

Self-affirmation as a Stress Buffer in High School Student's Cognitive Ability



Word Count: 5085

INTRODUCTION

In today's society, high school students stress levels are at an all time high. From an academic perspective, Marya Gwadz, a research scientist at NYU, mentions that most students don't have much downtime these days (Gwadz, 2015). Apart from participating in extracurriculars, high school students are now more than ever receiving heavier workloads, often of which take students in rigorous courses more than three hours to complete a night. Additionally, academics is only *one* part of students lives. Students often have to worry about events in their personal lives as well such as poverty, family matters, and issues with mental illnesses. With all of these stressors playing a role in students lives, cognition function can be negatively influenced (Sandi, 2013). Knowing this, many researches have tended to focus on different aspects of this idea, looking for means to create a buffer between stress and cognitive ability.

A new psychological phenomenon, called self-affirmation has been widely adopted by numerous researchers. Self-affirmation is the act of affirming one's values to improve an individual's perception of the self. The self-affirmation theory is the concept of how individuals adapt to information that damages their sense of self (Harris, 2009). Knowing both of these ideas, the act of self-affirming one's values acts as a buffer between the perceived threat and their sense of self (Sherman and Cohen, 2014). As a result, many researchers have put this theory to the test using stress as the threat and the act of self-affirmation as a buffer. Many of these studies range from a wide variety of issues such as its effect on college retention rates and its effect on racism perceptions (Adams, 2006) (Lin and Liu 2018). While, many of these studies focus on these two

variables as well (self-affirmation and stress), there is a gap in the research on self-affirmations effect on one of america's most stress prone population, *high schoolers*. Knowing the effect that stress has on cognitive function and how self-affirmation can be used to buffer its influence, leads the researcher of this study to the question of: Does Self-Affirmation Buffer High School Students' Perceived Stress When Taking a Cognitive Ability Exam?

LITERATURE REVIEW

Main Principles

Although the self-affirmation theory can be synthesized into a generalization of protecting the integrity of the self, Claude Steele, broke up the self-affirmation theory into 2 main principles that help explain the process of how the theory is applied, and ways that other researchers have contributed to the psychological theory.

Flexibility

The reason as to why self-affirmation is possible is because humans have many roles that they characterize themselves as (Harris and Philine, 2017). This can be supported by Washington University professor Amy McQueens findings, where she categorized the way self-affirmation is tested across different areas. Amongst all studies analyzed, the common connection between all of them is that every researcher had the participant rank a list of values that undertook possible roles and or morals (McQueen, 2006). Amongst all studies there was never an instance in which a participant couldn't identify themselves with the list presented (McQueen, 2006). This is what creates

flexibility, the idea that people identify themselves with different roles. Such roles that allow shifts to take place as UCSB professor, David K. Sherman explains as “once self-affirmation is included with this flexibility, highlighting one value, can allow the threat of another value to take place because the highlighted value accommodates for this threat” (Sherman, 2006). For this very reason is why many studies in this domain create two groups, one group that highlights said value in their life, and another group that does the opposite and highlights their bottom ranked value in someone else's life, also known as the self-affirmation manipulation (McQueen, 2006). This allows researchers to measure the role that self-affirmation plays relative to the experimenters focused domain.

Protecting Integrity

Stanford University Psychology professor, Claude Steele, highlights the idea that self-affirmation is less about working to reduce the self-threat and more about maintaining the global conceptions (Steele, 1988). These global conceptions can be broken up into aspects defined as socially right (kindness, professionalism, eco-friendly, etc.) or culturally right, which is how most people deem what's right and wrong. In other terms, to protect self integrity is to protect roles, beliefs, and values (Brink, 2008) . For instance, in a study Steele decided to have a male phone operator call women and he was either going to negatively name call the women or positively name call women. The situation presented itself in a mormon community, where involvement in the community is seen as socially right. The phone operator then either told women that it was common knowledge that they were heavily involved in community projects (positive name calling) or that it was known that they were uncooperative in community projects (negative name

calling). Two days later, the female participants were approached by a woman and were asked to participate in a community project. Upon looking at the list, one can see that women who were negatively name called had more of an incentive to join than those who were positively name called. This situation that presented itself can be seen in the domain of role in a society. Since mormons heavily value this ethic, Steele presents the idea that the women were not merely protecting the perceived threat for their own will, but to follow the norm within their society (Steele, 1988).

Although Steele brought up the idea that self-affirmations is used to protect the integrity to the self because of global conceptions (social roles), studies have shown that in cases where people have issues with addictions, these conditions don't apply (Klein and Harris, 2009). Affirmations in this case are more oriented towards helping the self, not towards wanting to follow societal norms (Legault, 2012). For instance in a study conducted by researchers William M. P. Klein and Peter R. Harris, they tested the theory of self affirmation and attentional bias for women that consume alcohol. For accuracy purposes they focused on women who drank at least 7 times a week, and from that point separated them into four groups: Moderate drinkers (affirmation), moderate drinkers (control), heavy drinkers (affirmation), and heavy drinkers (control). After they participated in a self-affirmation manipulation, Harris and Klein concluded that those in the self-affirmation group, more specifically, in the heavy drinker category tended to spend more time on the article and tended to show a stronger bias towards the words, while the control groups tended to stray away from the threatening messages and words (Klein and Harris, 2009). It is important to note that the reason as to why the

self-affirmation group could take on these ego depleting messages is not due to their motivation to want to be “accepted” as the global conception states, but is because their risk perceptions played an ongoing role in self-affirmation (Klein and Harris, 2009).

Beneficiaries

Although self-affirmation speaks in terms of the general population, it does tend to have bias in terms of the gratuity of the threat to the self (Kingston, 2014). In a study conducted by Ohio State University professor, Jennifer Crocker, she had smokers follow a self-affirmations task prior to asking them to read a pseudo research paper on how smoking increases the risk of developing abdominal aortic aneurysms. Upon follow-up questions two weeks after the experiment, she found that the amount that people smoked decreased, but found that those who were labeled as heavy smokers in turn smoked less than moderate smokers in their same group after the experiment because there gratuity of threat was perceived as greater (Crocker, 2008). Similar to how self-affirmation is often focused on gender achievement gaps since women are perceived to have a stronger threat to the self (Miyake, 2010) and as to how it can also be focused on race, as minorities tend to have an inherent disadvantage (Cohen and Garcia, 2006).

Similarly, this can be applied to other addictions as proved by researcher Ubaldo Cuesta Cambra, where he followed a similar task, but instead of smokers he focused on people that consumed alcohol and found similar results. Participants did report lower intakes of consumption, but those labeled as heavy drinkers reported the greatest decrease amongst all participants as well (Cambra, 2017). Aligned with this concept, David K. Sherman and Claude Steele conducted a similar study where instead of focusing on

extreme behavioral conditions, they focused on caffeine, a minor form of addiction that is more common. After conducting the self-affirmation manipulation, they had everyone read an article about how caffeine intake could cause breast cancer amongst its users. As predicted, those who consumed coffee the most reported a greater decrease of intake than any other group (Sherman and Steele, 2000).

On the contrary, results from Mark B. Reed and Lisa G. Aspinwall had a different result. They too did a study closely aligned with Shermans and Steele's research where they focused on people that intake caffeine. The only difference is that they had participants read a article on Fibrocystic Breast Disease (FBD), but unlike the other studies they found that those with high intakes of caffeine, still reported a high intake after (Reed and Aspinwall, 1998).

Stress

Apart from being studied in areas of health and wellbeing, self-affirmation has also been linked to stress and the way it is processed. In David K. Sherman's and William T. Welch's research, college students did the same rankings as the previous studies mentioned (rankings, reflection), but this time stress was induced through the Trier Social Stress Test (TSST) and saliva samples. At the end of the study cortisol levels in the saliva and heart rates were constantly increasing while the test was being administered, but those in the self-affirmation group, tended to respond better in the TSST (Sherman and Welch, 2005).

In a further study done by Carnegie Mellon University professor David Creswell, focused more on how stress and self-affirmation affected performance on creativity.

