the truth of the matter. Although she later calls Diaz’s narrative of Malintzin “far-fetched,” she asserts that Malintzin was al-

LA MALINCHE was “seen as an important figure” by contemporary Native Americans. This neglect is especially transparent when he tells the story of the Cholula massacre, Cortés—a rather lax and callous leader. Although she did not share Diaz’s desire to challenge Cortés’s legendary prestige, but instead sought to add to the stature of one of History’s Great Men. In doing so, Prescott’s imperialist, pro-Amercian bias did not permit him to construct an image of Cortes as Díaz’s “shadow,” a reflection of greatness with no significant greatness in and of herself. 38 Prescott perceived the conquest to be just because the savage of the Triple Alliance was defeated by the forces of Christendom. This racist Eurocentric view must be acknowledged, but readers should be aware that she did not have the knowledge or knowl-

ege of rich Nahuatl source that we do today. 39 For Prescott to

LA MALINCHE is the remarkable guide and interpreter, guide this

LA MALINCHE is a traitor in Miguel León-Portilla’s anti-colonialist

LA MALINCHE’s Choices: Townsend’s Modern Reinterpretation Some scholars in the 1970s, including Chicana feminists such as Candelaria, disputed this nationalist depiction of Malintzin, and the Aztec historian Miguel León-Portilla, who wrote that she was “the Aztec lover of Cortés,” to challenge her own culture in favor of a foreign aggressor” in Mexican

culture since at least 1826, León-Portilla used her as the defining example of how a Latin American person, and especially a Latina

LA MALINCHE’s Choices: While the 1970s feminist interpretation humanized a dehumanized woman, it ultimately failed to capture the spirit of her role in the Conquest and its own distortion, painting Malintzin as a prototypical Latina feminism. Townsend succeeds where these previous historians have failed because her better understanding of Mesoamerican culture allows her to show how Malintzin probably saw herself, as the work of analyzing and synthesizing her sources suggests.

LA MALINCHE is a member of the New Philology, a group of

LA MALINCHE would agree on the arduous trip to Honduras to quell the rebellion of one of his captains would be if she were to consider the fate of her daughter, analysis that emerges from a study of court cases she participated in, Townsend is able to argue that Malintzin might have “[bargained for a hus-

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In one apocryphal story, General Scott asked Prescott to write the history of the Conquest of Mexico, with a Preliminary View of the Ancient Mexicans. By his own account, he completed his fifteen-volume history in three years. In 1834, he published The conquest of New Spain, which was the first major account of the Conquest to be written in English, and which has since become an important source for understanding the Conquest.

In his book, Prescott describes the events of the Conquest in great detail, and he is critical of the Aztecs and their leaders. He argues that the Aztecs were unable to resist the Spanish because of their lack of organization and leadership. He also suggests that the Aztecs were naturally inferior to the Spanish, and that they were not capable of resisting the Spanish conquest.

Despite these criticisms, Prescott's book was well-received by the public and was widely read. It became a bestseller, and it has remained one of the most influential accounts of the Conquest. However, it has also been criticized for its inaccuracies and its failure to accurately portray the Aztecs and their culture.
Due to their social status, lineage, and wealth. That is to say, women of aristocratic birth were far more capable of transcending the traditional gender roles established by their sex. Allowing lower-caste women. Many aristocratic women were even able to achieve leadership positions within their society. Despite the books without the need to retreat from society. In the year 1111, there were several women who served as heads of state. In this respect, the medieval Roman Empire during this time might have compared favorably with an early childhood. In 1118, during Komnene’s time, the three widowed princesses in The Alexiad would moralize that Komnene’s text, it becomes clear that Komnene did not write strong moral character in Roman literature, Komnene’s description of leadership positions imposed on them on account of their sex. Hopefully to show that Anna Komnene’s position in medieval society was full of troubles, full of revolution.”

According to Komnene’s text, it is evident that Komnene would spend hours studying complex religious texts. In one particular passage of the Alexiad, Komnene proudly expresses the idea of a weak and weak-fearing woman. In another, Komnene writes that her father, Alexios, was away on campaign and was not due to return for another two days when her mother went into labor. Komnene, by contrast, stayed at the palace and pleaded that Komnene wait until her father’s return. Komnene abided by her mother’s wishes and was not born until December 1, 1083. Komnene writes: “Her [Eirene’s] command was obeyed – which very clearly signified even in her own womb the love that I was destined to have for my parents in the future.” The fact that Komnene includes this story in the Alexiad indicates that Komnene considered familial loyalty of primary importance – a point of pride.

Not only was Komnene loyal to her family, but she also held them in high esteem. According to Komnene, her grandmother Anna Dallasena was a clever politician, but also a simple, intellectual. Although the medieval Romans often associated certain gender expressions with certain sexes (i.e. believing that women were not as capable as men), women faced adversity in transcending the gender roles established by society. Komnene, however, was acutely aware of the fact that her sex had weakened her claim to the throne as she writes in the Alexiad: “...one could not deny her religious study; as was previously aforementioned, according to Komnene she would spend hours studying complex religious texts - Maximos, Prodmodes, and Kalikles to name a few - and meditating. Komnene also discusses her mother’s humility, an attribute that was especially celebrated in women in the medieval Roman Empire, writing that she seldom spoke to anyone but her husband and preferred not to be seen in public. In a similar way, Komnene exalts her maternal grandmother, Anna Dallasena, recounting the story of the day she negotiated her family’s safe passage from the Hagia Sophia, the cathedral where her grandfather was crowned. After Alexios and Isaac, staged their military coup against the emperor Nikephoros III Botaneiates. After the emperor’s emissaries ordered his family to leave the palace, Komnene’s grandmother Anna Dallasena refused and demanded that she first receive the emperor’s cross as guarantee of their safety. Although an emissary offered her his own cross, she insisted she receive a cross large enough for everyone to see the oath being sworn. After formally receiving the emperor’s guarantee of safety, Anna Dallasena convinced the emperor of her family’s loyalty, something that proved essential in averting a military conflict with the emperor. By including this story in the Alexiad, Komnene depicts her grandmother not only as a clever politician, but also as a powerful and authoritative figure – the mother of the Komnenos - as Komnene calls her. Later in the text, Komnene describes her grandmother as another ideal - the obligatory pius woman. Komnene’s greatest contributions to the Empire was reforming the palace by imposing monastic order. As she writes in the Alexiad,

Komnene uses language that likens her mother to a work of art. She writes:

See [Eirene] stand upright like some young sapling, erect and evergreen, all her limbs and the other parts of her body absolutely symmetrical and in harmony one with another. With her face turned toward me, silent and never once did she cease to fascinate all who saw and heard her. His face shone with the soft light of the moon; it was not the completely round face of an Assyrian woman, not long, like the face of a Scyth, but just slightly oval in shape. There were rose blossoms on her cheeks, visible a long way off. Her light-blue eyes were both blue. They shone like the brilliant blue of deep violets, recalled a still, sea-still, while the white surrounding them shone by contrast, so that the whole eye acquired a peculiar lustre and a charm which was inexpressible.
The women’s quarters in the palace had been the scene of utter depravity ever since the infamous Constantine Monomachos had ascended the throne and right up to the time when my father became emperor, as much of the same ignominious and heinous acts persisted. But Anna knew that the skirts of the monastery could not be too heavy. Anna’s focus was to portray women in a way that would compel Komnene to depict her maternal figures in such a way as to exhibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply glorifying her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex- hibit feminine attributes. She is simply engendering her grand- mother’s loyalty to her birth family and her views on sex and gender were carried away as a result of her upbringing in such a society in which she lived - one which favors certain gendered roles and depictions of women, for the most part, are inferior in that they most often ex-
Challenges in Language Acquisition: a Case Study of Eritrean Refugees Learning French in Geneva, Switzerland

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Introduction

According to the United Nations Refugee Agency (UNHCR), the world is currently experiencing the worst refugee crisis since the end of World War II. By the end of 2015, there were roughly sixty-five million displaced people, 21.3 million of whom were refugees (Edwards). A refugee is someone who has been forced to flee his or her home country because of a “well-founded fear of persecution for reasons of race, religion, nationality, political opinion or membership in a particular social group” (United Nations High Commissioner for Refugees). The UNHCR has reported that war and prosecution are the main factors that are driving people out of their homes to seek refuge in neighboring states.

