Spring 5-4-2023

Adverse Childhood Experiences, Resilience, and Student Engagement in a University Statistics Course

Adam Heck
Southern Adventist University, adamheck@southern.edu

Adverse Childhood Experiences, Resilience, and Student Engagement in a University Statistics Course

Adam Heck
University at Buffalo – SUNY
adamheck@buffalo.edu

Ji-Won Son
University of Buffalo – SUNY
jiwonson@buffalo.edu

Engagement is a fundamental aspect of the learning process. Exploring the role of outside factors on student engagement offers potential for eduators to tailor their pedagogies to meet the need of students who have experienced trauma. Researchers over the past couple of decades have begun exploring the role of adverse childhood experiences (ACEs) on a whole host of different fields (health, education, etc.). This study examines the potential role that ACES and resilience may play in a student's engagement levels within a university statistics course. Participants were college students from a university in the southeastern United States. Two survesy, an ACE inventory (Child Experiences Survey) and a resilience inventory (Child and Youth Resiliency Measure), were completed by each participant and from this group a selected number (25) were asked to participate in an interview. Analysis from the interviews pointed to a possible link between resilience, ACEs, and different aspects of engagement (affective, behavioral, and cognitive). This paper will discuss these findings.

Keywords: Adverse childhood experiences, resilience, engagement, university statistics.

Childhood trauma is a public health challenge that desperately needs to be addressed. Nearly two decades ago, van der Kolk (2005) called it the most important public health challenge that we currently face. Since that statement, research on adverse childhood experiences (ACEs) has shown that this statement was prescient. In 2011, 48% of children in the United States had at least 1 ACE and 22.6% had 2 or more. (Bethell et al., 2014). Five years later, in 2016, the numbers were similar. Despite the prevalence of ACEs in our society, over half (56.3%) of individuals who experienced child abuse, report having good mental health as adults. (Afifi et al., 2016). One factor that may answer part of this is resilience. Masten (2018) defined resilience as "the capacity of a system to adapt successfully to significant challenges that threaten it's function, viability, or development" (p. 16). It is within this concept that we see how a child may be able to overcome adverse experiences and move toward a productive life.

Theoretical Framework

Brofenbrenner's bioecological model of human development (Brofenbrenner, 1981) provides support for this research. In that this theory emphasizes the role of environment on human development, we see how ACEs and resilience may influence the learning and growth that takes place in a child's life.

Methods

Participants were recruited from a small (2400 undergraduate students enrolled during Fall 2021), 4-year, private university in the southeast United States. The participating instructor received a PhD in mathematics and has taught statistics for at least 30 semesters. Four sections of

statistics were chosen. Two during the fall semester of 2021 and two during the winter semester of 2022. The instructor uses a flipped teaching modality. A total of 98 students provided consent and completed the survey instrument which consisted of an ACE instrument (Child Experiences Survey) and a resilience instrument (Child and Youth Resiliency Measure).

Participants were then classified as being high (4+), medium (2-3), or low (0-1) on their ACE scores and resilience measure (high 76 or above, low 65 or below). Based on these classifications, individuals were separated into 4 groups: High resilience-low ACE, high resilience-high ACE, low resilience-low ACE, and low resilience-high ACE. From each of these groups individuals were recruited to take part in an interview. See table 1 for subgroup sample sizes.

Based on the above classifications, this paper seeks to answer the following research questions

1. Is there a difference in affective, behavior, and cognitive engagement between students with Low ACE scores (0-1) and High ACE scores (4+) within a flipped classroom setting?
2. Is there a difference in affective, behavior, and cognitive engagement between students with low resilience scores (CYRM<66) and high resilience scores (CYRM>75) within a flipped classroom setting?
3. Is there a difference in affective, behavioral, and cognitive engagement between students with low ACE scores and high resilience, low ACE/low resilience, high ACE/high resilience, and high/low resilience within a flipped classroom setting?

Findings

Separation by ACE score. Regarding affective engagement, individuals with high ACEs were more likely to indicate a low level of affective engagement. Additionally, those in the high ACE group were less likely to express enjoyment of the course and provided much stronger negative feelings about it. While both groups expressed some feelings of just getting through it, the level of dislike indicated by the high ACE group was more intense.

A slight difference was noted between the groups on behavioral engagement. While there was a higher proportion of individuals who displayed low behavioral engagement, this difference was not as noticeable as with affective engagement. When looking at the data more closely, however, it was clear that those in the high ACE category were much more likely to self-report procrastinating behavior. So, while the groups were only moderately different in overall behavioral engagement, looking more deeply indicated certain behaviors that may warrant further study.

A strong likelihood of encountering someone with low cognitive engagement was noticed among the high ACE group. All individuals classified as having low cognitive engagement fell into the high ACE category. Quotes expressing an inability to obtain the information were common among high ACE individuals. While the low ACE group also indicated some difficulty in understanding the material, other statements by the same individuals expressed a willingness to work at it until they understood it. This kind of effort wasn't present nearly as often among the high ACE individuals.

