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The Effects of Music on Fear

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Submission of Thesis and Dissertation

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Abstract:

This study was conducted to investigate if there is a relationship between music and fear. It was hypothesised that horror themed music combined with fear inducing imagery creates more of a fearful reaction than if the images were viewed in silence, the other hypothesis addressed was that fear inducing imagery coupled with classical music would lead to lower feelings of fear. Fear and music are both heavily researched and fleshed out topics but not together in this manner. Research has found links between parts of the brain responsible for processing emotion and parts responsible for processing sound or how affective, joyful imagery has more of a reaction if paired with a soundtrack deemed to elicit the same feelings. That is the purpose of this study, to investigate if there is a similar relationship between fear and music and to bridge that unexplored gap in the currently available research It was hypothesised that fear inducing imagery paired with a horror song would have. It was decided that simple random sampling would be used to recruit as many participants as possible for 2 groups. These two groups would rate a song based on how much fear they felt listening to it, view images themed after common fears in silence and rate them

on how scary they were and listen to the song while viewing similar images. Each group would listen to a different song, one would listen to a horror themed song, and one would listen to a classical one. After this the total scores for each participant would be added for both the imagery without music condition, and the imagery with music condition. These results were processed in SPSS to find descriptive statistics and calculate Pearson's product-moment correlation coefficient to determine if there is statistically significant relationship present. It was found that the first hypothesis was supported, horror themed music does increase feelings of fear when presented with phobia related images. The second hypothesis was disproven, as it was found that classical music also amplified feelings of fear while viewing scary images, however to a lesser extent than horror themed music.

Introduction:

Fear is an emotion, the American Psychological Association defines it as a basic, intense feeling which is caused by perceiving a prominent threat ("APA Dictionary of Psychology", 2022). This can lead to physiological symptoms such as heightened heart rate and sweating. The following is an evaluation of the available literature on the subject of music's impact on emotions and pain alone and when coupled with images. It will cover the influence of music on the brain mechanically while we listen to it, how it impacts emotions and motivation, and how it helps people deal with pain.

Music has found to be helpful when dealing wih highly painful situations such as childbirth. This was seen during a study which investigated the effects of music on intensity of pain and fear during childbirth (Gönenç & Dikmen, 2020). Using a single blind, randomised, controlled study in a maternity Hospital in Turkey, they measured pain levels under 3 conditions. Music and dance, music and neither. There were 93 participants, and all were in active labour and only having one child, no twins. Participants were randomly assigned to one of these three groups and information on their pain and fear levels during childbirth was collected 4 times during the birthing process. This information was collected using a personal information form, labour monitoring form, visual analog scale and the Wijima Delivery Expectance / Experience Questionnaire Version A. It was found that music decreased the levels of pain and fear felt during childbirth both on its own and when paired with dance. This result was found to be statistically significant and supports the idea that the presence of music can affect stressful, pain inducing situations such as childbirth. This lends itself to the current study in supporting the idea that if music can influence a physical feeling such as pain, perhaps it can also influence more abstract feelings such as fear. Which is a part of why this topic was decided upon. This study also spurred the idea for a self-reported questionnaire, as no one knows without doubt how someone feels besides they themselves.

Similar to this, a study carried out in 2005 also investigated a relationship between music and fear (Baumgartner, Lutz, Schmidt & Jäncke, 2006). The aim of the study was to investigate if there was an increase in activation in the ventral system when viewing highly affective imagery paired with suitable music compared to viewing the images in silence. This was compared to the activation levels in the dorsal system when presented with the same imagery and audio cues. They hypothesised that there would be an increase in activation in the automatic ventral system of emotion processing This differs from the previous study as while this study investigates how music intensifies emotional responses in the brain, the previous study examines how the emotional response of fear could be mitigated through the use of music. This study used neuroimaging to measure changes in activity in the brain. It differs from the previous study in how it focuses more on emotional effects of music in general rather than fear alone or physical pain. It was found that images alone only affect the cognitive dorsal system in the brain and raise activity there, however, when paired with music, this effect is intensified and activity in the ventral system increases as well. This was only seen to be the case when the music and image match and evoke the same emotion, such as an image which incites joy paired with a song that sounds joyful. This supports the idea that music can evoke fear and that if the theme of the music is incongruent with the images shown, may have the inverse effect and reduce how fearful one feels. Hence the idea of having 2 groups in the current study, one to test the hypothesis that horror themed music paired with horror themed images leads to an increased feeling of fear, and one to test the hypothesis that music designed to be calming would reduce this feeling. This study also prompted the idea to first have a set of images to be viewed in silence as a control seeing how this method was used in this study.