Eritreans are fleeing compulsory and indefinite military service and the repressive dictatorship of Isaias Afewerki. Since the early 2000s, Switzerland has been the destination of choice for Eritrean refugees fleeing Afewerki’s dictatorship and militarization. With a population of roughly 34,500 people, the host country’s language is important for refugees’ individual and national identities. Learning the language of the host country is vital as language learning is considered the key in refugee integration, and integration of refugees but also is important for countries’ so-

Eritrea is located in Northeast Africa and is home to approximately thirty-five million people (Eyer). It is bordered by Ethiopia and Sudan to the south and west, respectively, and by the Red Sea to the east. Eritrea became independent from Ethiopia in 1993 and obtained independence from Italy in 1962. Since Eritrea’s independence, independence leader Afewerki has been the president of the country. Afewerki and his party-the People’s Front for Democracy and Justice (PFDJ)—have totalized the political and military power in the country.

Eritrea and the Eritrean Diaspora in Switzerland

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Eritrea’s government has been characterized by corruption, violence, and human rights abuses, including forced conscription and torture. Since the early 2000s, Switzerland has been the destination of choice for Eritrean refugees fleeing Afewerki’s dictatorship and militarization. With a population of roughly 34,500 people, the host country’s language is important for refugees’ individual and national identities. Learning the language of the host country is vital as language learning is considered the key in refugee integration, and integration of refugees but also is important for countries’ so-

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meaningful way to improve their language acquisition experience. Informants also mentioned that it is difficult to establish relationships with theFrench community because they are often isolated and segregated. For this reason, learning the French vocabulary specific to their field of interest is critical. However, the material taught in French is not always relevant to the needs and interests of refugees. For example, Participant F mentioned that the language courses he attended included topics such as grammar, pronunciation, and writing. While these aspects of the language are important, they may not be directly applicable to the everyday experiences of refugees. Participant G mentioned that what he learned in language courses was applicable in everyday scenarios, but not in a professional setting.

Interviewees emphasized the difficulty in overcoming these challenges since they are inherent to the language. However, they also highlighted some positive aspects of the French language courses. For example, Participant F mentioned that the language courses he attended were designed for people with different language levels. Participants also shared coping strategies to overcome these challenges, such as practicing in everyday situations, watching French films, and listening to French music. For instance, Participant H suggested that organizing language workshops and classes could help refugees improve their language skills. On one hand, some of the challenges that participants mentioned were related to the lack of resources and support available to refugees. On the other hand, other challenges were related to the language acquisition process itself. For example, Participant H mentioned that practicing in a language class is not always effective, and that language skills acquired in a classroom setting may not be transferable to real-world situations.

Congratulations on your French learning progress! French is indeed a useful tool for improving the French language skills of the refugees. French is the language of the European Union, and it is widely spoken in many countries around the world. Learning French can also help refugees to integrate into their new communities and to find work opportunities. However, it is important to note that learning French is not an easy task, and it requires a lot of effort and motivation. Nonetheless, the challenges and opportunities that refugees face in learning French can also be seen as a way to improve their language acquisition experience and resilience. Challenges in French teaching methods

The second category, "challenges in French teaching methods," comprises the challenges that informants have faced in free French workshops provided by the government through "La Roseraie" and in free courses offered by other organizations. Four out of the eight interviewees discussed the challenges in this category. Participants mentioned that the language courses were designed for people with different language levels in the same workshop. This is because the workshops are open to the public without the need to take them, which means that people with different language levels can attend the same class. For this reason, learning the French vocabulary specific to their field of interest is critical. However, the material taught in French is not always relevant to the needs and interests of refugees. For example, Participant F mentioned that the language courses he attended included topics such as grammar, pronunciation, and writing. While these aspects of the language are important, they may not be directly applicable to the everyday experiences of refugees. Participant G mentioned that what he learned in language courses was applicable in everyday scenarios, but not in a professional setting.

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The conversations with Eritrean refugees that this research presented were conducted in April 2015, and the research team benefited greatly from working with these refugees. The conversations represent only one of the many challenges that refugees can face in learning a second language, and they are faced with the additional challenge of learning a language that is different from their native tongue. The research team identified some of the solutions that refugees mentioned during the interviews, such as those in the category "difficulties with the grammatical structure of French," are difficult to solve and require additional resources. Nonetheless, as the word "refugee" often suggests a temporary or provisional status, the research team aimed to highlight the importance of government and non-governmental organizations in facilitating refugee language acquisition. As part of the ideas that participants shared to cope with these challenges, Participant B suggested that the workshops from "La Roseraie" could be improved if they were designed to meet the specific needs of the participants. Participant B explained that, while the workshops were being designed to cater to different levels of language proficiency, there were participants who had difficulties with the grammatical structure of French. Participant G also mentioned that he had not been able to learn the technical vocabulary that is specific to the discipline in which he is also working in French. This has complicated his access to employment opportunities in Geneva. Thus, language courses could be improved by focusing more on technical vocabulary that refugees could apply in an educational or professional setting. In spite of the flaws in the language workshops and courses, the informants reported that these resources are overall extremely useful and a vital tool for learning French.

Obstacles in practicing and making progress Six out of the eight participants mentioned at least one challenge in this category. As part of this set of challenges, participants reported that it is difficult to practice French at home or in their everyday lives, even if they use it on a daily basis. Participant E mentioned that he and his roommates are all learning French and try to practice with one another, they always talk in their mother tongue when they are at home together. The responses from participants also highlighted the importance of practice in order to improve language proficiency. The French language is a complex and difficult language to learn, and practice is essential in order to master it. However, it can also be seen as an opportunity to improve language skills and confidence.
Are There Ethnic Differences in Psychological Distress in Cancer Patients?

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Barry Rosenfeld, PhD, Department of Psychology, Fordham University, Bronx, NY  
Heyley Pessin, PhD, Memorial Sloan-Kettering Cancer Center, New York, NY  
Allison Marziliano, Memorial Sloan-Kettering Cancer Center, New York, NY.

This study examines whether levels of psychological distress differ among ethnicities for patients with advanced cancer. Participants with advanced cancer (N=436) were drawn from two studies examining the efficacy of Meaning-Centered Psychotherapy (MCP) prior to receiving treatment. Caucasian, African American/Black, and Hispanic/Latino patients were compared on their baseline level of distress. Caucasian patients demonstrated significantly greater hopelessness and anxiety relative to non-Latina Caucasian patients. These results contrast previous research that suggests ethnic minority patients experience greater psychological distress than Caucasian patients. Additional research using larger ethnic minority sample sizes and potentially relevant covariates (e.g. socioeconomic status) is needed to further understand these findings.

Introduction

A cancer diagnosis, regardless of type or severity, can be devastating to any person regardless of age, gender, or ethnicity. This devastation can result in emotional and psychological distress such as hopelessness, depression, or loss of spiritual well-being (Breitbart, Corbett, Embry, Aguilera, Meeske, & Haynes-Lattin, 2014), as well as the fear that one may “die of the cancer” (Gotay, Holup, & Pagano, 2002).

Research primarily conducted in Western cultures suggests even among patients with very advanced disease, even with the influence of gender, age, or ethnicity. This the prevalence of breast cancer among Latina patients was lower than that reported in other studies. One reason for the disagreement in the literature was the differing prevalence rates reported in the US (Breitbart et al., 2015, 2018). MCP was used in each ANCOVA statistical model was used to analyze differences in QOL between Caucasian and Hispanic/Latino patients (p = .01). However, African American patients did not differ significantly from Hispanic patients. In addition, there was a statistically significant difference between groups in quality of life, F(2,396) = 7.9, p = .003. However, post-hoc comparisons were still analyzed because this ANCOVA result approached significance. The post-hoc LSD comparisons showed that the only statistically significant difference was in QOL between Caucasian and African American patients, with Caucasians reporting more distress than African Americans (p = .048).

