Higher Resilience and School Performance
Among Students with Disproportionately High Adverse Childhood Experiences (ACEs)
at Lincoln High, in Walla Walla, Washington, 2009-2013
Technical Appendix

Data Sources

Quantitative Survey Data on School Experiences and Resilience
In the Spring of 2014, a survey was administered to students at Lincoln High.

After the introductory questions on personal characteristics, like grade, gender, and length of time at Lincoln High, students responded to the following questions on their school experiences:

"From the following list, let us know which experiences have been very important, important, or not important to you. At Lincoln, I have been supported by...
1.   being told by my peers that I am trusted
2.   having authority figures set clear and fair expectations for me
3.   having healthy role models
4.   having people take care of me when I was sick
5.   being told I am loved no matter what
6.   feeling likeable and loveable
7.   having grades I was proud of
8.   helping others and being happy to do so
9.   learning how to take responsibility for my actions
10. asking for help and being helped
11. being sure that everything would be okay
12. being able to confide in someone
13. learning how to control myself when I feel myself getting really upset or angry
14. being able to solve problems on my own
15. learning how to respect myself
16. learning how to respect others
17. doing my homework well and on time
18. being proud of my grades or having other people who are proud of my grades

Students were also asked questions on three dimensions of resilience. The resilience questions were a subset of those used by the authors, Madsen and Abell, from a 2010 study of protective factors associated with positive adaptation following traumatic experiences. The authors gave us permission to use their questions in this survey. Most of the original questions were included in the survey: a few were omitted because they were not relevant to school experiences.

The survey asked students to report on aspects of their current resilience and also on the same aspects of their resilience before coming to Lincoln. The answers to the resilience and experience questions were measured with ordinal scales ranging from 1 to 7, as in the original resilience study by Madsen and Abell.

The resilience scales were based on the following eighteen questions:

1.   If I am in a bind, I have people I can turn to who will help me
2.   When times are hard, I have difficulty talking with those close to me (reverse order coding)
3.   I have a hard time starting and/or keeping intimate relations (reverse order coding)
4.   I have people in my life who I can talk to about everything
5.   I can accept love from those around me
6.   I am able to find and get the services I need to help me with tough situations
7.   I can achieve the goals I set for myself
8.   If I keep thinking, I will figure out a new way to fix ant problem
9.   When my plans are not working for me, I am able to change them

10. When a friend is in need, I make time to help
11. I am resourceful in the face of a challenge
12. I make changes in my life to help make my life better
13. Most people say that I have a hopeful outlook on life
14. If I keep trying, things will work out
15. No matter how hard things seem today, I know they will eventually get better
16. My tough challenges will make me stronger
17. I believe that I will overcome my weighty struggles
18. Even though bad things have happened to me, I have peace about my future

Qualitative Survey Data on School Experiences and Resilience

The qualitative research was conducted following Steele et.al.'s 2012 qualitative study and sought to categorize levels of resilience among Lincoln High students by differences in the language they used to describe themselves and their lives and by differences in the types of experiences they wrote about. In order to accomplish this, the following set of twelve open-ended questions was included in the Spring 2013 survey.

1. In the past, has anger or depression stopped you from doing the things you want? When? Why or why not?
2. In your present day-to-day life, does anger or depression stop you from doing the things you want? Why or why not?
3. What do you do when you're really upset?
4. How would you describe your attitude towards school?
5. What do you look forward to the most about going to Lincoln?
6. What do you look forward to the least about going to Lincoln?
7. What would you change about Lincoln?
8. Do you want to graduate from Lincoln? Why or why not?
9. What are your dreams for the future?
10. What is the most significant change in your life since you have started attending Lincoln?
11. What is your proudest moment at Lincoln?
12. What is your most memorable moment at Lincoln?

Sources of Adverse Childhood Experiences (ACEs) Data

Student ACE scores, the number of cumulative traumas among a set of ten commonly identified and researched traumatic experiences (Anda 2010, Shonkoff, 2012, RBJ 2013), were collected from three sources:

- Two anonymous 'health' surveys administered during the past two years to all students
- A recent (2013) brief ACE survey administered to students, with responses linked to student identification numbers, but with student consent and guarantees of confidentiality
- Teacher-staff estimates of ACE level for all students

The ACEs are:

1. emotional abuse,
2. physical abuse,
3. sexual abuse,
4. emotional neglect,
5. physical neglect,
6. parental separation or divorce,
7. physical abuse of mother,
8. household with substance abuse,
9. household with depression, mental illness or suicide, and
10. household with an incarcerated member

Sources of School Performance Data

Official school records were provided to us by school district authorities, for purposes of conducting this evaluation study upon request by Lincoln High authorities and with stipulations to maintain student confidentiality in any public report (in accordance with FERPA rules). The records contained only IDs, no names or other personal student identifiers, and the following school performance measures:

- Attendance - number of absences per high school grade
- Current and past (8th grade) standardized reading and math test scores - calculated by the central state Office the Superintend of Public Instruction (OSPI) as individual percentile values over the state average scores
- Current high school and past (8th grade) cumulative grade point averages (GPAs)

Methods

Quantitative methods

ACE score results and school performance data were matched by student identifiers to the resilience and school experience survey responses. The resulting quantitative database had information on:

- Student experiences that were important to students while at Lincoln
- Resilience level information before and after Lincoln
- ACE scores
- Measures of school performance

The response rate on the survey was high: about 75 percent of all Lincoln students answered the survey. The total student sample size of major concern for this study, the sample that had information on student responses to the resilience questions both before and after Lincoln, was sufficiently large (111 students) to conduct appropriate statistical analyses.

For quantitative analyses, the statistical software, Statistical Package for the Social Sciences (SPSS), was used to

- Calculate descriptive statistics (means and standard deviations)
- Conduct factor analyses of underlying dimensions of resilience and types of experiences and calculate factor scores for each variable that was generated
- Determine the significance of mean differences on various variables (like the difference between the average resilience before and after entering Lincoln High)
- Calculate correlations among variables and test the statistical significance of their relationships
- Run multivariate statistical models (multiple linear regression) on various outcomes of interest (particularly school performance outcomes as a function of ACEs and resilience)

Qualitative methods

To enable qualitative analyses, student answers to the twelve open-ended survey questions were collected and displayed, verbatim, for each student and for each question across all students. An independent researcher, without knowledge of the quantitative results, performed the qualitative analyses. Student privacy was maintained by assigning arbitrary identification numbers to student responses.

- Patterns or types of responses to the twelve open-ended questions were found that differed in terms of both language and content
- Based on the patterns of responses, the following eight types of experiences were identified
  1. struggles with anger or depression
  2. ability to cope with anger or depression
  3. positive attitude towards Lincoln High
  4. forming positive relationships
  5. value or pride in academic achievements
  6. value or pride in achievements outside of academics
  7. degree of change they felt happened
  8. ability to plan and focus on future goals

  Each student was then coded on each of these eight types of experiences as having :

  0 – no experience, 1 – some experience, 2 – lots of experience

- Following Steele et.al. 2012 formal qualitative study theory and guidelines, a typology of Lincoln High students' handling of their traumas was found. Guidelines provided by Steele et.al. for their typology are described below:

  Trauma victims with no/little resilience - Due to traumatic experiences in which children feel unsafe and powerless, survival responses of 'fight or flight' get automatically triggered by neuron brain processes. Youth who remain trauma victims, by gaining little-no resilience, blame others or themselves, feel anger or grief, fight back or wall-up their feelings and try to escape, feel powerless and alone in their troubles, with little hope to control their future. Even talking about it hurts, since the trauma is re-experienced by talking about it, so youth tend not to talk about it or only very briefly. "The traumatized brain especially when activated will have a difficult time processing words…" (Steele 2003).

  Survivors with moderate resilience – Some children manage "to experience something that is calming, soothing, familiar…" than enables them "to regain control and regulate their reactions"(those physiological, behavioral, and emotional reactions induced by the brain in response to cumulative traumas). Once safety and empowerment is regained, talking about what happened may help… not hurt… clarify what happened… focus on the present… Conversations in some safe place and with some people they feel safe with… is essential to becoming more resilient and gaining survival skills."

  Thrivers with high resilience – Some other children gain access to "multiple people they feel safe with, multiple safe places to go to, multiple activities that help them regain control." They then are much more likely to experience "significant adults in their lives and their home and school environment… a sense of competency… a sense of empowerment… a sense of value in their ability to influence." These children say: "I am important to someone – I am good at something – I can influence my world, and I am a good person."

A representative set of student descriptions of themselves, their lives and experiences were organized and displayed in the report (figure 2), providing a descriptive profile of trauma victims, trauma survivors and thrivers. Readers could then visually examine, from looking at the student verbatim quotes, how students described themselves and their experiences.

