

# McNair Scholars Program

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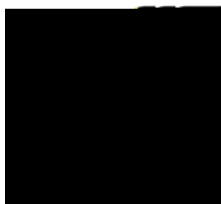
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Alissa Bey



# Research Manuscripts

# Religiosity and Sexual Shame among Young Women

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## *Literature Review*

The World Health Organization (2010) has defined sexual well-being as “a state of physical, emotional, mental and social well-being in relation to sexuality....” This may include healthy sexual outcomes such as personal satisfaction with one’s sexual life, a high sexual self-efficacy, and a low level of sexual shame. Building on previous research regarding shame (Murray, Ciarrocchi, & Murray-Swank, 2007), we define sexual shame as expectations of self and others to have negative evaluations of one’s sexual behavior. Research suggests that cultural messages about female sexuality contribute to sexual shame among young women. Women’s sexuality is seen as positive only as long as it is contributing to some alternative cause such as reproduction or for the gratification of others; it is less common to find positive attitudes toward female sexuality when the sexual experience is solely for pleasure or personal desire. Existing research supports the idea that sexual shame interferes with sexual well-being. For example, in a study of 14 and 15 year old Norwegian adolescents by Traeen and Kvalen (2006), sexual shame was found to have a direct effect on sexual self-efficacy. Female participants who reported feeling shame had lower self-efficacy in regards to communicating about condom usage with their partner, and those who reported more shame were less likely to have used birth control during their last intercourse. Female participants were also significantly more likely to feel shameful for stopping unwanted sexual intercourse than male participants. These results suggest that shame is a barrier to healthy sexual behaviors such as discussing contraception use with a partner, stopping unwanted sexual

intercourse, and using oral birth control (Traeen & Kvalen, 2006). These findings raise questions about how shame affects sexual well-being through its effects on sexual satisfaction and overall sexual self-efficacy.

Cultural messages about sexuality permeate our social institutions, and young people’s sexual well-being has been shaped by the sexual values and norms learned through interactions within institutions such as education, family, and religion. In 1988, Michelle Fine explored sexual messages within the institution of school in a piece titled “Sexuality, schooling, and adolescent females: The missing discourse of desire” and found







pledge ceremonies, in which adolescent participants vow to abstain from sex until marriage, or purity rings, which are worn by participants as a symbol of sexual abstinence until the ring is replaced by a wedding band. Indeed some sects, such as Catholicism, frown upon sexual relations for any other reason than reproduction (Runkel, 2008). With this in mind, the conservative attitude of Catholics towards condom usage discussed above, supports the idea of social control theory, as using condoms is seen as unacceptable because it contradicts a strongly held norm within this group.

Within many Judeo-

sexual pleasure and having equal and even autonomous control over their sex lives. This portrayal of women within religious context has provided reason to actively seek information about religious women's sexual well-being.

Aspects such as the policing of female sexuality and the emphasis on male pleasure reveal a power structure within Judeo-Christian faith that has placed women at the bottom of a hierarchy with God first, then Christ, followed by men, and last women (Runkel, 2008). Virginity and sexual purity have been praised in many religions, and this has especially been true for women (Daniluk & Browne, 2008). The Catholic faith has emphasized Mary's status as a virgin, and certain sects of Islam have promised a prize of virgin women in heaven for male martyrs of the faith (Runkel, 2008). This can create an atmosphere where women who are not virgins or are not within their religion's standards of sexual purity may feel shame regarding their sexual experiences or may even feel reprehensible. Sharma's (2008) study of the Protestant church revealed an interesting perspective when a participant said that the sexual policing within her church has not kept her from committing sexual acts that her church community would not approve of, but instead she kept her sexual life hidden from her church community for fear of being judged. Fear of judgment and alienation for engaging in sexual relationships makes sense for women within the boundaries of Judeo-Christianity.

The heavily regulated sexuality of religious women has the potential to strongly influence women's sexuality differently than men. Research has found that woman's sexual attitudes, expectations, and values differ from their religious male counterparts (Cochran &

Beeghley, 1991; Luquis, Brelsford, & Rojas-Guyler, 2011). In a study by Earle, S(l)4(u(5(s)-i)-2e2(t)1(t)e)-1(d)1.1(, & )3.730.001 Tw 01 TwD1



associations vary by dimension of religiosity, including overall religiosity, fundamentalist beliefs, and religious affiliation?; and 3) How are adolescent religiosity and sexual attitudes associated with women's contraceptive use in young adulthood? We hypothesized that adolescent religiosity would have a positive association with sexual shame and perceived obstacles to birth control, religiosity would have a negative association with expectations of sexual pleasure, and religiosity in adolescence and contraceptive use in adulthood would be associated with one another as they would both be correlated to sexual

mistakes?” (0 = no, 1 = yes). Finally, we grouped *religious affiliation* similarly to the suggestions of Adamczyk and Hayes (2012) and Steensland et al. (2000), creating six religious groups: Conservative Protestant (consisting of religious identifications such as Adventist, Pentecostal, and Baptist), Mainline Protestant (consisting of religious identifications such as Episcopalian, Quaker, and Methodist), Other Protestants (Protestants whose denomination was not ascertained), Catholic, and Other Religion (consisting of smaller religious groups such as Baha’i, Christian science, Muslim, Eastern Orthodox as well as those who did not specify their religion). We included those who responded “none” when asked their religious affiliation in the No Religion group.

**Sexual Attitudes.** We also examined three measures of sexual attitudes in adolescence: sexual shame, sexual pleasure, and sexual self-efficacy. In order to examine *sexual shame* among the participants at Wave 1, we used the mean score of Likert scale ratings on the following statements: “If you had sexual intercourse, your partner would lose respect for you”, “if you had sexual intercourse afterward you would feel guilty, “if you had sexual intercourse it would upset your mother” (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree; alpha = .681) *Expectations for sexual pleasure* were measured at Wave 1 by the question “if you had sexual intercourse, it would give you a great deal of physical pleasure” (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly

agree). We measured respondents’ perceived *obstacles to using birth control* at Wave 1 by examining the mean Likert Scale ratings on the following statements: “In general, birth control is too much of a hassle to use.”, “In general, birth control is too expensive to buy”, “It takes too much planning ahead of time to have birth control on hand when you’re going to have sex.”, “It {is/would be} too hard to get a {girl/boy} to use birth control with you.”, “For you, using birth control {interferes/would interfere } with sexual enjoyment.”, “It is easy for you to get birth control.”, “Using birth control is morally wrong.”, “If you used birth control, your friends might think that you were looking for sex.” (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree; alpha = .815).

**Consistency of Condom Use.** We examined one dimension of sexual behavior in young adulthood: consistency of contraceptive use. To determine the consistency of contraceptive use in adulthood, we examined a five category ordinal measure of responses to the Wave 3 question “On how many of these occasions of vaginal intercourse in the past 12 months did you or your partner use some form of birth control or pregnancy protection?” (0 = none, 1 = some of the time, 2 = half of the time, 3 = most of the time, 4 = all of the time).

**Controls.**

0r) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



contraception use in young adulthood  
16.1% of participants reported using  
contraception “none of the time” within  
the past 12 months, 10.9% reported  
using contraception “some of the time”  
within the past 12 months, 7.9% of  
participants reported using  
contraception “half of the time” within  
the past 12 months.



perceived obstacles to birth control  $F(5, 6648) = 12.09, p = .000$  between the different religious affiliations. Those who identified as having no religion had significantly higher expectations of pleasure ( $M = 3.31, SD = .995$ ) and a significantly lower amount of sexual shame ( $M = 2.910, SD = .946$ ) than all other religious affiliations. Conservative Protestants had a significantly higher amount of sexual shame ( $M = 3.399, SD$



associated with contraceptive use in adulthood, suggesting that these sexual attitudes did not mediate the association between religiosity and sexual attitudes. Although the estimated effect of fundamentalism was somewhat reduced after controlling for adolescent sexual attitudes, it still had a significant and independent association with contraceptive use.

## **Discussion**

Scholars have been in search of answers to enhance the overall sexual well-being of the population for decades. In this pursuit researchers are exploring the institutions that construct and influence perceptions of an ideal sexuality. Due to religion's norms and regulations regarding sexuality, we can see that this is an important institution from which young women construct ideas about sexuality, and our research supports this.

As this study first explores how adolescent religiosity shapes attitudes toward sex and birth control, it provides support that religiosity does influence these young women's sexual attitudes as those who had higher levels of overall religiosity had more sexual

effects of adolescent religiosity and sexual attitude variables on adulthood contraceptive use. Findings did support the expectation that fundamentalist beliefs influence contraceptive use, as participants who reported fundamentalist beliefs in adolescence used contraception less often in adulthood, compared to those without fundamentalist belief. This study also shows associations between participants' perceived obstacles of birth control in adolescence and their contraceptive use in adulthood as, not surprisingly, the young women who perceived fewer obstacles to birth control in adolescence were more likely to use contraception during sex in adulthood.

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This suggests that, for young women, religious teachings may not send a message of sex as a pleasurable or positive experience. Prior research suggests that many religions teach that sex is solely for procreation rather than personal desire (Daniluk & Browne, 2008; Runkel, 2008). The stronger these young women identify religiously, the more they seem to see sex as taboo and associated with shame. Perhaps this is because these religious messages about sex are more internalized.

In this study, fundamentalism was shown to be an important factor in shaping sexuality. Sixty-one percent of our sample reported fundamentalist belief, and fundamentalism was the only dimension of religiosity which was associated with all of the sexual attitudes. This implies that fundamentalism may be more important than strength of religiosity and religious affiliation when it comes to predicting sexual attitudes. Fundamentalists reported more sexual shame and lower expectations of pleasure than non-fundamentalists, suggesting that messages of sexual shame may be embedded in fundamentalist teachings to young women and may not send a message of sex as pleasurable experience for young women. Fundamentalists also saw more obstacles to birth control than non-fundamentalists implying that fundamentalist teachings may inspire a negative view towards young women using birth control.

