# Table of Contents

Volume 4 | Issue 1 | Spring 2018

**From the Editors**
- Letter from the Editors

**Interviews**
- Hannah Patenaude, UNLV Senior Editor
- Dr. Samuel Parrish, M.D.
- UNLV School of Medicine, Charter Class
- Dr. Dale Netski, Ph.D.

**Research Articles**

**Economics**
- Does Having Children Make Cents? An Economic Analysis of the Gender Wage Gap in Nevada, by Jeffrey Wheble
  - [http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_1](http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_1)

**Psychology**
- Attachment Styles of Predictors of Relationship Satisfaction Within Adulthood, by Oceana Hill
  - [http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_2](http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_2)
- Ascending versus Descending Timers: Stress and Motivation, by Arno Ruymaekers
  - [http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_3](http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_3)

**From the Editors**
- Acknowledgements
- Undergraduate Research
- NSURJ Statistics
To the state of Nevada:

The Nevada State Undergraduate Research Journal (NSURJ) was established by the Associated Students of the University of Nevada (ASUN) in 2014. The function of the journal was to provide a unified, scholarly, peer-reviewed resource for Nevada undergraduates to disseminate their research. The first volume of the journal was published September 19, 2014. NSURJ is currently celebrating its fourth year working with brilliant and talented undergraduates across the state to create new thesis or hypothesis-driven research.

We, the Senior Co-Editors, reached out to the student bodies of multiple institutions throughout the last year. Within these interactions, we received overwhelming support for the journal’s cause, but building a network of communication proved to be difficult, given the vastness of the state and the campuses within. In 2016 and 2017, the Senior Co-Editors catalyzed the creation of a new Senior Editor position at UNLV. As of December 2017, Hannah Patenaude has become the first Senior Editor of southern Nevada. We would like to take this opportunity to welcome Hannah to NSURJ; the new union between our universities will facilitate the proliferation of ideas in Nevada, and we could not be more excited for what is to come. NSURJ now has the resources necessary for ensuring that the undergraduates of Nevada higher education institutions have adequate access to the journal and efficient statewide communication.

Witnessing the current manifestation of the journal in relation to the first issue demonstrates obvious growth, which will certainly continue as NSURJ develops in the future. The production of knowledge in Nevada is accelerating and flourishing exponentially, and we are sure that this expansion of information will be reflected in the journal. This reflection will materialize as a larger representation of the disciplines, institutions and research that this state has established and will continue to establish. The centralization of ideas in NSURJ will surely be improved by our future referees, faculty mentors, Associate Editors and the new intelligent and motivated Senior Co-Editor, Tyler Ewing. There is a grand multiplicity of thought in Nevada that must be captured, and we are confident that the minds of NSURJ will continue to endow an innovative and outstanding publication upon the state.

The fourth volume offers a glimpse of the exceptional research that Nevada undergraduates are capable of generating. The ideas within this issue demonstrate the diverse fields of knowledge that students are actively contributing to. It is these myriad perspectives that allow NSURJ to be designated as an interdisciplinary text. Nevadan thought cannot be reduced to a singularity; it is an ever-expanding network of difference that NSURJ has the honor of unifying.

Our experience as the Senior Editors of NSURJ has given us a remarkable opportunity to assist with the development of undergraduate researchers and create a journal to demonstrate their wondrous achievements. NSURJ will continue to develop as a resource for motivated students indefinitely. With our departure, we will gaze upon the evolving journal with excitement and be elated that we had a chance to be involved with it. We extend our sincerest thanks to all who assisted in the production of NSURJ Volume 4: The Associated Students of the University of Nevada (Especially Dr. James Beattie), Undergraduate Research (Especially Dr. Scott Mensing and Gabriel Golez), our Associate Editors, our referees and all of the authors within this issue.

Sincerely,

Larissa Gloutak & Tanner Lyon
NSURJ Senior Co-Editors
Hello Fellow Scholars!

My name is Hannah Patenaude and I am a native of Charleston, South Carolina. I am entering my fourth out of five years at the University of Nevada, Las Vegas within the Honors College. I am a double major in Chemistry and Communication Studies. A few fun facts about me include my involvement in UNLV’s CSUN Student Government, where I serve as a Senator for the College of Sciences.

I have also been conducting my own research through the UNLV Radiochemistry Program for the past year and a half! My research is attempting to find an efficient method for reprocessing toxic waste that is produced by Nuclear Power Plants. No, I have not developed super powers… yet. Most importantly, I love Hello Kitty and corgis.

As the first Senior Editor for the Nevada State Undergraduate Research Journal at UNLV, I am hoping not only to help alleviate some of the tasks that exist for my neighbors in the north, as they have been taking on the entire state for over three years, but also provide advertisement and specialized attention to those publishing out of southern Nevada. NSURJ was created to not only unify our state with the robust research produced by our NSHE Institutions and Sierra Nevada College from all over, but also provide unparalleled professional development for our students.

Whether you are an author of a piece within this publication or a reader enjoying the cutting-edge research from our Nevadan undergraduates, this journal is a gateway to an ever-changing of growth, discovery, and accomplishment.

Enjoy!

Hannah Patenaude
NSURJ Senior Editor
How did you begin conducting research?

I entered student affairs in 2000. Prior, I was hired at Johns Hopkins University in 1997 to run their college health service. Most of the work I did at Johns Hopkins was to try to devise educational programs that helped lower binge drinking and experimentation on campus and to monitor drug and alcohol use with campus-wide surveys that were there when I transitioned over to Student Affairs.

What does your research focus on, at this point in time?

In 2000, I became the Student Affairs Dean at Drexel in Philadelphia. I started looking at what factors were consistent in students experiencing difficulty in medical school. Why were students experiencing trouble? It was almost an epidemiological approach. In the twelve years I was at Drexel, how many students got in trouble academically? What were the characteristics of those students? Were any of them academically unprepared for medical school? How often did mental health issues compound their academic difficulties? What was the incidence of drug and alcohol use in terms of students who had difficulty academically? What were the factors associated with students doing poorly? There is a huge research consortium out at the Mayo Clinic in Rochester, Minnesota that looks at students who have difficulty in medical school. It is a really unique population; everyone who gets into medical school is in the top 5 or 10% of their college class. They have done extremely well academically and they have done well on national exams. So you are looking at people who are, by-and-large, exceptionally capable. Why would someone who is that talented and that capable experienced difficulty at this time? There is a number of people who are doing some good work in that area that try and identify the factors that are associated with students having problems at this level. That is my area of interest these days - trying to figure out what are the factors involved in this. How can you identify them early? How can you intervene?

What aspects of your research have been implemented into the UNLV School of Medicine curriculum?

In many medical schools, examinations are extremely high-stake events. Students will take exams every ten to twelve weeks. They account for an awful lot. There is a huge penalty that goes along with doing poorly on an exam. Our approach is we would rather give quizzes every couple weeks where they are very low-stakes examinations. For example, if I am giving an exam that is largely biochemistry and a student does fine on all the questions except metabolism, then what I understand that is where the deficit lies. In terms of designing a remediation, or a way to approach that academic difficulty, it does not make sense for me to force this student to try to relearn translation and transcription when their area of deficit is intermediary metabolism or acid-base. It allows us to target our remediation to an area of specific deficit. Now, if a student does poorly across a spectrum on an exam, we know this is the student who had difficulty with that. We will approach the student’s needs in a different way. It allows us to target student difficulties in a way that is a lot more specific. I actually think it is better from that perspective. We are doing things like very frequent low-stakes quizzes that cover a smaller amount of material, so there is not a huge penalty associated with stumbling. If a student was ill for a week, it is much easier to catch up.

The other thing I think it reflects is how view our curriculum like climbing a step ladder. You do not start on the third step; you start on the first one. The second step relies upon the success of the first one. This brings the class along at the same time and at the same pace. If a student has stumbled on an exam, we are not going to say, “No, you cannot do the make-up work until the summer.” We feel strongly that knowing the material in the second block relies on the material of the first block, so we have got time spaced in our
curriculum to allow students who experience difficulty to catch up. That is one thing we have put into the curriculum. The other is that we are trying to look at being invasive in a good way. If a student has experienced difficulty, we would like to know why. After every one of these quizzes every couple weeks, those who do not perform well will sit down with the learning advisor and myself. We discuss what went wrong. It allows us to say, “Okay, before the quiz, my mom was really sick. I tried to help deal issues with my family.” We feel like that is fine. It is my responsibility that everyone has the resources to be successful. If I am talking to a student and something like this is going on, I want them to let me know; then I can make arrangements to take the exam later, so that one does not fall behind.

We are trying to identify the problems to develop an intervention to address them, instead of a one-size-fits-all method of retaking the exam. We are trying to be a bit more specific in how we address academic issues within medical school. The screening process students go through to enter medical school is extreme. Nobody gets past the doors to medical school if they are not academically prepared to be there. The issue tends to be what is getting in the way. Is it a family issue? A financial problem? What is happening? Is there an ongoing mental health concern? The age-range that the most students are in when starting medical school is an age-range when mental health concerns, like bipolar disease, tend to have a peak. It is not uncommon from students we interview in October to be fine and during second look, in the middle of their first year, the student develops a mental health concern. As long as they identify it and get resources, they can go on to be good physicians.

In many instances, students find it difficult to ask for help. Working differently tends to be the answer. We are bringing in learning advisors to show, “Here is a different way of looking at things.” There are things that students find helpful. I used to be a student who went to lecture, write notes, go home, rewrite notes, organize them, and then re-organize them. Medical school is like taking 32 credits at one time with mostly science. A lot of the material is more conceptual in nature than simply memorize these facts or doing a proof. In my experience, the students who do really well in memorizing long lists of stuff have a hard time with conceptual information. With immunology and genetics, it tends to throw a lot of students for a loop because it is different than anything they have ever done before. We have learning advisors who can guide students and say, “This is how you approach this material.” Or if you are a visual learner and you write it all out, here is a way of doing this efficiently. I would spend hours sitting down and doing this work.