A study from 2013 also investigated the effects of music on fear responses in the brain (Koelsch et al., 2013). The amygdala was looked at in detail in how it responds when

presented with music which evokes fear using an fMRI. There were 18 participants who listened to music which instilled fear, music which invoked joy and neutral music with no significant emotional evocation. The results of the study found that the auditory cortex has emotion specific purposes and is connected to multiple different systems such as the visual and limbic systems. It acts as like a central hub for relaying affective information. It was also found that the superficial amygdala was involved in fear responses and plays a role in processing social signals including music. It elicits increased visual awareness when faced with danger, lending credibility to the idea that music can play a role in the perception of fear. This further sparked the idea for the current study as it shows the brain has a mechanical reaction when hearing music which is intended to be scary, along with confirming the auditory cortex has emotion specific functions aside from being used to process sound. If this part of the brain is used for 2 functions, they may be somehow linked, thus, the idea that music can instil fear.

Music has also been found to cause people to feel emotions depending on the genre or theme behind it (Verling, 2022). This study was qualitative and had participants listen to 5 genres of music to find emotionl themes in each. These were Jazz, Trap, Disco and Reggae. Three themes were identified from each genre, with Reggae most commonly causing happy, relaxed and active feelings. Jazz evoked relaxation, happiness and nostalgia, trap caused feelings of excitement, “chilled” feelings, and neutrality. Finally, disco caused participants to feel happy, excited and gave them the urge to dance. This gave the current study stronger foundations as it highlighted that different music genres can have different impacts on how individuals feel. Lending credibility to the idea that fear themed music combined with fear themed images could cause a stronger fear reaction than if they were experienced separately.

All of these studies influenced the method used in the current one, or the formulation of the hypotheses. These hypotheses being that horror themed music will increase the usual

levels of fear felt when viewing phobia themed imagery, and that classical music will reduce the levels of fear felt when viewing scary imagery.

Method:

Participants: Due to the quantitative nature of this study, participants were gathered using simple random sampling in order to recruit as many individuals as possible as there was no limit to the amount of participants required. Specifically, advertisements and links were posted on social media by the researcher with a brief description of the study and what it entailed, followed by a link to the google forms page. This is where an information sheet was present detailing further the requirements of participants and a checkbox confirming they understood and agreed to take part in the study which must be checked before continuing. Snowball sampling was also employed as colleagues of the researcher did confirm they sent the form on to their contacts as well. There was no exclusion criteria or screening for participants as this study was not aimed at any specific population or sub-group. The total participants for both groups came to 32.