Each student was also given a numerical code identifying them as part of one of the three types, but the survivor type was differentiated into low and moderate resilience:

- 0- trauma victim,
- 1- survivor, moderate - low resilience
- 2- survivor, moderate - high resilience
- 3- thriver, high resilience

Mixed methods analyses

By numerically coding qualitative answers, statistical analyses could be performed among the qualitative variables, types of experiences and the three categories of students coping differently with trauma and becoming more resilient (the trauma victims, survivors and thrivers).

- Using only the numerically coded qualitative variables, correlations and multiple regression models provided us with measures of the strength of relationships among the different student experiences and their collective impact on differentiating between trauma victims, survivors and thrivers.

By merging the quantitative measures with the qualitative measures into a common 'mixed-methods' dataset, statistical analyses could be run to examine the relationships between both types of variables.

The quantitative ones were factor scores and scales derived from statistical factor analyses. The qualitative ones were numerical ordinal scale values derived from similar use of language and patterns of similar experiences that generated the three categories of students, trauma victims, survivors and thrivers. Using this combined dataset,

- Qualitative derived measures of resilience could be compared to quantitative ones.
- The correlations among quantitative and qualitatively derived types of experience variables could demonstrate the degree of agreement between results based on different methods.

Measurement of Variables

Measures of Resilience

Quantitative Measures of Resilience

Three Subscales and a Global Scale (Both Before and After Entering Lincoln High)
Questions from three of the four resilience subscales, developed and tested by Madsen and Abell in 2010, were chosen for this study, with the permission of the authors. The fourth subscale, 'Spirituality,' was omitted due to difficulties in asking such questions in a school setting.

The questions were selected based on their applicability to high school students and whether they referred to dimensions of resilience that could be changed by different high school experiences. For example 'feeling connected with family', 'being able to depend on brothers and sisters' were not considered applicable. A few non-school experience questions were omitted.

Following is the list of questions selected for each subscale, with means and standard deviations.

Problem Solving Subscale Questions	Before Entering Lincoln High		After Attending Lincoln High	
Coded on a scale from 1 to 7 1= Almost Never True 4= Sometime 7= Almost Always True	Mean	Std. Deviation	Mean	Std. Deviation
I can achieve the goals I set for myself	4.71	1.85	5.49	1.45
If I keep thinking, I will figure out a new way to fix ant problem	4.62	1.84	5.31	1.57
When my plans are not working for me, I am able to change them	4.13	1.79	4.90	1.61
When a friend is in need, I make time to help	5.76	1.50	5.85	1.35
I am resourceful in the face of a challenge	4.60	1.78	5.47	1.37
I make changes in my life to help make my life better	4.77	1.82	5.47	1.43

Supportive Relationships Subscale Questions	Before Entering Lincoln High		After attending Lincoln High	
Coded on a scale from 1 to 7 1= Almost Never True 4= Sometime 7= Amost Always True	Mean	Std. Deviation	Mean	Std. Deviation
If I am in a bind, I have people I can turn to who will help me	4.48	1.98	5.48	1.66
When times are hard, I have difficulty talking with those close to me (reverse order coding)	3.01	1.93	3.48	2.00
I have a hard time starting and/or keeping intimate relations (reverse order coding)	3.84	1.87	4.01	1.93
I have people in my life who I can talk to about everything	4.08	2.10	5.06	1.81
I can accept love from those around me	4.61	2.03	5.17	1.68
I am able to find and get the services I need to help me with tough situations	3.99	2.03	5.26	1.63

Optimism Subscale Questions	Before Entering Lincoln High		After attending Lincoln High	
Coded on a scale from 1 to 7 1= Almost Never True 4= Sometime 7= Almost Always True	Mean	Std. Deviation	Mean	Std. Deviation
Most people say that I have a hopeful outlook on life	4.27	1.90	5.18	1.65
If I keep trying, things will work out	4.39	1.94	5.35	1.53
No matter how hard things seem today, I know they will eventually get better	4.29	2.01	5.34	1.70
My tough challenges will make me stronger	5.16	1.69	5.63	1.42
I believe that I will overcome my weighty struggles	4.34	1.89	5.23	1.67
Even though bad things have happened to me, I have peace ab out my future	4.60	1.97	5.49	1.61

The questions from each subscale were not asked in the sequence presented and not grouped by subscale. Questions from each subscale were interspersed in the Lincoln High survey in the same sequence as in the Madsen and Abell survey.

Factor Analysis Results for Each of the Three Subscales of Resilience

We tested whether the questions selected in the Lincoln High survey had the same underlying resilience dimension, one for each subscale, by verifying:

1. Whether only one factor was extracted by principal component analysis and
2. Whether the selected questions loaded similarly on the same extracted factor

The factors and factor loadings are presented below for each subscale.

Factor Component and Question Loadings for Problem Solving Subscale	Before Entering Lincoln High	After Attending Lincoln High
	Factor Component (Loading value)	Factor Component (Loading value)
I can achieve the goals I set for myself	.846	.882
If I keep thinking, I will figure out a new way to fix ant problem	.856	.873
When my plans are not working for me, I am able to change them	.830	.796
When a friend is in need, I make time to help	.598	.621
I am resourceful in the face of a challenge	.834	.835
I make changes in my life to help make my life better	.834	.803

Extraction Method: Principal Component Analysis.

% of variance explained by common factor extracted	65.006	64.787

Factor Components and Question Loadings for Supportive Relationships Subscale	Before Entering Lincoln High		After attending Lincoln High	
	First Factor (Loading values)	Second Factor (Loading values)	First Factor (Loading values)	Second Factor (Loading values)
If I am in a bind, I have people I can turn to who will help me	.852	-.025	.867	.007
When times are hard, I have difficulty talking with those close to me (reverse order coding)	.191	.768	.312	.752
I have a had a hard time starting and/or keeping intimate relations (reverse order coding)	.158	.776	.010	.842
I have people inmy life who I can talk to about everything	.800	-.041	.814	-.-039
I can accept love from those around me	.855	-.029	.825	-.122
I am able to find and get the services I need to help me with tough situations	.832	-.229	.804	-.132

Extraction Method: Principal Component Analysis.

% of variance explained by common factors extracted	47.481	20.801	47.312	21.812

Factor Component and Question Loadings for Optimism Subscale	Before Entering Lincoln High	After Attending Lincoln High
	Factor Component (Loading value)	Factor Component (Loading value)
Most people say that I have a hopeful outlook on life	.786	.822
If I keep trying, things will work out	.808	.847
No matter how hard things seem today, I know they will eventually get better	.864	.899
My tough challenges will make me stronger	.659	.818
I believe that I will overcome my weighty struggles	.875	.833
Even though bad things have happened to me, I have peace about my future	.848	.917

Extraction Method: Principal Component Analysis.

% of variance explained by common factor extracted	65.592	73.434

Factor analyses showed that the six questions selected for the 'Problem Solving' and 'Optimism' scales showed common high loadings, indicating they were measuring a common underlying factor, which explains two-thirds to three-quarters of the variance among the questions. The six questions all loaded similarly on the common global factor.

For the 'Supportive Relationships' dimension of resilience, four of the six questions loaded well and were used for constructing the supportive resilience subscale. The other two questions were omitted because they were unrelated to this factor subscale. There are two probable explanations for this: (1) These two questions were the only ones that were asked in a 'reverse' order, and some students probably were confused and answered them 'backwards'; (2) the two questions measured support in intimate relationships that may not have changed while at Lincoln High.

Evidence of Internal Consistency of the Resilience Measures
By averaging the responses across the set of questions, scales were constructed for each of the three dimensions, providing three separate subscales, and for an overall 'Global' resilience measure, both for before and after entering and attending Lincoln High. This was done in conformity with the original authors instructions (Madsen and Abel, 2010: private communication). By taking the difference between the two 'Global' resilience scores (the after score minus the before score) we obtained an estimate of the change, or improvement, in resilience.

Three analyses were conducted to test the internal consistency of the resulting resilience estimates.

Consistency across the three dimensions: "How were the three dimensions related to each other and to a 'global', overall measure of resilience?"

- *Correlations Among the Three Subscales of Resilience*
  Based on both theory and prior research results, the three subscales were expected to be highly inter-correlated, representing different dimensions of resilience that are in reality highly interrelated.

Correlational analyses confirmed this, for resilience subscales both before and after attending Lincoln High. See tables below, where correlation values ranged from .775 to .921.

Pearson Correlations among Resilience Subscales
Before Attending Lincoln High

Resilience subscales	Problem Solving	Supportive Relationships	Optimism
Problem Solving	1	.775**	.883**
Supportive Relationships	.775**	1	.807**
Optimism	.883**	.807**	1

** Correlation is significant at the 0.01 level (2-tailed).

After Attending Lincoln High

Resilience Subscales	Problem Solving	Supportive Relationships	Optimism
Problem Solving	1	.848**	.921**
Supportive Relationships	.848**	1	.843**
Optimism	.921**	.843**	1

** Correlation is significant at the 0.01 level (2-tailed).

- *Factor Loadings of Resilience Subscales on a Common Factor*

Factor Analysis of Three Subscales

Resilience Subscales	Factor loadings Before LH	Factor loadings After LH
Problem Solving	.945	.966
Supportive Relationships	.915	.937
Optimism	.956	.964

Principal Component Analysis.