We are going to approach from a causality standpoint, and target to specific - whether it is time management, study skills, it is a different piece of it. We have tried to place it into our curriculum to look at all of this. Another thing we are putting in our curriculum is everything is integrated. If we saw a young person who was involved in substance abuse with a certain type of environment, friends, we look at these as causal factors. Everything is integrated. Anatomy is integrated with physiology, pathology, etc. Everything is integrated for what a patient has. This way the student will learn concepts that will relate to a patient. Every Monday, the students are going to meet a new patient. The patient is their job for the week. In your clinical years, you are going to talk to students saying, “Remember the 38-year-old patient with type 2 diabetes, and remember her issues with acid-base?” Coming out of problem-based learning, the patients are real. When you are learning in clinical years, you are going to remember these things in context.
UNLV Medical Students Interviews
Charter Class of 2021

Vladislav (Vlad) Zhitny: I started going to UNLV in 2012. I come from College of Southern Nevada. I went originally for biochemistry and then switched over to biology. I had a minor in global entrepreneurship. I graduated from there in summer 2017. I was also a member of the Honors College.

Elizabeth (Liz) Groesbeck: I went to Carleton College for my undergraduate degree, in a small town in Southern Minnesota. I was a dual psych-bio major throughout almost all of my time there. I graduated with Honors. I just graduated with my Masters of Science in Neuroscience at the University of Nevada, Reno. Green Valley all the way!

Chris Endo: I went to Duke University for mechanical engineering, then did not like it. I decided to go into medicine instead. I graduated just last year.

Tanner Lyon: Currently, you are all in the school of medicine. At this point, what would you say your area of study is?

Vlad: I originally wanted to go into medicine because my grandfather passed away from brain cancer, so I wanted to be a neurosurgeon. As time progressed, cancer is not necessarily bound to one place. Once I was in the United States, I realized oncology is what I am interested in. I did some research. While doing that, I realized researching cancer is different than treating patients with cancer. That is why I am undecided right now.

Liz: I really like brains. I had a situation where we almost lost my sister to a brain disease; neurosurgeons at the Mayo Clinic saved her. I landed a really great shadowing program here where they study neurodegenerative diseases. That was right before sophomore year of college. It sparked my interested in Alzheimer’s research. All throughout undergrad, I studied Alzheimer’s. I have written several self-study research papers in grad school. One is currently being reviewed by a neurobiology professor at UNLV. I am really drawn toward neurology.

Chris: I have been working as an EMT. When I took an EMT class in college, it sparked my interest in medicine. I am interested in everything about medicine. For now, I am geared toward emergency medicine and cardiology. Hopefully in the future, I will explore more. I am also interested in public health.

Tanner: I have been told 100% of medical students at UNLV have been involved in research. What was everyone’s introduction to research?

Vlad: When going into research, I wanted to see what I wanted to do in my life. I started working in the laboratory at UNLV. During my time in the lab, I was invited to go to a presentation by Stanford University. One of their assistant deans approached me. I got some information from the associate dean and got into their program. That was in 2014. I worked in Dr. Helena Blaauw’s lab on stem cell research. I started meeting a lot of faculty and asked, “What is the future for cancer treatment?” I met with a cardiologist, who had met with Jimmy Carter. They worked on melanoma that started on metastasizing. I see the future treatment of cancer being immunology. From there, I pursued another laboratory experience at NYU. It was an immunology lab for cancer. This past summer, I worked at Harvard Medical School. I was working in the lab with Dr. Kathy Wu, one of the oncologists there, created a couple of therapies that are going to trial. I also was interested in researching under my immunology instructor, who was studying fruit flies: Dr. Andrew Ungus.
Liz: Once I got back to college my sophomore year, I started working in my primate lab at Carleton. Cotton top tamarins are a pound each. Their tails are longer than their bodies. If you do not screw up, you can do your thesis. My entire undergraduate thesis is inspired by Cynthia Lamar, who is a researcher at Harvard. This past semester, I finally broke and emailed her. One of my best friends at Reno did not know what to get me for graduation. He actually emailed Cynthia and, as a grad present to me, took the two papers she wrote, put them on gloss paper, framed them, sent them to me, and also sent brain-slice coasters. It was all inspired by her. We were looking at cotton top tamarins to see if they would be a good model organism to study Alzheimer’s. The findings were really cool; we found that they would be a good model organism. If they would die, we performed slices and looked at their brains for the amyloid plaques. We got 3 or 4 monkeys through. That is something to be published when 8 monkeys are taught. Cotton top tamarins a good model organism because they naturally develop [Alzheimer’s]. They do it the same way [humans] do. Beta-amyloid 42 starts to deposit before beta-amyloid 40, but monkeys are the way to go. That is a huge project I love. My master’s thesis research was on neural plasticity, specifically sensory adaptation in response to sensory deprivation. They are testing vision in deaf people and set to be published very soon.

Chris: When I started undergrad, everyone around me had research experience in high school. I went to Durango High School. I started looking on websites and see what looks interesting. None of them wanted to hire me because I did not have prior experience. Most people washed beakers. After taking my first bio class of pipetting and PCRs, I had some knowledge and emailed this regeneration lab of cardiac cells with zebrafish. That was coolest thing I ever heard. I emailed the Principal Investigator. He replied and I started investigating the summer after my freshman year. I started shadowing the postdoc and doing little tasks here and there and eventually got my own project. The best way to get into a laboratory is to email a lot of professors.

Tanner: What is interesting in current research and how are you researching it?

Chris: I worked in the lab for 3.5 years. When I got a project, we looked at tissue growth factor, which is a multidomain protein in all the animal kingdom and is overexpressed after injury. After weeks, zebrafish regenerate their spinal cord. How do they do it? Once we performed the quantitative PCR, we found ctgf gene is overexpressed in the spinal cord after injury. I took that gene, made a DNA construct, injected that into a zebrafish embryo, and made a transgenic zebrafish which overexpressed the gene after heat shock. That was part of my project: making fish, injuring the spinal cord, and seeing if you could overexpress the gene even more. We saw an increase in the shorting of time of regeneration. We got it published in Science just last year. I was a co-author. There’s another regeneration lab at UNLV; I emailed her and asked if she is looking for medical students. I am most interested in basic, bench research.

Liz: My interests tie back into my undergraduate years. The big need we have is a true model organism for Alzheimer’s. It has been cured in mice five times, but it has to be induced in mice. They will find things that get close, like dogs who form tangles but not plaques. The issue with monkeys is that you need the physiological and behavioral aspects of Alzheimer’s that are similar to humans. My lab tried to tie it to age-related memory tasks, which we found to be true. The true model organism is not mice, but cotton top tamarins. My research right now is methylation patterns in relation to Alzheimer’s. They’ve shown that some genes show aberrant methylation patterns with high risk to Alzheimer’s. It is very strongly correlated. My proposal is to run blood samples to test for methylation patterns as a bio marker. There is a pathway directly related to the misfolding response. It has been shown they turn off. If we can biomark the people at risk and go in and turn off the pathway, this may be one way to get rid of this awful disease. Methylation is when a methyl (-CH3) attaches to a gene. It messes with how the gene functions.
Vlad: As I was seeking research, after NYU, we were studying the inhibitory T-cell response. T-cells are part of your immune system that cancel cancer cells directly. I was thinking, “Why not control T-cells and macrophages?” I talked to my professor at UNLV. When you have a cell, you have endocytosis and exocytosis. We actually do not know how secretion or exocytosis happens. It is a fruit fly lab that focuses on specific secretion. How does your pancreas secrete enzymes? How do those proactive secretions happen? My project focused on this. Through a series of inhibitions of genes, shox (short hyspicopratin protein). When you inhibit that gene, the whole process stops. We used the fruit fly salivary gland. When you inhibit that, there is no secretion that happens using fluorescent testing. Using single-stranded RNA inhibition. Does it secrete or not? What happens when inhibiting a specific domain? Through this research, we found is it necessary and essential for secretion. We share the exact same gene in humans. After we identified it, they’re moving towards publishing this research. We are waiting to hear. It was my undergraduate senior honors thesis.
What was your path to starting research?

My path to beginning research was probably not typical. I was not involved in research during my undergraduate training, as I spent my time outside of classes working so I could afford to attend UNR. During my 5th and final year in undergrad, a friend of mine moved into the house, which I was renting; he was a lab technician at the UNR School of Medicine. He worked in the immunology lab of Dr. Dorothy Hudig, trying to isolate natural killer cell serine proteases and a molecule called perforin. We would have discussions about the research they were doing and it absolutely fascinated and intrigued me. Since I was unsure of what I really wanted to do after my undergraduate work, I took my roommates advice and scheduled a meeting with Dr. Hudig to discuss the research she was doing and ask questions about graduate school. After this meeting I decided to do a non-thesis Master of Science degree and work so that I could afford to continue my education. During my masters, I volunteered my time during the day, when not going to class, and did research in Dr. Hudig’s lab so that I could continue working at night. During my time in the lab, I learned several immunologic techniques and got to work with some amazing individuals, which made me realize the research setting was what I wanted to do going forward. While finishing my Master of Science degree, I was accepted to the Cell & Molecular Biology program at the UNR School of Medicine. I did my Ph.D. with a great mentor, Dr. Stephen St. Jeor, examining the pathogenesis of Sin Nombre virus (hantavirus) infection.

What does your position at UNLV School of Medicine entail?