Design: This study used an independent groups design. There were 2 groups as participants were advertised 2 links at random. One led to a google forms questionnaire with an information sheet, followed by a song from the movie Insidious and participants were required to rate their levels of fear while the song played. Due to horror movie soundtracks being designed to inspire fear (Haider, 2022) and insidious being in the top 10 horror movies of the 2010s. ("Top Horror Movies – 2010s - IMDb", 2022). This group hereafter referred to as Group H. Fear was rated using the, “Degree to which I feel afraid,” section of the Immediate Fear Scale (Lin, 2017) This was followed by imagery themed after the most common fears people have, such as a picture of a needle, which were to be viewed in silence and rated based on how much fear they inspired in participants. Finally, the participants were asked to listen to the song from Insidious while viewing different images under the same theme, such as another picture of a needle, different from the first one. Separate pictures were used in the control and the variable conditions to avoid familiarity with the image reducing fear responses and affecting results. The other link was to another questionnaire identical to the last but instead with a song by Mozart as classical music has been seen to reduce anxiety and calm people down (Nelson et al., 2022). This group hereafter referred to as Group C. The same images were used in both groups to ensure one group did not get one objectively more or less fear inducing picture than the other. Participants were required to rate the how afraid they were of the songs to ensure the selected music was suitable, to show whether or not the Insidious song was deemed scary and the Mozart song was deemed calming. Participants were asked to rate images in silence to get a baseline on how afraid they were of the images on their own, to examine any increase or decrease in fear levels upon pairing the pictures with the soundtrack. There were seven ratings to choose from on each image or song and

each was assigned a value from 1 to 7. The value of 1 corresponds to the lowest fear rating and 7 corresponds to the highest. These values were totalled for the images without music and then with music and these were the 2 values used to determine the presence of a relationship between the conditions in each group.

Materials: Google forms, an online questionnaire and quiz making website was used to create the questionnaires used in this study. These were advertised on social media platforms Instagram and TikTok and upon request of some participants sent to them through WhatsApp, an online messaging app. SPSS, a data processing software for mac and windows was used to record the data and view the descriptive statistics, infer information from the data and determine the statistical significance of any relationships found. Participants used any internet capable piece of equipment available to access the website with the questionnaires on it.

Procedure: Participants were given the link to participate in the study via social media platforms such as Instagram, TikTok and WhatsApp. This link brought them to one of two questionnaires, both identical apart from the embedded song in each. Each questionnaire started with an information sheet detailing what was expected of the participants along with a checkbox to show they consent to take part of their own free will and participants could not proceed without confirming this. Participants would then go on to listen to one of two songs and rate how intensely they felt fear while listening to them and were instructed to allow the song to play for at least thirty seconds before rating. Following this, a series of 7 images were to be viewed and rated in complete silence all pertaining to one of 7 of the most common fears people have. These were spiders, needles, heights, crowds, snakes, difficult to escape places and dogs. Participants were then expected to listen to the song they had just rated while looking at a second set of pictures with the same themes and rate how intensely they felt fear. The ratings scale used was a 7 item scale called the immediate fear scale, and the section known as, “Degree to which I felt afraid,” was the one adopted for the current study. These ratings were totalled in SPSS for the images viewed without music and with music in both groups. Age, along with these totals were processed to find their descriptive statistics and the totals were then compared to find a relationship between them and determine if it was statistically significant.

Results:

Participants were asked to rate how fear inducing the songs in this study were when not paired with images. This was to ensure the selected songs for each group were appropriate. 64.3% of participants said the horror song to caused them to feel unsettled, mildly afraid, afraid or very afraid. Of the participants who listened to the classical music, 50% deemed it to cause them unease, mild fear, fear or a lot of fear. This implies the songs

used were appropriately chosen as more participants deemed the horror song to induce fear then the classical one. In regard to the test conditions, there was a strong relationship found in both groups. Group H had a strong positive relationship between silence when viewing images (condition 1) and the presence of horror music when viewing images (condition 2). Group C also had a strong, relationship between fear ratings with images alone, and when paired with classical music. Descriptive Statistics for age, silence with images and images with horror music for Group H were calculated in SPSS (*fig.1)*. It was found that the average age in this group was 37, average total score for images without music was 30, and average total score for images paired with horror music was 35.

fig. 1

Variable	*M* [95% CI]	*SD*	Range
Age (Group H)	36.50 [28.12 – 44.88]	14.52	39
HSTtl	30.14 [26.49 – 33.79]	6.32	22
HTtl	34.79 [30.35 – 39.22]	7.72	395
Age (Group C)	43.41 [33.88 – 52.94]	18.53	53
CSTtl	29.16 [25.25 – 33.09]	7.88	26
CTtl	31.22 [26.95 – 35.49]	8.59	27