% variance explained	88.146	91.385

The factor analysis results above show very strong loadings of all three subscales on a common factor.

This justifies calculating what Madsen and Abell called a 'global,' overall, resilience scale score for each Lincoln High student. This simply involved calculating the average of the three subscale scores for each student.

Consistency in level of global resilience across time: "Did the before and after resilience measures differ depending on time spent at Lincoln High?"

    Among those who had just started at Lincoln (six months or less), it was expected that the 'baseline - resilience' of students before entering Lincoln High would not be very different from their 'after-resilience.' We expected that 'before' and 'not much time after' resilience would be highly correlated for these students since they would not yet have had a chance to experience what Lincoln had to offer them. Results support this expectation: For the students just starting at Lincoln, the correlation between before and after resilience was found to be very high: .838. This compares to .522 among students who had been at Lincoln two or more years.

Consistency in terms of time dependent outcomes of resilience: "Did early lack of resilience correlate with early poor school performance?"

    The lack of resilience among students just starting at Lincoln High was expected to manifest itself in early poor school attendance and poor behavior. For these students, we expected that the correlation between resilience and 9th grade absences would be negative, and the correlation between resilience and suspensions would be positive. Results support this expectation. The data show a negative correlation, r = -.21 (p= .058) for absences and a [positive one, r= .41 (p=.067) for suspensions before entering Lincoln.

Qualitative Measures of Resilience

Following the theory and guidelines of a previous formal qualitative study (Steele, Kuban and Raider 2009) three categories of students emerged. They are described below.

Trauma Victim – Little/No Resilience
These students' answers displayed *a lack of resilience and an inability to accept or cope with their traumas.* Their answers differed dramatically from the answers of more resilient students in terms of both form and content.

Form - They tended to have much shorter, often one word, answers and exhibited difficulty or lack of interest in explaining their actions and experiences.
- they reported struggling with anger and depression, however they did not go into detail about what they struggled with or how it affected them. Few got beyond one or two words. They seemed apathetic, remarking that they did not know, or did not care.

Content - Students tended to:
- use much more hostile, angry or aggressive language and reported active aggression such as "punching walls"
- mention harmful ways they coped with stress and anger
- self-medicate with drugs such as marijuana,
- show little to no evidence of developing positive relationships and often had more negative things to say about the people in their lives,
- use very defeated language,
- speak openly and frankly about the lack of hope or negative foresight they had for their future: "to be homeless" "to not be a bum" or "I just hope that I don't die when I join the Core." They wrote in quips that said very little, but seemed to reflect a deep hopelessness and defeated life view.

Survivor – Moderate Resilience (Moderate - Low and Moderate - High)
Students categorized as moderately resilient showed a similar pattern of experiences that built resilience and helped them 'survive.' The types of experiences of these 'survivors' are described below.

It is important to note, however, that some survivor students tended to give shorter, less detailed answers, indicative of *moderate - low resilience*. Other survivor students tended to give longer, detailed answers, with a much greater number of "because" statements. They provided evidence of more insights, logic and reasoning, indicative of *moderate - high resilience*.

The 'survivor' experiences are:

- *In terms of anger and depression –*
  *M*any students discussed these in ways that showed some level of understanding and acceptance of their feelings. "Yes, anger and depression stops me from doing my everyday things that I would like to do because when I am sad/mad I like to be alone and stay in my room, but I would like to hang out with my friends and family"

- *As for coping -*
  Some students listed simple strategies that diverted attention and postponed active coping, such as playing video games; others said they used 'logical knowledge relaxation techniques' such as taking a walk or drawing, but followed it with some problem-solving activity and resolution. "Usually I go to a friend's house and talk and play music and calm down, then go solve the problem that caused me to be upset."

- *In describing relationships with others, peers and adults -*
  Most students acknowledged the importance of relationships with others. Some said "I have new friends I can trust" "Staff are great" "Teachers help you out more." Some specifically mentioned a supportive and nice teacher or a counselor or a boy/girlfriend ("who saved my life").

- *In terms of the value of education in their lives -*
  Almost all students acknowledged they were now able to learn, be successful in school, get better grades.
  But some students just said: "I started going to school again" "I have been trying my hardest in school". While other students also recognized the high value of education. "It is a privilege to be here. It's free and it's very important. I'm very lucky." "Graduating is the most important thing in my life right now and I intend to do my very best."

- *Being successful in school represented a big change for these students -*
  "My attitude towards a learning environment has changed greatly for the better. My education has never been so important to me until now, and it makes me happy that these changes are so apparent to myself and my family."

- *Now they had goals and plans –*
  Many wanted to graduate. They had professional goals such as becoming a cosmetologist, police officer, mechanic, or teacher. Some responded that they wanted to go to college to "have a better life".

Thriver – High Resilience

Students categorized as 'thrivers', ones having achieved a high level of resilience, wrote in a unique way about themselves, their strengths and their accomplishments.

These 'thrivers' had the longest answers, gave examples and demonstrated an unusually clear understanding of their experiences, their inner feelings and desires, and the outcomes of their actions.

The "thriver" experiences are described below.

- *Struggles and coping -*
  Those who struggled with anger and depression gave long, detailed answers about: what they have gone through, for how long, how it influenced them, the effect on their lives and what they did to cope, in the safety of places and of caring help from adults and peers.

They used self-appreciating language and displayed a pride in their accomplishments on various fronts.
- *Change –*
  While recognizing help received, students' writing emphasized that they themselves had worked to reach the place where they were. One students said: "I wouldn't be where I am today without my change." Another said: "I am able to achieve actual academic goals". There are many "I" and "I am" or "I have" statements in their answers.

- *Positive relationships –*
  One of the most obvious contributing factors to their resilience was the support they had received and the relationships they had formed. Nearly all the students wrote about their relationships with other adults, with great appreciation for the support they had received. The biggest change they recognized was "being comfortable talking to staff about struggles in life and knowing that I have people to turn to when I'm in need".

- *More pride, more control and future plans –*
  Many students spoke about their desires to be proud of themselves and do something that will make others proud: "I am determined to have something to be proud of". Many of these students wrote that they felt more in control over their lives; they had more ability to direct the paths that their lives would follow. One student remarked that the most memorable moment was the realization of "being able to change my life". Furthermore, many of these students indicated they wanted to continue to make progress, graduate, go to college, have a career, be a good role model: "I have come too far to quit now and so I can achieve something I never thought I could until I came here".

The findings from Lincoln High students (see also figure 2 in the report) are very similar to the ones found by Steele et al. 2009.

Steele et.al. presented their findings in the form of a chart, saying:

"The following Experience of Recovery and Resilience Chart provides vivid descriptions of how victims began to re-experience themselves, others and their world following the help received from Trauma and Loss in Children (TLC) programs and services."

The Experience of Recovery and Resilience

THRIVER	• Life is bigger than just me now. • I have some new friends who are not survivors. • When I do think about it, I don't think about the horrid details but how it changed my life – each day is so important now. • The truth is, I never imagined I would be doing some of the things I'm doing now, the people I'm enjoying. • I enjoy having time for myself now…before I was too scared to be alone. • When some things happen to remind me, I now just think how fortunate I am compared to the way I was… • Change doesn't terrify me now…actually it's exciting at times. • Had all that stuff never happened, I would have never discovered how strong I am, but also how important it is to have other people in my life now.	• I can control my feelings now. • I really am positive about my life. • Routines are really important to me now. • Now I don't hesitate to ask for help. • I have a lot more compassion for others. • I certainly appreciate life more. • I'm making more choices about my life than I ever did. • I don't ignore or shy away from problems…I go right after them until they are worked out. • I really try to be of help to others now. • Sometimes I'm even surprised by my reaction to things happening…stuff happens and I move on, and it wasn't always like that. • I'm a lot more generous with my time.	**RESILIENCE**
SURVIVOR	• I no longer feel alone…I know others have had reactions like mine. • Things are making a bit more sense to me now. • It still hurts and scares me every now and then, but I'm no longer overwhelmed. • I can face the difficult memories head on now. • I am still surviving – I don't need to apologize for my behavior. • I am able to manage the day-to-day problems much better. • I hope nothing else happens but, if it does, I think I'll get through that, too. • There are some things I look forward to now. • Being with other survivors, I've learned I can help the new survivors coming to our group. • Everyday isn't great, but more days are a lot better now.	• I wake up and feel better now. • The hurt isn't all the time now…only when I think about … but even that isn't too bad. • I remember more of what people tell me now. • It's easier to pay attention…I'm not as jumpy. • My tears don't scare me so much now. • I'm not so scared, period. • There are days…but the tough times don't last as long now. • I used to worry a lot more about bad stuff happening…I don't worry as much. • I'm sleeping a bit more…I'm even laughing a bit more. • I go out with friends again…a little bit more.	**RELIEF**
TRAUMA VICTIM	• I can't stop thinking about… • Everything around me reminds me of… • I'm never going to feel safe again. • Why even bother? I can't change a thing. • It's all my fault…I should have… • I shouldn't have…If only I had… • It's never going to get better. • Why me?..Why now?…What next? • I close my eyes and see it all over again. • Everything makes me jump. • I can't think…I'm not remembering. • People talk to me, but I can't listen. • I'm ready to punch anyone. • I think about it, see images, even when I don't want to.	• I'm afraid to… • I worry about what next…Who next? • I have no energy. • I'm jittery. • I see our friend and start crying all over again. • I went to talk about it and started stuttering. • Her face, all those horrid details, they won't go away. • I still hear those sounds.	**TRAUMA VICTIM**