Creswell, like other researchers, split college students into two groups: affirmation & control, along with two subpopulations under each category: low stress and high stress, and had them follow the self-affirmation manipulation. Following this task, they then participated in a RAT (Remote Associates Task) that is oriented towards measuring creativity, all whilst measuring their heart rate to measure their stress. Creswell found that the self-affirmed group performed better in the task compared to those who hadn't affirmed (Creswell, 2013) and concluded that results such as these can help intervene with education barriers that some might face (Creswell, 2013).

Furthermore David K. Sherman and Debra P. Bunyan elaborated on such findings in, a study at a university where college students volunteered to give urinary samples 2 weeks prior to their midterm exams, day before the exam, and the day of the exam. The day before the experiment they were asked to state their opinions of themselves in terms of college students and following the lines of the self-affirmation manipulation, affirmed students were asked to write about their top values and where it applied in their lives, while the control group wrote about the least important values and why it might be important to others. As a result, those that were self-affirmed had epinephrine levels that were lower than those that were in the control group. Showing that once again, self-affirmation lowered stress' effect on the body (Sherman and Bunyan, 2009).

Census

While self-affirmation is believed to take upon many domains of our everyday lives (health, academics, behaviors, etc.) the commonality between all studies is that self-affirmation is an ego-depletion that isn't working towards creating defensiveness, but

is rather working towards greater efficiency in people's lives, otherwise known as a reward-related mechanism (Dutcher, 2016).

All of these factors contributed to the goal of this study: to measure how perceived stress levels of high school students affects their performance on an arithmetic task. This study follows the combination of procedures from David Creswell's study to meet the stated goal. From the results of the aligned studies, this paper follows the hypothesis that those that perform better on the Cognitive Aptitude Task will be part of the group that is in the self-affirmation condition and has experienced high stress levels prior to the experiment.

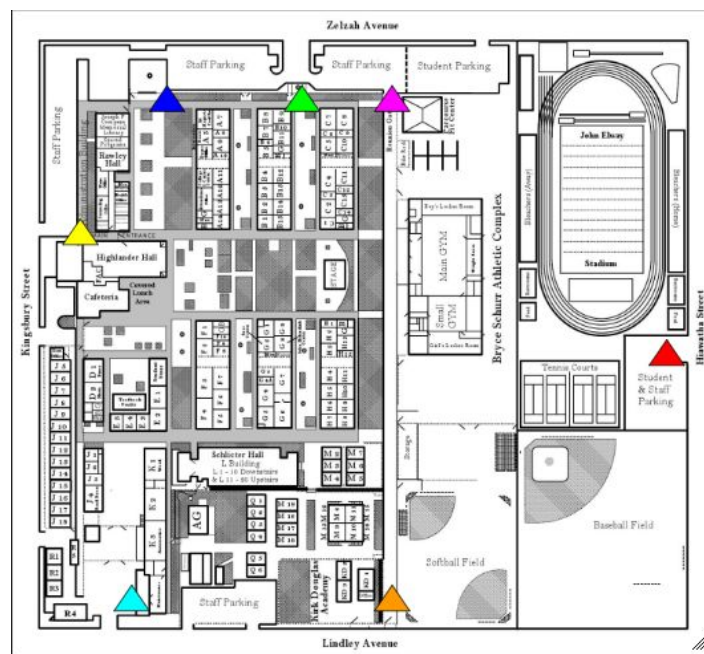
METHODS SECTION

Participants

This experiment is closely aligned with David Creswell's study in *Self-Affirmation Improves Problem Solving Under Stress* (2013), with a few alterations made to suit the population. Participants in this experiment came from an ethnically diverse, co-ed, large public high school in a suburban high school (SHS), where 48% of the 4,480 students face socio-economic disadvantages. The diverse school profile allows me to establish GHC as an appropriate sample for most suburban high schools. 77 students participated in this experiment and respondents ranged from 9th-12th grade, therefore representing different levels of difficulty in terms of course rigour. Among these participants 39 were males and 38 were females.

Sample Selection

In order to get a representative sample, students were either chosen from a stratified random sample in terms of gate entry, or were current students in a Business Statistics class. For the stratified random sample, students were approached at different entry gates, gates that all students must use in order to enter the campus premises (See Figure 1). Due to the various gates, and the assumption that students tend to use one gate on a regular bases allowed the data collection to span over the course of a month, from 7:20 am to 8:20 am everyday. An incentive was offered in terms of a \$10 giftcard to Starbucks. For data collection that was gathered from a Businesses Statistics class, students were told about the intent of the experiment from their teacher and were asked to participate in it as well for class participation points.



Procedure

Students that were approached from different entry gates were asked if they wanted to participate in a survey that dealt with the topic of self-perceived values and

stress. Students that agreed to participate provided their email and were told that they would be contacted later that day with a link to the survey. Students that wished to know more about the intended purposes of the survey were debriefed on the psychological aspect of the questions and then chose to either provide or not provide their email. No student in this population was excluded due to not having the necessary equipment to take the survey, as all students are issued Chromebooks by the school.

The survey started of 3 demographic questions, followed by questions on their perceived stress over the course of the last month, were given 11 values to rank, followed by a reflection piece on said value, and ended with 2 questions that asked about how the value they were asked to write about affected their character and their life (See Table 1).

Table 1

TABLE 1: Instrument Table		
Questions	Measurement Scale	Source
Demographics	Assorted	Source
What gate did you come in?	Flagpole, Zelzah Teacher Parking Lot, Service Road East, Service Road West, J Gate, Kingsbury, Hiawatha Lot, Business Stats Class*	Self-defined
What math level are you in?	Algebra 1, Algebra 2, Pre-Calculus, AP Calculus AB, AP Calculus BC, Business Stats, AP Statistics, CP Statistics, H-Pre calculus, No Math	Self-defined
What grade level are you in?	9th Grade, 10th Grade, 11th Grade, 12th Grade	Self-defined
What is your gender?	Female, Male	Self-defined
Perceived Social Stress	Likert Scale (0-4)	Source
In the last month, how often have you been upset because of something that happened unexpectedly? were unable to control the important things in your life?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you felt nervous and "stressed"?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you felt confident about your ability to handle your personal problems?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you felt that things were going your way?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you found that you could not cope with all the things that you had to do?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you been able to control irritations in your life?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you felt that you were on top of things?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
In the last month, how often have you been angered because of things that were outside of your control? were piling up so high that you could not overcome them?	Never (0), Almost Never (1), Sometimes (2), Often (3), Very often (4) (same for all statements)	J. David Creswell
Ranking Of Values	Ranking System (1-11)	Source
Artistic Skills	Most important (1), Least important (11)	David K. Sherman & David Creswell
Sense of Humor	Most important (1), Least important (11)	David K. Sherman & David Creswell
Relations with friends/family	Most important (1), Least important (11)	David K. Sherman & David Creswell
Spontaneity/living life in the moment	Most important (1), Least important (11)	David K. Sherman & David Creswell
Independence	Most important (1), Least important (11)	David K. Sherman & David Creswell
Athletics	Most important (1), Least important (11)	David K. Sherman & David Creswell
Musical ability/appreciation	Most important (1), Least important (11)	David K. Sherman & David Creswell
Politics	Most important (1), Least important (11)	David K. Sherman & David Creswell
Creativity	Most important (1), Least important (11)	David K. Sherman & David Creswell
Business/Money	Most important (1), Least important (11)	David K. Sherman & David Creswell
Religious Values	Most important (1), Least important (11)	David K. Sherman & David Creswell

Reflection	Open Response	Source
Control		
Why your ninth ranked value (#9) might be important to someone else	Eg: Different values, hobbies, parents, experiences, how they were raised	David K. Sherman & David Creswell
Self-Affirmation Group		
Why your top ranked value (#1) is important to you?	Eg: Experiences, Familiarity, hobbies, parents, how they were raised	David K. Sherman & David Creswell
Manipulation Check	Likert Scale (1-5)	Source
The value I wrote about has influenced my life	Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), Strongly Agree (5)	David Creswell
The value I wrote about is an important part of who I am	Strongly Disagree (1), Disagree (2), Undecided (3), Agree (4), Strongly Agree (5)	David Creswell

After collecting emails each day, students from each gate were then equally split and were sent different surveys according to the random split. Both groups were administered the same survey, but each group was administered a different writing prompt that acted as a manipulation. The first group (control group, n=40) was given a reflection piece that asked them to write about their 9th ranked value and why it might be important to others, and the second group (self-affirmation group, n=37) was given a reflection piece that asked them to write about their topped ranked value and why it was important to them. At the end of each survey, students were told that if they wanted to participate in a experiment as a follow up to the survey, to provide their email in a slot provided.