Key: HSTtl = Group H condition 1 *CSTtl = Group C Condition 1*

HTtl = Group H cpndition 2 *CTtl = Group C Condition 2*

For Group C, average age was 43, average total score for images viewed in silence was 29 and average score for images viewed alongside music was 31. Correlation analyses were conducted via SPSS for both groups to find if there is a relationship between the two totals, and if so, the direction and strength of it. Pearson's product-moment correlation coefficient was used to determine the relationship between condition 1 and condition 2 for

Group H first. A histogram, *(fig. 2)* scatter plot *(fig. 3)* and box plot *(fig. 4)* were created first to ensure normality, linearity, and homoscedasticity. These graphs showed normal data distribution and a strong positive correlation was found between the two variables which was statistically significant ($r = .744$, $n = 14$, $p = .002$). This shows the variables shared approximately 54.76% of variance. These results imply that for each feeling of fear upon viewing an image, the presence of a horror themed song amplifies it. This supports the first hypothesis that the presence of horror themed music would increase how much fear is felt when viewing scary images. Another Pearson product-moment correlation coefficient was calculated for Group C. This was again to investigate the relationship between condition 1 and condition 2 and a second set of graphs were created. A histogram *(fig. 5),* a scatter plot *(fig. 6)* and a box plot *(fig.7)*. This was to ensure normality, linearity and homoscedasticity and upon viewing the graphs it was confirmed the data was suitable. After processing, a strong positive correlation was found between the two variables which was statistically significant, ($r = .77$, $n = 18$, $p = .000$). This shows that the two variables share approximately 59.29% of variance. These results imply that with each fearful reaction to an image, this increases in the presence of classical music. Disproving the second hypothesis that classical music would reduce feelings of fear overall. This can be seen in the table above also, where the average total for condition 1 was less than the average total for condition 2.

Discussion:

The results of this study support the hypothesis that horror themed music increases feelings of fear when viewing scary images. However the second hypothesis was disproven, it stated that classical music would reduce feelings of fear when viewing scary images but the results show that classical music also increased fear rather than reduce it. The average total score for Group H condition 1 was 30.14, for condition 2 it was 34.79. This leaves a difference of approximately 4.65. In Group C the average total for condition 1 was 29.16, for

condition 2 it was 31.22. This leaves a difference of approximately 2.06. So while both song types do increase fear levels, classical music only increases fear by roughly half as much as horror themed music.

These findings do echo some previous studies such as Baumgartner, Lutz, Schmidt and Jäncke's study which found that highly affective imagery paired with music of the same theme, elicits a stronger reaction than looking at the images in silence. This also builds on Gönenç and Dikmen's study investigating if music can help with pain, showing that music can affect abstract feelings such as fear, as well as physical feelings like pain. However, this study also found that music and images with incongruent themes can still have the same effect, with classical music also increasing fear levels despite not completely matching the theme of the images. Perhaps this is due to not carrying out prior research to determine which types of music would most oppose feelings of fear and implement them instead. This could also be due to the small sample size, as this study only had 32 participants in total. If there was a larger sample, results may have differed as it is possible out of the total population, the 18 who selected the Group C link were more prone to fear. It is also possible there was some response bias as this study investigated fear, which was advertised to possible participants, those who decided to participate may just be naturally more courageous people hence why they chose to take part and others did not.

This study does benefit from its age range though, both groups have average ages of approximately 30 and the ages range from 24 to 63 in Group H and 20 to 73 in Group C. This shows strong generalisability as a wide variety of ages were incorporated into the study, showing perspectives from 25 year olds as much as 65 year olds. The control condition also strengthens this study as it makes it quicker and clearer and easier to understand the results. By seeing the average total of condition 2 and taking the average of condition 1 from it one can easily understand the findings without an extensive explanation.