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Measures of Students' Most Important Experiences at Lincoln High

Quantitative Measures of Types of School Experiences - Factor Analyses Results

Questions on school experiences were grouped into four categories which corresponded to the four virtuous cycles that staff and teachers had been implementing at Lincoln High. Factor analyses were run to test whether the experiences in each of the four categories were measuring the same underlying dimension of support that students thought were important.

Love - Trust Experience

Important Experience	Component
	Factor Loadings
being told I am loved no matter what	.883
feeling likeable and lovable	.843
being able to confide in someone	.817
being told by my peers that I am trusted	.678

Extraction Method: Principal Component Analysis.

1 component extracted.
% variance explained   65.472

Respect Experience

Important Experiences	Component
	Factor Loadings
learning how to respect others	.842
learning how to respect myself	.786
helping others and being happy to do so	.765
having healthy role models	.648

Extraction Method: Principal Component Analysis.
1 component extracted.

% variance explained   58.275

Responsibility - Self Control Experience

Important Experiences	Component
	Factor Loadings
being able to solve problems on my own	.878
learning how to take responsibility for my actions	.805
asking for help and being helped	.729
learning how to control myself when I feel myself getting really upset or angry	.689
having authority figures set clear and fair expectations for me	.674

Extraction Method: Principal Component Analysis.

1 component extracted.
% variance explained   57.601

Pride in Grades - Performance Experience

Important Experiences	Component
	Factor Loadings
having grades I was proud of	.831
being proud of my grades or having other people who are proud of my grades	.869
doing my homework well and on time	.660
being sure that everything would be okay	.636

Extraction Method: Principal Component Analysis.

1 component extracted.
% variance explained   57.113

Results of the factor analyses show that the important student experiences can be summarized into four factor scales, four types of experiences, so four factor scores were calculated for each student. Based on these factor scores we could test how
- The four type of experiences were inter-correlated
- Each type was correlated to the global level of resilience achieved

In other words, we could find out whether students who had one type of experience that they considered important (like 'respect' or 'love') also had another type of important experience like 'responsibility – self control' or 'pride in grades and performance'. Finally, we could find out how each type of experience was related to overall resilience.

Correlations among Quantitatively Derived Types of Experiences and Resilience

Correlations among Type of Experiences Considered Important at Lincoln High and Student Resilience

Type of Important Experiences and Resilience		Love – Trust Experience	Respect Experience	Responsibility - Self Control experience	Pride in Grades and Performance Experience	After LH Resilience
Love – Trust Experience	Pearson Correlation	1	.705**	.659**	.608**	.328**
	Sig. (1-tailed)		.000	.000	.000	.000
Respect Experience	Pearson Correlation	.705**	1	.824**	.672**	.408**
	Sig. (1-tailed)	.000		.000	.000	.000
Responsibility - Self Control Experience	Pearson Correlation	.659**	.824**	1	.714**	.476**
	Sig. (1-tailed)	.000	.000		.000	.000
Pride in Grades and Performance Experience	Pearson Correlation	.608**	.672**	.714**	1	.419**
	Sig. (1-tailed)	.000	.000	.000		.000
After LH Resilience	Pearson Correlation	.328**	.408**	.476**	.419**	1
	Sig. (1-tailed)	.000	.000	.000	.000	

**. Correlation is significant at the 0.001 level (1-tailed). N=111

The correlations show a high degree of interdependence among the four types of experiences students had deemed important while at Lincoln High. Correlations ranged from .608 to .824.

Students who were more resilient after attending Lincoln High tended to consider all these experiences equally important. Correlations ranged from .328 to .476. and were all statistically significant at the .001 level.

Qualitative Measures of Types of Experiences

Using the mixed-methods data set, a further set of analyses was conducted to see how various types of experiences, together, influenced overall levels of resilience. The theory of trauma-informed practices (Steel et al 2009) define what set of experiences build resilience.

The theoretically predicted set of experiences that were qualitatively derived in this study were:
- Experiencing Lincoln High as a safe, desirable place to be
- Having a set of positive, safe and caring relationships
- Experiencing success and pride in school achievements
- Experiencing success and pride in out-of-school achievements
- Being able to focus on the future, plan and have positive goals

The expectation was that the qualitative data would show that:
- The experiences outlined above are correlated with each other: if you have one positive such experience you are likely to have some of the others.
- These experiences are expected to collectively impact the level of resilience achieved, together explaining most of the variance in student differences in levels of resilience: if you have many of these positive experiences you are likely to achieve higher levels of resilience, associated with becoming a survivor and thriver.

To do these statistical analyses, each type of experience was given a numerical score of 0, 1, or 2:

       0 - indicating <u>a lack of, or poor,</u> experience

       1 - indicating <u>some, mid-level</u> experiences

       2 - indicated <u>many, good, meaningful</u> experiences

Relationships among student experiences and levels of overall resilience associated with being a trauma victim, survivor or thriver

The statistical results were in accordance with theoretical expectations on how trauma informed practices build resilience by providing an interrelated set of experiences:

1. The correlations among almost all these experiences were all found to be positive and statistically significant: correlation coefficients ranging from .27 to .50. The exception was the experience of out-of-school achievements that occurred rather rarely. This experience was still positively related to others in the set, but the correlations were low (correlation coefficients in the teens) and not always significant.

2. A multiple regression analysis testing the cumulative effects of each of these experiences on overall resilience found:
   - A very high multiple regression effect: r = .81 (R-square = .66). This indicates that these experiences explained about two thirds of the variance in level of resilience among students, a large amount of variance, as theorized.
   - Each type of experience had a statistically significant, independent effect on level of resilience. Standardized regression coefficients ranged from .25 to .30 except for the out-of-school experience's coefficient that was much lower: .11.

These results provide evidence that each experience was uniquely important in building resilience, and that all of them, together, had a large combined impact in determining overall levels of resilience.

Three Measures of ACEs or ACE level

Identified ACE Survey – Self Reported

The following survey form was used to collect information on students' self-reported ACE scores.

The ACE score is simply the sum of the number of Adverse Childhood Experiences.
The ACEs included are the ones identified in the original ACEs research (RWJ 2012) and measured by CDC funded adult Behavioral Risk Factor Surveillance System (BRFSS) surveys (see Anda 2010). The ACEs are: emotional abuse, physical abuse, sexual abuse, emotional neglect, physical neglect, parental separation or divorce, physical abuse of mother, household with substance abuse, household with depression, mental illness or suicide, and household with an incarcerated member.

Only about a half of Lincoln High students (n=58) filled in the ACE form that included the students' ID numbers. The ID potentially made the form identifiable by school staff and teachers, even though students were told that the information was going to be used only for research purposes and that they were guaranteed confidentiality of the information reported.
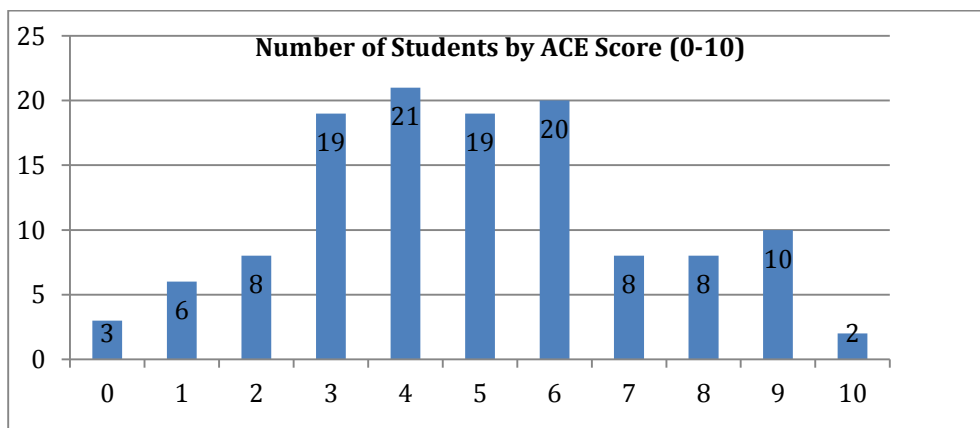
Self Reported ACE score		
ACE score	Percent	Percent
0	7	
1	19	42
2	16	
3	16	28
4	12	
5	7	16
6	9	
7	10	14
8	0	
9	4	
Total	100	100

N= 58
mean = 3.5
st. dev.= 2.5

The reported mean ACE score was 3.5, (see table and statistics above). This average is 3 times higher than in the general population, but lower than anonymous surveys previously administered to Lincoln High students, where the ACE score was about 5.0. See results below.