The same procedure and manipulation was applied to 2 periods of Business Statistics students. Period 1 was administered the survey that asked them to write about their top ranked value, or in other words their were my self-affirmation group. Period 2 was administered the survey that asked them to write about their 9th ranked value, therefore meaning that they were my control group. In this case, students were not asked

if they wanted to provide their emails in order to participate in the experiment portion of the study, as they had all given their consent the day prior.

After collecting email responses on students that agreed to take part in the experiment from the stratified sample, students were then told to come to a designated room on either Wednesday, Thursday, or Friday. Students that wished to take these further steps were then asked to send me an email confirming their attendance on their designated day.

Upon their arrival each student was asked to take a seat and was given a copy of their response to the survey. They were then asked to reflect and review their responses for at least 5 minutes in order to make sure that the gap in time period from then, to when the survey was administered played no significant role in the results. After the reflection period, respondents were provided with a piece of scratch paper, and a link to a mock Criteria Cognitive Aptitude Test (CCAT), a test used by employers to measure an individual's problem solving and analytical skills. Questions ranged from different approaches such as mathematical (logic), verbal (analogies, antonyms, syllogisms, etc.) and spacial/abstract (series, matrices, analogies). Participants were given 9 minutes to complete as many questions possible out of 30. No calculators were allowed during the test.

Students from the Business Statistics class completed the same tasks as those from the stratified random sample, but instead completed both the survey and the CCAT test at once. At the start of each period, students were debriefed about the intent of the experiment once again, and were then told they'd have 15 minutes to complete the

survey sent out to their emails. They were told to follow the instructions provided on the survey, but if they had any questions to raise their hands as to avoid disrupting other students. If students had time remaining, they were told to reflect more on the value they wrote about (top ranked). Students were then told that they would have 9 minutes to complete the CCAT test and the same materials and rules as the stratified random sample were given to these students as well. The same procedure applied to 2 period as well, but as stated before the only difference being that their prompt followed that of their 9th ranked value.

At the end of all the experimental sessions, scores were collected and students were told about the meaning of their scores, the test, and the purpose of their reflection. This was not done before, as to avoid it playing a role with the whole intent of the study.

Although, data was being gathered from two different settings (Class and gates), for the intent of the study, their data will be used together in order to form a conclusion, and limitations on this will discussed.

RESULTS

Figure 1

Figure 2

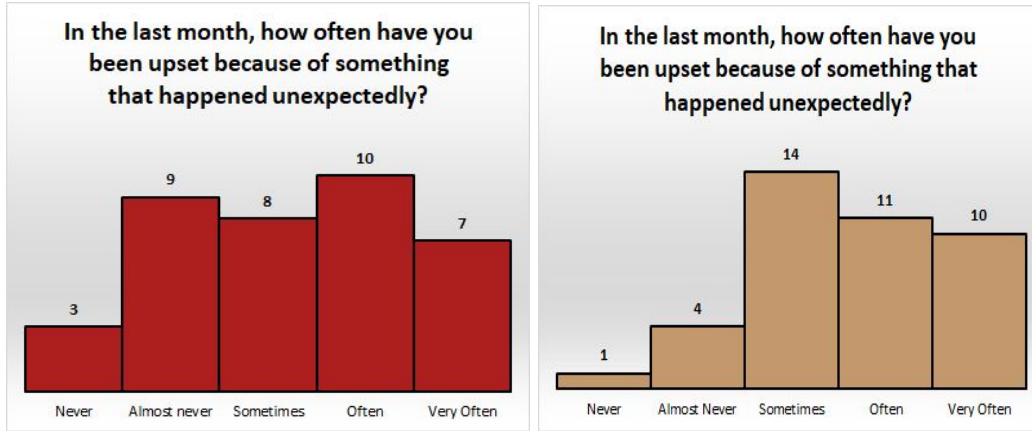


Figure 1 represents those in the self-affirmed group. Figure 2 represents those in the control group. The question stated above the histograms, belonged to a category of questions that fell under “unexpected events”.

Figure 3

Figure 4

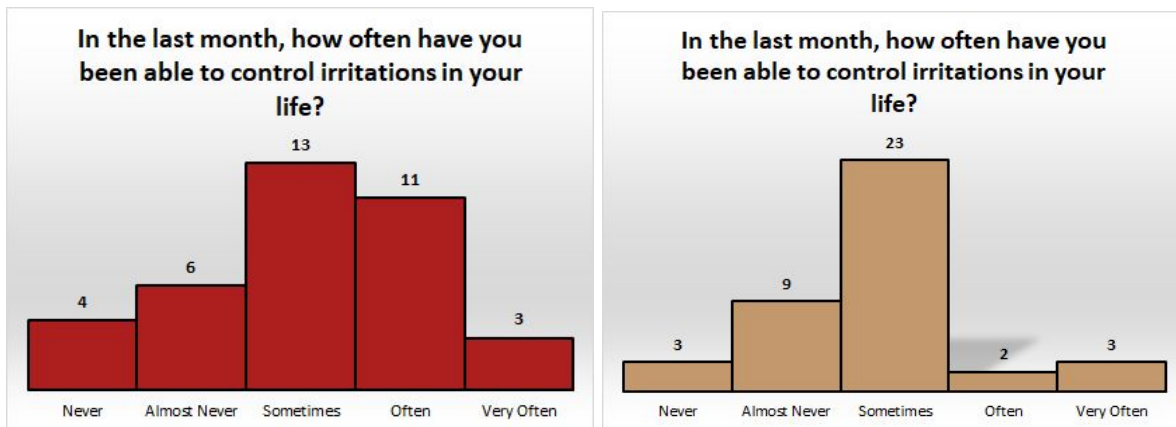


Figure 3 represents those in the self-affirmed group. Figure 4 represents those in the control group. The question stated above the histograms, belonged to a category of questions that fell under “control”.

Figure 5

Figure 6

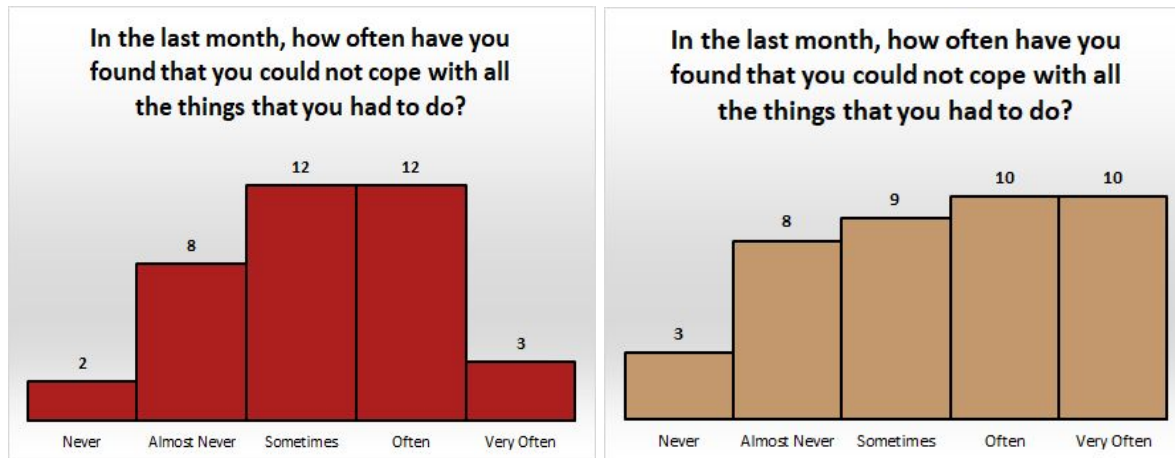


Figure 5 represents those in the self-affirmed group. Figure 4 represents those in the control group. The question stated above the histograms, belonged to a category of questions that fell under “management”.