Our findings demonstrated that non-religious women and Conservative Protestants are most often at opposite ends of the spectrum regarding sexual attitudes. The differences in sexual

attitude outcomes between the individuals reporting no religion and those who did identify with a religious affiliation may suggest that those who do not proscribe to a religion are socialized differently in regards to sexual shame. conservative Protestant women tended to report higher levels of sexual shame and were less likely to expect sex to be pleasurable, suggesting that sexual shame may be ingrained in conservative Protestant teachings to a greater degree than in other religions. Conservative Protestants also saw more obstacles to birth control in adolescence than any other religious affiliation; this implies that there is a negative view towards birth control in conservative Protestant teachings. However, the negative views towards birth control in conservative Protestant teachings did not seem to keep participants from actually using birth control in adulthood, as they were no less likely than other religious groups to use contraception in adulthood. Perhaps the disapproval of birth control is an emphasized teaching in adolescence for conservative Protestants, but is disregarded for adult married women. The conservative Protestant teachings may encourage young women to be sexually conservative by not using birth control when having sex because sex should be within marriage; however, it is possible that by the time these young women reach adulthood their behaviors regarding birth control do not reflect this as only half of our sample reported using contraception “all of the time” during sex.

This research supports the relationship between religiosity and sexual attitudes. This research has shown how certain dimensions of religiosity influence young women’s sexual well-being.

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# Investigating Guiding Attributes in Visual Search for Medication Vials

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## ***Abstract***

Medical professionals must select from a vast array of medication vials to dispense the correct medication to a patient. The vials are often small and highly similar, potentially increasing the chance of committing a medical error. Over 400,000 people die every year due to medical errors according to recent studies; a third of which are thought to be medication related. We studied the visual characteristics of medication vial labels to identify properties leading to the fastest and most accurate search. In a visual search task, participants located a target vial among an array of similar looking vials whose labels varied along a set of specific attributes (color density, text size and text orientation). Based on our data which examines response times and accuracy, we found that participants were faster and more accurate at finding vials with high color density and vertical text orientation, with the exception that when the text was



the manufacturer logo and an alphanumeric code were printed on each drug. However, with the growing influx of medications and brands, this system is no longer sufficient, and it is apparent that changes need to be made. The sheer number of medication names on the market today is increasing the 'neighborhood density' of each name, a term referring to how many similar names are within a fixed distance from the target name. This increase has been shown by research to increase the probability of pharmacists making an error in a visual identification task (Lambert, Chang, & Gupta, 2003). Currently, there are over 15,000 drug names in use in the United States (Lambert, 1997), some having multiple names such as the chemical name, proprietary name, and generic name.

One way to help differentiate similar looking medications is with the use of tall man lettering, which is simply capitalizing distinguishable sections of a specific medication name (i.e., AmOXIcillin versus AmPICillin). The overall usefulness of tall man lettering is still being debated, but Filik, Purdy, Gale, and Gerrett (2006) found that if the participant is aware of the purpose of tall man lettering, it can make similar names easier to distinguish, and that tall man lettering may increase attention. Finding no significant difference between the number of errors in each condition, however, the study suggested that the tall man lettering did not reduce confusability with similar names, but simply increased attention to high risk drug names. These findings offer support for the use of tall man letters to reduce errors caused by similar looking drug names (Filik et al., 2006).

In addition, researchers at the University of Illinois in Chicago created a search engine that has achieved a 94.8% accuracy rate at detecting confusing

name pairs (Lambert, Yu, & Thirumalai, 2004). Though not yet as precise as expert judgments, the program determines orthographic (visual) similarity as well as phonological (pronunciation) similarity. The researchers asserted that there is not currently an existing system for pre-approval screening of drug products that takes into consideration non-name attribute similarities and are working on developing one. The article also states, "What we used to think was a problem with drug name similarity is actually a problem of drug *product* similarity, incorporating multiple non-name attributes" (Lambert et al., 2004, p.26). These features are what we propose to test, including color, placement, design, and overall visual appearance.

In the early 2000s, the American Academy of Ophthalmology partnered with the FDA and pharmaceutical manufacturers to develop a uniform color-coding scheme for topical medications. The color schemes were selected taking into account the medication, its side effects, the disease it treats, and the risk of complications (American Academy of Ophthalmology, 2000). Some examples of this color scheme are bright red caps known as 'Anesthesia Red' on vials containing neurotransmitter blockers (ISMP Medication Safety Alert, 2003) and black caps on potassium chloride containing vials, which has many times been mistaken for sterile water or sodium chloride with deadly consequences (Cohen, 2002). This color-coding system seems to be effective so far in the fields in which it has been utilized, but it

shape, orientation). These features happen to be the very same features that research concerning Feature Integration Theory (Treisman & Gelade, 1980) found to be unconsciously recognized by different parts of the brain before entering conscious awareness during the first stage of visual perception called the preattentive stage. Such features were found by Wolfe and Horowitz (2004) to be effective perceptual dimensions that can be used by the visual system to guide attention quickly and efficiently to a target. Guiding attributes are typically identified on the basis of differences in measured reaction time (RT) and accuracy. For a given set size (i.e. the number of items in the display), targets containing attributes supporting guided search are typically found more quickly than targets not containing such guiding attributes. Accuracy typically mirrors the RT data, with faster-to-find items



**Procedure.** The participant was seated at a computer monitor and used





due to the way they were scanning the array of distractors. We are conducting follow-up studies to address both of these possibilities.

**Limitations.** Because we designed this experiment to closely resemble a realistic situation in which a pharmacist or another medical professional may

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# An Experimental Study of Fiber Architecture Effects on the Stress Relaxation Behavior of Carbon Fiber Composites

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to accurately predict the glass transition temperature of epoxy-based composites when compared with dynamic analysis results.

Instead of investigating composites consisting of an epoxy matrix system, Wang and Yang<sup>17</sup>

composed of the same material still behave differently due to the weave or fiber orientation. The present study aims to investigate this influence across various degrees of cure to develop a deeper understanding of the effects of weave patterns and fiber orientations on the behavior of the resin. Hence, the present study primarily focused on composite systems composed of the same material but with varying weave patterns and fiber orientations for changes in stress relaxation behavior.

minutes under a cyclic pressure with a lower limit of 5kPa and 20kPa. This helped minimize the air bubbles in the mold during mixing, because they could act as voids and weaken the structural integrity of the molds. Once air bubbles were reduced, the mold was taken out of the vacuum and left to cure at room temperature for 24 hours, according to the manufacturer's recommended

### Experimental Approach, Resin

The resin tested for this investigation was 5320-1 epoxy resin, and it was cured to various degrees of cure using cure cycles that were previously generated and validated. The desired degrees of cure (DOC) were 95%, 83%, 67%, and 50%, and although the cure cycles had previously been validated, thermocouples were attached to the resin samples during curing to monitor the temperature observed by the resin samples. This ensured that the resin samples were properly cured according to the correct cure cycle, and it ensured that the oven was properly working. Along with the thermocouple readings, the resin was also tested using differential scanning calorimetry (DSC) to validate the actual degrees of cure of the samples.

In order to cure the samples in the proper shapes necessary for testing silicon, molds were first created. The molds were made by first lightly gluing four or five aluminum samples to the base of plastic hexagonal cups. In a separate cup of the same shape and size, the base and catalyst for the silicon were weighed and mixed together using the manufacturer's recommended ratio. After thorough mixing, the silicon was slowly poured onto the aluminum samples until the desired thickness of the mold was obtained. Then the mold was vacuumed for approximately 30



different shaped epoxy resin samples were laid-up and cured together.

Before stress relaxation testing could start, the cured samples were tested for the glass transition temperature in the Q2000 Differential Scanning Calorimetry (DSC). This was done by taking small circular 5320-1 epoxy resin samples and testing them under a ramp with the rate of 10°C per minute. The heat flow was then plotted versus the temperature, and the glass transition temperature was measured according to ASTM E 1356-08<sup>23</sup>. To measure the

had a matrix consisting of 5320-1 epoxy resin. Similarly to that of the epoxy resin, the composites were cured to the 95%, 83%, 67% and 50% degrees of cure. These samples were also cured with thermocouples attached and had their degrees of cure verified through DSC—the same reasons as those of the resin.

Unlike the resin, silicon molds were not necessary for the fiber-reinforced composites, so the uncured composites

exponential decay was calculated. In each case this average temperature was taken as the glass transition temperature for the respective principle. In the case of the tan delta, the glass transition temperature was taken as the temperature at which the tan delta peaked. For the sake of being conservative, the lower glass transition temperature produced by the two was taken as the glass transition temperature for stress relation testing. Unlike the pure epoxy resin, the fiber reinforced composite systems are not viscous fluids and do not present the possible danger of flow. Hence, direct contact between the specimen and testing apparatus could be used, making the Q800 DMA a viable option for measuring the glass transition temperatures.

Once the glass transition temperatures of the fiber reinforced composites were calculated, the specimens were tested for stress relaxation using a constant strain of 0.1% and a relax time of an hour. Next, the stress relaxation modulus for the composites was measured across the temperature range starting at room temperature and ending at a temperature past its glass transition temperature. Then the data was analyzed using TTS by manually calculating the shifted factors, normalizing the relaxation modulus and creating the stress relaxation mastercurves for all degrees of cure. Except in the case of 5320-8Hs( )-5(c)1(as)-np s l5Tc 0 Tw 13.485 0 Td(-)Tj-0ft3(c)1(as)-1(y)finJ0.50I0

investigation the researchers felt rounding in such a manner would not disrupt the results.

Three point bending is not an ideal mode of testing because it is nonhomogeneous; however, it has proven to be the most reliable due to the simplicity of mounting. Appendix E shows the results gathered from the three point bending samples across all tested degrees of cure. It can be seen from the graph that the materials behave as expected under flexural testing for all degrees of cure, except the lower two. Ideally, the material should relax more as the DOC is decreased due to the decreased amount of chain linking. This chain linkage is directly proportionate to the stiffness of the material; hence, with more chain linkage the material should be stiffer and relax less. This behavior can be seen for the higher two degrees of cure, but the relaxation behaviors of the lower degrees of cures are more similar. It was believed that the material behaved in this manner due to the heterogeneous nature of the flexural state of stress.

At the lower degrees of cure, it would appear that the various contributions of stress compete for dominance and thus affect the behavior of the material differently. This is one of the main complications with the three-point bending test. It is unknown if the shear, tension, or compressive stress is dominant. In this test, this dominance appears to vary depending on the DOC of the sample, too. If the stress contributions remained constant, the difference in the relaxation of the material should be approximately equal to the subsequent DOC. However, it is seen that the difference between the subsequent degrees of cure decrease along with the cure state.