Separation by resilience scores. All individuals in this sample who displayed low affective engagement came from the low resilience group (See Table 1). Based on interview

comments, students in the low resilience group either didn't want to be in class or felt apart from it, or both. Only 4 comments indicating low affective engagement were made by members in the high resilience group. This number was 44 among the low resilience group.

There were two individuals within the low resilience group who displayed a low level of behavioral engagement verses 0 in the high resilience group. These two individuals between them provided 25 comments indicating low engagement. The remaining members of this group also provided evidence of low engagement, but this was either offset by other self-reported behaviors that were classified as high or moderate, leading to an overall classification of moderate or even positive. With that said, 11 out of 14 members of the low resilience group provided statements indicating some form of low behavioral engagement, whereas this number was only 2 in the high resilience group. Additionally, members of the low resilience group more were more likely to indicate procrastinating behavior, difficulty asking questions, and having a lack of focus.

Low resilience groups were more likely to express a low level of cognitive engagement. 43% of the low resilience individuals were classified as having low cognitive engagement, whereas this was 22% among high resilience students. While both groups had individuals who reported low cognitive engagement, the sources of the low engagement are worth noting. The individuals in the high resilience group indicated that a major contributor to their low engagement was the relative ease of the course. With the low resilience group, the sources were due to feelings of helplessness and that the course was moving too fast.

Four groups. On the question of affective engagement (See Table 2), individuals with low ACEs and high resilience generally displayed moderate-positive affective engagement. Those on the other end of the spectrum (HA-LR) displayed moderate-negative affective engagement. The two additional groups were closer to the LA-HR group but had some additional negative feelings and lowered affective engagement. The group that stands out is the HA-LR group where individuals were highly likely to either have a negative affective engagement or have entered the course with lowered expectations about mathematics in general. Additionally, among the last group, there were decreased feelings of belonging and a greater dislike for the material.

There was little difference between the first three groups (LA-HR, LA-LR, HA-HR) on behavioral engagement. All three groups were similar and there were few indications of negative engagement. The final group (HA-LR) stood out a bit more as there were two individuals who displayed poor behavioral engagement. The remaining 5, however, were high. Nearly all individuals in this final group displayed some positive behavioral engagement, but there were strong signs of negative engagement in a couple of them. Additionally, some members of the final group displayed stronger behavioral engagement than members of the other three groups. This could be an indication that their behavioral engagement was, by necessity, stronger because it needed to be to achieve success.

Regarding cognitive engagement, there was strong evidence of a difference between the HA-LR group and the remaining three. The first three groups were strong or moderate all around. In the HA-LR group, however, 5 out of the 7 participants were classified has having low cognitive engagement and only 1 of the 7 displayed positive cognitive engagement.

Discussion

When separating the data by ACE scores or by resilience scores, there appeared to be a difference in affective and cognitive engagement with those having either low resilience or high ACEs more likely to display a lowered level of engagement. Behavioral engagement between the ACE and resilience groups was similar, although procrastination was higher among the low resilience and high ACE groups. Furthermore, the two individuals who reported a lowered behavioral engagement had both risk factors (low resilience and high engagement).

Considering all three of the engagement factors together, there seemed to be evidence of a difference in engagement levels between the four groups. Those with high ACEs and low resilience were much more likely to display poor engagement in all three facets, although behavioral engagement appeared for this group was nearer to the other groups than affective and cognitive. There are a couple of factors which may be a cause of this. First the course was taught at a low level which may allow individuals who struggle with math to stay more engaged while those who are strong in math to show less need of strong behavioral engagement. Additional research of this type using a more difficult course may be warranted. The second factor may be due to time. By the time an individual makes it to a university, it is highly possible that they have learned positive study behaviors. They may not use them at a high rate, but they are at the very least aware of what needs to be done to succeed. Coupled with an easier course, this may have led to higher than normal behavioral engagement in the HA-LA group.

Although negative engagement behaviors were exhibited by those with high ACEs, not all followed this pattern. Several students who fell into this category were actively engaged in this course. This is an important consideration as not all individuals will be affected by adverse childhood experiences in the same way. What seemed to be evident from this study is that individuals with high ACEs and low resilience were at an increased risk of being negatively engaged in the classroom.

Several limitations were present with this study. First engagement was determined solely through interviews. Because of the structure of the course, meaningful observation data was difficult to find and the focus was put on interviews. Future work on this front would utilize a different course that would lead to a better incorporation of observations. Second, the high ACE-high resilience group had a low sample size. As mentioned earlier, all effort was made to increase the sample size for this group, to no avail. Third, the course was taught at a low level of difficulty which may have affected some of the results for engagement. Finally, the data was gathered in the midst of COVID precautions and these may have had an effect on how students interacted in the classroom and with each other.

References

Afifi, T. O., MacMillan, H. L., Taillieu, T., Turner, S., Cheung, K. Sareen, J., & Boyle, M. H. (2016). Individual-and relationship-level factors related to better mental health outcomes following child abuse: results from a nationally representative Canadian sample. *The Canadian Journal of Psychiatry, 61*(12), 776-788.