Anonymous ACE survey – Self Reported
Students took anonymous surveys that had questions on ACEs interspersed with other questions on their experiences at Lincoln High. This probably felt less intrusive to them. The distribution of ACEs in the most recent anonymous student survey had a high student response (n= 124). Results are depicted below.

The mean ACE score is 4.9 for this anonymous survey, with very few students having low numbers of ACEs (about 14% having 2 or less) and many students (23%) having 7 or more ACEs.

There was some discrepancy between the self-reported ACE information from the identified and anonymous surveys. Only half of the students filled in the identified self-report ACE survey, many students with higher ACEs probably refusing to take the survey and those taking it probably under-reporting their ACEs. We needed to find another way to estimate ACE levels for a much larger number of students and particularly for those with higher ACEs.

School Staff Estimates of Students' ACE Level
In order to deal with this problem, staff and teachers agreed to estimate the students' ACE levels in four major categories. The precedent for doing this, with some tested validity, derives from the school staff estimation of ACEs among elementary school students in Spokane conducted by Chris Blodgett (Blodgett, 2012). The chart below provides a visual display of the four categories proposed for estimation and the percentage distribution of students derived from the anonymous survey.

# of ACES	Percent from anonymous survey (rounded)	Proposed 4 categories for estimation	Label
0	2%		
1	5%	**13.6%**	Low ACEs
2	6%		
3	15%		Medium ACEs (below average)
4	17%	**32.3%**	
5	15%		High ACEs (above average)
6	16%	**31.5%**	
7	6%		
8	6%		Very high ACEs
9	8%	**22.6%**	
10	2%		
N=124	100%		

In this way, we obtained ACE information on all students enrolled at Lincoln High (127 students).

The ACE distribution was more like the results from the anonymous survey: 32% low, 24% medium, 16% high and 28% very high. The distribution still overestimates lower ACE students, understandably so since students often keep ACE information confidential. The teachers and school staff, however, were able to identify a large proportion of very high ACE students: 28%, a higher percentage than the 23% expected from the anonymous survey.

The estimated mean ACE is 4.4, compared to the 4.9 obtained by the anonymous surveys and the 3.5 obtained by the identified survey.

Comparison of School Staff Estimates of Students' ACE Level and Self Reported ACEs
The next task was to test the validity of the estimated ACEs compared to the validity of the identified self reported ACEs. We had two variables that we expected to be associated with ACEs: 8th grade GPAs and 9th grade school absences. We expected that students suffering more accumulated trauma would have done less well in school before coming to Lincoln High: they would have had lower 8th grade GPAs and would have more absences as they first arrived at Lincoln High.

Both of these expectations were met by the estimated ACEs, but not by the self-reported ACEs that showed non- significant, very low correlations. See the results in the following table.

Correlations between ACEs and 8th Grade GPA and 9th Grade Absences

		ACE estimated	ACE self reported	8th Grade GPA	9th Grade Absences
ACE estimated	Pearson Correlation	1	.078	-.155*	.240**
	Sig. (1-tailed)		.267	.083	.029
	N	127	66	81	63
ACE self reported	Pearson Correlation	.078	1	-.053	-.016
	Sig. (1-tailed)	.267		.369	.464
	N	66	66	43	36

** Correlation is significant at the 0.05 level (1-tailed)
* Correlation is significant as a trend, at the 0.10 level (1-tailed)

We needed to explain why there was so little correlation between the identified self reported ACE score and the estimated ACE level: a non- significant correlation of .078.

When there are few sample respondents, a few outliers can mask positive correlations between two variables. This could have happened if some students exaggerated or under-reported their ACEs in the identified student ACE survey or if staff misjudged the students' ACE levels, either over or under estimating, based on lack of information.

Statistical methods allowed us to identify outliers. Thirteen outliers were identified: those cases that had very large residuals (at 1.65 standard deviations or more). When these outliers were excluded the estimated ACE sample size dropped from 127 to 114, but the correlation with self-reported ACEs became positive (.404) and statistically significant at $p < .001$. This shows that there is a substantial degree of agreement between self-reported and staff estimated ACEs in most cases.

For this study, in order to conservatively test the impact of ACEs, only school staff estimated ACEs were used, excluding outliers. This provided more valid and complete ACE data:
- Where student self-report and school staff estimates were more in agreement and higher ACEs were correlated with lower grades in 8th grade and more school absences in 9th grade
- With a large enough sample - total of 114 cases, including 99 also with resilience scores

The average number of ACEs calculated in this report is a conservative one, since it is slightly lower than the ACE average derived from anonymous surveys. Correlation estimates between ACEs and resilience, ACE and school performance may be slightly under estimated. However they are probably still pretty good estimates, since correlations are often not affected by small differences in average values of variables.

It is clearly advisable to replicate this study, with more complete and accurate ACE information, in order to calculate more precise relationships between ACEs, resilience and school performance. The challenge for future studies is to avoid the occurrence of outliers, by finding ways for students to honestly report sensitive and confidential information like ACEs in non-anonymous surveys.

Three Measures of School Performance

We needed three measures of school performance:

1. A quantitative, unbiased, measure of *level of school engagement*, like attendance, above and beyond student self reports, since the research literature indicates this is one of the best predictors of academic success (Adelman and Taylor UCLA).

2. Quantitative measures of *improvements in actual levels of academic achievement*, like standardized, state-wide, math and reading tests, since teachers and staff at Lincoln High had asked for this study to investigate whether higher resilience achieved at Lincoln High enabled students to actually learn better and improve their academic skills.

3. Quantitative measures of cumulative, *overall school performance over time*, like grades, with information both before and after enrolling in Lincoln High. We could then use these data to:

   - First, validate the degree to which higher overall school performance was determined by greater school engagement and better performance on standardized tests, thus reducing suspicions of bias: that teachers would give better grades to encourage students, not on the basis of actual improvements of academic knowledge and skills.

   - Second test whether higher resilience actually improved grades, even for students with higher ACEs - an analysis requiring large enough sample sizes.

The following three school performance measures were obtained from school records:

- School attendance – the number of absences per high school grade
- Current and past (8th grade) standardized reading and math test scores - calculated by the central state Office the Superintend of Public Instruction (OSPI) as individual percentile values over the state average scores
- Current high school and past (8th grade) cumulative grade point averages

Mixed-Methods Analyses of Resilience: Quantitative versus Qualitative

There are two important questions to which mixed-methods data can help provide an answer:

> *Question 1: "How can we be sure that we can estimate correctly overall resilience based on only students' narratives of their experiences, using their own words, as in the qualitative study?"*

This is an important 'basic science' question. It is also a question important for practitioners (teachers, counselors, parents, community organizers) who are implementing trauma sensitive practices intended to increase resilience. Many such practitioners may not be able to regularly administer diagnostic questionnaires with all the resilience scale items. Lacking this pre-post information, or regular assessments to monitor changes through time, it is difficult for practitioners to know whether their efforts have had the desired impact of increasing resilience.

This question can be answered by examining whether the <u>*qualitative*</u> measure of resilience based on narrations is a good approximation of the <u>*quantitative*</u> measure derived from scientifically valid and reliable scales.

This analysis can be done with a data-base that includes both quantitative and qualitatively derived variables, by calculating the size of the correlation between two measures of the same variable for the same students. The finding is that:

- The correlation between resilience measured qualitatively, from narratives, and quantitatively, with resilience scales, is moderately high (r = .43) and statistically significant (p<.001).

This moderate correlation size means that assessing resilience from student narratives of their experiences will _not_ provide wrong information, but neither will it _exactly_ measure the level of resilience attained. The two measures are clearly related but not highly correlated, probably due to variances in how students respond: what they say and don't say, how they say it and how their responses are interpreted.

The second question is how exact do we need these measures of resilience to be in order to provide useful feedback on whether outcomes are being reached, to guide the work of practitioners.

Since we found that resilience (on the Madsen scale) above a certain threshold (above the score of 5.59) moderated the impact of ACEs on school performance, estimating what proportion of students fall above or below this threshold is useful.
The question then becomes:

> Question 2: "Are qualitative measures of resilience sufficiently exact for identifying increases in the proportion of students falling above such a threshold – providing evidence that levels of resilience have increased sufficiently to moderate the effects of trauma (cumulative Adverse Childhood Experiences, ACEs) among certain groups of students?"