Figure 7

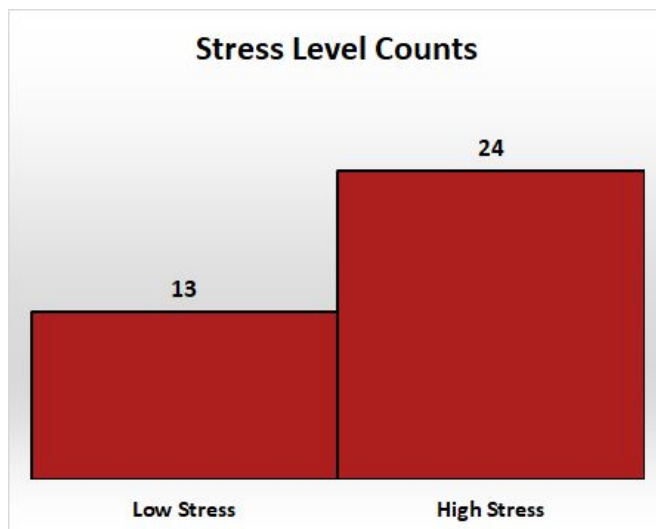


Figure 8

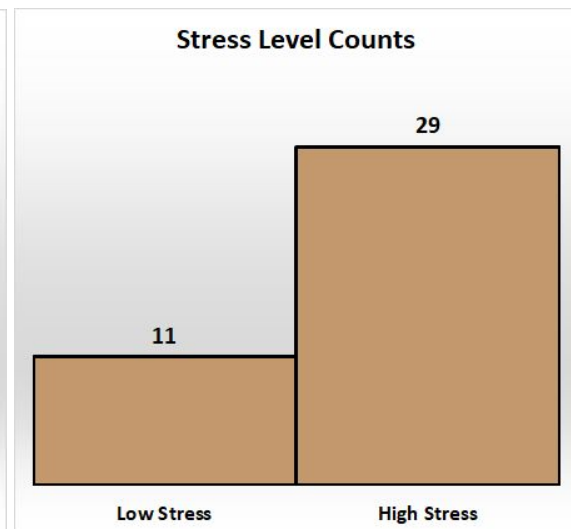


Figure 7 represents those in the self-affirmation group. Figure 8 represents those in the control/non-affirmation group. The histograms above is a representation of students from each group that were categorized as either having low stress or high stress.

Table 2: Values Chosen

Value Chosen	Control Condition, Low Stress	Control Condition, High Stress	Affirmation Condition, Low Stress	Affirmation Condition, Low Stress2
Artistic Skills	0	0	2	2
Athletics	0	3	0	0
Business/Money	1	2	1	2
Creativity	0	1	0	0
Independence	0	3	0	1
Music	1	1	1	2
Politics	2	2	2	1
Relations with friends/family	4	9	6	9
Religious Values	3	5	1	2
Sense of Humor	0	1	0	1
Spontaneity	0	2	0	4

Table 2 represents values that those both in the self-affirmed group and control group chose as their #1 ranked value to them, with respect to individuals categorized as either low stress or high stress. In other words, the table shows the frequency in which each value was chosen as being viewed as “important in their lives”. Creswell used a similar figure in an attempt to analyze if there was a degree of variance between the self-affirmation and control group.

Table 3: Values Written About

Value Chosen	Control Condition, Low Stress	Control Condition, High Stress	Affirmation Condition, Low Stress	Affirmation Condition, Low Stress2
Artistic Skills	0	6	2	2
Athletics	1	1	0	0
Business/Money	0	7	1	2
Creativity	2	3	0	0
Independence	1	0	0	1
Music	3	1	1	2
Politics	0	4	2	1
Relations with friends/family	0	1	6	9
Religious Values	2	2	1	2
Sense of Humor	0	3	0	1
Spontaneity	2	1	0	4

Table 3 represents values that those both in the self-affirmed group and control group wrote about, with respect to individuals categorized as either low stress or high stress. Those in the control condition wrote about their 9th ranked value and those in the self-affirmed condition wrote about their 1st ranked value. Creswell used a similar figure to affirm his idea that those in the control condition had a degree of variance in terms of values they wrote about.

Table 4: Manipulation Checks

Condition	Mean	Standard Deviation
Self-Affirmation	4.73	.53
Control	2.95	1.25

Table 4 represents the mean and standard deviation of how students felt about the value they had written about. Creswell used this to measure whether the manipulation of the self-affirmation variable occurred.

Figure 9

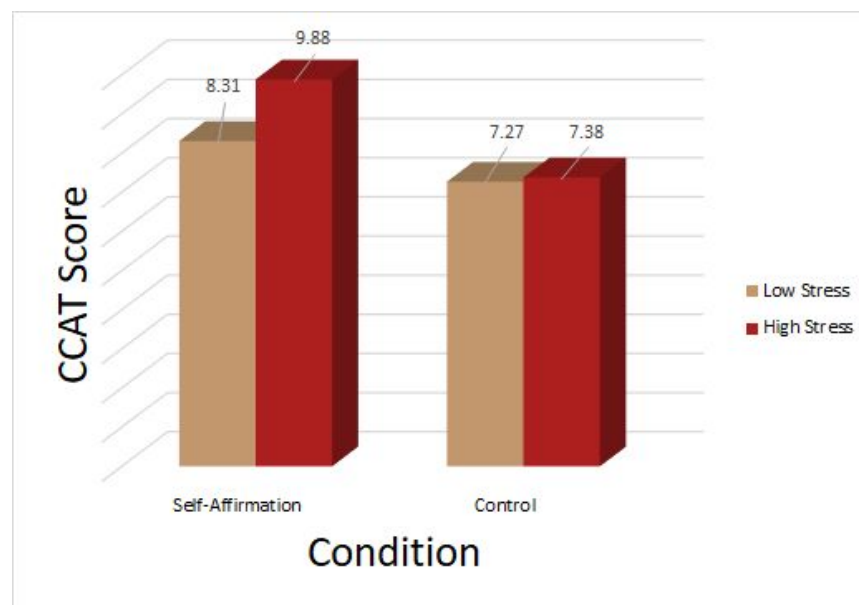


Figure 9 represents the overall mean score of individuals on the CCAT Test with respect to their designated population. Creswell used a similar figure to determine whether his hypothesis was correct, and will be used in the same way for this study.

Figure 10

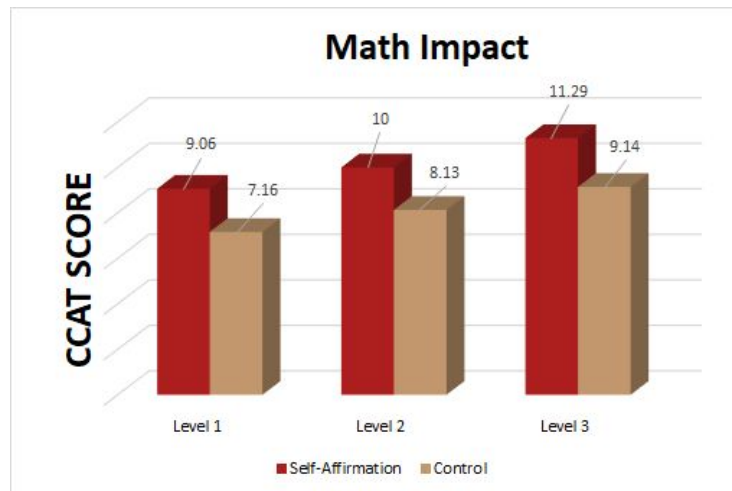


Figure 10 is used to determine whether the math level that an individual is taking, had an effect on their performance on the test. Creswell didn't measure this affect on his study, but will be used by the researcher of this study as part of a limitations.

