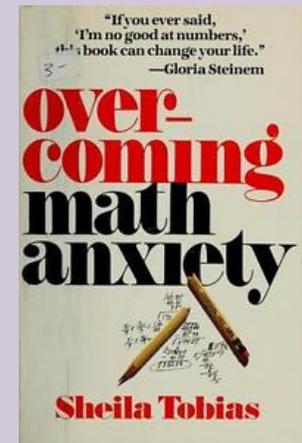


Preservice Teachers' Attitudes Toward Faith And Mindfulness As An Intervention For Math Anxiety

Shannon Schumann
Grand Canyon University
Joint Math Meetings
January 8, 2016

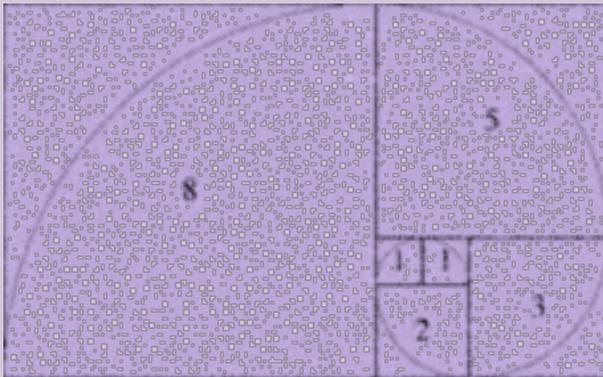
Math Anxiety

- “... adverse emotional reaction to math or the prospect of doing math,” (Maloney and Beilock, 2012)
- Students elect out of quantitative courses, majors, and careers (LeFevre, Kulak, & Heymans, 1993)
- Affects women disproportionately (Hembree, 1990)
 - *Girls can catch it from their female teachers (Beilock, 2010)*



Chicken or Egg?

- Poor performance can breed anxiety and avoidance.
- Anxiety hinders performance by allowing worry to clog up working memory. (Ashcraft, 2007)



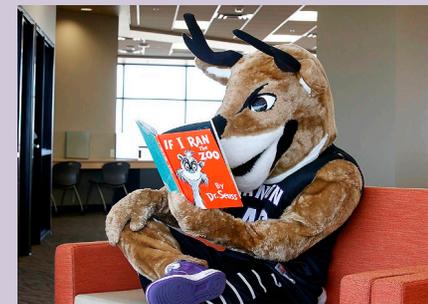
Prayer?

- Mixed results, sometimes decreases anxiety, sometimes increases
- Harris, Schoneman, Carrera, 2005 - style of prayer and view of God



Our school

- Non-denominational Christian, leans evangelical
- No test for faith for students
 - *Required Christian Worldview (CWV) course freshman year*
- Statement of Faith for College of Theology (COT) faculty
- Non-COT faculty merely required to support [Doctrinal Statement](#)
- CWV required to be incorporated into every course



I like to start small

- What do students think?
- Start with education majors
 - *Smaller more intimate class size*
 - *Students familiar with issues of math anxiety*
 - *Hopefully, students are introspective about thought process*

My Questions

- What do our students think about math anxiety?
- Are our students open to the use of mindful breathing?
- Do they think it is a useful tool?
- What do they think about their faith for relief of anxiety?
- What is their attitude toward contemplative practice in their future teaching role?

Method

- Population: preservice elementary, math focus
 - 17 female, 1 male in the class
 - 1 student declined to participate; n=17

- Two week “training” 3 minute guided breathing
- Three weeks of “practice”
 - *1 minute of breathing on their own*
 - *1 minute of silence, could meditate, pray, daydream*
 - *1 minute of free writing*

- Online open ended weekly discussion questions for the five week period

Initial Concerns

- Proseletyzing/Coercion
- IRB
- Privacy

Attitudes toward Anxiety

- No students reported personally having math anxiety
 - All attributed anxiety to poor performance
 - “I personally *do not suffer* from math anxiety *because I have always done well in math* and it is favorite subject.”
- 7 reported *test* anxiety
 - “*It affects my course work... I’ll mess up the numbers*”
- *Frustration* at not understanding instead of anxiety

Attitudes toward Faith

- 100% Christian (n=11)
- 2 students specifically reported having a personal spiritual practice similar to breathing
 - *“My time that I contemplate is when I am going to bed and it is very similar to the breathing exercises. It kind of starts out as a prayer and then my mind wanders...”*
 - *“Compared to the breathing exercise, they [my prayer practices] are very similar.”*

Attitudes toward Faith

- Not all students felt there was a connection between breath work and prayer
 - *“I pray before any test or quiz. I always feel better and a little bit more focus because I am not as stress or worried, it really helps relax me. I notice when I do this, my test scores are pretty good. When I don't pray, I am a lot more anxious and nervous and do not do as well. To me the breathing exercises are different than praying, but for each I feel not as stressed.”*