Future studies could build on this by investigating which genres or eras of music elicit the most to least fear and then attempting to find just how opposing the song themes need to be to reduce the fear felt when viewing the images. Specific age groups could also be studied to find out what age group in particular shows the most vulnerability to the effects of music while viewing scary images. Another possible approach for future studies would be to see if horror themed music affects fear levels when viewing more happy imagery or if music can turn a neutral image with no particular emotion, into something happy or fear inducing depending on the type of music paired with it. It may also be beneficial to see if there is any difference if the current study was repeated, but instead with silent video clips. Having a silent, happy clip and scary clip play, and then a similar clip play after it but with either happy or scary music playing alongside it.

Conclusions:

The effects of horror themed and classical music on fear felt when viewing scary images. Two groups were formed, one to listen to the horror themed song (N = 14) and one to listen to the classical song (N = 18). Both groups rated their songs on how scary they were, rated scary images in silence and then rated scary images with their group's song. This study found that both horror themed songs and classical ones increase the amount of fear felt when viewing phobia related images. Horror themed music was found to have almost twice the amplifying effect that classical music does, however both do have a statistically significant effect on how much fear is felt when viewing horror themed images. These results are generalisable as a wide variety of ages participated in this study and data was normally distributed. These results also support past papers and prompt interesting future research questions such as investigating which type of music creates the most calming reaction, how different to the image's theme a song needs to be in order to reduce the effect it has on

someone, and what effect do horror themed and classical music have on the emotions elicited by video clips rather than pictures.

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Appendices:

fig. 2

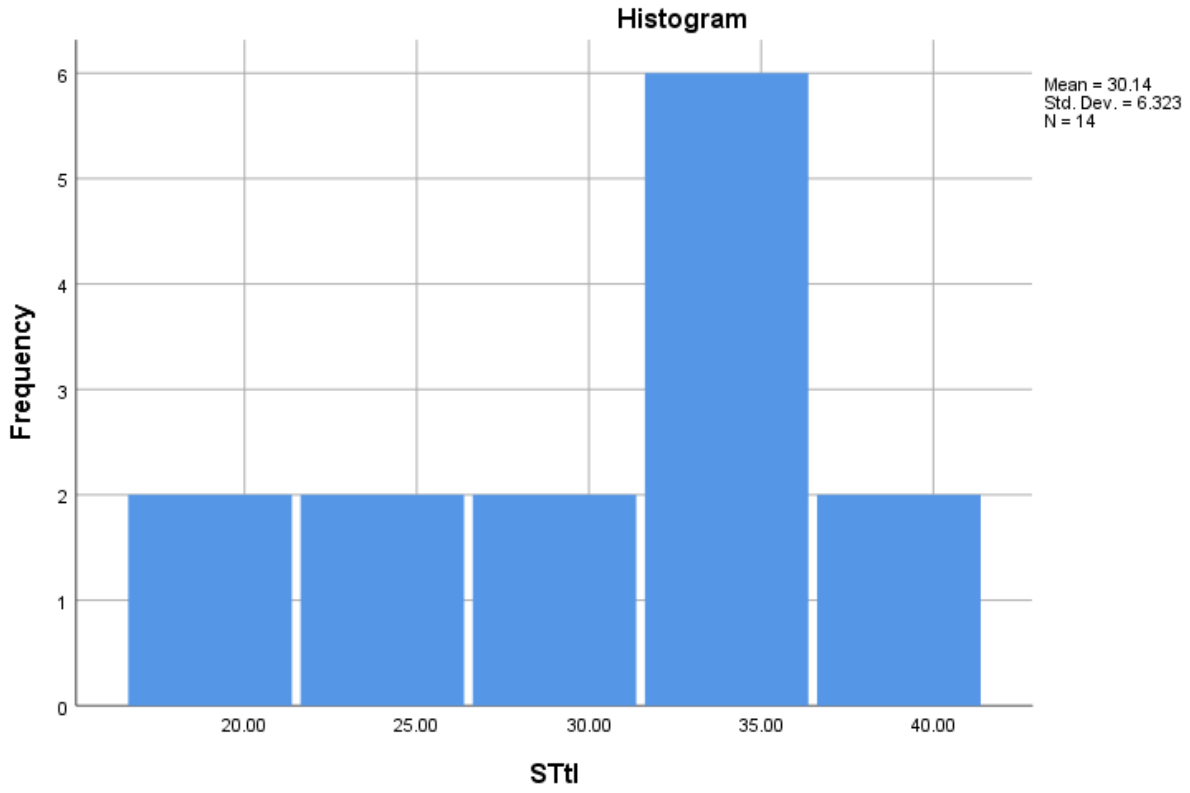
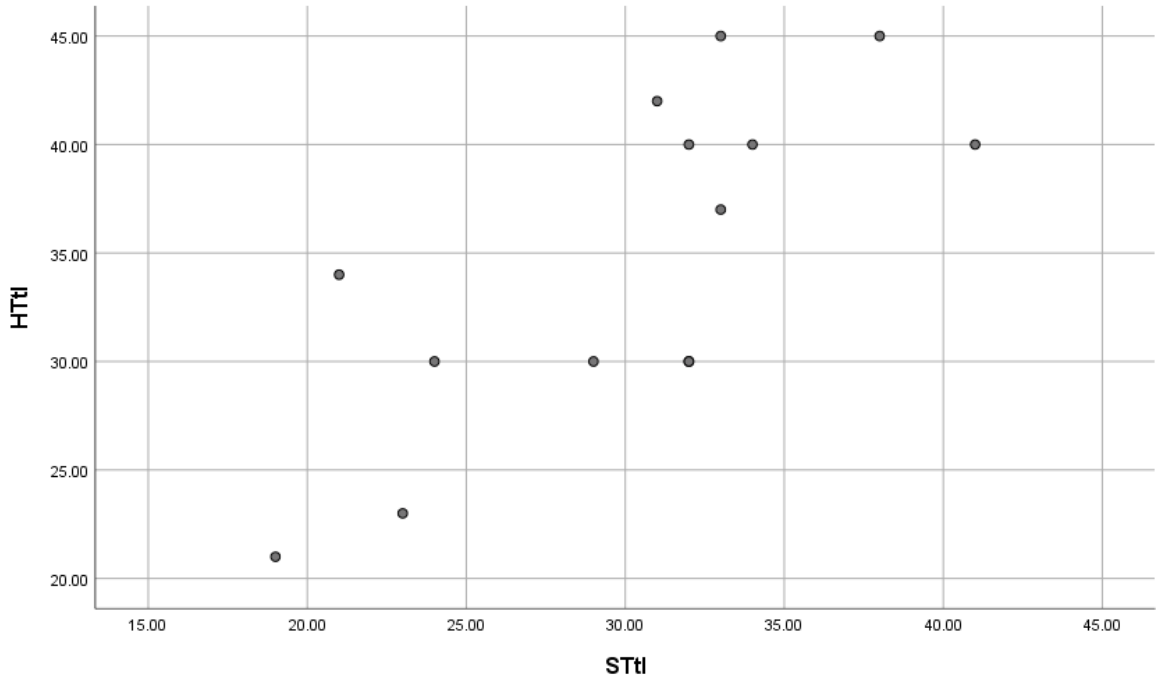


fig. 3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40.00
35.00
30.00
25.00
20.00
HTtl
15.00
20.00
25.00
30.00
35.00
40.00
45.00
STtl