In order to gain a better understanding of how the stress contributions were distributed, samples were prepared in dogbone shapes and tested in tension. Tension testing is more ideal because it is a uniaxial test, meaning the state of stress is homogenous throughout. However, this type of testing is not perfect and oftentimes investigators face the problem of slippage. Slippage occurs when there is not enough friction between the fixture and the specimens, causing the specimen to slip slightly out of place during the test. In terms of stress relaxation, this behavior generally yields unrealistic spikes in the unanalyzed data and makes it seem as though the material gets stiffer as the temperature is increased. This behavior is nonrealistic and implies that the material will become stronger as time evolves due to the principle of Time Temperature Superposition, meaning it would never corrode. To avoid this problem, the edges of the sample that could be clapped by the fixture were sanded to increase the friction between the sample and the fixture clamps.

Appendix F displays the stress relaxation mastercurves for the samples tested under tension, and it can be seen that the material behaved as expected, unlike the results generated from flexural testing, displayed in Appendix E. As the DOC decreases, the material relaxes more, and the difference between each subsequent cure state is fairly similar except at the lowest DOC. Unlike the flexural results, the differences between the differences in stress relaxation behavior between the cure states appear to follow a more apparent pattern. As the DOC decreases, the differences between the mastercurves decrease. Also, in the case of the flexural test, the difference in behavior between the higher two degrees of cure was very

60% degrees of cure, there was an apparent trend of the flexural relaxation decreasing with respect to the tensile relaxation. At 90% DOC the tensile relaxation is less, but at 60% DOC the tensile stress relaxation is more than that of the flexural. Then, once again, at 47% DOC the material relaxes less under tensile stress. This demonstrates that the stress contributions within the material vary along with DOC when subjected to three-point bending. In the cases of 80% DOC and 60% DOC, the tensile stress contribution was dominant in the heterogeneous state of stress. However, in the cases of 90% DOC and 47% DOC, one of the other stress contributions proved to be dominant.

## Results, Fiber Reinforced Composites

Once the stress relaxation behavior of the 5230-1 epoxy resin was characterized, the next step was to determine the behavior of the composite systems. The two composite systems used for this study were 5320-8HS and 5320 UDEO, both carbon fiber reinforced composites whose matrix is made of 5320-1 epoxy resin. As with the epoxy resin, before starting stress relaxation testing, the fiber reinforced composites were tested for the glass transition temperature. The composites were then tested in testing conditions similar to that of the resin to determine how the stress relaxation behavior of the resin changed due to the fiber architecture of the composite system. Hence, first the individual composite results will be presented, and then those results will be presented along with epoxy resin results. The first results presented will be for the 5320-8HS composite system. The results for the 5320 UDEO composite system will be presented next. The results for the epoxy resin will be presented last.

Although flexural state of stress proved to be the more reliable of the two, there was a complication faced with this mode as well. One important characteristic of proper stress relaxation analysis in this investigation was to maintain the same reference temperature for all the degrees of cure. However, the Q800 DMA had a force limit of 18N, and when this limit is reached data cannot be collected. This reference temperature was taken as the lowest one at which the highest relaxation modulus was taken. The relaxation modulus measured and the force produced are directly related, so if the material demanded a high stress to maintain the desired strain the 18N limit could be reached. In the case of both 5320-8HS and 5320 UDEO, this limit was reached at the beginning of the test for all degrees of cure. Despite this complication, consistent stress relaxation behavior for both 5320-8HS and 5320 UDEO was still measured and characterized.

5320 UDEO is the simpler composite system of the two because all the fibers are organized in a single direction throughout the entire system. For this composite system, there were no problems with the reference temperature, and they all have the same as the 5320-1 epoxy resin. However, when examined closely it can be seen that the time scale is smaller than that of the resin, and there is not much relaxation overall. This is due to the material increasing in stiffness at higher temperatures. As explained earlier, this behavior is unrealistic and can only occur if there is a problem in the set-up; although, three point bending is a very simple mode of testing, and there were no apparent issues regarding the test set-up. Regardless, through various stress relaxation tests this same result kept appearing, and the glass transition temperature could never be reached without the stiffness increasing. It is believed that this behavior is attributed to

the inconsistency of the heterogeneous state of stress that the three point bending mode provides.

In the case of the 5320-1 pure epoxy resin, it was seen that the flexural stress relaxation was inconsistent across the degrees of cure. This was again seen in the case of the 5320 UDEO (refer to Appendix M) because the 90% DOC sample relaxed slightly more than the 80% DOC sample. Not only is it thought that the flexural stress relaxation behavior is sensitive to DOC, but it is also sensitive to the higher temperatures as well. Hence, the full relaxation behavior of 5320 UDEO was not properly characterized due to the competing stress contributions developed in a three point bend mode. If the composite could be tested under tension such as the epoxy resin samples, it is believed the stress relaxation behavior of the composite could be properly characterized. 5320-8HS is not as simple as 5320 UDEO because its fibers are not all







polypropylene resin was used. From this, one can infer that when a polymer matrix composite is created with polypropylene matrix, the resin is dominant in terms of glass transition temperature, but this is not true for all polymer matrix composites.

Another important aspect considered for this study was that of the DOC and the efficiency of proper curing. Like the work done by Alavi-Soltani et al.<sup>14</sup>, the cure cycle used deviated from that recommended by the manufacturer. The cure cycle also was composed by modifying the final isothermal period of the cure cycle to change the DOC. In both cases, the cure cycles were validated successfully through the use of DSC testing, but in the present study the cure cycle did not quite reach the desired DOC. Even though the temperature of the oven used for curing was thoroughly monitored through the use of thermocouples, the desired DOC and the actual DOC were not always consistent. This suggests that better models need to be made for the cure cycle that will be more efficient and more capable of predicting the DOC of the composite materials.

Although the DOC and the glass transition temperature are important concerns for this study, the main focus is on the stress relaxation behavior of the polymer matrix composites and the individual resin. There has not been much work on the stress relaxation or creep behavior of the individual resin; rather, most researchers have investigated the composite systems in their entirety. When testing the pure epoxy resin in three point bending and in tension, the behavior observed in tension complied with that observed in previous studies, but they did not for three-point bending. In stress relaxation, the relaxation modulus is synonymous with the material's

stiffness. Also, the DOC of the polymer is associated with the chain linking within the structure. As the DOC is increased, more chain links between the individual monomers develop, increasing its stiffness. For this reason, the relaxation modulus of the material is expected to decrease as DOC is increased. A limitation in this study that should be noted is that the normalized relaxation modulus does not relax to zero in most cases. Therefore it is possible that sufficient relaxation was not observed in the case of the composites at higher degrees of cure.

In the case of the epoxy resin

for 47% DOC. This suggests that pure epoxy resin's ability to resist shear, tension, and compression varies as the DOC changes. Hence, it seems advisable to use a testing apparatus that creates a simple (homogenous) state of stress to conduct a study of this nature. In order to successfully do that, researchers must overcome the problem of slippage, which this study was unable to do.

It should also be noted that the samples in this studies were small in size, and thus the behavior observed in this studied would best characterize a small-scale case. When the fiber pattern is significantly larger with respect to the size of the sample, the state of stress experienced by the sample compared with that to which it is initially subjected to may vary. This possibility does not occur in the sample sizes, such as the ones used in this study, and therefore the results in this study are not best to characterize large-scale behavior. Hence, the results from this study would be best to describe the behavior of a small unit cube of a material at a given point, rather than

with previous studies. The equation





## **Appendix A**

**This graph shows the cure profile for 5320-1 epoxy resin that was used to cure it to various degrees of cure.**

## Appendix C

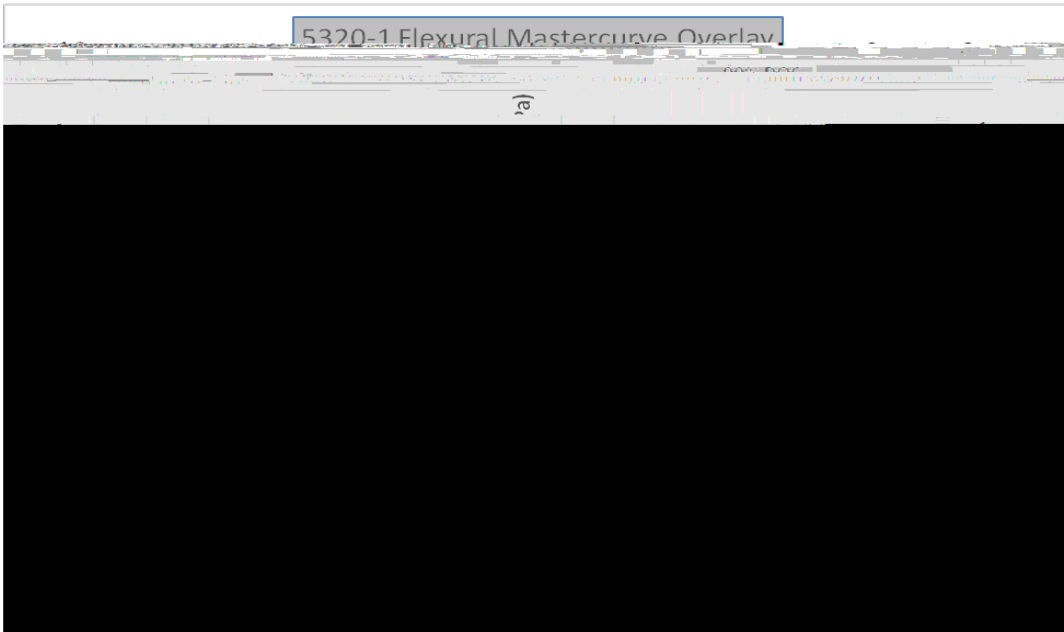
5320-1 Epoxy Resin Tg Comparison
-------------------------------------

This shows a tabular representation of how the glass transition temperature of 5320-1 epoxy resin at various degrees of cure.