I am currently the Director of Medical Student Research at the UNLV School of Medicine. While finishing my Ph.D. in Dr. St Jeor’s lab, I was starting the process of looking for post-doctoral fellowship opportunities outside of Nevada, because I was born and raised in Las Vegas and did all my education in Reno. In the process I met my wife and she had been accepted to the School of Medicine at UNR. So the question became, “Do I leave Reno and my wife to do a post-doc while she attends medical school?” I decided to stay in Reno while she attended medical school and find a post-doc that would allow me to further my training. I decided to choose a new investigator, Dr. Ron Washburn at the VA medical center, who was examining cell-mediated immune responses to the opportunistic fungal pathogen called Aspergillus fumigatus. I learned several new immunologic techniques while training with Dr. Washburn and, after a year or so, he decided to leave to pursue research at another institution. My wife was in her second year of medical school at this point, so I wanted to continue my post-doctoral training in immunology and was fortunate to be accepted in Dr. Tom Kozel’s research program. While in Dr. Kozel’s lab, I examined the pathogenesis of another fungal pathogen Cryptococcus neoformans. My time in Dr. Kozel’s lab was spent learning how to make monoclonal antibodies to the carbohydrate antigens of C. neoformans. I then used these immunologic reagents to examine Fc-dependent and Fc-independent opsonization of C. neoformans and the role that epitope specificity played in this important interaction. After spending 2 years under the amazing mentorship in Dr. Kozel’s lab, I started applying for faculty positions.

Please describe your research history thus far.

My first faculty position was in the Division of Infectious Diseases at The Johns Hopkins School of Medicine and my wife matched in a residency program at the University of Maryland Medical Center. My research at Johns Hopkins allowed me to continue with the immunologic focus of my research, but now examining the role the humoral immune response played in Hepatitis C virus infection. My laboratory developed an approach to assemble HCV pseudoviruses from a library of HCV patient sequences to examine the role of anti-HCV glycoprotein antibodies to drive sequence evolution in acute HCV infection. I was also involved in several studies
examining HIV and HBV infection. After 6 years on the faculty at Johns Hopkins and having 2 young children, my wife and I moved back to Las Vegas to be closer to family.

**How are you implementing your research at the UNLV School of Medicine?**

In my role as the director of medical student research at the UNLV School of Medicine, I am developing the standards for the medical student research projects that are part of the 4 year medical school curriculum. Recently, I have been assembling a team of multi-disciplinary researchers, both laboratory and community based, to mentor the medical students in their research projects.

**Who should be involved in research?**

I absolutely believe that undergraduates should be involved in research. Education at the college or university level is more than a mastery of content. The process of learning, critical evaluation, questioning, and development of new ideas are the facets of education that doing research will help in mastering.

**What advice do you have for such undergraduates involved in research?**

My advice for undergraduates doing research would be to focus on the mentor that they choose for their research, rather than focus specifically on the content area of the research program. By choosing a mentor that meets your individual needs, who has your best interest in mind and provides guidance while also inspiring you to develop your independence, I believe the scientific learning process can be mastered. In addition, a research group that will allow for an enjoyable experience and a research environment that will allow you to realize your full potential are also paramount.
Economics
Does Having Children Make Cents? An Economic Analysis of the Gender Wage Gap in Nevada

Jeffrey Wheble and Dr. Djeto Assané

University of Nevada, Las Vegas. Department of Economics

DOI: http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_1

Abstract: I examine Jane Waldfogel’s hypothesis regarding the family pay gap in Nevada. Women have made progress in human capital equality with men, yet there remains an unexplained gap. The salient summary statistics illuminate why there remains a pay gap before moving on a pair of ordinary least squares (OLS) models split by gender. A Blinder-Oaxaca decomposition was performed to uncover how much of the gap in this sample is due to traits differences and how much comes from the treatment of traits (i.e. discrimination). A total wage gap of 31% is found, about two-fifths of which is due to discrimination. The family pay gap hypothesis finds some evidence in this analysis via marriage. Human capital and occupational choices are also found to be important in explaining the wage gap in Nevada. The implications of these results suggest further research into the differences in labor market choices, maternity leave policy, and differing returns to education are offered.

Introduction

Despite the skills convergence discussed by Goldin (2014) which brought the gender pay gap from 60% to 76% (Blau & Kahn, 2000), the difference between the wages of men and women calls out for explanation. This paper focuses on testing the hypothesis offered by Jane Waldfogel (1998) and several labor economists worldwide: children and the family structure are behind the remaining wage gap. Waldfogel (1998) argues that a lack of support in the US for mothers is the cause of the wage gap. Mothers often bear the cost of children, which deters from their careers. Intuitively, the idea of unequal burden-sharing makes sense. If the mother and father both work and have an equal interest in raising those children, there are still more ways to unequally divide labor than to do so equally. The distribution of hours spent with children might be thought of as standard-normal, where the mean is equal division and the tails are skewed towards one parent or the other spending more hours with children. If that distribution is shifted by social pressures on women to take on the responsibilities of children, then one can easily expect that more women will be stuck with an unequal burden than fathers. Time is the scarcest resource of all, and when one partner in a family must make the trade-off between time with kids and time at work, it follows that the partner saddled with the extra responsibility will lose out. Without maternity leave, Waldfogel (1998) argues that mothers also experience a delay in their careers while fathers continue with theirs because women are, as mentioned earlier, usually burdened with childcare. I will refer to Waldfogel’s explanation broadly as the “family pay gap” in this paper.

Since the family pay gap research was initially completed, there have been other analyses focused on the family and its influence on wages. A decade after the Waldfogel work, a paper by Miller (2009) addressed the possibility that when one has children matters. Implicitly, this means that children matter to wages. This later work offers some support to Waldfogel’s hypothesis via unequal burden effects; it is not the number of children, but the mere fact of having them that impacts women’s careers. In other words, each child after the first has a diminishing marginal cost to the mother in terms of lifetime wages. Miller (2009) points out that having a gap in one’s career without maternity leave and legal protections (which are not protected under the law in the United States) stunts one’s capital accumulation,
which has long-term consequences, such as capital compounds. The earlier the stunting, the greater the effect (Miller, 2009).

Another analysis by Budig and England (2001) details four main routes by which motherhood may hurt women’s wages. Mothers may, by taking time off to care for children, be trading job experience for child-rearing. This results in lowered wages, since experience is strongly linked to pay (Budig and England, 2001). One route which echoes Goldin’s (2014) flexibility preference explanation is that mothers prefer jobs that are suitable for their need for a schedule which might allow them to work and raise children (Budig and England, 2001). The remaining two routes are lower productivity due to motherhood and outright discrimination.

Recent research by the Department of Labor also refers to the family to explain part of the gap. Goldin’s convergence of human capital leaves much to be explained since the gap is widest among those with higher levels of education (“Women’s Earnings and the Wage Gap”, 2016). Furthermore, the gap widens as people grow older, which would complement the idea that children disrupt the careers of women; if there is an interruption early in life, perhaps between 25 and 35 years of age, then that effect will affect those older than 25-35 much more than those younger on average (“Women’s Earnings and the Wage Gap”, 2016).

Goldin’s (2014) oft-referenced explanation compliments Waldfogel’s explanation: job preference may differ between genders via differing preferences for flexibility, which would impel women to seek part-time work in more flexible fields at a higher rate than do men. That explanation may strongly relate to children because the possibility of having children and the social expectations of handling childcare could impose extra costs on women, which men are not concerned with. That difference in costs, which generally involves the time-commitment of children and the potential loss of career advancement, could explain why women make different occupational choices than men, if they do.

The preceding analyses of the gender wage gap will be applied to Nevada, a frontier state in terms of demographics and as a service-oriented economy. Focusing on a single state will allow this research to address the wage gap without distortion from unobserved factors and the methods may be later extended to other states for comparison in later research. I first illustrate the pair of models with which I attempt to analyze the wage gap in Nevada. I use the Nevada subset of the American Community Survey (ACS) from 2014, a sample which describes 12,430 workers. The data set has been cleaned to eliminate outliers. Summary statistics will be provided to contextualize these results in Nevada. I proceed to perform several regressions and analyze the results with respect to the hypotheses in question. I compare means and OLS regression coefficients of female and male subsets of the data set, examine joint significance for each category of variable in the model, and perform a Blinder-Oaxaca decomposition by the female variable.

**Summary Statistics**

By 2060, some estimates assert that the US census will reflect the results from Nevada (Kolko, 2017). Some selected summary statistics are presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S. d.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage ($/year)</td>
<td>41738.29</td>
<td>46608.79</td>
<td>520</td>
<td>355000</td>
</tr>
<tr>
<td>Part-time (&lt;35 hours/week)</td>
<td>.2656476</td>
<td>.4416952</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>.2501207</td>
<td>.4330998</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Married</td>
<td>.5267900</td>
<td>.4993019</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td>42.91022</td>
<td>14.35152</td>
<td>16</td>
<td>91</td>
</tr>
<tr>
<td>Black</td>
<td>.0625101</td>
<td>.2420894</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.2180209</td>
<td>.4129183</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Asian</td>
<td>.0817377</td>
<td>.2739758</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>.4769107</td>
<td>.4994867</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Food and Beverage</td>
<td>.0938858</td>
<td>.2916815</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Entertainment</td>
<td>.0179405</td>
<td>.1327404</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**Table 1: Summary Statistic.** Each variable has been statistically calculated with ranges in cost as min and max.

The average wage in the sample was about $41,000 per year, with a standard deviation of nearly $47,000, i.e. the variation of wages across workers is high among Nevadans. Roughly one-in-four
workers was a part-time employee, which will prove salient in the latter parts of this analysis, wherein part-time work is shown to be a major determinant of wages. A fourth of individuals in the sample had a bachelor’s degree. Education is relevant to one’s wages; Nevadans are slightly less educated than the national average of 32.5% of people over 25 years of age, even if one only considers members of the sample 25 and older (Ryan & Bauman, 2016). The youngest sampled individual was 16 years of age while the oldest was 91 years old. The average age among Nevada workers was approximately 43 years-old. Nevadans worked in numerous industries in this sample; 9% of them were in food and beverage jobs, a staple of the Las Vegas economy, while just under 2% worked in entertainment.