Personal Experience

Overall	
Positive: 15 Helps to focus and prepare mindset for class Helps to “forget everything” Nice to “allow mind to wander,” “relax,” “stop”	Negative: 2 Would not help Would rather study
During “free” minute	
Pray	4
Breathe	4
Breath or pray	1
Think or do nothing	4
Did not indicate	4

Daily open writing: Varied

- Provided insights to students *as individuals*
 - *“There must be a new clock cause it is ticking so friggin loud and I've never noticed it before.”*
 - *“I actually took the time to fully understand my surroundings I see how my body reacts and what is comfortable.”*
 - *“Today it was easier to breathe by myself but time still went fast - I realize how fast the days go by, and how I need to make quiet time. Today I prayed for the students of this campus.”*
 - *“I miss my family”*
 - *“The thoughts that came to mind were that before this class I had a quiz in sociology and I did not do good at all and I'm scared because of my grade.”*

Use With Their Students

■ Potential for use in elementary classroom: 2 yes, 8 no

- *Students “may not fully understand how to do the exercise”*
- *Should pray instead*
- *“they would be so young that they wouldn't take it seriously and they would get distracted.”*
- *“try to do something like it, but make it appealing for their age.”*
- *” sitting quietly and just breathing will make it more difficult to focus on the problems”*

Use with their students

- **Use for older students (high school college) 9 yes, 1 no**
 - *I want to teach middle school, and they are at that age where they are trying to discover new things and such. So I feel like it could be beneficial for some students who tend to not goof around and actually pay attention in a sense. I think these exercises could potentially influence and help college students by allowing them time to themselves.*

Limitations and Challenges

- Homogenous atypical college population
- Population had little to no math anxiety
- Short period of study
- Balance between objectivity and connecting with students

Future Plans: Quasi experiment

- Beginning Algebra, Intermediate Algebra, Intro to Psych (3 instructors)
- Pre-post across groups
- Use A-MARS and internal skills test to measure change
- Control for instructor, major, gender, ethnicity, prior ability, religious preference/practice
- Compare mindfulness, prayer, control group

Selected References

- Ashcraft, M. H. (2007). Working memory, math performance, and math anxiety. *Psychonomic Bulletin & Review (pre-2011)*, 14(2), 243 - 248.
- Ashcroft, M. H. (2002). Math Anxiety: Personal, Educational, and Cognitive Consequences. *Current Directions in Psychological Science*, 11(5), 181.
- Barbezat, D., Bush, M. (2013), *Contemplative Practices in Higher Education: Powerful Methods to Transform Teaching and Learning*, Wiley and Sons
- Beilock, S. L. (2010). Female teachers' math anxiety affects girls' math achievement. *Proceedings of the National Academy of Sciences (PNAS)*, 107(5), 1860 - 1863.
- EA, H., E, B., L, M., CA, M., LK, M., DJ, R., et al. (2013). Randomized controlled trial of mindfulness meditation for generalized anxiety disorder: effects on anxiety and stress reactivity. *Journal of Clinical Psychiatry*, 74(8), 786 - 792.
- Ford, T. E., Ford, B., Boxer, C., & Armstrong, J. (2012). Effect of humor on state anxiety and math performance. *Humor*, 29(12), 59 - 74.
- Harris, J., Schoneman, S. W., Carrera, S.R. Preferred Prayer Styles and Anxiety Control, *Journal of Religion and Health*, 44(4), 403-412.
- Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education*, 21, 33 - 46.
- LeFevre, J., Kulak, A., & Heymans, S. (1993). Factors influencing the selection of university majors varying in mathematical content. *Canadian Journal of Behavioral Science*, 25(1), 108 - 125.
- Niss, L. K. (2012). *Mindfulness Intervention on Math Anxiety and Exam Scores in a High School Population (Unpublished undergraduate honors thesis)*. U Colorado at Boulder, retrieved from http://digitool.library.colostate.edu/R/?func=dbin-jump-full&object_id=174046&local_base=GEN01.
- Nunez-Pena, M. I., Suarez-Pellicioni, M., & Bono, R. (2013). Effects of math anxiety on student success in higher education. *International Journal of Educational Research*, 58, 36 - 43.
- Park, D., Ramirez, G., & Beilock, S. L. (2014). The Role of Expressive Writing in Math Anxiety. *Journal of Experimental Psychology: Applied*, 20, 103-111.
- Wolcott, F. L. (2013). On contemplation in mathematics. *Journal of Humanistic Mathematics*, 3(1), 85 - 95.

Thank you!