## Appendix D

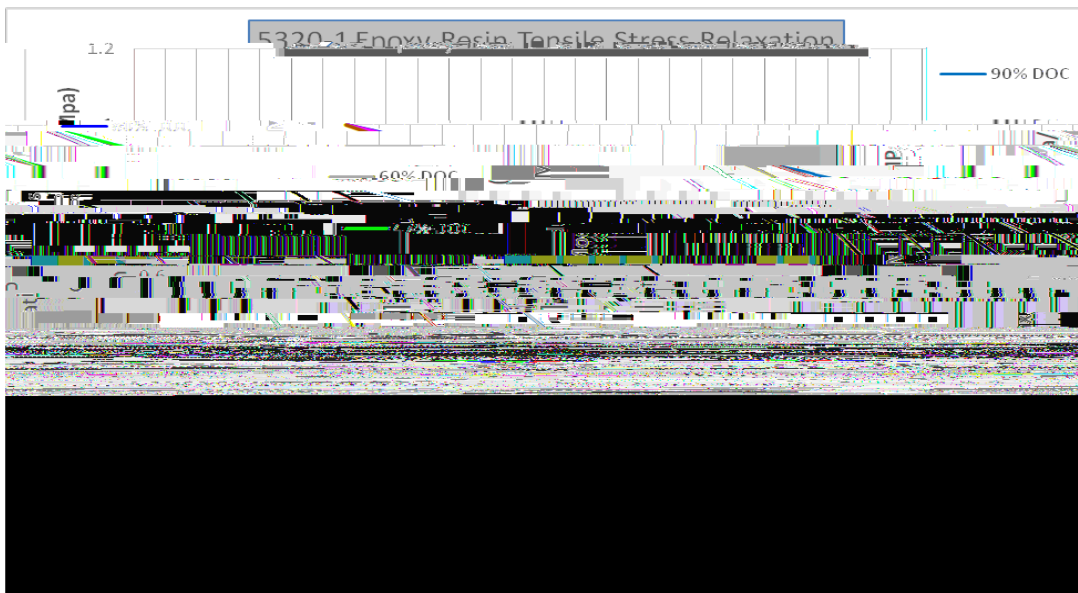
This table shows the expected degree of cure from the cure profile and the corrected degree of cure values that were found experimentally using a differential scanning calorimetry.

## Appendix E



This graph shows the normalized flexural stress relaxation mastercurves of 5320-1 epoxy resin across various degrees of cure.

## Appendix F



This graph shows the normalized tensile stress relaxation master curves of 5320-1 epoxy resin across various degrees of cure.



## **Appendix G**

**This graph shows the comparison of tensile and flexural stress relaxation mastercurves at 90% degree of cure.**

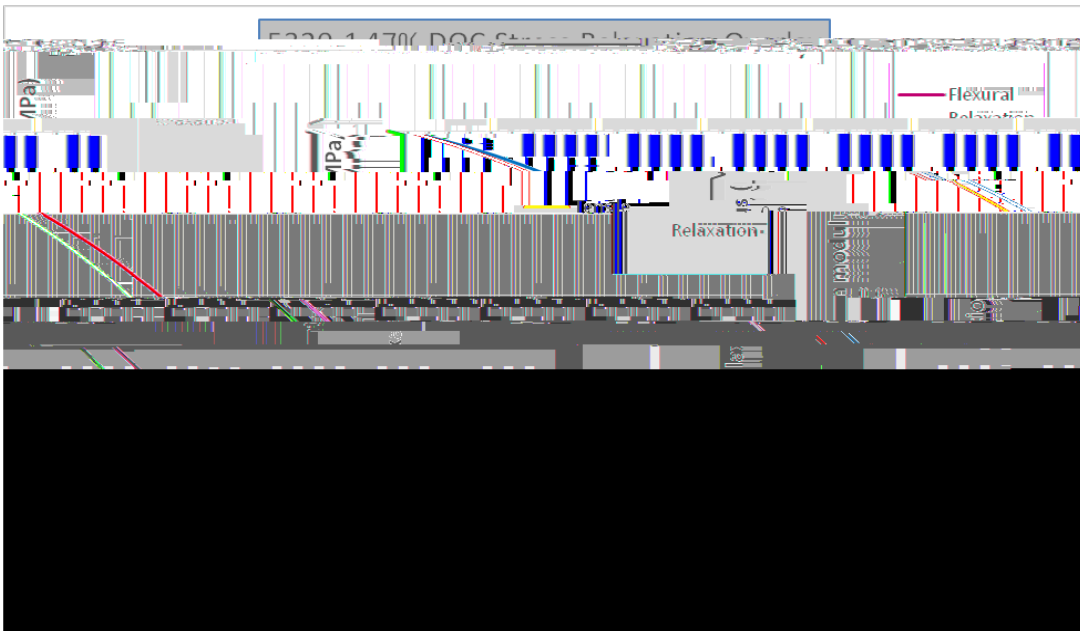
## **Appendix H**

## Appendix I



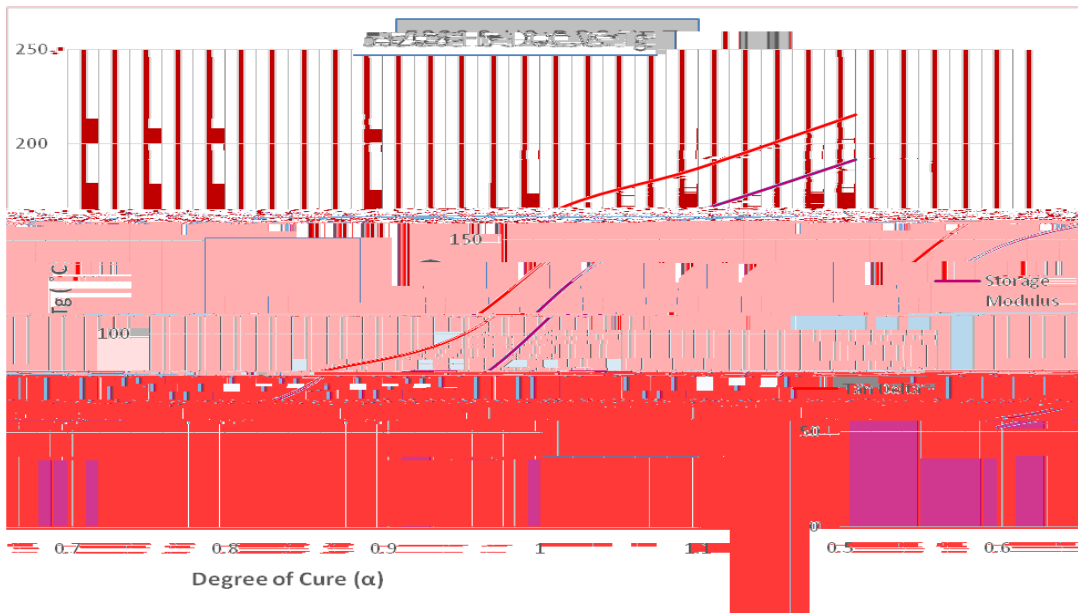
This graph shows the comparison of tensile and flexural stress relaxation mastercurves at 60% degree of cure.

## Appendix J



This graph shows the comparison of tensile and flexural stress relaxation mastercurves at 47% degree of cure.

## Appendix K



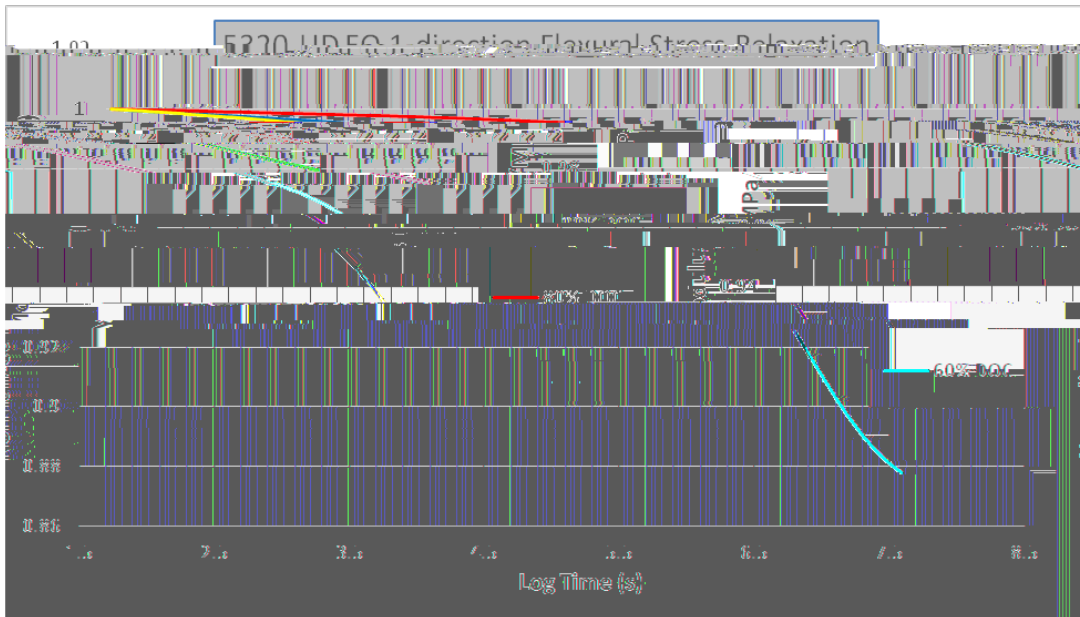
This gives a graphical representation of how experimental measurements of the glass transition temperature for 5320-8HS varies across degrees of cure using a method based of the storage modulus and a method based of the tan delta.

## Appendix L

5320-8HS Tg Comparison		
DOC ( )	Storage Modulus Tg (°C)	Tan Delta Tg (°C)
0.9	164.34	

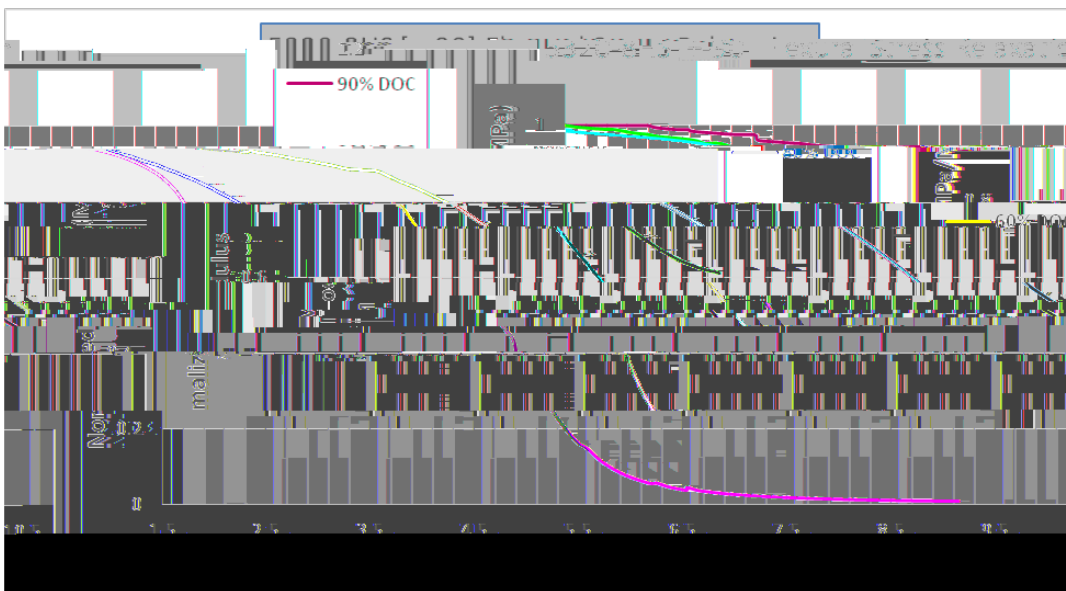
This gives a tabular representation of how experimental measurements of the glass transition temperature for 5320-8HS varies across degrees of cure using a method based of the storage modulus and a method based of the tan delta.