DISCUSSION

Table 5: Mean of Questions

Question	Control Mean	Self-Affirmation Mean	Main Difference
1: In the last month, how often have you been upset because of something that happened unexpectedly?	2.63	2.24	0.39
2: In the last month, how often have you felt that you were unable to control the important things in your life?	2.63	2.41	0.22
3: In the last month, how often have you felt nervous and “stressed”?	3.25	3.03	0.22
4: In the last month, how often have you felt confident about your ability to handle your personal problems?	1.58	1.14	0.44
5: In the last month, how often have you felt that things were going your way?	2.00	2.05	0.05
6: In the last month, how often have you found that you could not cope with all the things that you had to do?	2.40	2.16	0.24
7: In the last month, how often have you been able to control irritations in your life?	1.83	2.08	0.25
8: In the last month, how often have you felt that you were on top of things?	2.15	1.89	0.26
9: In the last month, how often have you been angered because of things that were outside of your control?	2.35	2.32	0.03
10: In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	2.68	2.38	0.30

Question Categories

As part of the experiment, students had to answer 10 questions in order to measure their perceived stress. Of these 10 questions, the researcher of this study categorized the 10 questions into 3 separate categories: unexpected events, control, and

management. Although this method was not implemented by Creswell, the researcher of this study decided to analyze the results to determine if those in the self-affirmation group and control group responded significantly different to these questions. Using table 5 as a reference, it can be determined that there was no statistical difference between how individuals responded to the questions, in terms of whether they were in the self-affirmation group or the control group. The largest difference in the means were seen in question 4, a question that measured control, with it being a difference of .44. The smallest difference in means was seen in question 5, a question that measured control as well, with it being a difference of .05. Therefore, it can be concluded that whether students were placed in the self-affirmation group or control group, this played no role as to how individuals responded to the questions

Chosen/Written Values

When conducting the experiment, randomization in selection of top ranked value is crucial in order to determine the validity of self-affirmation. Self-affirmation is meant to be universal to all affirmed values, and ensuring that self-affirmation is not biased to a specific value is key to its theory. Upon observation of Creswell's study, he noted that 50% of all participants chose "Relations with friends and family" as the top ranked value, a percentage that is consistent with previous studies as well (Creswell, 2013). In this study, approximately only 36% of students chose "Relations with friends and family" as their top ranked value (Table 2), an outcome that can be a direct result of the population at hand. In terms of what students actually wrote about after being placed into either the self-affirmation group or control group, in this study 40% of students in the

self-affirmation group wrote about “Relations with friends and family” while the control group wrote about a variety of different values with no commonalities amongst all sub-populations (Table 3). These statistical findings are aligned with that of Creswell’s in reaching the determination that apart from the “Relations with friends and family” value, there is no commonality between both the self-affirmation and control group, therefore allowing the researcher to determine that in this study self-affirmation is universal.

Manipulation Test

To test whether the self-affirmation manipulation task was effective, a comparison the ratings that participants in the two conditions made about the value they wrote about were analyzed. In the self-affirmation group, the mean value was a 4.73 on a scale of 1-5, with 5 being that the individual felt strongly about the written value. For the control group, the mean was 2.95 on the same scale as that of the self-affirmation group. Therefore, the significant statistical difference of these two groups shows that those in the self-affirmation group felt more strongly about their written value than those in the control group, which allows the researcher of this study to confirm the idea that a self-affirmation manipulation took place. A conclusion that was also yielded in Creswell’s study, in which he found that the self-affirmation manipulation was enacted due to relatively high difference in means of the self-affirmation group and control group (Creswell, 2013).

Self-affirmed v. Control

When comparing the test scores of those in the self-affirmation group and the test scores of those in the control group, it should be noted that as hypothesized, those in the

self-affirmation group performed better on the CCAT Test than those in the control group (Figure 9). Findings that were directly aligned with those of Creswells in his study where he also found that participants in the self-affirmation group performed relatively better on the RAT test (Creswell, 2013). The difference between these two conclusions were that for Creswells study, the differences in means between the two conditions were more statistically significant, than that of this study. While the difference yields a stronger conclusion, the differences in scores in this study is still significant enough to show that self-affirmation is affecting performance ability on the CCAT test as a whole.

Self-affirmation: Low Stress vs. High Stress

When analyzing the scores of those in the self-affirmation group, there is a notable difference between students in the low stress and high stress category. Those in the low stress category had a mean score of 8.31, while those in the high stress category had a mean of 9.88. These results affirm my hypothesis, that states that those that are in the self-affirmation group and have high levels of stress will have a high score. These results are also aligned with those of Creswells in which he found that those with high levels of stress in the self-affirmation group, performed better on the RAT test than those categorized as having low stress (Creswell, 2013). From these results it can be concluded that self-affirmation does in fact act as buffer between stress and performance ability. Furthermore, it affirms the common belief that those with a greater gratuity of threat to the self will benefit more from the act of self-affirming.

Control: Low Stress vs. High Stress

When comparing the mean scores for those in the control group, there is no significant difference between those in the low stress and high stress category. Those in the low stress category had a mean of 7.27 while those in the high stress category had a mean of 7.38. These results were not aligned with those of Creswells because in his study he found that those in the high stress category had a lower mean score than that of those in the low stress category (Creswell, 2013). These new findings bring upon the new understanding that stress had no effect on the CCAT score as students who were expected to perform worse, actually performed better.

Self-affirmation & Control: Low Stress

When comparing those with the same levels of stress amongst both conditions, there is a significant difference across the two conditions. Firstly, when comparing those labeled as low stress individuals, those placed in the self-affirmation category had a mean of 8.31, while those in the control condition had a mean of 7.27. Although these findings are not statistically significant, the difference between the two means is important to note as it brings on the idea that even though the participants labeled as low stress self-affirmed, their overall mean scores were not that different as compared to the participants that did not affirm in the control condition. These findings were also aligned with Creswells study in which he also found that no matter the condition, individuals that were deemed to have low stress levels performed the same (Creswell, 2013).

Self-affirmation & Control: High Stress

When comparing those with the same levels of stress amongst both conditions, there is strong statistical findings that affirm the concept of self-affirmation. For students

in the self-affirmation group, students had a mean score of 9.88, while those in the control conditions had a mean score of 7.38. These findings while not as strong as those of Creswells who had a significant difference of mean scores between the two levels, still proved significant as it is still evident that those in the self-affirmation group outperformed those in the control group (Creswell, 2013). Other than Creswells overall means for high stress individuals being significantly higher, one more key difference to note is that in the control condition for this study, those in the high stress categories still had a relatively high mean. This reveals the idea that stress did not act as a major influencer on the CCAT score, perhaps leading on the idea that for students in this study stress plays no major effect on their overall performance.

Math Level

To determine whether the math class that students were taking altered their overall performance, mean scores for students across three levels of math classes were analyzed according to the two conditions. When looking at the control and self-affirmation condition across the three difference levels, mean scores increased as the math level got more advanced. Furthermore, when comparing the scores against the two conditions, it important to know that for each level, those in the self-affirmation condition had a higher score. Therefore, regardless of math level that a student was placed in, those in the self-affirmation group still performed better within their subgroups.

CONCLUSION

Implications

While the study outlined a clear connection between the act of self-affirmation and stress, it's important to note that there are implications in this study. Firstly, this study is only examining stressors that have occurred within the last month and does not test ongoing stressors. Therefore, the effect that self-affirmation might have on individuals that face ongoing stressors could be different. Another implication is that the degree to which the performance task was taken seriously can not be measured, students might have made guesses on answers instead of making an attempt to actually respond to the cognitive questions. Finally, this study does not make the concept of stress absolute, therefore how different degrees of stress affects performance can not be analyzed.

Limitations

The main limitation of this study was that in Creswell's study, he included a separate part of the experiment that measures heart rate and arterial pressure throughout the experiment duration. These two factors were used in order to measure the stress levels of individuals throughout the experiment. In turn, this data was used to see how participants reacted throughout the RAT performance task and if this altered their results in any way. These two limitations were not included in this experiment as students might have reacted strongly and results could have been affected due to their negative reaction. Therefore, the researcher of this experiment found it best to exclude that procedure in this experiment. Another limitation that is important to note is that the sample size of this study is not large enough to make statistically significant conclusions, and while although they still yield a probable conclusion, these conclusions would be stronger if they were based around a larger sample.