It is important to note the racial and ethnic demography of Nevada since this still plays a role in wages. Just under 22% of the sample was Hispanic, which is the largest non-white population. 8% were Asian and 6% were black; combined, these numbers show a diverse racial composition which lends itself to analyzing wages in a way that can potentially be applied in a broader context. Perhaps most importantly, approximately half (47%) of workers in the sample were female.

Model

Both the female and male OLS wage models I will use can be specified as the following:

$$\ln(wage) = f(\text{Human Capital}, \text{Traits}, \text{Children}, \text{Industry}) + \varepsilon$$

The female model will only include women and the male model will include the rest of the observations. Wage represents income in the last 12 months. Human capital contains variables like age (an instrument for experience) and level of education. Traits are facts about a worker which do not benefit or harm one’s capacity to be productive, such as race or marital status. Children contains the variables for having children and their interactions with the female variable. Occupation contains all variables which specify the industry of which the worker is a part. The symbol $\varepsilon$ represents the error term with the usual assumptions. The definitions of some selected variables are listed in Table 2. Due to the scope of this model, not all variables will be specifically listed in this table.

Human capital variables should all have positive coefficients, except for the quadratic age variable. Age is a proxy for experience, since age and experience are highly correlated. The education variables, which include level of education and years of school, capture the remaining human capital of the worker. The degree variables will capture the sheepskin effect, the additional wage premium of completing a degree on top of spending years in school. The base group for the degree binary variables is the population which has not graduated high school.

Trait variables vary widely in their impact and are included to account for factors which are important in existing research, but these do not constitute the focus of this research.

Goldin’s work, among numerous others, points to a persistent wage gap, which will be partially captured by the female binary variable (2014). The difference between estimates on married between models should favor men, coinciding with Waldfogel’s (1998) hypothesis; women, when married, are frequently expected to settle down and raise children. Marriage, thus, may allow men to work comparatively more and thus benefit from the marriage more than women. Both genders should benefit from marriage in general.

The part-time and hours variables control for the possibility that men and women work different amounts. I expect that working more hours will bring higher yearly wages, simply because each hour worked represents an hourly wage (de facto in salaried positions, yet still applicable). In turn, part-time work can be expected to have a wage penalty because part-time workers are legally entitled to fewer benefits than full-time workers. Furthermore, the flexibility of part-time work lowers the opportunity cost of working for the worker, so the worker does not need as much direct monetary compensation to justify spending his or her time at the job.
The children binary variables could have positive or negative coefficients in a model and it would not speak to the pay gap per se; their interpretations must be sensitive to the context. If the children binary variables are positive for a model containing only men and negative for a model containing only women, that would provide evidence that having children contributes to the pay gap. The children hypothesis would also be evidenced if the variables differ in magnitude or sign between the male and female models. The base group for the children variables is a person who currently has no children aged 17 or under whatsoever.

By controlling for industry, I can further isolate the effects of gender discrimination; in this model, the effect of working in a higher-paying industry will be included, which means that the resultant gap will not be explained strictly by the fact that there are fewer women in one field or another. I use industry to account for the different sectors of the economy; it is reasonable to assume that people who work in mining might make more money on average than those who work in food and beverage. This part of the model will provide ample material to analyze how much of the gender pay gap is due to differences in industry and how much is due to differences within that industry. Of special interest are entertainment with food and beverage industries, which comprise a significant amount of the economy in Nevada. As for signs, I expect extractive industries, business, finance, entertainment, and food and beverage to have a wage premium. The first three listed are well-known for their high wages; there is a lot of money to be had in oil and minerals, business, and on Wall Street. The latter two are highly valuable in Nevada, so the corresponding wages ought to reflect that value. Despite the small number of workers, entertainment is worth including for its sheer importance to the Las Vegas economy.

## Discussion and Conclusion

Coefficients for the variables from both OLS models are listed alongside each other in Table 3. The averages of each variable are also given to clarify the subsequent Blinder-Oaxaca Decomposition results. Due to the scope of the model, not all variables will be included in the table. The regression which had only female workers is denoted by a sub- or superscript 'F' and the one

<table>
<thead>
<tr>
<th>Variables</th>
<th>Definition</th>
<th>Expected Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wage</td>
<td>Wages in last 12 months</td>
<td>n/a</td>
</tr>
<tr>
<td><strong>Independent Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Human capital</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age</td>
<td>Age of worker</td>
<td>+</td>
</tr>
<tr>
<td>age²</td>
<td>Age of worker, squared</td>
<td>-</td>
</tr>
<tr>
<td>school</td>
<td>Years of schooling of worker</td>
<td>+</td>
</tr>
<tr>
<td>assoc</td>
<td>1 if worker has an associate's, 0 if not</td>
<td>+</td>
</tr>
<tr>
<td>colgrad</td>
<td>1 if worker has a bachelor's, 0 if not</td>
<td>+</td>
</tr>
<tr>
<td>masters</td>
<td>1 if worker has a master's, 0 if not</td>
<td>+</td>
</tr>
<tr>
<td>phd</td>
<td>1 if worker has a PhD, 0 if not</td>
<td>+</td>
</tr>
<tr>
<td><strong>Traits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>black</td>
<td>1 if worker's is Black, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>asian</td>
<td>1 if worker is Asian, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>hispanic</td>
<td>1 if worker is Hispanic, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>othernw</td>
<td>1 if worker is another nonwhite race, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>married</td>
<td>1 if worker is married, 0 if not</td>
<td>+</td>
</tr>
<tr>
<td>female</td>
<td>1 if worker is a woman, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>fmarr</td>
<td>interaction of female and married</td>
<td>-</td>
</tr>
<tr>
<td>parttime</td>
<td>1 if worker worked &lt;35 hours usually</td>
<td>-</td>
</tr>
<tr>
<td>hours</td>
<td>Mean number of hours worker worked per work</td>
<td>+</td>
</tr>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>children05</td>
<td>1 if worker only has children 0-5 years old, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>children617</td>
<td>1 if worker only has children 6-17 years old, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>children017</td>
<td>1 if worker has children 0-17</td>
<td>-</td>
</tr>
<tr>
<td>femch5</td>
<td>interaction of female and children05</td>
<td>-</td>
</tr>
<tr>
<td>femch617</td>
<td>interaction of female and children617</td>
<td>-</td>
</tr>
<tr>
<td>femch017</td>
<td>interaction of female and children017</td>
<td>-</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eat</td>
<td>1 if food and beverage worker, 0 if not</td>
<td>-</td>
</tr>
<tr>
<td>ent</td>
<td>1 if entertainment industry worker, 0 if not</td>
<td>+</td>
</tr>
</tbody>
</table>

Table 2: Variables, definitions, and expected signs. This model includes 24 independent variables and one dependent variable. The prior expectations for these variables are presented and grouped according to the model equation.
which had only male workers is denoted by a sub- or superscript ‘M.’

The dependent variable is the natural log of the worker’s wages in the last 12 months. All coefficients are reported to four decimal places. To determine the percent effects of each variable on wage based on the coefficients in the table, one must enter each coefficient into this formula:

\[
\%\Delta w_\text{age}/\%\Delta x_i = 100(e^{\beta_i} - 1)
\]

where \(\beta_i\) is the coefficient on the \(i\)th variable and \(x_i\) is the \(i\)th variable.

<table>
<thead>
<tr>
<th>Variable</th>
<th>(\beta^F)</th>
<th>(x_F)</th>
<th>(\beta^M)</th>
<th>(x_M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>5928</td>
<td>5928</td>
<td>6502</td>
<td>6502</td>
</tr>
<tr>
<td>Constant</td>
<td>6.7140***</td>
<td>n/a</td>
<td>7.0590***</td>
<td>n/a</td>
</tr>
<tr>
<td>Part-time</td>
<td>-0.4267***</td>
<td>0.3339</td>
<td>-0.5646***</td>
<td>0.2126</td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>0.1922***</td>
<td>0.2667</td>
<td>0.2900***</td>
<td>0.2350</td>
</tr>
<tr>
<td>Married</td>
<td>0.0634***</td>
<td>0.4992</td>
<td>0.2256***</td>
<td>0.4973</td>
</tr>
<tr>
<td>Age</td>
<td>0.0908***</td>
<td>42.93</td>
<td>0.0849***</td>
<td>42.89</td>
</tr>
<tr>
<td>Children (&lt;6 yrs)</td>
<td>0.0482</td>
<td>0.0476</td>
<td>0.0147</td>
<td>0.0441</td>
</tr>
<tr>
<td>Children (6-17)</td>
<td>-0.0197</td>
<td>0.1510</td>
<td>-0.0201</td>
<td>0.1484</td>
</tr>
<tr>
<td>Children (0-17)</td>
<td>0.0617</td>
<td>0.0435</td>
<td>-0.0395</td>
<td>0.0417</td>
</tr>
<tr>
<td>Food and Beverage</td>
<td>-0.0652</td>
<td>.0900</td>
<td>-0.0830**</td>
<td>.0974</td>
</tr>
<tr>
<td>Entertain</td>
<td>0.0519</td>
<td>.0170</td>
<td>0.0704</td>
<td>.0188</td>
</tr>
</tbody>
</table>

Table 3: Regressions of the variables. Each value represents the p-value for the corresponding variable. Entertain stands for entertainment.