The results, even though based on small sample sizes, are promising. The percent of students in the qualitative resilience categories (trauma victim, survivor, and thriver) who had scores above the threshold on the quantitative resilience scale varies from one category to another:

- Survivors with relatively high resilience - the percentage above the threshold score is very high: 81%, indicating a high chance of moderation for almost all such students
- Survivors with relatively low resilience - the percent is predictably uncertain: 52 % , giving a 50/50 chance of moderation impact for any one student in this category
- Trauma victims – the percentage is very low: 18 % indicating little chance of moderation

Using the above categories of resilience, this suggests that practitioners could estimate the percent of students who are likely to have sufficient resilience to moderate the impact of trauma.

In conclusion, the mixed-methods, quantitative and qualitative, results on resilience suggest that:

- An accurate assessment of _levels of resilience for any given student_ requires results based on _quantitative, valid and reliable scales._

- _Student narratives may provide good enough estimates of resilience for groups of students_, in the sense of providing information on the percentage of students in each group that would likely have enough resilience to moderate the impact of their past trauma (ACEs).

Descriptive Statistics and Correlations among Variables

We now present two tables with descriptive statistics and correlations of the main study variables. (See the two tables on the next two pages)

We can observe some key overall patterns based on these overall statistics.

Based on means of some key variables:

1. Large improvements in ultimate outcomes, school performance, from before to after enrolling at Lincoln High
   - Overall standardized reading scores improved by 52%, based on 8th to 10th SGP (percentiles). Lincoln High is doing as well as the average high school in the state, even though handicapped by large proportion of students having high ACEs.
   - Overall standardized math scores improved by 42%, based on 8th to 9th SGP (percentiles).
   - GPAs increased by about .40, from 2.17 in 8th grade to the current 2.57, representing an increase of about a half of a standard deviation.

2. Large improvement in average overall global resilience scores .82, representing an increase of about 2/3 of a standard deviation.

3. The above changes are happening among students with many early traumatic experiences in their lives: a very high average ACE score of 4 to 5, depending on how ACEs are measured.

Based on correlations among key variables:

1. Fewer absences are highly correlated with improvements in reading test scores (.609) and with higher grades (.369), as expected from the literature on impacts of student engagement.

2. Higher ACE levels estimated by staff are correlated with higher number of absences (.307), lower improvements in reading scores (-.463) and lower GPAs (-.165).

3. Resilience scores after enrolling at Lincoln High are correlated with fewer number of absences (-.273).

Regarding differences in results for different ACE measures, note that:
   - Both in terms of means and correlations ACEs results differed depending on how ACEs were measured. This led to the calculation of a new ACE variable that omitted outlier values.

Regarding number of sample cases, note that:
   - Variables involving standardized test scores had only 40-50 cases.
   - Sample cases were only sufficient (around 60 to 100 cases) to run multivariate regression analyses with a sub–set of variables. The most important statistical model was the one predicting improvements in grades based on changes in resilience for students with different leaves of ACEs.

Descriptive Statistics
Means and Standard Deviations of Major Study Variables, with Sample Sizes

Study Variables	Mean	Std. Deviation	N
ACE score, anonymous self report (From anonymous survey, 1-10 ACE score)	4.90	.n.a.	124
ACE est. score (Estimated by school staff, mean estimated based on 0-10 ACE score)	4.40	n.a.	127
ACE est. level (Coded: 1=low 0-2 ACEs, 2=med-hi 3-6 ACEs, 3=very high 7-10 ACEs)	1.95	.775	127
ACE est. level (Same coding ,without outliers)	1.97	.770	114
ACE score, non-anonymous (From identified survey, all cases, 1-10 ACE score)	3.44	2.444	66
ACE score, non anonymous (From identified survey, without outliers, 1-10 ACE score)	3.00	1.861	53
Before LH resilience (All cases, scored 1 to 7) **Before LH resilience** (Without cases that had missing data for After LH Resilience)	4.49 4.52	1.425 1.459	121 111
After LH resilience (All cases, scored 1 to 7)	5.34	1.259	111
Diff. between before & after LH resilience	.82	1.283	111
10th Grade Absences *	14.49 13.05	15.942 15.689	74 65
8th GRADE READING MSP *	388.01 388.86	27.629 27.555	86 74
10th GRADE READING HSPE *	424.07 425.23	25.134 25.232	41 39
8th to 10th SGP READING (Percentile change) *****	51.91% 52.36%	30.461 30.908	44 42
8th GRADE MATH MSP *	362,57 363.91	30.953 31.758	87 75
ALGEBRA EOC *	383.95 384.16	35.146 34.169	55 50
8th to 9th SGP (Percentile change) *****	42.35% 41.62%	28.020 25.801	46 42
8th GR GPA - All cases available - Cases with LH resilience and ACE level info.	2.12 2.17	.861 .872	83 72
Current GPA - All cases at Lincoln High - Cases with LH resilience and ACE level info.	2.49 2.57	.874 .814	126 107

 * Statistics are reported separately for all cases and for those cases with resilience improvement information (having both before and after LH resilience scores).

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Correlations between Main Study Variable Indicators
Two Measures of ACEs, Before and After LH Resilience, and Selected School Performance Measures

		ACE score (self report)	ACE level (staff est.)	Before LH resilience	After LH resilience	10th Grade Absences	8th to 10th SGP READING	Current GPA
ACE score (Self report, non anonymous)	Pearson Correlation	1	.416""	-.359**	-.141	.055	.162	.014
	Sig. (1-tailed)		.001	.003	.145	.367	.247	.458
	N	58	53	58	58	41	20	58
ACE est. level (Staff est.)	Pearson Correlation	.416""	1	.026	-.052	.307"	-.463""	-.165
	Sig. (1-tailed)	.001		.395	.306	.007	002	.042
	N	53		107	99	63	39	111
Before LH resilience	Sig. (1-tailed)	-.359**	.026	1	.563**	-.214*	.358**	.014
	N	.003	.395		.000	.043	.010	.443
	N	58	107	111	111	65	42	107
After LH resilience	Pearson Correlation	-.141	-.052	.563**	1	-.273*	.345*	.186*
	Sig. (1-tailed)	.145	.306	.000		.014	.013	.028
	N	58	99	111	111	65	42	107
10th Grade Absences	Pearson Correlation	.055	.307"	-.214*	-.273*	1	-.609**	-.369**
	Sig. (1-tailed)	.367	.007	.043	.014		.000	.001
	N	41	63	65	65	65	28	65
8th to 10th SGP READING	Pearson Correlation	.162	-.463""	.358**	.345*	-.609**	1	.244
	Sig. (1-tailed)	.247	.002	.010	.013	.000		.060
	N	20	39	42	42	28	42	42
Current GPA	Pearson Correlation	.014	-.165	.014	.186*	-.369**	.244	1
	Sig. (1-tailed)	.458	.042	.443	.028	.001	.060	
	N	58	111	107	107	65	42	107

**. Correlation is significant at the 0.01 level (1-tailed).
*. Correlation is significant at the 0.05 level (1-tailed).
Note: Ns vary depending on missing data: 111 students have both before and after resilience, 107 have before and after resilience scores and ACE estimated levels; 58 have both self-reported ACEs and before-after resilience scores, 53 have self-reported plus staff estimated ACEs (excluding outliers) and before and after resilience; sample cases with school performance measures vary based on school record information (fewer cases for all 10th graders and those also having 8th grade reading scores).
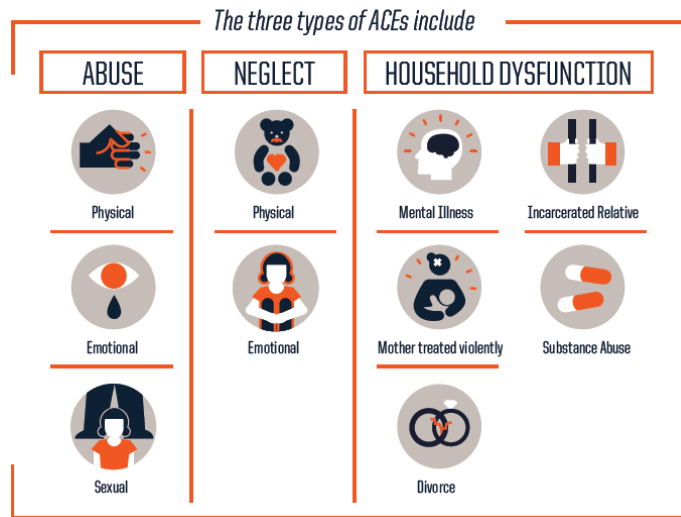
Selected Review of Recent Literature
ACEs, Resilience, School Performance and Prevention/Intervention Practices
(adapted from Erik Gimness' 2014 review)

ACEs

Robert Wood Johnson Foundation (2013), *The Truth About ACEs: Infographic*

Anda, R. (letter) in Anda, R. and Brown, D. (2010), *...The face of a chronic public health disaster*

"I had already concluded that Adverse Childhood Experiences (ACEs) have created a "***chronic public health disaster***." This conclusion *was* based on epidemiologic data from members of the Kaiser Health Plan in California by the ACE Study—in laborious and ongoing detail. *Now* this conclusion is based on population-based data from in the State of Washington. ACEs are poisonous to the fragile human ecosystem. The chronic disaster is real. It is *alive in your state.*

....Your results are consistent with what we have learned about the biology of childhood. Excessive stress and adversity has a cumulative and predictable negative effect on human development. These effects are most pronounced for infants, children, and adolescents. The developing brains (and other body systems) of your young ones are negatively impacted by the inherent biochemistry of stress. More is worse, adversity is cumulative; it can affect any human function.