Further Study

Since this study included numerous implications and limitations, it is recommended that future studies measure the effect that self-affirmation has on ongoing stressors, monitor the participants closely to ensure reliability of scores, and narrow down degrees of stress into different categories to see self-affirmations effects on these degrees.

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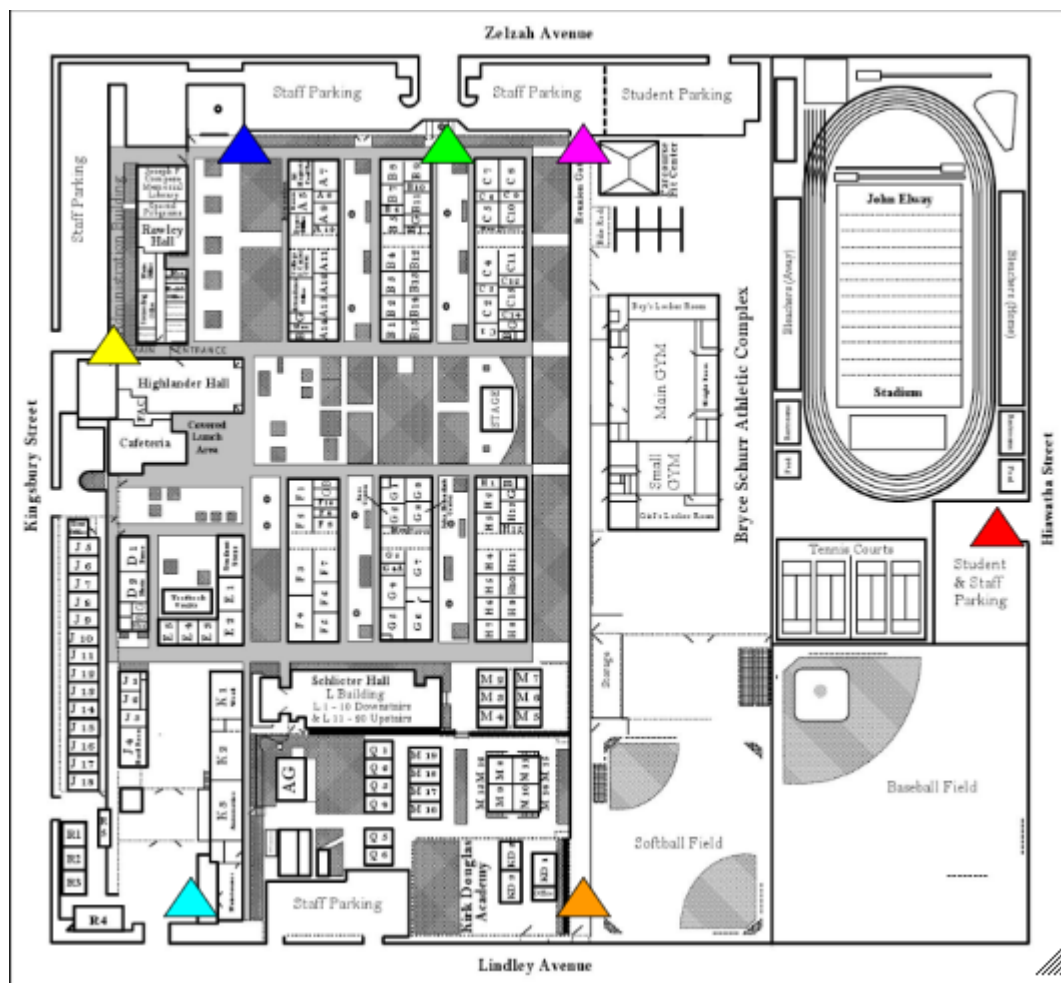
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Self-Affirmation: Perceived Stress

Your email address (d31336@student.ghchs.com) will be recorded when you submit this form. Not d31336? [Sign out](#)

* Required

Entry Gate



1. What gate did you come in? *

Mark only one oval.

- ☐ Flagpole (Dark Blue)
- ☐ Zelzah Teacher Parking Lot (Green)
- ☐ Service Road East (Pink)
- ☐ Service Road West (Orange)
- ☐ J Gate (Aqua)
- ☐ Kingsbury (Yellow)
- ☐ Hiawatha Lot (Red)
- ☐ Nelson's Class

Demographics

2. What math level are you in? *

Mark only one oval.

- ☐ Algebra 1
☐ Algebra 2
☐ Pre-Calculus
☐ AP Calculus AB
☐ AP Calculus BC
☐ Business Stats
☐ AP Statistics
☐ CP Statistics
☐ H Pre-Calculus
☐ No Math

3. What grade level are you in? *

Mark only one oval.

- ☐ 9th
☐ 10th
☐ 11th
☐ 12th

4. What is your gender? *

Mark only one oval.

- ☐ Female
☐ Male

Perceived Social Stress Test

Your final task consists of questions related to the amount of stress you have received within the last month. Please answer to the best of your ability.

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

5. In the last month, how often have you been upset because of something that happened unexpectedly? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

6. In the last month, how often have you felt that you were unable to control the important things in your life? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

7. In the last month, how often have you felt nervous and “stressed”? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

8. In the last month, how often have you felt confident about your ability to handle your personal problems? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

9. In the last month, how often have you felt that things were going your way? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

10. In the last month, how often have you found that you could not cope with all the things that you had to do? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

11. In the last month, how often have you been able to control irritations in your life? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

12. In the last month, how often have you felt that you were on top of things? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

13. In the last month, how often have you been angered because of things that were outside of your control? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? *

Mark only one oval.

	0	1	2	3	4	
Never	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Often

Ranking of Personal Characteristics and Values

Below is a list of characteristics and values, some of which may be important to you, some of which may be unimportant. Please rank these qualities in order of their importance to you, from 1 to 11 (1 = most important item, 11 = least important item).

USE EACH NUMBER ONLY ONCE.

15. Values *

Mark only one oval per row.

	1	2	3	4	5	6	7	8	9	10	11
Artistic Skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sense of Humor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Relations with friends/family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spontaneity/living life in the moment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Independence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Athletics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Religious Values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Mark only one oval.

	1	2	3	4	5	
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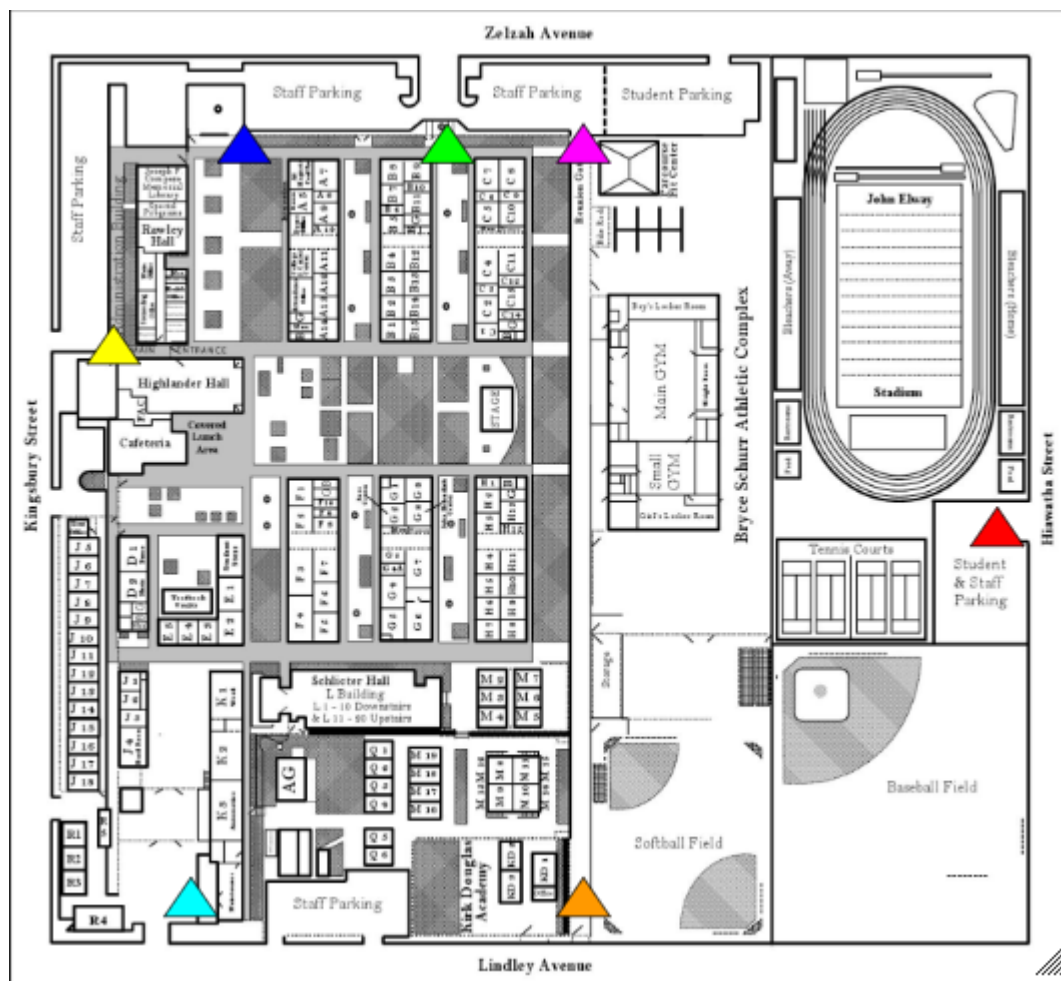
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Self-Affirmation: Perceived Stress