It is immediately notable that none of the children variables’ coefficients are significant in either model. While not shown in Table 3, the children variables are also jointly insignificant at conventional levels. This result indicates that whatever effects children have on wages are captured elsewhere. While this does not dismiss the possibility that children make up part of the wage gap, the lack of any direct effects of children on wages whatsoever in this sample does limit the avenues for the family pay gap. Perhaps the most important row in Table 3 is that of the married binary variable. Plainly, the returns to marriage are far greater for men than women. This is important because Waldfogel’s (1998) family pay gap predicts that marriage should be the route by which children affect women’s wages. It is also important that marriage, and not the mere presence of children, should matter since it points to which theoretical cause of the family pay gap is more likely to be true. It is largely the unequal burden of the cost of children, not the presence of children, that counts.

Men and women have almost the same incidence of bachelor’s degrees at 23.50% and 26.67% respectively, but the coefficients are starkly different. Men receive an almost 50% greater wage premium than women do, even controlling for type of degree via the industry variables.

Table 4 shows the results of a Blinder-Oaxaca decomposition by the female binary variable. This analysis will show the magnitude of the gap, broken down by differences in traits and by discrimination.

<table>
<thead>
<tr>
<th>Blinder Oaxaca Decomposition</th>
<th>Ln wage gap</th>
<th>Percent difference (rounded)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total gap</td>
<td>.2710871</td>
<td>31.14%</td>
</tr>
<tr>
<td>Due to skills and traits</td>
<td>.1616092</td>
<td>17.54%</td>
</tr>
<tr>
<td>Due to discrimination</td>
<td>.122221</td>
<td>13.00%</td>
</tr>
</tbody>
</table>

Table 4: Decomposition of average gender wage gap. Blinder-Oaxaca Decomposition is present as the different with percentages.

The Nevada gender pay gap in 2014 was for each dollar a man earned, a woman earned about 69 cents. The gap due to observed traits was 17.54%, which means that over half of the magnitude of the wage gap is due to differences in factors such as hours worked and industry. 13%, or two-fifths of the wage gap, however, results from
what is termed discrimination in the foundational papers upon which this research is founded (Cotton, 1988). Roughly half of the wage gap found comes from differing treatment of those characteristics between men and women, such as marriage and education differentials (see Table 3).

The family wage gap hypothesis is evidenced in Nevada by the difference in the married variable between male and female models, which points to the family pay gap. The children variables do not appear significant individually or jointly. This is surprising and might indicate something akin to the sheepskin effect, but for children. The number of years of education are not as important as the degree milestones; the presence of children is more important than the ages of the children. The effects of children and family-building could also be captured, as suggested by Goldin (2014), in occupational traits such as part-time work or flexibility of hours. This result contrasts with Budig and England’s (2001) work at the national level, where children do have a statistically significant effect on the margin. Thus, further research shall examine whether Nevada does differ from the nation in the aggregate. One cannot assume that something true in the aggregate is true of its constituent parts. To address the wage gap effectively, one must understand at each level where the wage gap occurs. Furthermore, the very reason to focus on a single state is to account for unmeasured interstate variation, making it imperative to consider how that variation could affect these results in other environments.

Based on these findings, Waldfogel’s family pay gap does seem evident in the wage gap in Nevada (1998). Occupational choices and differing returns to education are also powerful for explaining why there persists such a wide gender wage gap in the Nevada labor market, yet from Budig and England’s (2001) work, one could posit that the occupational factors are related to choices stemming from motherhood. The reasoning behind men and women making different occupation choices (if they are choices) is a matter for future research. It would be important to start by examining children, since they figure greatly in the wages of human beings. It is not yet clear why women face differing returns to education, nor why the fields that women choose are often paid less than those chosen by men. Further analysis could also examine the causal links between children and the factors that have been shown by previous research to have caused the gender wage gap. Lastly, Waldfogel’s (1998) policy suggests expanding maternity leave laws must be further analyzed for effectiveness in closing the family pay gap.

Nevada achieving gender pay equity is a test for whether the United States may also someday achieve this goal. The burden of children seems to weigh disproportionately on one gender, and if that is the case, current and future generations must approach mothers and fathers as equals in parenthesis.

References


Psychology
Attachment Styles of Predictors of Relationship Satisfaction Within Adulthood

Oceana Hill and Haley Orthel-Clark

Truckee Meadows Community College

DOI: http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_2

Abstract: Attachment styles and relationship satisfaction are universal mechanisms used to develop healthy intimate bonds. There is much debate concerning whether or not attachment styles link directly to adult relationship contentment. This study focused on correlating attachment styles with distinct levels of relationship satisfaction. Participants were asked to report on one central relationship in their lives that exemplified high levels of personal closeness and a strong emotional bond. Attachment styles were grouped into three categories: secure, avoidant, and anxious. Individuals who were classified as obtaining a secure attachment style were hypothesized to reflect a higher level of romantic relationship satisfaction in comparison to individuals who were classified as obtaining an avoidant or anxious attachment style. The findings confirmed this hypothesis: those that had a secure attachment style did obtain a higher level of relationship satisfaction in comparison to those who exhibited an avoidant or anxious attachment style. These results were consistent with conclusions derived from past research regarding attachment styles and relationship satisfaction. The data within this particular study can be employed to support future research on the implications attachment styles may have on relationship satisfaction.

Introduction

It has often been stated within the field of psychology that individuals develop a significant relationship with their primary caregiver, which begins at birth and persists throughout childhood. This interpersonal connection often generates a pattern of attachment that typically remains consistent throughout all relationships within one’s life. This pattern of attachment has been formally addressed as an “attachment style” and primarily reflects how one chooses to pursue and maintain the various relationships that they develop over time. Attachment styles occur in three main forms: secure, avoidant, and anxious. Individuals with a secure attachment style often characterize themselves as one who finds it easy to become close to others and are more likely to build strong bonds through dependence on others and having others depend on them. Individuals with an avoidant attachment style typically report feeling uncomfortable being close to others and find it difficult to trust anyone completely. Furthermore, those with an anxious attachment style state that others are reluctant to get as close to them as they would like and often worry that their partners do not truly love them or do not truly wish to be with them. The connection between attachment styles and the ways in which people perceive their close relationships is an increasingly important element when looking at characteristics of emotional bonding.

In order to evaluate different attachment styles within intimate relationships, it may prove beneficial to first examine links between attachment styles and the construct of relationship satisfaction. Past research has suggested that many individuals typically do not have specific ways in which they define a romantic relationship, but often state that romantic relationships are believed to provide a mixture of personal closeness and attachment (Banker, Kaestle, & Allen, 2010). This idea was uncovered from a study where participants, aged 18 to 24, were asked a series of questions involving how they know they are in a partnership and how they define different roles that are assumed in the context of relationships. It has been established that secure attachment styles positively impact self-esteem and are linked to diminished anxiety (Meyers, 1998). To examine this idea, a study was
conducted where 323 undergraduate college students were given an adult attachment questionnaire in conjunction with a defense mechanism inventory and a self-esteem scale. Strong correlations resulted between an undergraduate’s ability to manage stress and anxiety and the general category of the attachment style. Being able to cope with stress allows for one to ease conflict, generate compromise, and build close emotional bonds within the context of a relationship. Contrastingly, if individuals cannot adequately manage stress, they may withdraw from others, become emotionally distant, and fail to provide or seek support within relationships.

The conventional skill of building rewarding relationships is commonly structured by factors associated with interpersonal functioning. In a 2012 study conducted by Holland, Fraley, and Roisman, it was found that having an anxious attachment style was the leading factor in causing consistently low quality relationships. Individuals with attachment related anxiety interacted with their romantic partners less positively; they communicated infrequently and with more hostility than those who reflected a more secure attachment style. Attachment related anxiety was thought to be a specific reflection of perceived interpersonal functioning. Previous findings have established that certain opinions associated with how young adults feel about romantic relationships are based off the relationship exemplified by their parents (Trotter, 2010). The study developed by Trotter (2010) measured the marital status of each participant and then recorded their rating of the impact of their parents’ relationships on their through self-report assessments. Overall, it was found that parental relationships are a highly contributing factor to the success of all future relationships that are experienced throughout a child’s life.

There is a significant connection between attachment styles and the actual intimate commitments that are made by the individual (Coy & Miller, 2014). This deduction was derived from a study that examined four main relationship challenges: lack of recognition, cultural/religious pressures, financial instability, and differences in the definition of “formal commitment.” It was conclusively revealed that all four of these categories play a role in how one communicates their attachment style within the context of romantic relationships. Generally, it can be stated that various contexts, both physical and psychological, impact behaviors associated with taking personal chances within an intimate relationship, personal chances typically meaning giving up all other romantic relations in order to be with another individual. Research done by Elliott, Easterling, and Knox (2016) found that individuals typically calculate the rewards and costs of a proposed act and further work toward taking chances only when the immediate consequences are more positive than negative. This information can prove useful when analyzing how an attachment pattern works in order to establish an intimate connection.

More detailed research has revealed that those in primarily healthy romantic relationships, defined by characteristics such as open communication and the ability to trust one another, experience fewer mental health and physical problems, engage in less risky behaviors, and are associated with less problematic life outcomes. Braithwate, Delevi, and Finchman (2010) determined that romantic relationships keep individuals focused, committed, and more likely to generate healthy lifestyle habits. This conclusion was obtained through a sample of 1,621 college student who were given surveys that asked questions associated with relationship status, mental and physical health problems, and risky behaviors in the form of sexual history and substance abuse. This particular study brings a clear focus to the idea that relationship satisfaction is made up of numerous factors.

Many individuals experience differential psychological and physiological impacts that can be directly attributed to their attachment style. More specifically, there are significant differences expressed when comparing those who exemplify a secure attachment versus those who do not (Stanton & Campbell, 2014). This conclusion was illustrated in a study that analyzed past literature focused on the implications of attachment anxiety and attachment avoidance on health. Relationships were established as important indicators of mental and physical health, which influences factors such as how one copes with stress. A substantial amount of research supports the idea that attachment styles correlate to relationship satisfaction and the general ability for one to pursue a romantic relationship.
Additionally, past research has aimed to place an emphasis on defining the correlation between attachment style and the capacity for intimate interactions later on in life. A study conducted by Mayseless and Scharf (2007) focused on assessing attachment styles and their role as potential contributors within adolescents’ capacity for intimacy. An avoidant attachment style is associated with less capability for intimacy while secure attachment style is associated with a higher potential for intimacy.