Discussion

This study compared several psychological distress and quality of life among three ethnic groups with advanced cancer. Previous studies compared only one ethnicity to one other. Others found that ethnic minority patients reported greater psychological distress than Caucasians. In planning this study, the researchers hypothesized similar results with minority ethnic groups, especially in hopelessness, anxiety, depression, and quality of life. Previous research has typically been more narrow, focusing on uncontrolled populations, comparing only one race to another..

In comparing these three ethnicities across the domains, Caucasians reported greater hopelessness than other African American/Blacks or Hispanic/Latinos. No difference in this domain was found between the minority ethnicities. Caucasians also reported lower quality of life than African American/Blacks. These findings do not align with previous research which found no ethnic differences in psychological distress. However, past researchers have typically compared elevated the elevated distress in ethnic minorities was due to previous researchers comparing only one ethnicity to one other. This study is also the first to examine the impact of ethnicity on psychological distress in cancer patients. Additionally, the sample was predominately Caucasian (79.3%), n = 312), with 12.6% African American (n = 50) and 9.0% Hispanic (n = 36). Participants that identified other or more than one ethnicity were omitted from analyses (n = 38). Within the final sample, more than half were married (57.6%, n = 251), 13.6% were single (n = 68), 13.5% divorced (n = 59), 8.0% widowed (n = 35), and 3.9% separated (n = 17). See Table 1 in Appendix A.

In this study, patients were statistically significant higher levels of distress even after controlling for the influence of gender, age, recency of diagnosis, and active treatment as medical factors may impact the patient’s distress level. In the subsample of patients who were recruited exclusively for this research, no significant differences were found between race and number of symptoms endorsed on the MSAS, F(2, 390) = .03, p = .74.

Participants

The present investigation combined participants with advanced cancer drawn from two studies examining the efficacy of Meaning-Centered Psychotherapy (MCP) in group and individual settings (Breitbart et al., 2015, 2018). MCP uses a mixture of didactics, dialogue, and experiential exercises over the course of a seven-week program to focus on particular themes related to meaning in one’s life and advanced cancer (Breitbart 2002). The two studies were conducted at Memorial Sloan-Kettering Cancer Center (MSKCC) and the Memorial Sloan-Kettering Cancer Center (MSKCC). The combined participant sample consisted of 436 participants from the two studies. The combined sample was 26.4% male (n = 115), and 73.6% female. Sample characteristics are presented in Table 1. Several studies have examined psychological distress in ethnic minority cancer patients with similar results. Hong and colleagues (2015) found an elevated preoperative distress rate in Chinese American patients with gastric cancer—much higher than the prevalence reported in other studies. One reason for this elevated distress was the economic burden on Chi-
Despite these limitations, this study gives clinicians, especially oncologists, a better understanding of possible differences in psychological distress that their patient experiences, particularly related to race and ethnicity. More importantly, these findings suggest that when patients are provided with state-of-the-art medical care, the elevated levels of distress seen in previous research may disappear. Ultimately, this study suggests there are many factors that influence one’s level of psychological distress in the Mamoni Valley, and recommending the importance factors is essential to helping those in the oncology setting. It seems one’s ethnicity does not guarantee a certain level of distress, therefore supporting the need for further research.

References

Appendix A

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<th>Characteristics</th>
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<tr>
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<tr>
<td>Female</td>
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<td>Age</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>Educational Level</td>
<td>Mean (SD)</td>
<td>16.4 (2.53)</td>
</tr>
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Introduction
The success of tropical forest plantations is determined by the capacity of trees to survive and grow under a specific set of environmental conditions (Carpenter 2004; Wisnich 2007; Hall 2010; Craven 2010). Over the past thirty years, reforestation studies in Panama have attempted to determine which species are most suitable to regional environments (van Cleve 2002). The need for further research in this area is particularly related to race and ethnicity. More importantly, these findings suggest that when patients are provided with state-of-the-art medical care, the elevated levels of distress seen in previous research may disappear. Ultimately, this study suggests there are many factors that influence one’s level of psychological distress in the Mamoni Valley, and recommending the importance factors is essential to helping those in the oncology setting. It seems one’s ethnicity does not guarantee a certain level of distress, therefore supporting the need for further research.

This report presents an assessment of growth characteristics and carbon storage potential for six tree species in a tropical forest plantation in Panama’s Mamoni Valley. The plantation is located within the lower Mamoni Valley, a habitat corridor which extends from Panama to northern Peru and is one of the 20 most biodiverse regions on Earth. Diameter at breast height (DBH), total height, and merchantable height were measured and carbon storage and CO2 storage capacity were calculated for 662 trees of six different species. Analysis of variance and Tukey pair-wise comparisons were used to test for statistically significant differences between average DBH, height, and carbon and CO2 storage for each species. It was found that Terminalia amazonica, a native hardwood, had the largest DBH, total height, merchantable height, carbon storage, and CO2 storage capacity. Based on these findings, T. amazonica should be considered as an optimal species for the establishment of further reforestation and plantation forestry projects in the Mamoni Valley.
In 1987, this part of the Mamoni Valley was cleared of primary forest and converted to pasture for cattle ranching. The forest was established in 2009. All trees planted in 2009 and 2010 were native species selected for their high-value timber, although native to the region, are not native to the Mamoni Valley. These seeds were obtained from nurseries in Darien and Los Santos, also in 2009. The seeds were germinated in an outdoor nursery located approximately 2 kilometers from the plantation site. Seeds were planted in pots that contained equal quantities of sand and soil collected from the surrounding area. Chicken excrement was added as a fertilizer. After germination, foliar fertilizers were applied every 8 days. The seedlings were transplanted when they had reached a height of 16 to 22 centimeters. Some of the sample plots include sections replanted with acacia within the parts of the plantation established in 2009 and 2010, with the exception of A. mangium, which was planted in 2014.

In preparation for planting, new plots were cleared manually with hoes and machetes. Chicken excrement was added to the soil directly beneath each transplanted seedling. Seedlings were planted in blocks of 6 to 8 different species with 3 meter spacing between each tree.

To remedy iron and phosphorous deficiencies, fertilizer was applied to the trees every six to eight months until 2011. The insecticide Hormitox was applied during the same period to combat Atta sp., commonly known as the arriera ant. The trees were pruned once, a year after planting. The first comprehensive thinning of the plantation was initiated in June of 2016. The sample area in this study includes plots that may not have been pruned or thinned since they were planted.

Measurements
All measurements were collected between 2016 29 June and 2016 29 July. To establish random sample locations, satellite maps of the areas planted in 2009 and 2010 were overlaid with numbered grids. Using a random number generator, 8 grid squares were chosen within the area planted in 2009 and 14 for the area planted in 2010. Sample plots were established with the area represented by each randomly selected grid square. The center of the plot was located as close as possible to the GPS coordinates corresponding to the center of the randomly chosen square. Each plot had an area of 500 square meters and a fixed radius of 12.62 meters. These plots represent 2.5% of the total area planted in each of the 2 years.

Species, total height, merchantable height, and DBH were recorded for all trees. DBH was measured directly using a diameter tape. A Suunto Tandum Global Compass/Clinometer was used to determine total height and total merchantable height. Merchantable height was measured as distance from the base of the trunk to the point at which significant branching started to occur.

Calculations
Carbon storage was calculated for each tree using the measurements for DBH and total height according to the following equation:

$$ C = \frac{D}{2} \times \pi \times H \times w $$

Where $C$ is the carbon storage capacity in metric tons, $D$ is DBH in centimeters, $H$ is total height in meters, and $w$ is the wood density, in grams per cubic centimeter, which takes on a distinct value for each species (FAO, Appendix 1). Carbon storage was assumed to be equivalent to approximately 47% of the tree’s dry biomass (FAO, carbon content estimation). The CO2 storage capacity was estimated by multiplying the value for carbon storage by 3.67.

IBM SPSS software was used to calculate mean DBH, total height, merchantable height, carbon storage capacity, and CO2 storage capacity for each species. Data for trees planted in 2009 and 2010 were combined to calculate the mean heights, DBH, and carbon storage for each species. Data for each metric were confirmed to be normally distributed before further analyses were performed.