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Spontaneity/living life in the moment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Politics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business/Money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Religious Values	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reflection

Writing task may be brief. MINIMUM 3 sentences. Please make the responses thoughtful.

16. Why your ninth ranked value (#9) might be important to someone else *

Using the value you just wrote about, state the value of agreeance/disagreeance according to the following statements

17. This value has influenced my life *

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1	2	3	4	5

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	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

18. This value is an important part of who I am *

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
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Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

☐ Send me a copy of my responses.

CCAT Test

Your email address (d31336@student.ghchs.com) will be recorded when you submit this form. Not d31336? [Sign out](#)

1. A recipe for making 18 cookies requires $\frac{3}{4}$ cup of sugar. How much sugar would be needed to make two dozen cookies using the same recipe?

Mark only one oval.

- ☐ $\frac{3}{8}$ cup
- ☐ 1 cup
- ☐ $1\frac{1}{3}$ cup
- ☐ $1\frac{1}{2}$ cup

2. A bluetooth speaker costs \$120. Its price rose by 20% and then by another \$24. What is the total percentage increase in price for this speaker?

Mark only one oval.

- ☐ 35%
- ☐ 40%
- ☐ 45%
- ☐ 25%

3. Assumptions: Some writers don't own a car. No gardeners are writers. Conclusion: Some gardeners don't own a car. If the assumptions are true, is the conclusion

Mark only one oval.

- ☐ Correct
- ☐ Cannot be determined based on the information available
- ☐ Incorrect

4. Letter is to word as house is to

Mark only one oval.

- ☐ Mansion
- ☐ Hospital
- ☐ Homeless
- ☐ Room

5. What fraction of the grid is NOT covered in black



Mark only one oval.

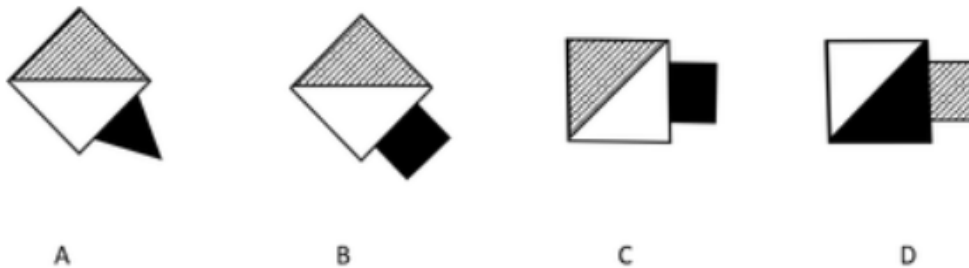
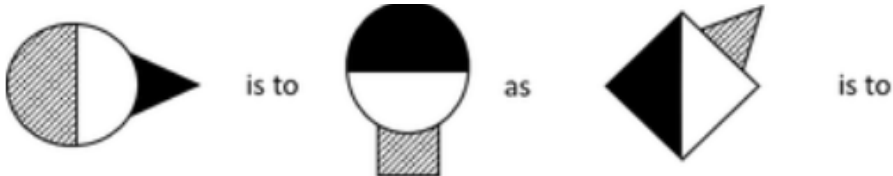
- ☐ 5/6
- ☐ 2/3
- ☐ 3/4
- ☐ 1/2

6. Satiety is to meal as achievement is to

Mark only one oval.

- ☐ effort
- ☐ trophy
- ☐ conquest
- ☐ running

7. Follow the pattern



Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D

8. Which of the following is the opposite of the word covert?*Mark only one oval.*

- ☐ advert
- ☐ invert
- ☐ apparent
- ☐ internal

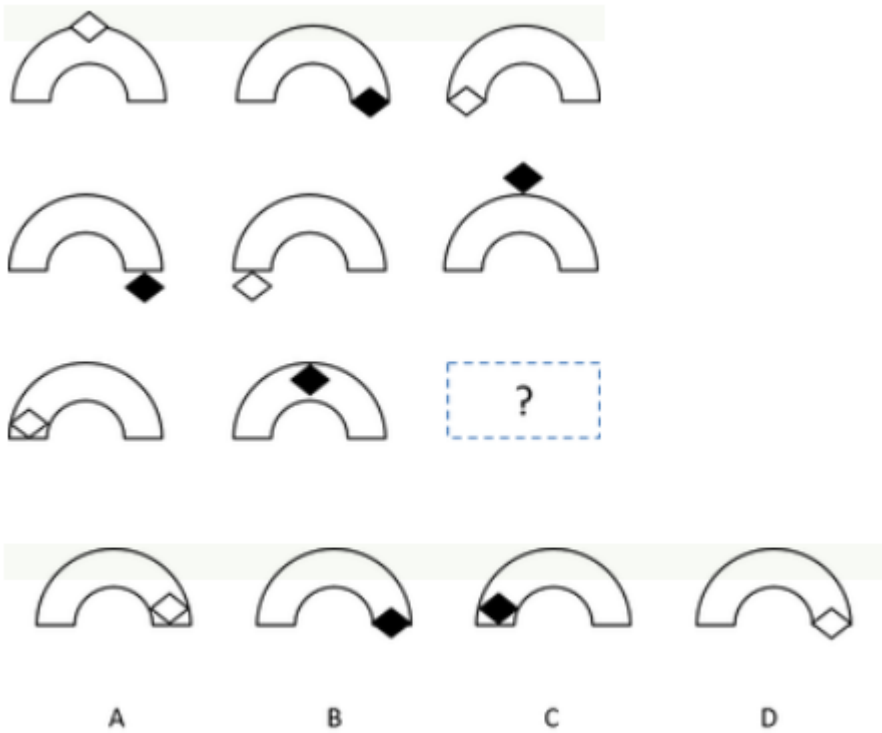
9. Choose which of the following expressions represents the smallest value:*Mark only one oval.*

- ☐ 14/49
- ☐ 15/50
- ☐ 17/51
- ☐ 16/64

10. Spark and Trace. These Words*Mark only one oval.*

- ☐ have similar meanings.
- ☐ have contradictory meanings.
- ☐ mean neither the same nor opposite