From the literature, it can be determined that attachment style is a valuable aspect of relationship development; however, conducting additional experimentation is necessary to link individual attachment styles to more specific elements of relationships. The focus of this current study is to utilize a means of categorizing attachment styles with the intent of further correlating them to distinct levels of relationship fulfillment. With this approach, information that reflects direct comparisons or direct contrasts between attachment style and relationship satisfaction may become more apparent and provide additional support to already existing research. Individuals who are classified under a secure attachment style are expected to express higher levels of relationship satisfaction when compared to individuals who are classified under an avoidant or anxious attachment style.

Methods

Participants

A sample size of 40 participants was utilized, the participants were community college students sampled from two distinct psychology classes. Approximately 80% of the participants were female and 20% were male. Ages ranged from 18 to 61 years old. The average participant age was recorded at 22.25 years, but one participant chose not to disclose information about age. No information regarding ethnicity was collected. All 40 participants were included within the analyses of the data collected. The protocols that were put into place were reviewed by the University of Nevada, Reno’s Institutional Review Board.

Materials

Attachment style was measured through the Adult Attachment Scale (AAS) which is a scale that focuses on defining three central adult attachment styles: secure, avoidant, and anxious (Collins & Read, 1990). The AAS consists of 18 items scored on a 5 point Likert-type scale. A rating of 1 indicates strong disagreement and a rating of 5 indicates strong agreement. Participants were asked to select how strongly they agreed or disagreed with a given statement. For example, one item included the statement, “I find it difficult to trust others completely,” and was accompanied by a 1 to 5 scale. Six statements were presented within the AAS that were representative of each attachment style, making up the total of eighteen statements.

Relationship satisfaction was measured through the Relationship Satisfaction Survey (RSS), which included a total of twenty-three questions. The first two questions recorded demographic information in the form of age and gender, while questions 3 to 6 gathered information associated with current relationship status and relationship history. Then, seventeen items scored on a 6 point Likert-type scale were presented, prompting participants to record their level of agreement or disagreement in regards to each statement. A rating of 1 indicated strong disagreement while a rating of 6 indicated strong agreement. For example, the statement, “My partner and I can rely on one another,” was presented and participants were asked to score their agreement on the 1-6 scale located below it. Data was placed within a Microsoft Excel spreadsheet and organized accordingly.

Procedure

An informed consent document was provided to participants prior to gathering data. Survey methodology was the primary form of research design that was implemented. The variables utilized were attachment style and relationship satisfaction. Attachment style is classified as the participant variable, while relationship satisfaction is classified as the dependent variable. Participants were given a packet that included both the AAS and the RSS. The packets were numbered from 1 to 40 to ensure the anonymity of each participant. A number was assigned to each question along with options for selecting which answer was most applicable to the individual. While the packets were administered to each classroom as a group, they were completed on an individual basis.

First, participants were asked to respond to 18 items associated with their generalized feelings regarding all past relationship experiences. Each
item took the form of a statement and the response options were limited within a 1-5 Likert-type scale, whereupon participants circled the number indicating their level of agreement. Then, the RSS prompted participants to provide brief demographical information in the form of gender and age. The next three questions asked respondents about their current relationship status or their most recent relationship experience. Next, 17 statements were presented that intended to specifically focus on the participants current or most recent romantic relationship. If no romantic relationship history was available to report on, respondents were asked to correspond their answers to the closest relationship maintained with either a friend or family member. The various potential classifications of relationships were not differentiated in the results. Each of these statements included response options in the form of a 1-6 rating on a Likert-type scale. Participants answered by circling the number that was most applicable to their level of agreement.

Participants silently marked which rating they believed best represented themselves in regards to all of the statements presented within both the AAS and the RSS. A debriefing was given after the completion of the study, informing participants that no deception took place and providing them with further contact information should they wish to follow up with the results of the study.

Results

It was hypothesized that individuals who were determined to obtain a secure attachment style would reflect a higher level of romantic relationship satisfaction in comparison to individuals who were determined to obtain an avoidant or anxious attachment style. The data was prepared by first calculating each participants’ score for the AAS. These calculations were made by numerically recording each level of agreement with the corresponding statement. The final attachment label was given as a result of the highest score within either the secure, avoidant, or anxious category. A secure attachment style was assigned to the individuals who acquired consistently high scores on the 12 statements that were originally assigned a “secure” label. Avoidant and anxious attachment styles were assigned in the same way. Out of 40 participants, 21 were categorized under a secure attachment style, 13 were categorized under an avoidant attachment style, and only 6 were categorized under an anxious attachment style (M=2.9, SD=1.21).

The RSS scores were calculated by organizing the data into a spreadsheet and determining the statistical averages in the form of mode, median, and range. Four of the items included within the RSS had to be reverse scored in order to calculate an overall composite value. A composite value was calculated for each participant by utilizing Microsoft Excel. As seen within Figure 1, the secure attachment group reflected the highest composite score for relationship satisfaction. The scale along the y-axis was determined by utilizing the composite score values which ranged from 0 to 90 with a standard deviation of 22.5.

A one-way ANOVA was utilized to test the data, which was composed of composite scores. The between-groups mean was calculated at 571.857 with a df recorded at 2. The within groups mean was calculated at 170.796 with a df recorded at 36 (Table 1). An overall F value of 3.348 was acquired. The alpha level of .05 was tested against. The resulting p-value was .04, indicating that the results were statistically significant (p=.04, .04 < .05). To accurately determine where specific differences occurred between the three groupings of attachment style, a t-test was implemented. Group 1
represented a secure attachment style \((M=83.95, \ SD=13.07)\), group 2 represented an avoidant attachment style \((M=72.15, \ SD=13.95)\), and group 3 represented an anxious attachment style \((M=77.0, \ SD=9.88)\).

<table>
<thead>
<tr>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Sum of Squares</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1143.714</td>
<td>2</td>
<td>571.857</td>
<td>3.348</td>
</tr>
<tr>
<td>Within Groups</td>
<td>6148.645</td>
<td>36</td>
<td>170.796</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>7292.359</td>
<td>38</td>
<td>742.653</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Relationship Satisfaction Variance Scores for Attachment Style Groups. Note: A statistical significance was expressed between groups 1 and 2.

Overall, it was observed that participants who were classified as having a secure level of attachment did obtain a higher level of relationship satisfaction in comparison to participants who were classified as having an anxious or avoidant attachment style. A more specific emphasis was expressed through the differences seen between those with a secure attachment style and those with an avoidant attachment style.

**Discussion and Conclusion**

The results that were gathered did support the hypothesis, which stated that individuals who exemplified a secure attachment style would express higher levels of relationship satisfaction compared to individuals who exemplified an avoidant or an anxious attachment style. These results are consistent with the outcomes of past research, which commonly illustrate the idea that attachment style plays a central role in the general level of satisfaction that is experienced within interpersonal relationships. Previous studies have concluded that various aspects of relationship satisfaction link with specific attachment styles and influence how they are communicated within the context of one’s own life (Schindler, Fagundes, & Murdock, 2010). The present study reveals distinct connections between high and low levels of relationship satisfaction in conjunction with attachment styles that either reflect comfort and stability or issues with trust and commitment. A growing body of research has predicted that distinct characteristics of childhood attachment patterns influence the direct development of healthy versus unhealthy attachment styles (Trotter, 2010). Additionally, attachment styles oftentimes express characteristics such as physiological health and general life success (Stanton & Campbell, 2014). Comparatively, the general findings of this study proved significant, and therefore can be utilized to further support these statements developed from previous research.

Overall, the study design maintained several strengths. In addition to only taking 20 minutes to complete both surveys, the study was simplistic and used a considerably small amount of money. Moreover, all individuals were exposed to the same surveys and a decent amount of variation was included within the sample size; in other words, participants were not exclusive to only one age or gender. Furthermore, due to obtaining a fairly small sample size, the research question was able to be addressed directly and in a relatively short space of time. Nevertheless, certain limitations may have played a notable role in the results. The study sample consisted of 32 females in comparison to 8 males, generating a large disparity in gender. The findings also indicated that only 5 participants were classified under an anxious attachment style, which is a considerably lower number than participants that were classified under a secure or avoidant attachment style. Many additional factors that may contribute to relationship satisfaction, such as sexual interactions and financial values, were not taken into account within the provided survey items. Additionally, the survey items utilized were self-report measures, which may potentially acquire information that is inaccurate in nature.

The results of this study can be employed in order to assess future research involving the impact of attachment style on relationship satisfaction. It may be the case that variables can be altered in order to achieve a differential outcome. In future research, it may prove useful to allow for a larger variation, in regards to both age and ethnicity, of individuals to complete similar survey items. For future studies, more items associated with each attachment style may be beneficial to control for similarities that might make it difficult to categorize a single individual under one exclusive attachment style.
Administering of survey items could take place in a setting that targets couples, versus the individual, allowing for data to then be linked to the couple exclusively and express more detailed information regarding relationship satisfaction. Replicating the study within different populations, such as on various college campuses or amongst specified age ranges, might allow for the development of more exclusive data that can link attachment style and relationship satisfaction to a more distinct expanse of individuals. Similar survey items could also be administered that directly target different categories of relationships, such as friendships or relationships with family members, to assess how levels of relationship satisfaction may alter when the relationship in question is one of a certain nature.