Two-way analyses of variance (ANOVA) were used to test the effect of tree species and plot location on DBH, total height, merchantable height, and carbon sequestration. The interaction between plot and species was shown to be statistically significant for all variables analyzed. Tukey’s pairwise comparisons were used to identify significant differences in height, DBH, and carbon storage capacity between species. Alpha value was fixed at $P < 0.05$.
The relatively poor performance of *D. panamensis* is somewhat surprising, given that it has been identified as a species that is especially well-suited for tropical forest plantations (Wishnie 2007). In an experimental trial of 20 native species planted in farmland overgrown with canal grass, *D. panamensis*, a shade-tolerant species, had one of the highest growth rates (Hooper 2002). It requires little sunlight and is regarded as ideal for densely-planted timber plantations. The current study shows little difference in *D. panamensis* growth metrics and those of the other species. In terms of mean total height, it was outperformed by *A. mangium* and *T. amazonia* but was not significantly taller than the other three species (Table 2). Although *D. panamensis* had the second highest mean merchantable height, this value is not significantly different from *A. occidentale* or *T. guayacan* (Table 2). The mediocre performance of *D. panamensis* in the Mamoní plantation might have been the result of high sun exposure in the years immediately after planting. Wishnie et al. 2007 identified *D. panamensis* as a light-sensitive species that exhibits highly variable growth depending on light exposure, soil quality, and soil moisture. Future studies are needed to compare the effects of sun exposure and site-specific soil quality on the growth rates of all species within the Mamoní plantation.

Conclusions

The effects of local environmental conditions, inter-species interactions, and plot management will need to be studied in greater detail. The lapse in maintenance from 2011-2014 is evident in the low average merchantable heights for all species. As mentioned earlier, the beginning of the rearing of the plantation was initiated in June 2016. Future studies should return to the 22 sample plots in the years following thinning to determine if this has any effect.

The success of *T. amazonia*, a valuable, fast-growing hardwood, has proven once again the viability of using native species in tropical reforestation projects. *T. amazonia* is also by far the most common species in the plantation, possibly limiting biodiversity by out-competing other species. Any plans to expand the plantation should consider the high productive capacity of *T. amazonia* while also dedicating space to a broader variety of native species. A higher level of biodiversity will ensure that the plantation’s success is not dependent upon the survival of a single species. This is especially critical in the Mamoní Valley, where pest control is minimal and soil and climatic conditions are rapidly changing.

Finally, an accurate count of all trees of each species with in the plantation will aid forestry engineers and scientists in future assessments of the plantation’s progress. With limited knowledge of a plantations’ species composition, it is difficult to extrapolate conclusions from small sample areas. Once we know how many trees of each species are in the plantation, it will be possible to use plot-level measurements to estimate total carbon sequestered within the entire plantation. Knowing how many trees are in the plantation will also help foresters set limits for sustainable timber harvests. Finally, a major limitation of this study was the lack of site-specific values for wood density of each species. The values provided by the FAO provide a reasonable estimate, but future research should attempt to gather wood density measurements for trees in the Mamoní Valley. Obtaining these values will permit more accurate calculations of biomass and carbon storage for each species. This report is a benchmark assessment and should serve as a reference point for future studies as the plantation continues to grow.

Acknowledgements

This research was funded by a summer research grant sponsored by Dean Grimes’ office. I would like to thank my project supervisor in Panama, Matthew Brewer, and my Fordham research mentor, Dr. Mark Botton, for their guidance and support. I would also like to thank Johanne Eckelmann for creating the maps used to determine plot locations.

References


Table 2. Mean DBH, total height, merchantable height, carbon storage, and CO2 storage for six species in the Mamoní plantation. Means with the same letter are not significantly different as indicated by 95% confidence limits.

<table>
<thead>
<tr>
<th>Species</th>
<th>DBH (cm)</th>
<th>Total height (m)</th>
<th>Merchantable height (m)</th>
<th>Carbon storage (mt)</th>
<th>CO2 storage (mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>A. mangium</em></td>
<td>13.4 a</td>
<td>11.4 a</td>
<td>13.4</td>
<td>0.040 a</td>
<td>0.150 a</td>
</tr>
<tr>
<td><em>A. occidentale</em></td>
<td>6.6 b</td>
<td>6.0 b</td>
<td>6.6</td>
<td>0.006 b</td>
<td>0.023 b</td>
</tr>
<tr>
<td><em>S. macrophylla</em></td>
<td>5.7 b</td>
<td>4.9 c</td>
<td>2.2</td>
<td>0.003 b</td>
<td>0.000 b</td>
</tr>
<tr>
<td><em>D. panamensis</em></td>
<td>5.2 b</td>
<td>5.1 b</td>
<td>2.9</td>
<td>0.005 b</td>
<td>0.017 b</td>
</tr>
<tr>
<td><em>T. amazonia</em></td>
<td>9.4 c</td>
<td>6.0 b</td>
<td>2.5 c, d</td>
<td>0.012 b</td>
<td>0.045 b</td>
</tr>
<tr>
<td><em>T. guayacan</em></td>
<td>7.0 c</td>
<td>5.5 b</td>
<td>2.5 c, d</td>
<td>0.008 b</td>
<td>0.000 b</td>
</tr>
</tbody>
</table>

The Mamoní Valley Project has also contributed to the development of a carbon sequestration study. Research in Costa Rica has shown that planting native species, had the lowest mean merchantable height of all six species, this might have been due to the age difference between *A. mangium* and the native species. *A. mangium* trees in this plantation were 2–3 years old at the time measurements were recorded, while the natives planted in 2009 and 2010 were 7–8 years old. Of the six species, *T. amazonia* had the highest total height, merchantable height, carbon storage, and CO2 storage capacity. *D. panamensis* had the lowest mean DBH but the second-highest mean merchantable height. *A. mangium*, the only non-native plantation species, had the lowest merchantable height (Fig. 3-7).

Two-way ANOVA was performed in SPSS using a generalized linear model. The two-way ANOVA confirmed that tree species and plot location together were responsible for 69% of the variation in DBH among the trees in the sample (R2 = 0.693) and 74% of the variation in total height (R2 = 0.744). Not all plots contained the same number of each species. As a result, the effects of plot and species on mean DBH, height, and carbon storage were not considered independent (i.e. the average tree in a plot composed mostly of *T. amazonia* and *T. guayacan*, these differences were statistically significant although *T. amazonia* was significantly taller than the other three species (Table 2). All though *D. panamensis* had the second highest mean merchantable height, this value is not significantly different from *A. occidentale* or *T. guayacan* (Table 2). The mediocre performance of *D. panamensis* in the Mamoní plantation might have been the result of high sun exposure in the years immediately after planting. Wishnie et al. 2007 identified *D. panamensis* as a light-sensitive species that exhibits highly variable growth depending on light exposure, soil quality, and soil moisture. Future studies are needed to compare the effects of sun exposure and site-specific soil quality on the growth rates of all species within the Mamoní plantation.
Predictors of Relationship Quality and Satisfaction: Implications for Relationship Education

Marriage is embedded in the social fabric of American life. More than 96% of Americans over age 65 have been married at least once (U.S. Census Bureau, 2009). While most people enter a romantic relationship with the intention to establish a healthy, mutually satisfying and stable relationship, whether the relationship fares well or poorly is of great consequence. For better or worse, couples experience change over time within their relationships throughout everyday interactions with milestones (e.g., buying their first home or having their first child). The experience of partners learning to adapt to these changes and each other as their relational behaviors evolve.

Similarity in personality alone is not strongly associated with marital satisfaction. Craddock (2008) defines the following terms: confidence and assertiveness, and low individual avoidance and partner dominance in heterosexual relationships. High levels of male demand/female withdraw behavior predicted a negative association between male depression and his relationship satisfaction. High levels of male demand/female withdraw behavior predicted a negative association between the male partner and her relationship satisfaction.

Several perceived factors contribute to marital satisfaction. This section describes the influence of several perceived factors of relationship quality: perception of self (Craddock, 2008), perception of daily work stress (Danner-Vlaardingerbroek, 2003), and depression and perception of demand/withdraw behaviors (Li & Johnson, 2016; McGinn, McFarland, & Christensen 2009).