11. Complete the missing frame:



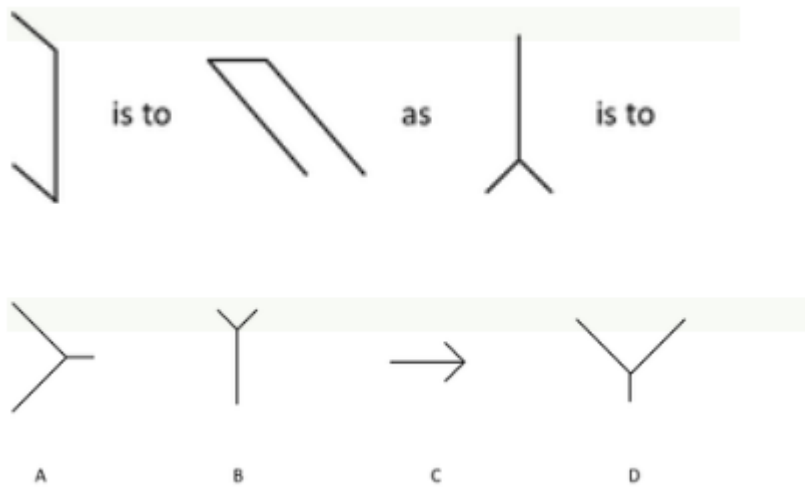
Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D

12. Arrange the words below to make a coherent sentence. What letter does the LAST word begin with?

sentence include a complete verb must a

13. Follow the Pattern



Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D

14. How many of the five pairs of items listed below are exact duplicates?

448844484	448844484
7147588991	71477588991
10563800	10563800
03003047777	03030047777
02036301325	02036801325

Mark only one oval.

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

15. Select the TWO statements which together prove that David owns a boat.

Check all that apply.

- ☐ All employees at O'reilly & Sons are accountants.
- ☐ Everyone who works at O'reilly & Sons owns a boat.
- ☐ David is an accountant.
- ☐ Accountants need to have a skipper's licence.
- ☐ David works at O'reilly & Sons.

16. Laura's granddaughter, Jenny, is very close to Elin, the eldest of Tom's children. Philip who's married to Fiona and is Tom's brother in law, is Laura's only child. Fiona is Elin's:

Mark only one oval.

- ☐ Sister in law
☐ Sister
☐ Aunt
☐ Mother

17. What is the next number in the series?

13, 9, 14, 8, 15,

Mark only one oval.

- ☐ 7
☐ 8
☐ 15
☐ 23

18. Which TWP words do not belong?

Check all that apply.

- ☐ Cloud
☐ Hail
☐ Fog
☐ Liquid
☐ Frost
☐ Ice

19. What is the next number in the series?

45, 15, 30, 30, 10, 20,

Mark only one oval.

- ☐ 1
☐ 10
☐ 20
☐ 40

20. Which TWO words do not belong?

Check all that apply.

- ☐ Marriage
☐ Infancy
☐ Adolescence
☐ Senescence
☐ Youth
☐ Birth

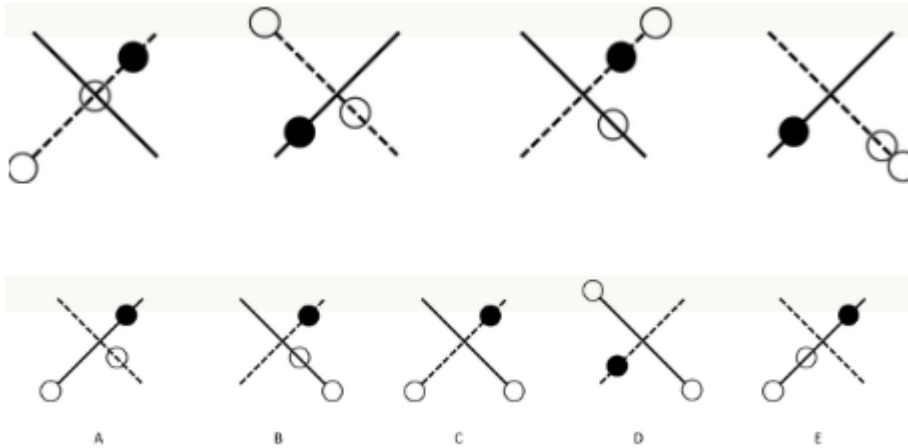
21. What is the next number in the series?

12, 12, 24, 8, 2, 10,

Mark only one oval.

- ☐ 5
- ☐ 8
- ☐ 20
- ☐ 60

22. Which of the figures below comes next in the sequence of figures shown above?



Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E

23. Select the two statements which together prove that each sales employee received a Lenovo computer.

Check all that apply.

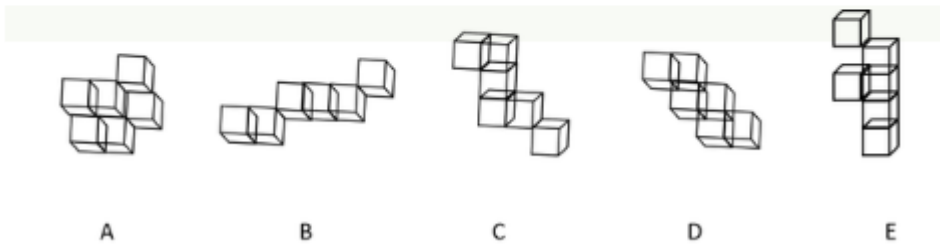
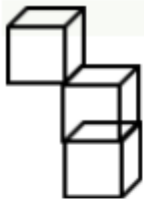
- ☐ Sean received a Lenovo computer
- ☐ Jason received an Acer computer
- ☐ All the laptop computers are Lenovos
- ☐ Some of the desktop computers are Acers
- ☐ All the Acer computers are desktops
- ☐ Each sales employee received a laptop computer

24. Irreversible is to repair as impenetrable is to

Mark only one oval.

- ☐ Pierce
- ☐ Restore
- ☐ Immutable
- ☐ Impervious

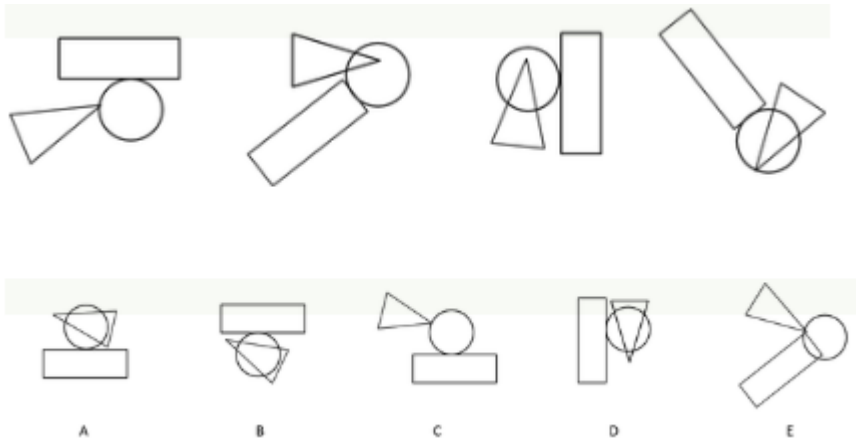
25. Which of the following shapes is NOT built of units of the above shape?



Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E

26. Which of the figures below comes next in the sequence of figures shown above?



Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ E

27. A plumber has 6,000 toilet sinks. He is about to install 20% of all sinks over the next four days. If he plans to divide his work evenly, how many toilet sinks will he install on each of the four days?

Mark only one oval.

- ☐ 300
- ☐ 400
- ☐ 500
- ☐ 1200

28. A clock was showing the time accurately on Wednesday at 4pm. On the following Saturday, at 2pm, the clock was running late by 35 seconds. On average, how many seconds did the clock skip each 30 minutes?

Mark only one oval.

- ☐ 1
- ☐ 1/3
- ☐ 1/2
- ☐ 1/4
- ☐ 1/8

29. Choose the correct pair of letters that continue this series

PB, OX, NT, ?

Mark only one oval.

- ☐ PC
- ☐ MP
- ☐ NT
- ☐ QR
- ☐ LQ

30. Chris is 15 years old and his sister is exactly twice as old as him. How old will his sister be when Chris turns 19?

Mark only one oval.

- ☐ 30
- ☐ 33
- ☐ 34
- ☐ 38

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