Ultimately, attachment style in correlation to relationship satisfaction likely maintains prospective implications for understanding the emotions and actions that humans display within interpersonal relationships. The benefits of attempting to connect attachment style to how one approaches and maintains relationships plays a significant role in the ability of one to understand the mannerisms of themselves and those around them, contributing to the potential success of lifetime bonds and connections.

References


Ascending versus Descending Timers: Stress and Motivation

Arno Ruymaekers and Dr. Christina M. Frederick

Sierra Nevada College, Department of Humanities, Psychology Program DOI: http://dx.doi.org/10.15629/6.7.8.7.5_4-1_S-2018_3

Abstract: A paucity of research exists on how timed tasks affect stress and motivation. The current experiment aims to contribute to the modern understanding of these fields. Stress occurs when an individual is unable to cope with situational demands and experiences discomfort as a result (Cox, 1985). The behavioral model of motivation (Touré-Tillery & Fishbach, 2014) explains individual motivation during task completion. This experiment employed a within-subjects design to examine the impact that the direction (ascending vs. descending) of a digital clock timer has on stress and motivation using a card-matching activity. Stress was indicated by Emotional Stress Reaction Questionnaire (Larsson, 2010); score and motivation was measured by how efficiently and accurately the participants finished the assigned task. The participants (N=31) were all undergraduates attending Sierra Nevada College. In ordered to familiarize the participants with the goals and instructions of the full-length (5 min) card matching activity and minimize practice effects, a practice card matching activity was issued to all participants prior to the time measured experiment. Participants then completed the full-length card matching activity under ascending and descending timing conditions in counterbalanced order. To emphasize the presence of the timer in the experiment, the time present on a prominently displayed digital clock was noted following each match. Participants completed the ESRQ after each timing condition. While the paired t-test showed no significant difference (p=.318) in stress between timing conditions, a significant increase (p=.007) in motivation was measured when a descending timer was used. When applying the findings of the current study to a timed workplace or sports setting, the benefits of a descending timer in regards to motivation should be considered.

Introduction

We live in a society that emphasizes efficiency and time management. Due to the importance of time management, many tasks completed in workplace or school settings are timed tasks. Although these timed tasks play a role in our lives, little research has been conducted on how individuals are timed and the effect this timing method has on our motivation and stress. The differences in stress and motivation produced from the use of an ascending timer (e.g. a stopwatch) versus a descending timer (e.g. a countdown clock) have yet to be studied in detail. Kellogg, Hopko, and Ashcraft (1999) suggested time pressure was likely to lower performance as a function of anxiety. In their experiment, participants completed tasks involving arithmetic under timed and untimed conditions while math anxiety levels were tracked. They found that time pressure lowered performance on the arithmetic tasks, despite the math anxiety level of the participant (Kellogg, Hopko, and Ashcraft, 1999). Kellogg, Hopko, and Ashcraft (1999) suggested having a timer while completing arithmetic tasks added to the anxiety that participants felt. The aim of the current study was to examine the direction of timing and the impact on stress and motivation.

Workplace and school environments can be stressful. Minimizing this stress, when possible, may have increased long term health benefits. Stress occurs when an individual recognizes they are unable to cope with the demands of a situation and is often induced by life changing events (Chamberlain & Zika, 1990). Cox (1985) emphasized the centrality of the discrepancy between the level of demand present in a situation and an individual’s ability to cope with it in the definition of stress. Chamberlain and Zika (1990) thought differently than Cox, defining stress as the result of many small hassles in day-to-day life that manifest as anxiety (Chamberlain & Zika, 1990). Over time, these commonplace stressors can result in poor long-term health (Chamberlain & Zika, 1990). The current study utilizes the definition of stress provided by Chamberlin and Zika (1990). If stress is routine, but
Motivation is the second element of interest in the current study. Graham and Weiner (1996) discussed motivation in terms of an individual’s behavior and thought processes and described it as a complex and multifaceted concept. For example, when an activity is considered interesting, engrossing, and involving, individuals show greater motivation (Graham & Weiner, 1996), which could be considered the driving psychological force that produces action (Touré-Tillery & Fishbach, 2014). The behavioral model of motivation examines individual motivation during task completion, specifically focusing on speed, performance, and persistence (Touré-Tillery & Fishbach, 2014). Touré-Tillery and Fishbach (2014) stated the amount of time an individual takes to complete a task can be a good measure of an individual’s motivation. Another measure of motivation is performance (i.e., accuracy, amount of trials completed, and highest level of achievement) when completing a goal-related task (Touré-Tillery & Fishbach, 2014). The final behavioral measure of motivation is persistence. Persistence is how long an individual continues to pursue a goal, even in the face of inherent difficulty (Touré-Tillery & Fishbach, 2014). Outcome-focused motivation describes how motivated an individual is to reach the end of a desired goal (Touré-Tillery & Fishbach, 2014). Touré-Tillery and Fishbach (2014) described process-focused motivation as completing a task for the internal benefit of the task itself (e.g., enjoyment).

The matching activity completed by participants as part of the current study had the purpose of driving outcome-focused motivation. Participants were informed the goal of the matching activity was to match as many cards as possible. Individuals in anxious states tend to worry about the threat of not achieving a goal and may develop strategies to reduce this anxiety (Eysenck et al., 2007). The process efficiency theory was considered because of the possible impact it could have on working memory and, therefore, on feelings of stress. Process efficiency theory has two key elements, effectiveness and efficiency, that should be distinguished. Effectiveness is the quality of performance and is generally recorded using behavioral measures (Eysenck et al., 2007). Efficiency is the connection between effectiveness and the resources invested in reaching a desired performance level (Eysenck et al., 2007). Worry or self-preoccupation increase anxiety, over-evaluation of failure, and expectation of adverse consequences (Eysenck et al., 2007). Worry occurs in stressful situations, such as tests or evaluations, and can cause cognitive interference by consuming the attentional resources available in working memory (Eysenck et al., 2007). Since worrying took up valuable space in working memory, there was less space available for the processing of other concurrent tasks (Eysenck et al., 2007). Process efficiency theory is key to the current study because working memory will be more occupied as worry increases, reducing the amount of working memory space available to complete the matching task. The descending timing condition was hypothesized to create more worry, producing a decrease in the number of matches observed, and that both stress and motivation would be greater in the descending timing condition than the ascending timer.

Methods

The current study employed a single factor, two-level, within-subjects design to control as many extraneous variables as possible. Participants completed a task under two different timing conditions to facilitate examination of any resulting differences in stress or motivation. The independent variable of interest in the current study was the direction (ascending vs. descending) of a timer present during an assigned activity. Two dependent measures (stress and motivation) were considered.

Participants

The current study took place at a small private liberal arts college. Thirty-one undergraduate participants were selected via convenience sampling and offered research credit for their time. All participants provided informed consent.

Procedure

The study began with an instructional phase when the participants were informed about the rules for the matching activity and the overall experimental procedures. The matching activity employed in the current study involved flipping over playing cards in attempt to find exact matching cards. Twenty-eight exact pairs of playing cards were laid face down in a pre-determined order, unknown to the participant. Participants were instructed to flip two playing cards over at the same time. If the playing cards matched, the exact pair was put aside and the
participant continued with the study. If the playing cards did not match, the participant flipped them to be facedown. It was communicated that the goal of the activity was for the participant to make as many playing card matches as quickly as possible.

Following the instructional phase, participants entered the practice phase during which they completed the matching activity using ten playing cards. This practice phase had several purposes, including familiarizing participants with the matching activity instructions, matching procedures, and minimizing potential practice effects. Participants were supplied with a timing sheet and an ink pen to indicate the time displayed on the clock every time they matched a pair of playing cards. Participants were instructed to document the time displayed on the clock to facilitate attention to the timer. A digital clock timer was placed prominently in front of the participant as they completed each matching activity. The placement of the clock timer was important to ensure visibility and facilitate attention. The ascending timer was a traditional timer starting at 00:00 and counting upwards to 05:00 (five minutes) in one second intervals. The descending timer was the same timer set to countdown from 05:00 to 00:00, also in seconds.

Following the instructional and practice phases, participants were exposed to each timing condition. The order in which participants were tested in ascending and descending timing conditions was counterbalanced, with half of the participants completing the matching activity with the ascending timer first and the other half of the participants completing the matching activity with the descending timer first. Five minutes were allotted for the matching activity associated with each timing condition.

After completing the first matching activity timing condition, participants were given a new board of playing cards to complete the second matching activity under the timer condition that had not yet been tested. The second matching activity was identical to the first, except the direction of the timer and the arrangement of the playing cards. A new arrangement of playing cards was used on the second test to further minimize practice effects. After completing each timing condition, participants answered the Emotional Stress Reaction Questionnaire (Larson, 2010). Participants were then provided with research credit.

Materials

A complete list of materials used in the current study can be found in Table 1. Informed consent forms were signed by and collected from each participant. Twenty-four decks of standard playing cards were used to compose the memory matching activity. Playing card layout was different between the two timing conditions but consistent across each level of the independent variable. In the interest of consistency, each participant worked with the exact same two playing card layouts to ensure consistency throughout the experimental procedure. The order that the playing cards were placed in for the matching activity was randomized in both timing conditions. Each playing card in the deck was given a corresponding number between 1 and 56. Playing cards were then sorted randomly using the random number generator in Microsoft Excel. This particular matching activity was chosen for use in this within-subjects design study to minimize the participant’s ability to learn the location of specific playing cards. One poker felt was used to keep the playing cards organized and stationary as participants completed both matching activities. A large digital clock with a red display was used to draw the participants’ attention to the timing factor.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Experimental Purpose</th>
<th>Number Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Informed consent form</td>
<td>Gain consent from participants to participate in current study</td>
<td>31</td>
</tr>
<tr>
<td>Deck of Bicycle™ playing cards</td>
<td>Used for playing the memory activity</td>
<td>24</td>
</tr>
<tr>
<td>Poker felt</td>
<td>Felt to keep cards from slipping</td>
<td>1</td>
</tr>
<tr>
<td>Large digital clock (432 mm x 160 mm, red LED display, EU displays brand)</td>
<td>Digital clock used to show participants the timer</td>
<td>1</td>
</tr>
<tr>
<td>Emotional Stress Reaction Questionnaire</td>
<td>Questionnaire to establish levels of stress</td>
<td>62</td>
</tr>
<tr>
<td>Timing sheet</td>
<td>Timing sheet for participants to write time of clock on timing sheet</td>
<td>31</td>
</tr>
<tr>
<td>Black Ink pen</td>
<td>Used by participants to notate on timing sheet</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 1: Materials employed in procedure. Table containing description of the materials needed and number required to complete procedure.