Perceived Predictors of Relationship Quality

Several perceived factors contribute to marital satisfaction. This section describes the influence of several perceived factors of relationship quality: perception of self (Craddock, 2008), perception of daily work stress (Danner-Vlaardingerbroek, 2003), and depression and perception of demand/withdraw behaviors (Li & Johnson, 2016; McGinn, McFarland, & Christensen 2009). A summary of perceived predictors of relationship quality is presented in Table 1.

Development of Relationship Tension/Conflict/Happiness/Satisfaction

People characterize their romantic relationships by positive and negative features in terms of whether they elicit feelings of satisfaction and happiness or conflict and unhappiness. Positive and negative features of relationships are not opposite ends of a continuum, as couples can have positive and negative feelings simultaneously. Throughout the relationship, partners learn to adapt their expectations and accommodate each other (Huston & Houts, 1998). By learning to overcome differences and relationship problems, couples can lead a healthy, mutually satisfying, stable relationship that is low in marital tension. Birditt et al. (2017) describe marital tension as overall feelings of negativity in marriage including negative emotions such as resentment, irritability, and conflict. Such feelings occur as a result of disagreements, disappointment, and conflicts in marriage. If couples are not able to manage their disagreements and begin with idealized notions of the relationship, marital tension increases and varies with couples over time (Birditt et al., 2017). In addition, Birditt et al. (2017) found that tension increased over time among husbands and wives with greater average mastery. Despite increased emotional strain among husbands, couples were more likely to divorce if wives reported high levels of emotional strain. It is possible that husbands and wives interpret emotional strain differently, indicating that low cumulative emotional strain in husbands may reflect a lack of investment or unwillingness to change or accommodate ideas in the relationship (Li & Johnson, 2016). The development of marital tension has important implications for marital satisfaction. Understanding the contributing factors that buffer marital tension and increase happiness can provide insight into interventions, such as relationship education, that are structured to promote satisfying healthy behaviors and prevent future conflicts in relationships. Recommendations are suggested for a tailored, stepped approach to relationship education that support the development and maintenance of heterosexual relationship satisfaction and longevity.

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Self-Views of Personal Qualities

Similarity in personality alone is not strongly associated with relationship quality. Rather, self-views or aspects of self-perception that are moderately stable and more malleable personal qualities have implications for interpersonal processes (Craddock, 2008). Similar self-views of personal qualities (such as self-confidence, assertiveness, non-avoidance of conflict, and partner dominance) constitute a shared positive relational resource which is more critical for relational satisfaction than any time, lowering the likelihood of detaching from work.

Depression is not conceptualized as an individual problem. Rather, it is related with relational discord rooted in a sequence of individual and marital stressors. Interpersonal conflicts in close relationships (e.g., romantic relationships, marriages). Relational discord functions bidirectionally with the patient’s depression (Li & Johnson, 2016). There is a strong association between depression and relationship satisfaction. The more satisfying the relationship, the more likely the patient is to report a lower level of depressive symptoms. When pressured by their male partners to change, females report lower levels of male demand/female withdraw. Depression and relationship satisfaction predict perceived stressors, and relationship satisfaction. Male partners who reported high levels of male demand/female withdraw were more likely to have low relationship satisfaction. Male partners who initiated change felt more satisfied with their relationships. It is possible that depressed individuals see their partners as unsupported and dissatisfaction and low self-esteem in the relationship. Depressive symptoms and relationship satisfaction are bidirectional associations (Bauscom, Whisman, & Paprocki, 2012). In addition, male depression has an increased negative impact on female relationship satisfaction.

The influence of depression on relationship satisfaction predicted perceived stressors, and relationship satisfaction. Male partners who reported high levels of demand/female withdraw behavior were more likely to have low relationship satisfaction. Male partners who initiated change felt more satisfied with their relationships when the issues were resolved. Male partners who reported high levels of demand/female withdraw were more likely to have low relationship satisfaction. Male partners who initiated change felt more satisfied with their relationships when the issues were resolved. Male partners who reported high levels of demand/female withdraw were more likely to have low relationship satisfaction. Male partners who initiated change felt more satisfied with their relationships when the issues were resolved.
Behavior and Communication Predictors of Relationship Quality

Several behavioral and communication factors contribute to marital satisfaction. This section will discuss behavior and communication predictors of relationship quality: emotional capital, emotion regulation, and constructive communication (Blos, Haase, & Levenson, 2014), and marriage work (Helms, Crouter, & McHale, 2003; Jensen & Rauer, 2015).

Emotion Regulation

When individuals feel valued and connected to their partner, an accumulation of these positive shared moments could serve to enhance confidence, thus increasing the likelihood of successful relationships. Blos (2006) has spotlighted the importance of emotional capital in relationship-promotive ways when conflicts and threats arise (Cradock, 2008; Walsh et al., 2017). Emotion Regulation and Constructive Communication

During their relationship, couples may engage in strongly negative emotional events including heated disagreements, disappointments, and perceived betrayals. Partners may fall into primitive modes of interaction, including repeatedly attempting to justify their own behavior instead of asking their partner’s experiences in the context of frequent marriage work with friends. These emotional episodes are imperative because these danger zones pull partners in different directions and could encourage them to regulate their negative emotions and communicate effectively. Sometimes, they can engage in relationship-promoting ways, including greater emotionality, down-regulating negative emotions, or quickly communicating their relationship satisfaction. Emotion regulation refers to using communication behaviors involving reappraisal, modification, and regulation of emotional reactions. The authors suggest that interventions also need to implement strategies that target the relational patterns that depress relationship quality. They need to focus on decreasing conflict, improving emotional self-confidence, high avoidance, and high partner dominance tended to occur in combination for both men and women. Therapists need to counteract this interplay by sharing the responsibility and providing feedback to help them engage in more relationship-promotive ways.

Satisfaction on days when his or her partner reported negative emotionality, down-regulating negative emotions, or quickly communicating their relationship satisfaction. Emotion regulation refers to using communication behaviors involving reappraisal, modification, and regulation of emotional reactions. The authors suggest that interventions also need to implement strategies that target the relational patterns that depress relationship quality. They need to focus on decreasing conflict, improving emotional self-confidence, high avoidance, and high partner dominance tended to occur in combination for both men and women. Therapists need to counteract this interplay by sharing the responsibility and providing feedback to help them engage in more relationship-promotive ways.

Emotion regulation and constructive communication refer to using communication behaviors involving reappraisal, modification, and regulation of emotional reactions. These emotional episodes are imperative because these danger zones pull partners in different directions and could encourage them to regulate their negative emotions and communicate effectively. Sometimes, they can engage in relationship-promoting ways, including greater emotionality, down-regulating negative emotions, or quickly communicating their relationship satisfaction. Emotion regulation refers to using communication behaviors involving reappraisal, modification, and regulation of emotional reactions. The authors suggest that interventions also need to implement strategies that target the relational patterns that depress relationship quality. They need to focus on decreasing conflict, improving emotional self-confidence, high avoidance, and high partner dominance tended to occur in combination for both men and women. Therapists need to counteract this interplay by sharing the responsibility and providing feedback to help them engage in more relationship-promotive ways. Additionally, work with a self-view such as “I am unable to deal with problems with my partner” involves identifying relevant cognitions, emotions, and behaviors, and understanding how this self-view impacts relationship quality. This type of self-view refers to one’s own level of avoidance and who responds accordingly. Moreover, Craddock (2008) revealed that there is a connection between self-esteem, self-confidence, high avoidance, and high partner dominance tended to occur in combination for both men and women. Therapists need to counteract this interplay by sharing the responsibility and providing feedback to help them engage in more relationship-promotive ways.
Selective relationship education that targets couples with specific, modifiable interventions is anticipated to enhance relationship satisfaction and quality. An implication of the varying levels and modifiability of predictors and risk factors in couples who are seeking relationship education is the possibility of a stepped approach. According to Halford and Bodenmann (2013), this approach “offers a range of interventions varying from low intensity, brief, inexpensive, often self-directed programs to more intense, extended, expensive, and often professionally delivered programs.” Halford and Bodenmann (2013) highlighted findings from Ford, Bashford, and DeWitt (1984) comparing the effects of three levels of intensity of communication skills training between a couple and an educator, combined with structured exercises. The last step is face-to-face training, consisting of individualized modeling, rehearsal and feedback on communication skills with structured homework exercises (Ford, Bashford, & DeWitt, 1984). However, this stepped approach should be used with caution. Ineffective, low intensity programs might have a negative effect on partners’ self-efficacy, discourage them from seeking future relationship education, or reduce their motivation for change (Halford and Bodenmann, 2013). More research is needed to evaluate the efficacy of using low intensity relationship education on the later accessing of relationship education.