fig. 4

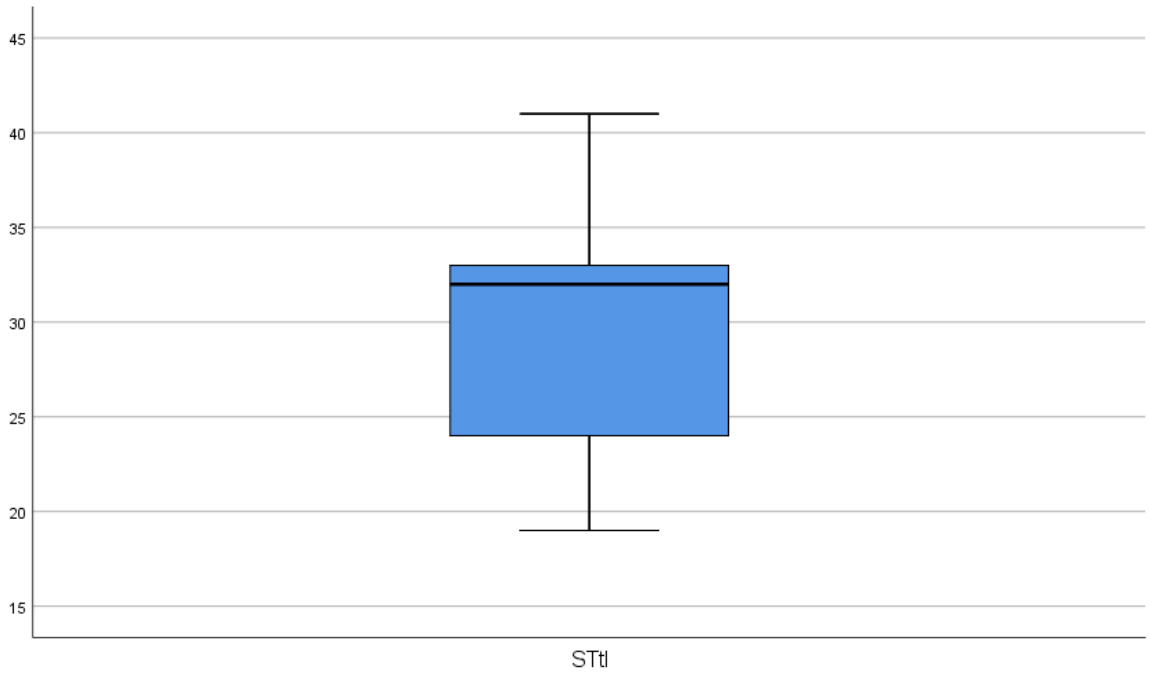
45
40
35
30
25
20
15
STtl

fig. 5

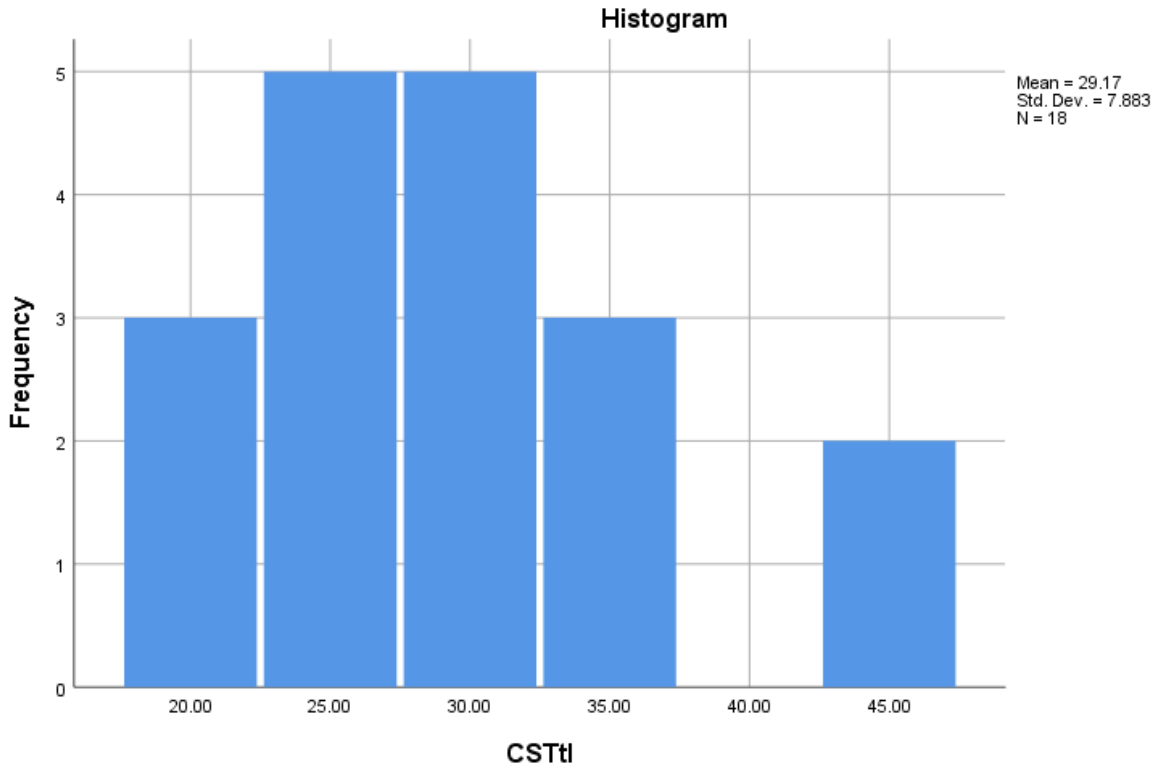
Histogram
Mean = 29.17
Std. Dev. = 7.883
N = 18
Frequency
0
1
2
3
4
5
20.00
25.00
30.00
35.00
40.00
45.00
CSTtl