....Until very recently, this public health disaster has been hidden from view. Our society has treated the abuse, maltreatment, violence, and chaotic experiences of our children as an oddity that is adequately dealt with by *emergency* response systems—child protective services, criminal justice, foster care, and alternative schools—to name a few. These services are needed and are worthy of support—but they are a dressing on a greater wound.

...The chronic public health disaster of adverse childhood experiences and their effects on human development are real. Data from your BRFSS properly informs about it. The first step toward healing comes with understanding the problem. The face of the disaster is in full view. "

Shonkoff, J (2012), *Leveraging the biology of adversity to address the roots of disparities in health and development*

A Science-Based Logic Model Could Inform More Effective Early Childhood Policies and Programs
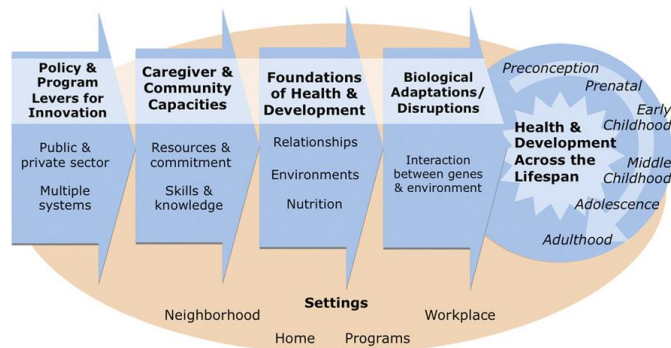
"Science tells us that early experiences in life are imbedded biologically (i.e., "build into our bodies") for better or for worse—and ongoing advances in the biology of adversity, the science of learning, and the disciplines of intervention research invite us to rethink the traditional modes of interaction among research, policy, and practice in the early childhood arena.

...Learning executive function and self-regulatory skills corresponds closely to the extended development of the pre-frontal cortex, which begins in early infancy and continues into the early adult years. Because these neural circuits have extensive interconnections with deeper brain structures that control responses to threat and stress, maturing executive functioning both influences, and is affected by, a young child's management of strong emotions.

...However, toxic stress (ACEs, intergenerational trauma) is identified extensively in research as an impediment that limits "the ability of children with normal cognitive potential to benefit from available learning opportunities."

The impediments include: "fear and anxiety, maladaptive social adjustment, disruptive behaviors, impairments in executive functioning, and a range of other difficulties that are often categorized rather loosely as socio-emotional problems or mental health disorders."

Thus, repeated exposure to threatening situations can disrupt the development of the prefrontal cortex and lead to emotional problems as well as compromised working memory, attention, and inhibitory control.

New research on the development of executive function and self-regulatory behaviors continues to advance, and offers many opportunities for informing education policy and practice.

Traditional methods for promoting more equitable outcomes (schooling, health) for populations of vulnerable young children include providing developmental enrichment and parenting education.

New evidence shows that there is a need for greater attention to interventions that seek to mitigate toxic stress and allow for the full (and equitable) development of executive function and self-regulatory behaviors in children.
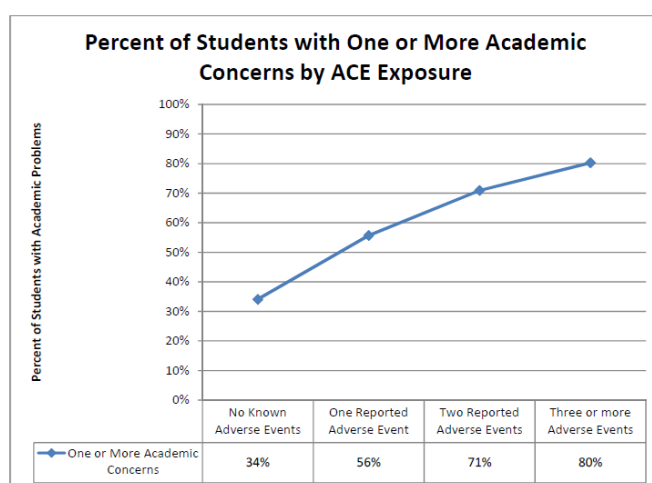
ACEs and School Performance

Blodgett, C. (2012)

Odds Ratios for Child Development Problems Compared to No Known Lifetime ACEs

	Academic Failure	Severe Attendance Problems	Severe School Behavior Concerns	Chronic Health Problems
Three or More ACEs	2.9	4.9	6.1	2.5
Two ACEs	2.5	2.6	4.3	1.6
One ACE	1.5	2.2	2.4	1.8

*ACE level of exposure in the past 12 months provided comparable risk predictions

Percent of Students with One or More Academic Concerns by ACE Exposure

	No Known Adverse Events	One Reported Adverse Event	Two Reported Adverse Events	Three or more Adverse Events
One or More Academic Concerns	34%	56%	71%	80%

..."This study connects adult research linking adverse events with social and health risks to academic risks in school children. As academic risks, and especially performance gaps, tend to increase with age, it holds that these children should also have increased risk of not graduating high school, not enrolling in college, and not graduating from college.

...This is an important societal factor that can't be mitigated by improved curricular and programmatic improvements alone. Moreover, with 45% of students experiencing at least one adverse event in their lifetimes, this phenomenon can be seen as affecting a broad spectrum of the population.

...The risk of ACE exposure is immediate, significant, and directly affects the success not only of individual children but of educational systems."

Longhi, D. (2011)

29% of HS students have either witnessed or experienced physical abuse in their home; this leads to an increase in school and behavioral problem risk by between 50 and 100%

13% of HS students have both witnessed and experienced physical abuse in their home; this leads to an increase in school and behavioral problem risk by between 84 and 199%

Resilience

Masten, A.S. (2001) *Ordinary Magic: Resilience processes in development*

"Resilience appears to be a common phenomenon that results in most cases from the operation of basic human adaptational systems. If these systems are protected and in good working order, development is robust even in the face of severe adversity; if these major systems are impaired, antecedent or consequent to adversity, then the risk for developmental problems is much greater, particularly if the environmental hazards are prolonged.

…Studies of resilience define risk in various ways, including SES, numbers of life events (recent or lifetime), community/intergenerational trauma, low birth weight, divorce, and cumulative combinations of factors. … Snowball effect—risks tend to be concurrent—and has a liner relationship with poor outcomes.

…The inverse perspective describes resources available in the individual as protective factors. In other words, "most risk gradients can be inverted to create an 'asset' or 'resource' gradient showing that high levels of assets are associated with better outcomes
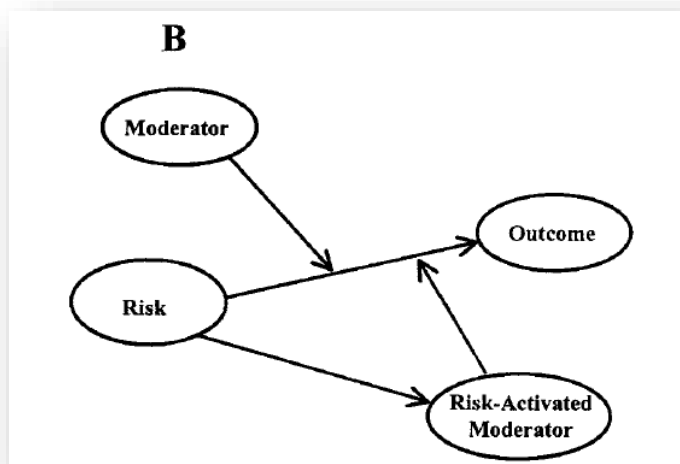
….Path diagram B (above) shows two kinds of moderator effects. One represents an attribute of individual or environment that moderates the impact of a risk factor or stressor on the outcome of interest but has no relation to the risk-stressor itself. The other is a risk-activated moderator analogous to an automobile airbag or immune system response. "

Madsen, M.D. and Abell, N. (2010) Trauma Resilience Scale: Validation of protective factors…

…" Resilience is the composite of phenomenon, which empowers a person to return to functional status following a damaging, or in the case of this research, violent event or events.