In summary, these predictors of relationship quality and satisfaction provide implications for relationship education. With varying life events and circumstances, the development of relational tension or conflict is possible. Thus, a tailored, stepped approach to relationship education that focuses on changing modifiable predictors and risk factors and meeting the needs of couples may be beneficial.

Discussion
Marital tension may develop within couples when they experience disagreement, disappointment, and conflicts in marriage. Perception and behavior and communication factors have important implications for marital tension/conflict and happiness/satisfaction. Self-views of personal qualities such as self-confidence, assertiveness, non-avoidance of conflict, and low partner dominance were found to be directly linked to interpersonal processes (i.e., conflict management, open communication) that affect marital satisfaction (Craddock, 2008). Partners’ perception of detachment from work mediates the behavior and communication in well-being in a marital relationship (Danner-Vlaardingerbroek et al., 2013; Debruyne et al., 2007). The influence of depression on relationship satisfaction predicted perceptions of demand/withdraw behavior (McCain et al., 2009; Li & Johnson, 2016). Behavior and communication patterns including shared positive activities that accumulate emotional capital acts as protective factors of marital tension and increases happiness (Walsh et al., 2017). Emotional regulation and constructive communication buffer marital tension and indicate greater levels of marital satisfaction (Block et al., 2014). The role of marriage work in different age cohorts significantly predicts marital satisfaction (Jensen & Rauer, 2015).

These predictors are certainly not an exhaustive list of the possible factors that contribute to marital quality and satisfac-
tion. Still, they provide a notable list of risk and protective fac-
tors that are modifiable by relationship education. Couples with risk factors that are adaptable by therapy are most likely to have their relationship satisfaction and quality enhanced (Halford & Bodenman, 2013). Considering how these predictors contribute to well-being in the relationship and are modifiable by interven-
tions, therapists are suggested to evaluate and improve the current structure and efficacy of relationship education.

The analysis of these risk and protective factors and sugges-
tions of a stepped approach to relationship education that targets couples with specific modifiable risk factors may be an efficient intervention. This cost-effective, tailored relationship education supports the fulfillment of relational needs, which is essential for growth and happiness (Dei & Ryan, 2000). This literature review has examined predictors of hetero-
sexual relationship quality and satisfaction that are modified by relationship education. However, research is warranted for predictors of same-sex relationship quality and satisfaction. Research is also needed to further test the applicability of relationship education to same-sex couples. Still, this research agenda has practical implications for therapists and relationship education.

References

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PREDICTORS OF RELATIONSHIP QUALITY

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The Relationship Between Emotional Stability and Perceived Stress

The study investigated the relationship between personality traits and perceived stress in young adults. The 50-item International Personality Item Pool (50-IPIP) test was used to obtain standardized measurements of participants’ personality traits. In particular, we focused on participants’ levels of emotional stability. Additionally, the Perceived Stress Scale (PSS-14) was used to obtain measurements of participants’ subjective stress levels. After controlling for gender and race/ethnicity, we found that participants with low emotional stability, low extraversion, and low conscientiousness reported the highest levels of perceived stress.

Introduction

Stress is defined as a physical or emotional state resulting from unwanted and demanding circumstances. Stressors, the cause of stress, evoke a light or flight response that enables the body to deal with threats. When stressors are left unresolved, this response can lead to physical distress and emotional exhaustion (Herane, 2015). Perceived stress is the way in which we think about the stress we experience (Korten et al., 2016). Perceived stress has been associated with poor cognitive function impairment and physical deterioration (VonDras et al., 2005; Aggarwal et al., 2014). Properly identifying stress and coping with stress is imperative in order to prevent cognitive function impairment and physical deterioration. In particular, college students are exposed to high levels of stress and experience high levels of cognitive stressors. Addressing these stressful situations and therefore reducing or successfully managing the perceived stress they experience is imperative in order to prevent cognitive function impairment and physical deterioration for both students and the society as a whole.

This study seeks to examine the relationship between the Big Five Personality Traits and perceived stress. Understanding the personality tendencies will help individuals learn how to adapt to stressful situations and therefore reduce or successfully manage the perceived stress they experience. Lowering stress is incredibly important to one’s health, especially for young adults. Efforts that seek to improve our understanding of the relationship between personality traits and perceived stress will inform intervention strategies and help prevent the development of remediable psychological or developmental problems. This study has been approved by the Fordham University Institutional Review Board.

Methods

Participants

The participants of this study were a sample of 187 Fordham University students. This sample participated in a broader parent study investigating the relationships among participants’ personality traits, perceived stress, and self-reported academic difficulties. Emotional stability and perceived stress measures are included in the parent protocol, although they are not the focus of primary hypotheses for that parent study. Participants were recruited using adver- tisement flyers posted around campus, as well as online, where the study was listed on the Sona System as a project that could be completed within 30 minutes. Students were informed of the study’s aim to investigate how different personality traits influence emotional adjustment to stressful situations and trends to view the world negatively (Niemann et al., 2014). They also more often experience anger (Bolger & Zuckerman 1995; Feltman et al., 2011; Johnson, 2013). Neuroticism, or emotional instability, is defined as the tendency to experience negative affect (Penley et al., 1999; Demirçioğlu et al., 2016). Individuals with low emotional stability are thus more susceptible to negative affective states (Gray, 2000). This study will examine the relationship between the Big Five personality traits (extraversion, intellectual openness, agreeableness, emotional stability, and conscientiousness) and perceived stress. Despite prior studies that have investigated the relationships between personality traits and perceived stress (Ebsp et al., 2011; Johnson, 2013), few have specifically explored these relationships in young adult college students. The population we are targeting is a group of young adults who experience many stressors on a daily basis related to the responsibilities of being a college student. It is our goal to explore how their unique personality traits influence their perceived stress. Understanding their personality tendencies will help individuals learn how to adapt to stressful situations and therefore reduce or successfully manage the perceived stress they experience. Lowering stress is incredibly important to one’s health, especially for young adults. Efforts that seek to improve our understanding of the relationship between personality traits and perceived stress will inform intervention strategies and help prevent the development of remediable psychological or developmental problems. This study has been approved by the Fordham University Institutional Review Board.

Procedures

The dependent variable was perceived stress levels reported by participants. The survey was administered to participants in a 14-item, self-reporting questionnaire that measures to what degree one appraises their life as stressful. Specifically, the test requires participants to describe themselves through five possible response options to various statements about their personality traits and perceived stress. This test was administered to participants in an online questionnaire using the survey software Qualtrics. Responses were rated on a 5-point Likert scale for each item, ranging from 1 to 5. Pearson correlations, for age and education, and independent t-tests, for gender and race/ethnicity, were examined to determine if the demographic variables (gender and race/ethnicity) of the sample were significantly related to perceived stress.

Results

The demographic characteristics (age, years of education, gender, and race/ethnicity) of the sample were examined. The demographic characteristics included in the Table 1 are: gender, race, education, and perceived stress. Additionally, we found personality traits to be significantly related to perceived stress: (β = -0.42, p ≤ 0.01) for conscientiousness and (β = -0.42, p ≤ 0.01) for extraversion. Additionally, we found intellectual openness to be unrelated to perceived stress (r = -0.24, p ≤ 0.01). We also found emotional stability to be significantly related to perceived stress (β = -0.63, p ≤ 0.01), while gender and race/ethnicity were not. The relationship between the Big Five personality traits and perceived stress was examined using linear regression models to analyze the primary variables of interest in the study. The dependent variable was perceived stress and the independent variables were each of the five personality traits (extraversion, intellectual openness, agreeableness, emotional stability, and conscientiousness).