## Appendix M



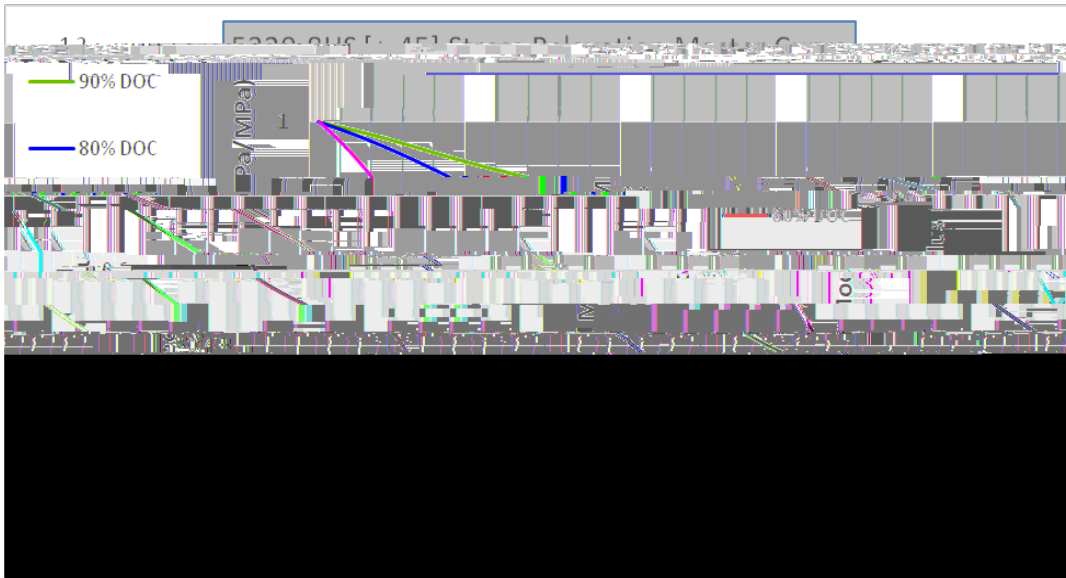
This graph shows the flexural stress relaxation mastercurves of 5320 UDEO composite in prepared in the 0° direction across various degrees of cure.

## Appendix N



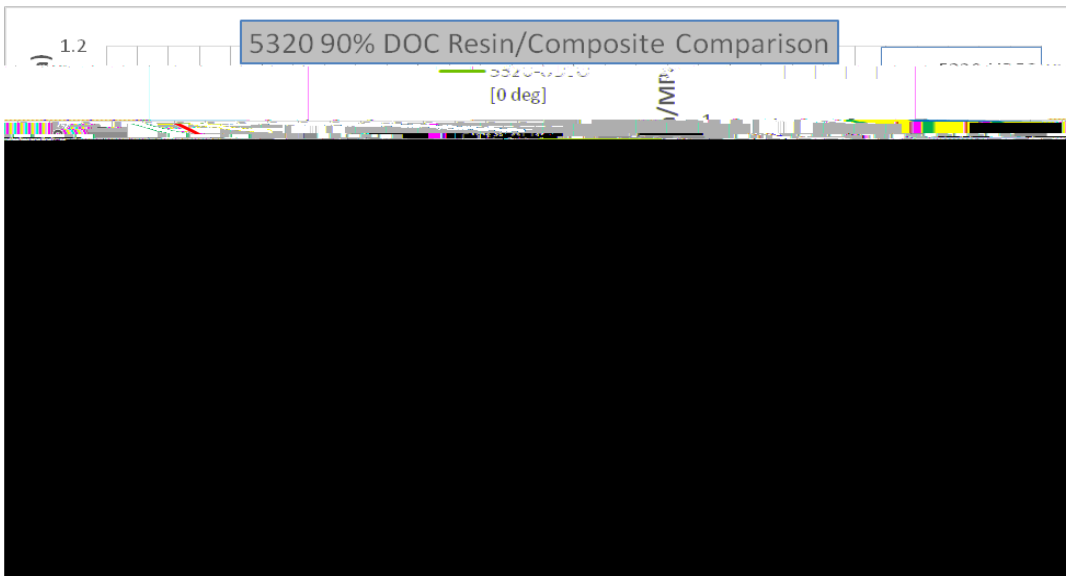
This graph shows the flexural stress relaxation mastercurves of 5320-8HS composite in prepared in the [+90°] direction across various degrees of cure.

## Appendix O



This graph shows the flexural stress relaxation mastercurves of 5320-8HS composite in prepared in the  $[\pm 45^\circ]$  direction across various degrees of cure.

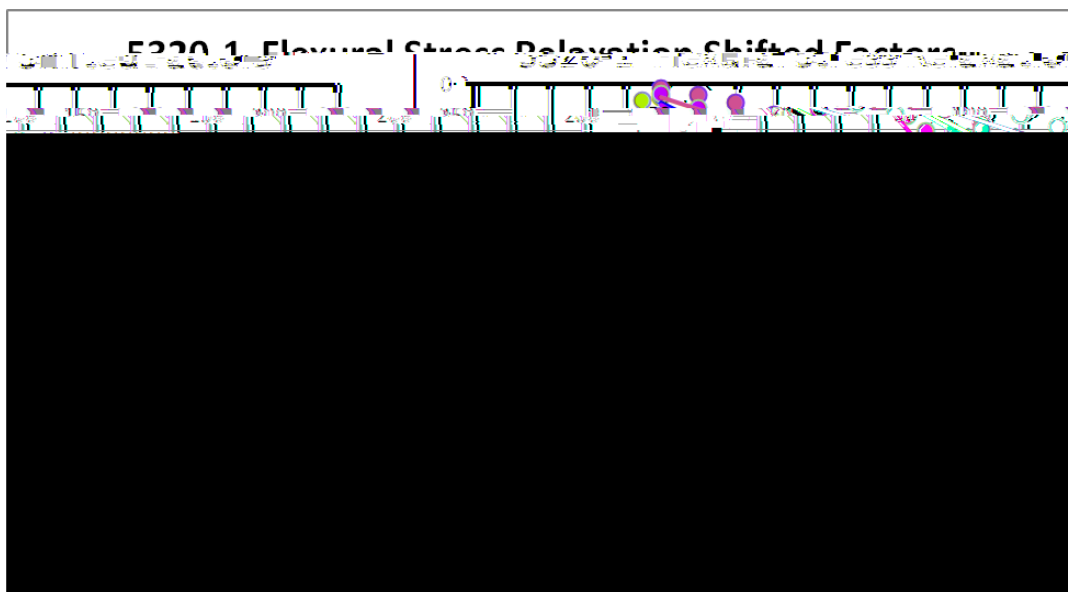
## Appendix P



This graphs shows the comparison of flexural stress relaxation mastercurves between 5320-1 epoxy resin and 5320-UDEO and 5320-8HS carbon fiber reinforced composites 90% Degree of Cure.

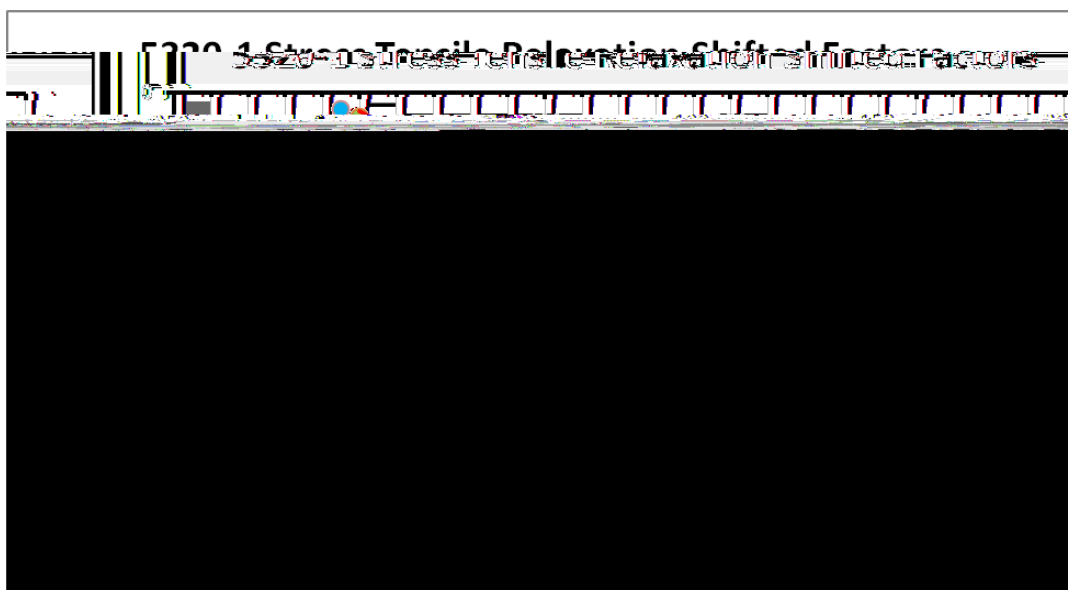


## Appendix S



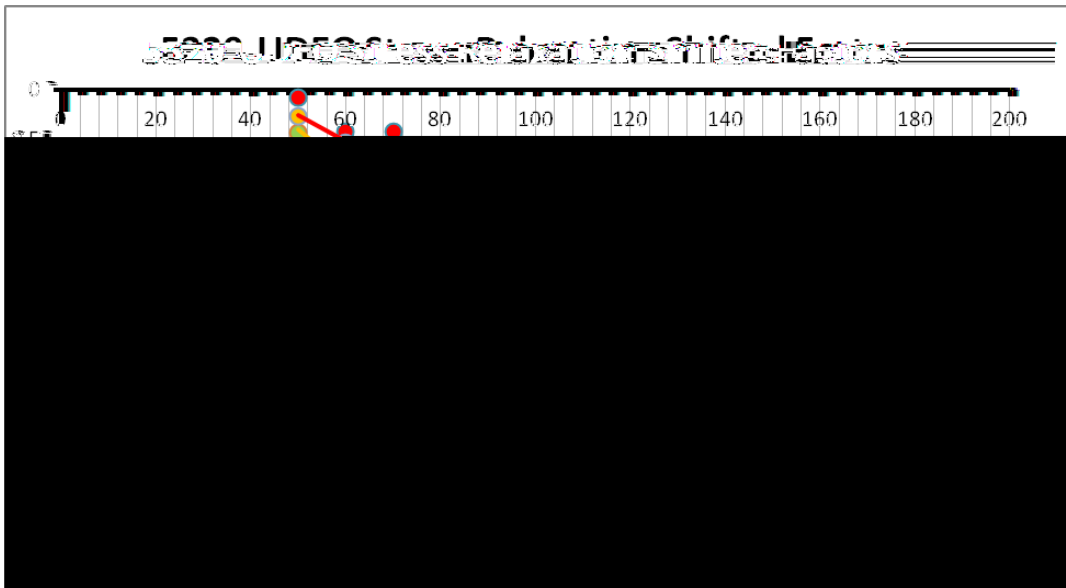
This graph shows how well the William Ferry's Equation fits the experimentally calculated shifted factors used to construct the flexural relaxation mastercureves for 5320-1 epoxy resin.