Results

Stress Analysis

It was hypothesized that stress, as measured by the ESRQ, would be greater in the descending timer condition than in the ascending timer condition.
The ESRQ consisted of 14 questions divided into 7 positive (relaxed, pleased, glad, alert, focused, concentrated, and energetic) and 7 negative (concerned, uncertain, disappointed, heated, mad, and angry) emotional questions (Larrson & Wilde-Larsson, 2012). Scores on the ESRQ ranged from -21 to +21, with a score of -21 indicating the dominant emotion was negative and a score of +21 indicating the dominant emotion was positive (Larrson & Wilde-Larsson, 2012). In the current study, the average participant ESRQ score was 5.5 in the ascending timer condition and 6.8 in the descending timer condition.

An Anderson-Darling (Anderson & Darling, 1952) test was applied to determine whether ESRQ scores were normally distributed. ESRQ scores were found to exist on a normal distribution, so a paired t-test was used to test for a difference in ESRQ scores between ascending and descending timing conditions. The null hypothesis was that no difference in ESRQ score existed between timing conditions and the alternative hypothesis was that a difference in ESRQ score between timing conditions would appear. The paired t-test (ds = 30, 95% CI) indicated no significant difference (p = .318) existed between stress in ascending and descending timing conditions (see Figure 1). Given this pattern of results, we fail to reject the null hypothesis and conclude ESRQ scores do not vary as a function of timing direction.

**Motivation Analysis**

It was hypothesized participant motivation would be higher in the descending timing condition than the ascending timing condition. Motivation was measured through performance (Touré-Tillery & Fishbach, 2014) and indicated by the number of matches made in each matching activity. The number of matched pairs made was higher in the descending timing condition with an average of 7.2, with the average number of matched pairs in the ascending timing condition at 5.8.

An Anderson-Darling (Anderson & Darling, 1952) test indicated the number of matched pairs existed on a normal distribution; paired t-tests were used to analyze differences in performance between ascending and descending timing conditions. The null hypothesis was that no difference in the number of matched pairs existed between timing conditions and the alternative hypothesis was that a difference in performance existed between timing conditions. A t-test (ds = 30, 95% CI) showed significant difference (p = .007) in between ascending and descending timing conditions (see Figure 2). Given the pattern of results, the null hypothesis was rejected and the alternative hypothesis was accepted. It was concluded that motivation was greater when the matching activity was completed in the presence of a descending timer rather than an ascending timer.

![Figure 1](image.png)

*Figure 1.* ESRQ scores ranged from -21 to 21 (Larsson & Wilde-Larsson, 2012). Error bars reflect one standard deviation from the mean.
Discussion

It was predicted ESRQ scores would be lower in descending timing condition than the ascending timing condition. The results of the current study did not support this hypothesis, indicating that stress does not differ based on the direction of a timer present during task completion. Also, performance (expressed by the number of matches made) was predicted to be higher in the descending vs. ascending timing condition and the results of the current study confirm this prediction. As performance was higher in the descending vs. ascending timing condition, it could be inferred that motivation followed the same pattern, relative between the two timer conditions.

The current study fits into an area of literature where there is a paucity of existing research; current literature has not focused on the direction of timing and its effects. Previous research has, however, addressed anxiety and timing, suggesting that both anxiety and stress were likely to lower task performance (Kellogg, Hopko, & Ashcraft, 1999). The results of the current study validate further examination on the effect the direction of a timer has on physiological and psychosocial variables.

Motivation is key in both a work and school environment, so it is essential to understand how society can use it to maximize performance. Touré-Tillery and Fishbach (2014) discussed outcome-focused and process-focused motivation. Since the hypothesis that motivation increases in the presence of a descending clock was confirmed, the current study supports the idea that task motivation can facilitate achievement (Touré-Tillery & Fishbach, 2014). Process efficiency theory is important to consider, due to its effect on working memory. In the context of the current study where participants were concerned about the timer, their ability to retrieve information and bring it into their working memory inconsistently impacted performance. It is recommended that future research examine the relationship between working memory and performance more closely.

Generalizability

The current study has strong external validity, as the results can immediately be applied in workplace or school settings to maximize motivation via performance by implementing a descending clock during timed tasks. It would be of value to replicate the current study with a variety of populations to expand the range of generalizability.

Alternative Explanations

The pattern of results found in the current study may have been impacted by previous experience with the matching activity. Though the goal of the current study was not to test the participants' memory, the memory ability of the participants may have affected the results. Had participants completed an activity they had never seen before, ESRQ scores may have been affected in different ways.

Methodological Issues

This experiment was a within-subjects design and, thus, participants may have been impacted by
practice effects. Although the matching activity was chosen to minimize practice effects, they still may have operated to impact the pattern of results. Counterbalancing was also used to minimize the impact of practice effects on the results. Future studies of a similar nature could either offer a greater time between conditions or implement a between-subjects design to extinguish the practice effect. Due to cognitive interference and attentional resources available in working memory (Eysenck et al., 2007) some participants forgot the instructions while completing the matching activity and attempted to take shortcuts to maximize the matching speed. Although participants were reminded and monitored to minimize these behaviors, the time pressure may have led participants to forget. It is also recommended that future studies test participants in groups to minimize the pressure that may come from a one-on-one testing environment.

Acknowledgements
This research was personally funded and supported by a grant from IDeA Network of Biomedical Research Excellence (INBRE).
Correspondence concerning this article should be addressed to Arno Ruymaekers, e-mail: Arno_Ruymaekers@snceagles.sierranevada.edu

References


From the Editors: Acknowledgements

The Senior Co-Editors would like to recognize and celebrate all of the NSURJ volunteers who made Volume 4 possible!

Associate Editors
We would like to sincerely thank our Associate Editors for their hard work. Associate Editors work one-on-one with the authors to ensure that the research is prepared for publication. Volume 4 relied on hours of dedication from our Associate Editors. We would like to share our appreciation of the following 2017-2018 Associate Editors:

Kathryn Becker, University of Nevada, Reno
Joseph Cheung, University of Nevada, Reno
Tyler Ewing, University of Nevada, Reno
Casey Lau, University of Nevada, Reno
Angelo Lippi, University of Nevada, Reno
Cayler Miley, University of Nevada, Reno
Brianna Peacock, University of Nevada, Reno
Sarah Sella, University of Nevada, Reno
Benjamin Wagner, University of Nevada, Reno
Madeleine Williams, University of Nevada, Reno

Referees
We would like to thank our referees for their dedication to the integrity of the journal. Referees ensure that the published research is of the highest caliber. The journal’s rigorous peer-review process is dependent on the referees’ expertise. We would like to thank the following 2017-2018 referees:

Dr. Marian Berryhill, Department of Psychology, University of Nevada, Reno
Dr. Christina Frederick, Department of Psychology, Sierra Nevada College
Dr. Lars Strother, Department of Psychology, University of Nevada, Reno
Dr. Jeanne Wendel, Department of Economics, University of Nevada, Reno

Senior Editors: Larissa Gloutak, Tanner Lyon, and Hannah Patenaude
Undergraduate Research

Thank you to Undergraduate Research for your dedication to NSURJ!

NSURJ would like to extend a special thank you to Undergraduate Research at the University of Nevada, Reno. Undergraduate Research has established a community where undergraduates can have general questions about research answered and find research-related opportunities and resources on campus.

Undergraduate Research funds grants that allows University of Nevada, Reno undergraduates to facilitate their research. The award recipients are actively encouraged to publish with NSURJ. Without Undergraduate Research, undergraduate students may not have the necessary resources for continuing their research. Additionally, Undergraduate Research provides the Senior Co-Editors with vital information about maintaining a peer-reviewed research journal. The Senior Co-Editors would like to thank Undergraduate Research for their time. We look forward to the years to come!

Undergraduate Research provides funding for undergraduates through the following awards:

- Honors Undergraduate Research Award
- International Research Experience for Undergraduates
- Nevada Undergraduate Research Award
- NSF-EPSCoR
- NSF Research Experience for Undergraduates
NSURJ Submission Statistics

NSURJ compiles submissions and manuscript statuses to track our growth since our establishment in 2014. The first, third, and fourth charts are data for Volume IV.

2017-2018 ACCEPTANCE RATE

- Acceptances: 55%
- Rejections: 45%

2014-2018 ACCEPTANCE RATE

- Acceptances: 49%
- Rejections: 51%
2017-2018 SUBMISSIONS BY CATEGORY

- Social Sciences: 73%
- Art/Literature: 18%
- Natural Sciences: 9%

N=11

2017-2018 SUBMISSIONS BY DISCIPLINE

- Psychology: 37%
- Economics: 18%
- Natural Resources and Environmental Science: 9%
- English: 9%
- History: 9%
- Sociology: 9%
- Political Science: 9%
2017-2018 SUBMISSIONS BY INSTITUTION

- University of Nevada, Reno: 55%
- University of Nevada, Las Vegas: 18%
- Sierra Nevada College: 18%
- Truckee Meadows Community College: 9%

N=11