Bethell, C. D., Newacheck, P., Hawes, E., & Halfon, N. (2014). Adverse childhood experiences: assessing the impact on health and school engagement and the mitigating role resilience. *Health Affairs, 33*(12), 2106-2115.

Bethell, C. D., Davis, M.B., Gombojav, N., Stumbo, S., & Powers, K. (2017). *Issue brief: Adverse childhood experiences among US children, child and adolescent health measurement initiative.* Johns Hopkins Bloomberg School of Public Health.

Bronfenbrenner, U. (1981). *The ecology of human development: Experiments by nature and design.* Burke, M. J., Hellman, J. L., Scott, B. G., Weems, C. F., & Carrion, V. G. (2011).

Cobb, P. (2007). Putting philosophy to work: Coping with multiple theoretical perspectives. In Lester, F. (ed.), *Second handbook of research on mathematics teaching and learning*, (p. 3-38). Information Age.

Finkelhor, D., Shattuck, A., Turner, H., & Hamby, S. (2013). Improving the adverse childhood experiences study scale. *JAMA Pediatrics, 167*(1), 70-75.

Fredricks, J. A., Blumenfeld, P. C., Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence, *Review of Educational Research, 74*(1), 59-109.

Harré, R., Langenhove, L. V. (2010). Varieties of Positioning. In van Langenhove, L. (Ed.) *People and Societies: Rom Harré and Designing the Social Sciences*. Routledge.

Jeffries, P., McGarrigle, L., Ungar, M. (2019). The CYRM-R: a Rasch-validated revision of the child and youth resilience measure.

Lam, S., Jimerson, S., Kikas, E., Cefai, C., Veiga, F. H., Nelson, B., Hatzichristou, C., Polychroni, F., Basnett, J., Duck, R., Farrell, P., Liu, Y., Negovan, V., Shin, H., Stanculescu, E., Wong, B. P.H, Yang, H., Zollneritsch, J. (2012). Do girls and boys perceive themselves as equally engaged in school? The results of an international study from 12 countries. *Journal of School Psychology, 50*, 77-94.

Masten, A. S. (2018). Resilience theory and research on children and families: Past, present, and promise. Journal of Family Theory & Review 10, 12-31.

Mersky, J.P., Janczewski, C. E., Topitzes, J. (2017). Rethinking the measurement of adversity: Moving toward second-generation research on adverse childhood experiences. *Child Maltreatment, 22(1),* 58-68.

Van der Kolk, B. A. (2005). Child abuse and victimization. *Psychiatric Annals*, *35*(5), 374-378.

Table 1:
Group demographics and engagement for ACE groups and resilience groups

Group	***Low ACE***	***High ACE***	***Low Res.***	***High Res.***
Sample Size	*6*	*3*	*5*	*7*
%Male	*27.3%*	*41.7%*	*42.9%*	*44.4%*
Mean (SD) Age	*19.9(3.7)*	*19.3(1.1)*	*20.4(3.5)*	*18.8(0.4)*
Mean (SD) CYRM	*72.1(9.0)*	*63.1(11.6)*	*58.1(6.8)*	*79.2(3.7)*
Mean (SD) CES	*0.3(0.5)*	*6.2(1.6)*	*3.9(3.1)*	*1.9(2.7)*
Negative Affective	*6*	*3*	*4*	*5*
Moderate Affective	*4*	*4*	*4*	*4*
Positive Affective	*1*	*5*	*6*	*0*
Negative Behavioral	*9*	*7*	*9*	*6*
Moderate Behavioral	*1*	*2*	*3*	*3*
Positive Behavioral	*1*	*3*	*2*	*0*
Negative Cognitive	*6*	*4*	*4*	*5*
Moderate Cognitive	*5*	*1*	*4*	*2*
Positive Cognitive	*0*	*7*	*6*	*2*

Table 2:
Group Demographics and Engagement for four sub-groups

Group	***LA-HR***	***HA-HR***	***LA-LR***	***HA-LR***
Sample Size	*6*	*3*	*5*	*7*
%Male	*16.7%*	*100%*	*40%)*	*28.6%*
Mean (SD) Age	*18.7(0.5)*	*19(0)*	*21.4(5.4)*	*19.7(1.3)*
Mean (SD) CYRM	*79.7(3.3)*	*78.3(5.1)*	*63(1.4)*	*55.6(7.2)*
Mean (SD) CES	*0.2(0.4)*	*5.3(1.5)*	*0.4(0.5)*	*6.6(1.5)*
Negative Affective	*5*	*0*	*0*	*0*
Moderate Affective	*1*	*1*	*2*	*1*
Positive Affective	*1*	*2*	*3*	*5*
Negative Behavioral	*2*	*0*	*0*	*0*
Moderate Behavioral	*2*	*1*	*1*	*2*
Positive Behavioral	*3*	*2*	*4*	*4*
Negative Cognitive	*5*	*0*	*0*	*0*
Moderate Cognitive	*1*	*1*	*0*	*4*
Positive Cognitive	*1*	*2*	*5*	*2*