## Appendix T



This graph shows how well the William Ferry's Equation fits the experimentally calculated shifted factors used to construct the tensile relaxation mastercureves for 5320-1 epoxy resin.

## Appendix U



This graph shows how well the William Ferry's Equation fits the experimentally calculated shifted factors used to construct the flexural relaxation mastercurves for 5320-UDEO composite prepared in  $[0^\circ]$  direction

## Appendix V



This graph shows how well the William Ferry's Equation fits the experimentally calculated shifted factors used to construct the flexural relaxation mastercurves for 5320-8HS composite prepared in  $[+90^\circ]$  direction.





## Appendix W

Material

# A Lost

## Introduction

Stories of human experiences are a fundamental aspect of life and have historically shaped relationships, defined culture, and created history. Humans have shared experiences through generations as myths, legends, and fables, as well as tales, jokes, and historical reports. Storytelling is an opportunity to weave common threads of information that build mutual understanding regardless of location, generation, or experiences of individuals and groups (Vannini, 2009). The lived history of a group or community provides insight to variations and similarities of interpretations of shared experiences (Jackson, 1998; Denzin, 2000). Additionally, narratives of history and experiences illuminate personal and emotional connections and separations of the group as well as shared values. A group's history reinforces belongingness within a community, or a sense of place, and uncovers existing generational values that are passed on over time (Hay, 1988; Bird, 2002).

This research utilizes a multicultural ethnographic framework to gather oral narratives and interpret the lived history of a group of African American people. The cohort selected shared collective experiences at a historic theater before the Civil Rights Movement of the 1960s. Their lived history has not previously been documented in detail, and while urban renewal and historic theater restoration is at the forefront of many communities in America, this community's voice has historically been silenced through oppression and marginalization. The multicultural ethnographic framework, as defined by Congress and Gonzales (2005), is relevant because it not only values lived experiences but also stresses the imperative nature of the participant

becoming a cultural guide while the researcher or clinician assumes the role of learner. This framework seeks to empower participants, and thus the community, by shifting the power balance from the researcher being "all knowing" to the participant being the expert.

In order to hear the voices within the community, the researchers utilized narrative inquiry and documented personal stories through in-depth interviewing. Additionally, archival document review provided information on Black history in the community and supplemented existing documentation. The goal of the study was to preserve the undocumented historical knowledge of this community, inform readers of the struggles and positive experiences specific to this community, and utilize the research as a form of social action against oppression and other social injustices.

## Historical Background

**Kansas.** Kansas has a rich cultural and economic history that has been reflected upon as a double-edged product of American experience (Becker, 1966). Although prominently observed and spoken of Eurocentric/Ethnocentric American values of individualism and idealism prevail in the area, intolerance and oppression have also been a common thread (Becker, 1966).

Dating back to the westward expansion of the United States in the nineteenth century, Kansas had been in between hostile pro-slavery and anti-slavery political movements in the mid-1800s and gained admittance to the Union as a free state in 1861. Hawkins (1973) elucidates the conditions under which African American people, termed "Exodusters," migrated to Kansas from southern states largely in the late 1870s to escape the Ku Klux Klan, the White League, and the Jim Crow Laws. Anti-slavery activists such as John Brown

In 1874, Kansas became one of only three states in the union to pass legislation against discrimination based on race, color, or servitude (Van Delinder, 2001; Carmody, 2014). Issues surrounding race relations became apparent primarily through legislation regarding color-

African American community erected a movie theater in the McAdams Neighborhood to serve its segregated clients (Grand opening (advertisement), 1941). The theatre was named after the poet Paul Laurence Dunbar, an African American poet and author whose life story and writing inspired many through insight and emotion in reaction to the African American experience.

The name and history of Paul Laurence Dunbar is important to the identification of the Historic Theatre, as well as to African American communities throughout the country. He was the leader of a poetic movement, and his life was evidence that black men possessed great intelligence and coafmeasttams

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view of the tone of the interview and macro-view of the experiences of the participant. This first view allowed the

community over time (Ridley, Mendoza, Kanitz, Angermier, & Zenk, 1994).

party at the theatre during her childhood. When asked how she felt the Dunbar compared to other movie theaters she attended in town, Ms. Jackson-Patton stated, "African Americans sat in the balcony at the movies or at the back of the theatre. So it was like family. At the Dunbar we were at home."

**Marvin Grant.** Marvin Grant's interview was completed in his home and took approximately 40 minutes. The researcher and Mr. Arbertha, Sr., were present, and Mr. Arbertha, Sr., identified Mr. Grant as a relative of his. Mr. Grant took time before the interview to take down some notes about what he wanted to convey and utilized the back of an envelope with those notes to guide his narrative. Mr. Grant was approximately 80 years of age at the time of interview and fondly recalled seeing *Gone with the Wind* in the theatre, as well as Saturday



ethnographic framework gives the community a means to preserve their oral history while retelling it from their own point of view.

**Limitations.** Literature often is reluctant to validate the experiences of people as documented through their own reflections of experiences and feelings, as this may not be quantifiable across populations. Authors such as Bird (2002) critique the pursuit of oral narratives. Bird (2002) states that local narratives are seldom at the forefront of peoples' minds, that their retellings "can often be somewhat artificial," and that the context in which narratives are retold may affect the details and precision and thereby affect the version of the story (p. 524). While a limitation such as this exists on a continuum, one would also argue that a critique of the stories and accounts of diverse groups, a discounting or rejection of their experiences, is an element of institutionalization of oppression, racism, sexism, classism, heterosexism, and ageism, etc. (Clark, 2003). Therefore, the researchers value the diverse perspectives shared through narrative development and have not sought quantifiable data to describe this group who shared experiences at a space and place that has been frozen in time. There is no desire to

limitation, created difficulty when arranging interviews, and many participants cancelled appointments, ultimately reducing the number of participants in the study.

### **Conclusion**

This research serves as a collaborative effort between the Wichita State University School of Social Work and the community to bring forward the lived



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# Consideration When Designing an

## *Summary*

Paralysis is caused by problems in the spinal cord. The ability to move or control the body is lost when synapse connections are broken. With the synapse connection broken, communication within the nervous system is inhibited. Approximately six million people, as





physical and chemical compositions of the materials need to be considered to produce an exoskeleton that is more resistant to wear and tear. By considering the composition of materials used, the exoskeleton can be created to ensure the comfort of the patients. Implementing and improving the characteristics listed above will allow scientists to make improvements to the field of biomechanics.

10.1108/JBSE-01-2018-0011

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# Wichita State University's Student's Perception of Police and the Effects of the Media

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Michael Birzer, Ph.D.

*, Wichita State University*

## ***Abstract***

Over the past few years, police behavior has come under national scrutiny. News agencies tend to report only negative police behavior with continuous coverage of police misconduct. In contrast, crime-reality and crime-fiction shows portray police as heroic, which can leave citizens' opinions somewhere in between. This study assessed selected WSU students' perceptions of the police before and after a controlled contact with a police officer. Students who are currently enrolled at Wichita State University were chosen by random selection for this study. Each participant was asked to partake in a pre- and post-semi-structured qualitative interviews with the researcher about their perceptions of the police, with the post interview being conducted after participants attended an open forum discussion with an officer from the Wichita Police Department. This research investigated the role the media plays in shaping students' perceptions of the police to determine whether or not informal contact with a police officer would have a positive effect on peoples' perceptions of police. This research will provide insight into the relationships between the police and media, the media and community, and the police and the community as a whole.



noted a change in their perception, noted an increase in knowledge about police. From this data, one can suggest that perhaps the content of contact with law enforcement was more important than the frequency of such contacts.

Categories included under the theme 'Experience' were pre-perceptions of police, situational, and personal acquaintances. Pre-perceptions of police showed how participants reported their perceptions coming into the study. Four participants reported a positive perception of police, one reported neutral, and one reported negative. Although the majority reported positive, when asked about their experiences with police, participants would recollect both positive and negative experiences, attributing the experience to either police behavior or the circumstances surrounding the experience.

Understanding what factors have the greatest impact on an experience to the general populace during formal or informal contact could, in the future, help to restructure how law enforcement engages a citizen. Five out of the six participants in this study reported having ongoing personal acquaintances with law enforcement and some knowledge of the inner workings of law enforcement. Both could have had an influence on their perceptions of police, in accordance with prior research stating that frequency of contact with the police has the largest impact (Maxson et. al, n.d.)

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Several participants discussed the mentality of law enforcement, feeling as though officers act as if they don't owe the general public an explanation for their actions. These participants also highlighted officers' belief that the public is responsible for knowing their own rights, without law enforcement having to explain actions during an arrest. Participants highlighted a perception that police officers are trying to fill quotas or that officers are out to arrest people maliciously. One participant, however, reported that she thinks police do their job just fine.

In conclusion, the group forum did have a positive effect on views of law enforcement as research indicated contact with law enforcement would. From this study, content of the contact appeared to be just as important as the contact itself. If an experience with an officer was abrasive or unpleasant, then this ultimately influenced perceptions. The group forum represented a neutral contact with an officer, which may have been in stark contrast to participants' previously experienced negative contacts with officers. Due to the combined responses of participants, future implications from this study could focus on a community policing model that brings together police and community in a manner that allows both parties to foster dialogue. This would not result in either party, public and police officers, feeling attacked; rather, both would feel heard.