… With acknowledgment of ecological modeling, the individual, the family, and the community impact the positive influences that protective factors have in dealing with violent experience over time.

… Following our review of the literature, we identified three useful conceptual domains inspired by the specific social, emotional, and cognitive-behavioral levels of adaptive processes in the individual who has experienced violence. The first domain is the ability to generate and maintain supportive relationships. The second domain is optimism or a hopeful and positive future outlook. The third domain is problem-solving skills in the face of adversity.

Abstract of scale construction

Objectives: The Trauma Resilience Scale (TRS), assessing protective factors associated with positive adaptation following violence, was tested in three waves of data collection. Empirical and theoretical literature shaped subscale and item formation emphasizing resilience following physical abuse, sexual abuse, intimate partner violence, and/or a serious threat or injury to life.

Methods: Content validation experts helped refine items. The three-factor model, including problem solving, relationships, and optimism, was tested (n = 270). A four-factor model adding spirituality was also tested (n = 307).

Results: Both models demonstrated strong reliability, validity, and factor analyses results. However, the four-factor model was best supported by the data.

Conclusions: Both global scales and individual factor subscales are supported for clinical and research administrations.

Community Capacity, Resilience and School Performance

Longhi, D. (2012), *Stress, Strength, Work, Hope – Technical Appendix*
"Findings regarding the Relation of Toxic Stressors and Resilience with Education"

- "The number of years of education was found to be lower among people with higher toxic stress, either in childhood or as adults.
- The number of years of education was higher among people with higher levels of resilience, even after taking into account the effects of toxic stress, functional impairment, differences in labor contexts and socio-economic and demographic factors.

  These results are numerically reflected in the positive regression coefficient for resilience in the second stage of the education linear regression model. (See Table 8.) The model estimates a difference of .24 years of education for one point of resilience; this, on average, is equivalent to 12 x .24 = 2.88 more years of education between those with the lowest (0) and the highest (12) levels of resilience.

These findings suggest two strategies for increasing education:
  o Prevent toxic stress - both childhood ones (ACEs) and adult ones, and
  o Increase resilience"

Table 8

Effects of ACEs, Adult Stressors, Resilience, Functional Impairment, and Community Context
On Years of Education
Controlling for Socio-Economic and Demographic Factors
Among All Adult BRFSS Respondents in Washington State, Age 18 to 64, in 2009-10

Variables	Education (in years) (all adults)	
	Linear Regression ***b*'s**	
	Stage 1	Stage 2
Stress		
ACEs (0-8)	- .163***	- .146***
Adult Stressors (0-6)	- .396***	- .322**
Interaction ACEs & Adult Stressors	- .048 trend	- .063*
SES & Dem.		
Age in years	.032***	.029***
Gender (male)	- .110	- .089
African Amer.	- 1.478	- 1.690
Native Amer.	- .177	- .282
Other –Mixed	.169	.165
Hispanic	- 2.492***	- 2.351***
Asian – HPI	.951***	.840***
Income		
Disability Index		.090
Strengths		
Resilience index (0-12)		**.238****
Community Context		
High Labor Participation		.345***
Intercept	13.67***	12.14***
Model fit R²	.203	.215
Model Sign F	28.50***	26.24***
Sample size N	2,558	2,519

Definitions: *b* s: regression coefficients
Trend or tr.: $p \leq .10$, *: $p \leq .05$, **: $p \leq .01$, ***: $p \leq .001$
Notes: Hi Lab Part.: 0,1 (1=top quartile)
Race-ethnicity reference group is 'Non-Hispanic White'

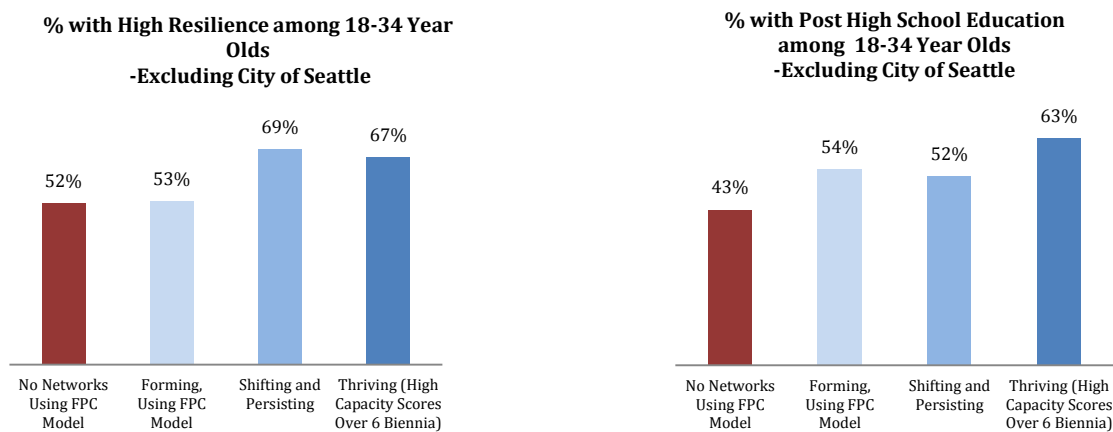## *Resilience Building Practices*

Shonkoff, J. (2012)

Hypothesis: interventions that strengthen the executive function and self-regulation of adults will also enhance their employability; will also augment the probability of disrupting intergenerational trauma and improving childhood outcomes by strengthening the economic and social stability of the home and family environment.

Hypothesis: community-based initiatives are more effective when they focus explicitly on strengthening neighborhood-level resources that buffer the effects of toxic stress.

Longhi, D. (2012), *Stress, Strength, Work, Hope (Technical Appendix)*

<u>"Findings regarding the relation between community capacity building and resilience"</u>

"Young adults, age 18 to 34, living in communities at higher stages of community capacity have fewer Adverse Childhood Experiences, higher resilience, higher levels of education, higher rates of employment and fewer dysfunctional days if employed - independent of socio-economic , demographic and cultural racial/ethnic differences among communities at lower stages of community capacity. (See Figure 2)"

Figure 2 (Selected charts)

% with High Resilience among 18-34 Year Olds
-Excluding City of Seattle

No Networks Using FPC Model	Forming, Using FPC Model	Shifting and Persisting	Thriving (High Capacity Scores Over 6 Biennia)
52%	53%	69%	67%

% with Post High School Education among 18-34 Year Olds
-Excluding City of Seattle

No Networks Using FPC Model	Forming, Using FPC Model	Shifting and Persisting	Thriving (High Capacity Scores Over 6 Biennia)
43%	54%	52%	63%

"These findings strongly suggest that increasing community capacity provide great benefits for younger adults: decreases in toxic stress factors, increases in resilience and education, and in combination with better labor participation, increases in the likelihood of employment and decreases in the number of days one is impaired, if employed."

Clegg and Associates: Smart, D., Smith, B., and Sambolin, I. (2008): Walla Walla Case Study

- "The *Becca Bill* provided leverage to enforce attendance and created a system for tracking students individually—the goal was truancy reduction."
- "…the combination of individualized attention and sanctions has helped the community dramatically improve its attendance and graduation rates." (p.46)
- "For kids that may have experienced neglect or trauma, knowing that the community cares about them is particularly important." (p.46)
- "Staff have learned that families have to invite you into their lives, which can be challenging. However, with time and consistent effort, they often do." (p.47)
- "Everyone is here for a different reason, whether their primary concern is jobs, jails, schools, or other issues, but the multisystem strategies build on each other to help youth overcome barriers to completing high school." (p.50)

Steele, W. & Kuban, C (2012), *Trauma-informed practices with children and adolescents.*

- "Private logic of trauma victims—reasoning that results from responses to the "feeling" part of the brain that responded to the initial trauma "instinctually"—makes it so that verbal reassurance or intervention are not effective. Traumatic experiences must be replaced with new experiences—ones that are safe, empowering, and that change self-concept for the better.
- Traumatized individuals develop a complex list of thoughts, a private logic, as a result of their trauma.
- Safe experiences *must* precede reflective talk. In an educational setting, this means that safe environments that are set up to be empowering are necessary to facilitate the dialogue—between student, teacher, and content—can be engaged and learned."

Meichenbaum, D. (2005). *Understanding resilience in children and adults: Implications for prevention and interventions*

Resilience Best Practices:

- Believe things can change and they can bring about that change
- Plan goals, and have evidence (like a checklist) of accomplishments
- Demonstrate self-efficacy and find a niche to be good at—solve problems and excel where you are good and have some control.
- Positive about accomplishments, especially in light of exposure to trauma
- Use faith and culture to bolster (rituals are sources of stability) self-confidence and connect to something larger
- Find meaning in life and actively connect to others with similar views
- Make a "gift" of the trauma survival to others—give something back and receive thanks
- Practice demonstrating emotional regulation: calm under pressure, accept the present
- Take incremental actions that are conducive to upholding cultural values
- Willingness to seek help and commune with others
- Help others