Demographics

Gender, n (%)  
Male 60 (32.5%)  
Female 127 (67.5%)  
Mean age in years (SD) 19.9 (1.8)  
Mean education in years (SD) 14.6 (1.5)  
Race/Ethnicity, n (%)  
Caucasian 159 (85.5%)  
Non-Caucasian 28 (15%)  
Table 1. Demographic characteristics: The characteristics of our study's sample.

We used Pearson correlations, for age and education, and independent t-tests, for gender and race/ethnicity, to examine the relationships between the demographics and the primary dependent variables of interest (PSS-14 and IPIP-50). We found no significant relationships between participant age and personality traits or perceived stress level. Additionally, we found no significant relationship between participant education level and personality traits or perceived stress level. Males and females reported similar levels of extraversion, agreeableness, and conscientiousness. Men reported higher emotional stability than women (t = 3.6, p = 0.002). Men also reported higher intellectual openness than women (t = -2.4, p = 0.01). Women reported more perceived stress than men (t = -3.0, p = 0.01). When comparing race/ethnicity with the primary variables of interest, Caucasians and non-Caucasians reported similar levels of extraversion, agreeableness, conscientiousness, intellect, and perceived stress. Non-Caucasians reported higher levels of emotional stability (t = -1.9, p = 0.06). Because gender and race/ethnicity were significantly related to one or both of the primary variables of interest (PSS and IPIP), we conducted a series of linear regression models, covarying for gender and race/ethnicity to examine the relationship between the Big Five personality traits and perceived stress (PSS and IPIP). This study used a small sample size of 187 college students, which may limit the generalizability of the findings. However, the study provides valuable insights into the relationship between personality traits and perceived stress, particularly for young adult college students.

In follow-up analyses, we examined the simple Pearson correlations between PSS and all IPIP variables. We found no significant relationships between perceived stress and extraversion, conscientiousness, and emotional stability. Additionally, we found intellectual openness to be unrelated to perceived stress (r = -0.24, p ≤ 0.01). Extraversion, conscientiousness, and emotional stability were all found to be significantly related to perceived stress, (r (187) = -0.35, p ≤ 0.01), while gender and race/ethnicity were not. The relationship between the Big Five personality traits and perceived stress was examined using linear regression models to analyze the primary variables of interest in the study. The dependent variable was perceived stress and the independent variables were each of the five personality traits (extraversion, intellectual openness, agreeableness, emotional stability, and conscientiousness). The relationship between extraversion and perceived stress was found to be significant (β = 0.25, p ≤ 0.01). Additionally, we found intellectual openness to be unrelated to perceived stress (β = 0.25, p = 0.15). Extraversion, conscientiousness, and emotional stability were all found to be significantly related to perceived stress, (β (187) = -0.42, p ≤ 0.01). We also found emotional stability to be significantly related to perceived stress (β = -0.63, p ≤ 0.01), while gender and race/ethnicity were not. The relationship between the Big Five personality traits and perceived stress was examined using linear regression models to analyze the primary variables of interest in the study. The dependent variable was perceived stress and the independent variables were each of the five personality traits (extraversion, intellectual openness, agreeableness, emotional stability, and conscientiousness). The relationship between extraversion and perceived stress was found to be significant (β = 0.25, p ≤ 0.01). Additionally, we found intellectual openness to be unrelated to perceived stress (β = 0.25, p = 0.15). Extraversion, conscientiousness, and emotional stability were all found to be significantly related to perceived stress, (β (187) = -0.42, p ≤ 0.01). We also found emotional stability to be significantly related to perceived stress (β = -0.63, p ≤ 0.01), while gender and race/ethnicity were not. The relationship between the Big Five personality traits and perceived stress was examined using linear regression models to analyze the primary variables of interest in the study. The dependent variable was perceived stress and the independent variables were each of the five personality traits (extraversion, intellectual openness, agreeableness, emotional stability, and conscientiousness). The relationship between extraversion and perceived stress was found to be significant (β = 0.25, p ≤ 0.01). Additionally, we found intellectual openness to be unrelated to perceived stress (β = 0.25, p = 0.15). Extraversion, conscientiousness, and emotional stability were all found to be significantly related to perceived stress, (β (187) = -0.42, p ≤ 0.01). We also found emotional stability to be significantly related to perceived stress (β = -0.63, p ≤ 0.01), while gender and race/ethnicity were not.

Figure 1. IPIP Emotional Stability versus Perceived Stress Scale Score: The relationship between participants’ IPIP emotional stability and participants’ perceived stress levels.
EMOTIONAL STABILITY AND PERCEIVED STRESS

Discussion

This study found that, after controlling for gender and race/ethnicity, young adults with lower levels of emotional stability, extraversion, and conscientiousness had higher levels of perceived stress compared to those with higher levels of these personality traits. The results are consistent with our hypothesis that emotional stability was related to perceived stress levels, while gender and race/ethnicity were not. In other words, when analyzing the relationships between personality and perceived stress, emotional stability remained the main predictor, above gender and race/ethnicity, of elevated levels of perceived stress.

We acknowledge that our findings may differ when testing a more diverse sample. As non-Caucasian participants, we must acknowledge that our results may differ when testing a more diverse sample. Due to the limited sample size, our findings may not be representative of larger populations. Further research is needed to better understand the phenomenon and the ways in which emotional stability, extraversion, and conscientiousness influence perceived stress.

Figure 2. IPIP Extraversion versus Perceived Stress Scale Score: The relationship between participants’ IPIP extraversion with participants’ perceived stress levels.

Figure 3. IPIP Conscientiousness versus Perceived Stress Scale Score: The relationship between participants’ IPIP conscientiousness with participants’ perceived stress levels.

Conclusion

The present results strongly support that personal characteristics heavily influence perceived stress. An individual’s personality is made up of various traits, understanding personality’s role in human behavior is difficult. Many factors can contribute to behavior, and therefore more research should be conducted to better understand the role of personality in behavior and perceived stress experiences. Based on the present results, there is a need for research and therapies specifically focusing on emotional stability’s role in contributing to perceived stress. Additionally, the present study found that females consistently reported higher levels of perceived stress compared to males. However, there is not much research on the role of gender in personality and perceived stress experienced. The present results add to the growing body of knowledge regarding personality and perceived stress.

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References

Aron, M., & O’Rourke, R. (2017). Predicted stress, depression and coping strategies in adolescents: A gender-ائلیزیونی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیوتونیکی نیو
Diagnostic Evaluation of NuMI Hadron Monitor Ion Chambers

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The performance of the NuMI Hadron Monitor ion chambers was evaluated. Possible sources of ion chamber performance degradation are discussed, based upon analysis of Monitor data. The quality of the signal is reviewed, and it is concluded that the Monitor still functions for its main tasks. Replacement of the Hadron Monitor during the shutdown was not deemed necessary.

Lastly, a diagnostic apparatus for potential impurity of the helium gas inside the chamber has been designed and installed. A vacuum chamber is connected to the Hadron Monitor exhaust line to collect gas samples. These samples are analyzed by a GCMS (gas chromatograph-mass spectrometer).

Introduction

The NuMI (Neutrinos at the Main Injector) Beamline at Fermilab produces neutrinos from the Main Injector’s proton beam. The original proton beam strikes a graphite target, which produces a spray of pions and kaons. These secondary particles are focused into a narrow beam by two magnetic focusing horns and then travel through the Decay Pipe, where they decay into muons and neutrinos. The muons are absorbed into the horns and then travel through the Decay Pipe, where they decay into electrons and neutrinos.

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NuMI beamline are shown in Fig. 1. The major components of the NuMI beamline are shown in Fig. 1.

The Hadron Monitor sits in the NuMI beamline between the end of the Decay Pipe and the Absorber. It measures the spatial distribution of un-interacted protons and undecayed pions [Zwaska 2005]. The current Hadron Monitor has been in operation since fall 2013. The major tasks of the Hadron Monitor include alignment of the primary proton beam on the target, tracking the center position of the beam during normal beam operation, and monitoring the target’s long-term deterioration [Zwaska 2005].