# Effectiveness of The Listening Program® in Children with Various Developmental Disabilities

Ayris Franklin



## *Summary*

Sound therapy is an alternative treatment for auditory hypersensitivity in children with developmental disabilities. The first sound therapy program was called the Tomatis method. It was named after an ear, nose, and throat physician named Dr. Alfred Tomatis in 1957. Dr. Tomatis had his patients first listen to classical music passively (i.e., doing nothing at the same time). He then had them listen to the music actively (i.e., they hummed or sang along to the music). Tomatis originally used sound therapy to improve the voice quality of patients that were opera singers, but he realized that his method improved more than his patients' voices. His patients also reported significant progress in various skills such as reading, writing, learning a new language, and spelling (Davis, 2004). All of these skills are linguistically-based and are stimulated by the auditory system. Accordingly, some people suggested it might be effective in improving linguistic skills of persons with developmental disabilities.

The Listening Program (TLP ®) is a sound therapy program created in the U.S. that claims to have positive results with a variety of clients with disabilities, ranging from Attention Deficit Hyperactivity Disorder and Autism Spectrum Disorder to Stroke and Dyspraxia. Advanced Brain Technologies, the provider of TLP®, hypothesizes “that as the brain learns to process a fuller spectrum of auditory information, this enhanced auditory processing will develop the user’s ability to filter out ‘extraneous’ sounds, leading to greater ability to attend and concentrate” (Francis, 2011, p. 611). Clients with developmental disabilities

*TLP® Listening Checklist*. The subtests for the *CHAPS* were all related to listening, whereas the *TLP® Listening Checklist* tested listening skills, level of energy, motor skills, and other skills not normally associated with auditory behaviors. When comparing *CHAPS* scores to *TLP® Listening Checklist* scores, all of the *CHAPS* subtest charts looked similar, and the only subtest for the *TLP® Listening Checklist* that looked similar to the graphs for the *CHAPS* was the graph for the Receptive Listening and Language subtest. Seeing the consistent progress among subjects 2 and 7 in all subtests related to listening supports that *TLP®* is an effective tool at improving listening skills in various environments, including quiet ones, ones with multiple inputs, and more.

The purpose of this study was to see if *TLP®* improved auditory behaviors and language among children with developmental disabilities. The current study did have a few limitations. Participants' parents were solely responsible for taping and surveying their children routinely, which resulted in inconsistencies in data. There was one group of participants in the current study, so the researchers didn't learn if the participants' auditory language and behaviors would improve without *TLP®*. Having a group of participants also having their hearing assessed but without receiving *TLP®* would be a necessary control in future research. Also, the severity of each subject's health and developmental disability was unknown to the investigators; therefore, some data couldn't be attributed to a definitive cause. It is now known that hypo- and hypersensitivity is a common issue among children with DDs, yet it is often ignored. Many parents and doctors are looking for the right solution for their patient and should be able to find unbiased research able to specify the possible outcomes of different forms of sound therapy, including *TLP®*. The current study had mixed results, unlike the studies on *TLP®*'s website which had only positive results.



# Religiosity and Sexual Shame among Young Women

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## ***Abstract***

For centuries, marriage has been rich in both cultural and religious tradition. According to the Pew Research Center (2014), 82% of married individuals identify as holding a religious affiliation. Marriage and divorce are regulated by legal policies, and religious bylaws also

## *Summary*

In many societies, marriage is a social institution regulated by both legal policies and the religious bylaws that structure and shape coupling and uncoupling practices within a particular congregation. In fact, religious communities have been influential in shaping larger marriage policies, advocating for covenant marriage licenses and a return to fault-based divorce (Stewart, 1998). Hawkins & Fackrell (2009) found that “

**Methods/Results.** The purpose of the current study was to gain a better understanding of pastor/clergy views about remarriage and stepfamily dynamics and to assess current areas of strength, as well as gaps, in remarriage and stepfamily programming provided within faith-based communities. Faith-based leaders residing in the Midwest who were over the age of 18 were recruited to participate in this study which consisted of a 24-item online survey utilizing Google Docs software. The survey included three sections asking about participants' Church Affiliation and Circumstances for Recognizing Divorce, Educational & Counseling Services offered by their denomination, and faith-based leaders' perceptions about Stepfamily Dynamics. Potential participants were recruited via posts advertising the study on relevant public faith-based Facebook groups or by an email invitation sent to faith leaders identified using the Wichita Christian Business directory. A snowball sampling method, meaning people viewing the posts were asked to share the recruitment materials with others they know meeting the study criteria, was encouraged in order to reach a larger audience.

Unfortunately, our data collection attempts faced several methodological barriers which resulted in no usable data being collected. Given the difficulties encountered, we were unable to fully assess whether the data collection limitations of the current study were purely technological, meaning software related issues that prevented participants from fully completing the survey, or methodological, meaning the method of recruiting participants itself. Given our research timeframe, it was not possible to have a revised methodology, relying on either paper and pencil surveys or

telephone surveys, approved by the IRB. Such methodological questions warrant additional investigation in future research.

**Conclusions/Future Directions.** Despite the obstacles faced with data collection, the intended purpose of this study was to gain increased insight into the premarital resources being offered to remarrying couples in faith communities. As family sociologists Higginbotham et al.'s (2009) research suggests, remarried couples and their resulting stepfamilies endure many more stressors and conflicts than are experienced by those entering a first time marital union. Given the increased risk of dissolution, premarital education targeting remarried couples forming stepfamilies has the potential to not only create awareness around the potential stressors common when developing stepfamily arrangements, but also to provide helpful tools that may assist the couple in lowering their risks for subsequent divorce (Fox & Shriner, 2014).

With the growing frequency of divorce and remarriage rates in the United States, it is likely that higher percentages of congregations will consist of stepfamilies as well. The lack of research on faith-based perceptions and acceptance of stepfamilies may be partially due to ideological differences in religious acceptance of remarriage. We expected to find that resources offered to stepfamilies would be dependent on the reasons, if any, divorce was acceptable within a denomination which would mediate whether that denomination performed remarriage ceremonies in the first place. Denominations not acknowledging divorce as appropriate would be less likely to provide resources for remarrying/stepfamilies. We further anticipated that faith-based leaders more accepting of remarriage would be more knowledgeable about stepfamily dynamics and would be more likely to report that there are unique supports that faith-based communities can provide stepfamilies. These hypotheses warrant further investigation. Gaining such knowledge is a necessary step in identifying ways in which faith-based communities can better support stepfamilies in the future.

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# Differences in Human Gait while Carrying a Load at Different Positions on the Back

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## ***Abstract***

Most people are introduced to backpacks when they are students. As they age, these bags usually grow in terms of size and load. This study sought to determine the differences in human gait patterns when individuals walk with and without a weighted backpack. In addition to backpack weight changes, the experiment placed packs at two different heights on subjects' backs to determine the impact of backpack position on human gait. The hypothesis for the study was that while carrying a weighted backpack, the differences in the gait would be noticeable as weight of load and position of the backpack changed. Data was collected from 10 subjects walking with and without weighted backpacks positioned at two different locations on their backs. Reflective markers were placed on the subjects to track body movement, and a treadmill was used to simulate natural walking. No significant changes were found in the three walking conditions measured: no weighted backpack, 17 %BW in backpack placed high on back, and 17% BW in backpack placed low on back. One significant find was



## Summary

Many people often neglect the importance of backpacks, but they are an essential tool for carrying loads. People of all ages, especially students, use backpacks to carry objects such as notebooks, textbooks, and other necessities for school. As a result, many concerns have often arisen regarding backpacks' loads and the stress they put on carriers' bodies. The position of the backpack on a person's back can also have various effects on the body. The purpose of this study was to determine the differences in human gait while carrying a load at different positions on the back.

A recent study was conducted in order to determine the weight limit that a person should carry [1]. The researchers used craniovertebral angle (CVA) as a measurement for the experiment. The results showed that with 10% body weight (BW) load, a decrease in CVA did not occur immediately, as opposed to 15% BW and 20% BW load, where a decrease in CVA occurred instantly. This indicated that a forward head action occurred immediately for 15% and 20% BW. Moreover, more than 50% of the subjects reported discomfort at 15% and 20% BW. The researchers concluded that 10% of body weight should be the limit for a backpack's weight. Several studies [2, 3, 4] have supported the idea that while a person carries a weighted backpack, his or her body tends to lean forward corresponding to the increased load in order to adjust to the body's center of mass.

Two studies [5,6] used a computational method to determine kinematic variables. They both found that the computational method was a reliable method to provide results for those studies conducted with limited equipment. Our study had limited

equipment as we were unable to measure kinematics such as acceleration, velocity, and marker positions. The objective of our study was to find the difference in the hip angle, knee angle, and ankle angle between three walking conditions: with an empty backpack, with a backpack placed at a high position on the back and containing 17% BW, and with a backpack placed at a low position on the back and containing 17% BW.

Seven healthy subjects volunteered for the project. Each subject was carefully weighed by the researcher to determine his or her BW, and then the backpack weight was adjusted to 17% of each individual's mass. Next, each subject's preferred walking speed was determined by having the subjects walk down a hallway. The subjects were then tested with each of the three aforementioned backpack conditions while walking in two-minute trials for each on a treadmill, maintaining the previously designated self-selected speed as derived from each subject's monitored hallway walking [8]. Software called Cortex, controlling eight motion capture cameras, was used in this experiment [9].

The level of significance was set at  $p < 0.05$ . After statistical analysis, P-values of each joint angle were recorded. The P-value of the hip angle showed 0.999 with a peak of 125.2 in no-weight condition, 124.7 in high-weight (high placement with 17% BW) condition, and 124.8 in low-weight (low placement with 17% BW) condition. As the P-value was bigger than 0.05, there were no observed differences in the hip angle across three walking conditions. Similarly, for the knee angle, the P-value showed 0.0877, which indicated there were no observed differences in the knee angle across three walking conditions. In addition, the hip angle showed a peak value of 66.6 in the no-weight condition, 68.8 in high-weight condition, and 69.2 degree in low-weight condition. The P-value of the ankle angle showed 0.324, which indicated there were also no observed differences in the ankle angle across the three walking conditions. The peak value of ankle angle was 201.7 in no-weight condition, 200.9 in high-weight condition, and 201.5 in low-weight condition.