fig. 6

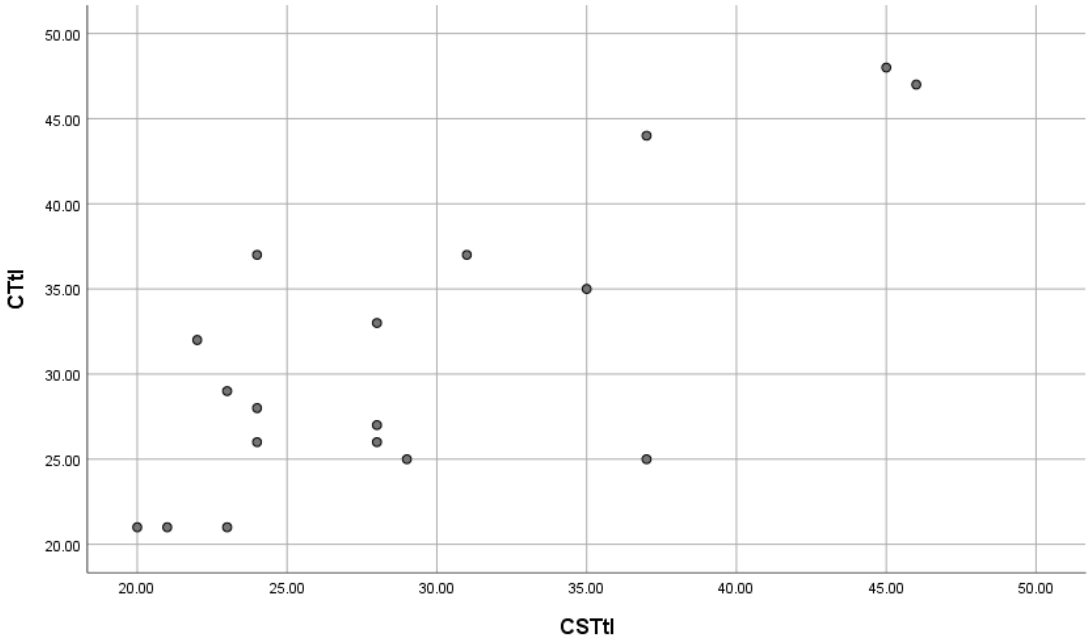
CTtl
20.00
25.00
30.00
35.00
40.00
45.00
50.00
CSTtl

fig. 7