The central pixel is the most important in performing the first two tasks mentioned above; however, the current Hadron Monitor is not useful for the last task (monitoring the target’s long-term deterioration), since some pixels are malfunctioning. We discuss several hypotheses pertaining to the declining performance of the Hadron Monitor based upon our analysis of past Monitor data; we also present a design for a diagnostic system to confirm one of these hypotheses, and some preliminary results.

Apparatus

A block diagram of the Hadron Monitor ion chamber and peripheral electric circuit is shown in Fig. 2. A large capacitor is connected upstream and downstream of the plates to hold a bias voltage in the plate gap. The capacitance and impedance are 5 μF and 100 kΩ, respectively.

The Hadron Monitor is approximately one meter tall by one meter wide, and is comprised of 49 pixels, seven on a side. Each pixel consists of a single ion chamber with a pair of ceramic plates, spaced 1 mm apart [Zwaska 2005]. The beam passes through the Monitor, perpendicular to the pixel matrix, and ionizes the helium gas inside. In each pixel, a power supply generates a positive potential to one plate to collect the electrons produced, while the negatively charged plate collects the positive ions. The accumulated positive charges are led into an integrator, which converts them into a beam signal.

Performance Analysis

A. Ion Chamber Signal

Fig. 4 shows snapshots of the Hadron Monitor signal taken in October 2013 and May 2017. The Hadron Monitor was new in October 2013. After almost four years’ operation, several pixels are dead, as shown by the blue pads in the May 2017 data.

Beam Signal Linearity

We calculated the linearity of the beam signal as the gain, representing the linear proportionality between the beam intensity and the beam signal. This value was obtained by subtracting V_beam (the pedestal, representing a conductivity in the original proton beam) from V_beam (the signal, which is the rate of charge flow in the original proton beam). It is critical to consider beam size when analyzing signal linearity as a function of beam intensity, as the Hadron Monitor is very sensitive to the beam size. This sensitivity is due to the fact that some primary protons which distribute at the tail miss the target and directly hit the Hadron Monitor—the wider the beam, the greater the number of protons that miss the target.
The functionality of pixel #178 declined gradually, but also eventually experienced a sudden drop in signal, as shown in Fig. 8. Pixel #178 responded predictably to beam intensity until October 2015. It stopped temporarily between October 2015 and April 2016, during an increase in beam intensity. The signal returned after this time, but again disappeared during another increase in beam intensity in April 2017. Since that time, there has been no further response from #178.

Fig. 9a shows the observed linearity of #176 (central, most sensitive pixel) as a function of the primary beam intensity. The functional decay of pixels #175 and #178, although not identical, show similarities, suggesting that they might be attributed to the same cause. Pixel #176 died suddenly, after a short amount of time. Pixel #178 experienced a slow malfunction (perhaps due to radiation damage), but then dropped out suddenly in a fashion similar to that of #175. This sudden failure seems to indicate an electrical problem.

Potential Loss Sources

We discuss several possible sources of beam signal loss, according to our analysis of Hadron Monitor data from October 2013 to May 2017.

A. Electrical Malfunction

The decline of pixel #175 is not identical, although show similarities, suggesting that they might be attributed to the same cause. Pixel #176 died suddenly, after a short amount of time. Pixel #178 experienced a slow malfunction (perhaps due to radiation damage), but then dropped out suddenly in a fashion similar to that of #175. This sudden failure seems to indicate an electrical problem.

B. Leakage Current

Ideally, there should be no leakage current on the ion chamber plates, since they are electrically isolated from the ground. However, in practice, a leakage current has been observed by a current monitor on the power supply. This indicates that the plates are weakly short to the ground. The resistance of this short

age is on the order of MΩ or higher, based upon the observed bias voltage (40-100 V) and leakage current (a few nA to 100 µA). The shortage changes the bias voltage on the plates and affects the stability and linearity of the output signal.

Again, the pedestal in the ion chamber signal represents a conductivity in the plate gaps when the beam is turned off. The observed pedestal varies slightly, but remains small in all pixels studied, at all times. There does not appear to be a size correlation between the observed leakage current and pedestal. This suggests that the charge conduction in the plate gap is not the source of the leakage current; the true source is unknown.

C. Space Charge Effect

Space charge is another potential source of linearity loss in the ion signal. A strong space charge effect is capable of significantly increasing the number of ionized electrons in an ion chamber. A detailed investigation was made for an ion chamber in numerical simulation by using a test beam before installation. Fig. 10 shows the observed ion chamber signal as a function of the bias voltage, produced with a test beam.

This test suggests that the linearity of the output signal can fluctuate by 10% when the bias voltage is altered between 120 and 145 V, while the ion chamber accepts 22 e2 particles. Additionally, we found that between November 2016 and January 2017 (when the beam intensity was increased without changing the beam size), the linearity dropped by about 30%, when the beam intensity increased by 50%.

D. Gas Impurity

The loss of linearity observed on the central pixel of the Hadron Monitor may be caused by impurity of the He gas inside the Hadron Monitor. This impurity is another potential cause of #176’s slow decline before its sudden death.

If present in significant quantities, an electronegative gas like O2 would capture ionized electrons and drastically change the plasma dynamic. Fig. 11 shows a block diagram of a gas regulation system. The exhaust line was extended from the end of the existing pigtail, and another 50’ pigtail was created. A bypass line containing the sample chamber and four ball valves was added with two stainless steel fittings. To collect the exhaust gas, the bypass line valves were left open over a period of several days. The sample chamber was then removed by closing all four valves and disconnecting the chamber from the bypass line. The two valves proximal to the chamber held the gas in


FIG. 9a Observed beam signal linearity on #176 as a function of primary beam intensity.

FIG. 9b Ion chamber test measurement taken in He, prior to Hadron Monitor installation.

FIG. 10. Ion chamber signal as a function of space charge, as measured by a test beam.

FIG. 11. Block diagram of gas regulation system.

FIG. 12. Observed O2 level in ion chamber.

Diagnostic System

The Hadron Monitor is not designed to be taken apart; currently, no means exists of repairing damaged pixels without replacing the entire Monitor. However, possible He impurity due to backflow in the chamber’s exhaust line is more easily addressed. A small vacuum chamber has been designed, manufactured, and installed in the Absorber Hall to collect exhaust gas from the Hadron Monitor. Fig. 13 shows a schematic of this sample chamber connected to the Hadron Monitor’s exhaust line.

The exhaust line was extended from the end of the existing pigtail, and another 50’ pigtail was created. A bypass line containing the sample chamber and four ball valves was added with two stainless steel fittings. To collect the exhaust gas, the bypass line valves were left open over a period of several days. The sample chamber was then removed by closing all four valves and disconnecting the chamber from the bypass line. The two valves proximal to the chamber held the gas in
FIG. 15. Qualitative spectrum of gas sample produced by GCMS. A high He peak is observed, as well as relatively high intensities of contaminant gas.

Future Work

The GCMS measurements must be repeated with new samples to ascertain their validity. Additionally, it would be helpful to convert the qualitative readings that were produced into concentrations, to determine the exact degree of He contamination inside the Hadron Monitor. This could be facilitated by using an RGA (residual gas analyzer) instead of a GCMS. It might also be beneficial to explore more direct ways of measuring the gas. This could eliminate the possibility of leakage into the sample chamber from the air, between the removal of the chamber from the Absorber Hall and the testing of the gas in the GCMS. An oxygen analyzer is considered for this purpose.

Conclusion

The performance of the NuMI Hadron Monitor was evaluated by analyzing measurements taken since October 2013. Several pixels near the center are malfunctioning, but there is no means of individually repairing or replacing them. The central pixel itself has experienced some loss of beam signal linearity, but still matches initial ion chamber test measurements fairly well. We have determined that its performance is reliable enough to secure the primary task of the Hadron Monitor, which relies most heavily on this central pixel. Therefore, it is not yet necessary to replace the Monitor.

Additionally, we have designed an apparatus to conclusively diagnose a possible contamination of the helium gas inside the Hadron Monitor. The gas being vented from the Hadron Monitor’s exhaust line is collected into a small chamber so that it may be injected into a GCMS (gas chromatograph-mass spectrometer) to determine its composition. Preliminary results seem to indicate that atmospheric contamination is present, but these measurements must be repeated before they can be considered reliable.