The key finding of this study was that no significance was found in joint angles between these three walking conditions. Some limitations could have impacted the results of this project. The sample size of this study might not have been large enough to observe the differences in the hip angle, the knee angle, and the ankle angle between the three walking conditions. The usage of the treadmill was another limitation of this study because it imposed a constant designated speed rather than allowing a more natural gait, as would be observed had the subjects walked over ground. The last limitation of this study was the calculation of the hip angle. In this study, the hip angle was calculated based on the vector from the hip to the knee marker positions in relation to the horizontal plane, instead of the vector from the hip to the shoulder joint. This is a potential limitation because when the hip angle is calculated based on the vector from the hip to the knee marker in relation to the horizontal plane, it ignores the angle of the torso in the calculation of the overall hip angle; therefore, one would not be able to see the effect of torso lean in the angle defined by the hip to knee in relation to the horizontal plane. Moreover, when we compared the results of the knee angle peak value with a separate study [7], we came across a significant finding from our data. The knee joint angle behaves very similarly when a person walks with a two-strapped backpack or with a one-strap backpack. Though we originally set out to discover how hip angle, knee joint angle, and ankle angle were affected by different walking conditions, we instead observed how knee joint angle data could potentially be used in conjunction with results of a separate study [7] exploring the role of one-



# pH Sensitive Conformational Change Monitored by Tryptophan Quenching of Fluorescence

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## ***Abstract***

Anthrax toxins are the main virulence component in bacterium *Bacillus anthracis*, a lethal agent for livestock and humans. *Bacillus anthracis* is composed of several polypeptide chains: the receptor-binding moiety protective antigen (PA) and enzymatic moieties lethal factor (LF) and edema factor (EF) (Pilpa, Bayrhuber, Marlett, Reik, & Young, 2011). This study examined the PA membrane and the expanding pores with emphasis on the mechanism of the pre-pore to pore formation of mutant protein D425A in comparison to wild type protein A350; a fluorospectrometer reading was used to measure the effects of the pH on the mutant protein, and then the reading was compared to that of the wild type protein. The kinematics approach was used to measure the rate of transition of the proteins from pre-pore to pore. Recent findings suggest that PA intermediates as mechanisms for pre-pore to pore formation. The details of how the PA pre-pore to pore mechanism forms an intermediates and translocate toxins are not yet known. In our lab we incorporated single tryptophan residues into the peptide segments that play key roles in the conformational change in the D425A mutant and the A350 wild type protein. This allowed us to explore the pH stability of anthrax Protective Antigen to figure the conformational changes on the PA. The results of this study will give scientists a better understanding of Anthrax toxins, with the data contributing to the development of a new therapeutic.



Our study measured the maturation of the mutant and wild type pores with temperature dependent kinetics studies using an Applied Photophysics SX.18MV-R Stopped Flow Spectrofluorimeter. Proteins were incubated at the pH 5 buffer (50 mM sodium phosphate buffer, 150 mM NaCl, 2.5 mM MgCl<sub>2</sub>). Excitation was set at 350 nm, and the rates were collected in split time base mode at 2 seconds and 20 seconds. All data points collected represent an average of at least two shots acquired by the stopped flow instrument. We used this to obtain the kinetic change, focusing on the initial change of both the wild type protein and the mutant D425A protein.

Kinetic data revealed that the end state of pore formation was indeed the formation of the phe-clamp. For both the A350 and D425, an initial structure change occurred. In both of these proteins, higher temperature led to increased rate of formation. The only differences noted were how the wild type protein continued pore formation after one second. This indicated that the <sub>10 - 11</sub> loop in D425A sensed a signal for pore formation, but also suggested that the <sub>2 10 - 2 11</sub> loop can adapt into separate conformations. If so, the mutation of D425A, known to block pore formation, may stabilize a structure that does not lead to a pore. More studies are needed to determine the meaning of this structure. Our main interest was understanding the mechanism behind D425A blockage in pore formation as a hint for an approach to a new therapeutic to defend from diseases caused by AB two-component systems.

In our studies of this mutant protein, we have found that at pH 5, the D425A mutant, is capable of forming an intermediate pore structure. This

intermediate has similar initial kinetic profiles as the wild type protein. Effects of conformational change of both wild type A350 and D425A mutant protein were measured by kinetic data incubated in acidic conditions at various temperatures in 5 concentrations. While more studies are needed for the development of a new therapeutic, our discovery of an intermediate pore state in the mutant protein brings new information about the mutant's mechanism that is known to block pore formation. This discovery will contribute to a wider body of research dedicated to advancing therapeutics in the field of anthrax research.



# A New Porcine Follicle-Stimulating Hormone Glycoform as a Potential Candidate for Superovulation in Animals

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## ***Abstract***

Follicle-stimulating hormone (FSH), a pituitary glycoprotein, plays a central role in reproduction in humans and animals. In females, it acts on ovarian follicles producing mature oocytes at ovulation. Glycosylation variants of FSH show different bio-activities. Hypoglycosylated hFSH<sup>21</sup> is more active than fully-glycosylated hFSH<sup>24</sup>, but its blood concentrations are going down during aging, as fertility decreases in women. FSH glycoforms have been observed largely in primates, including humans, rhesus monkeys, and Japanese macaques. Ovine, porcine, and bovine FSH preparations appear to possess only FSH<sup>24</sup>, while horse FSH is 90% FSH<sup>21</sup>. In cattle, follicle-stimulating hormone is used for superovulation. Folltropin®, a porcine pituitary-derived follicle-stimulating hormone, marke-a 00-3(y).94 Td(n 0 Tw 4(a)1



## Summary

Superovulation stimulates the ovary to induce multiple ovulations, particularly in species that naturally ovulate a single follicle per cycle. In cattle, maturation of the follicle requires both follicle-stimulating hormone (FSH) and luteinizing hormone (LH). Pregnant Mare Serum Gonadotropin (PMSG) is a glycoprotein hormone found in the blood serum of pregnant mares. An investigation by Cole and Hart (1930) led to the discovery of PMSG, and since then it has been used in superovulation protocols. Biological activity of PMSG is similar to the combined biological activities of FSH and LH (Licht et al., 1979). However, in equids, PMSG has largely LH-like activity. Compared to FSH, PMSG has a longer half-life, and can persist in bovine circulation for up to 10 days as compared to five hours for FSH (Bo' & Mapletoft, 2014). Longer half-life of PMSG results in the prolonged release of estradiol from unovulated follicles, resulting in an imbalance of hormones (Gordon, 2014). This imbalance can lead to enlarged ovaries and the continuation of follicles. In addition, PMSG can lead to an increase in the number of follicles in the ovary, which can result in a condition known as ovarian hyperandrogenism. This condition is characterized by an increase in the number of follicles in the ovary, which can result in a condition known as ovarian hyperandrogenism. This condition is characterized by an increase in the number of follicles in the ovary, which can result in a condition known as ovarian hyperandrogenism.

horse, two forms of glycosylated eFSHbeta have been found. One of the two eFSHbeta variants possesses both

pituitary sample.

**Conclusion.** Improving methods involved with superovulation will aid in the production of genetically superior calves. The only FDA-approved FSH product for superovulation in cattle is Folltropin® which contains a low amount of LH, according to the manufacturer's website.

Porcine FSH preparations appeared to be exclusively fully-glycosylated FSH. Our findings resulted in the identification of hypo-glycosylated porcine FSH that co-purifies with LH. Previous studies comparing biological activities revealed that hypo-glycosylated FSH is more active *in vitro* and *in vivo* than fully-glycosylated FSH (Davis et al., 2014). While an observed delay in receptor-binding assays exists for fully-glycosylated FSH, hypo-glycosylated FSH binds the receptor immediately (Bousfield, Butnev, Butnev, et al., 2014). Given our findings, hypo-glycosylated porcine FSH could be evaluated for its efficacy with superovulation protocols in cattle.



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# Characterizing Boundary Conditions of Self-Adjoint Operators

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# Laser Surface Treatment to Enhance Biointegration of Orthopedic Implants

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## ***Abstract***

Many implanted biomedical devices cause patients to suffer from infections that develop post-surgically on the device surface or in surrounding tissue. These infections not only cause device failure but could also spread systematically. To promote success of an orthopedic implant, quick host tissue integration is required for timely healing. The research explored the role of laser micro-

## *Summary*

Postoperative orthopedic implant infections cause major complications in the medical field (Popat, Eltgroth, LaTempa, Grimes, & Desai, 2007). Patients who must be given reconstruction or support surgeries are in need of un-harmful, functional, and safe orthopedic implant placement. The

complex geometric materials (Hallgren, Reimers, Chakarov, Gold, & Wennerberg, 2003). Compared to commercially pure machined titanium and acid treated samples, laser treatment influenced bone cell growth on the implant surface directly. Protein absorption, cell proliferation, cell differentiation, and deposition of bone matrix were caused and resulted in more stable interlocking, faster tissue integration, and improved bone-implant retention due to laser surface treatment as a patterning method (Queiroz et al., 2013). Using a laser allows for easily created nano-scale patterning which is beneficial because cell growth is more successful on a nano rough surface due to its biomimetic effect (Mendonça, Mendonça, Aragão, & Cooper, 2008).

Although laser patterning shows many promising characteristics, it has not yet been sufficiently assessed in many specific areas. There is not much evidence comparing laser machining to

methods other than machined titanium. The purpose of this study was to assess the effect of laser machining on bone integration of titanium implants. The study was conducted in a laboratory setting using a rat model. The results showed that laser machining significantly improved bone integration compared to machined titanium. The study was published in the Journal of Biomedical Materials Research, 2014, 86(1), 1-14. doi:10.1002/jbm.b.33001

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# Exploring Informal Sources of Information and Women's Use of Preconception Health Services

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## *Summary*

The purpose of this review of literature was to attempt to identify the informal information sources women use in deciding to use preconception health services. Preconception care refers to a set of interventions that aim to increase healthy behaviors in women and reduce the risks of birth defects and infant mortality. Preconception care includes services such as regular wellness checkups, smoking and alcohol cessation, social and mental health awareness, and developing a variety of behaviors that support a healthy lifestyle (Johnson et al., 2006)

Although many studies have investigated women's knowledge and use of preconception care, there is a need for more specific information regarding the informal sources that influence women's preconception care utilization. This gap in information about informal influences, if filled, could be used to better educate and reach women that may be hesitant to seek out formal sources, such as general practitioners, or those who do not receive adequate preconception care services.

A focus on preconception care may be a key approach to preventing poor birth

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