



# Does happiness increase productivity?

## Master Thesis

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## Summary

This paper conducts an experiment in an attempt to investigate the relationship between the levels of happiness of the participants and their productivity. We managed to find strong positive correlation between the two variables. In addition to this we were able to confirm that the increase in the happiness of the subjects, as caused by our treatment procedure, led to improved performance. We also analyzed the subjects who recently experienced a bad life event, confirming the negative correlation between their reported lower levels of happiness and their productivity.

## **List of Acknowledgements**

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## 1. Introduction

The happy-productive worker thesis has been sparking researchers' interest throughout the years. Landy (1985) even defines it as “the holy grail of the organizational sciences”. This thesis represents the idea that happier people tend to be more productive (Zelenski et al. 2008). The discussion is enduring for almost a century and since then there has been mixed findings on the topic. Earliest correlational findings between happiness and productivity are developed in the 1930s and build the foundations for future research.

At micro-economic level, the happy-productive worker thesis can have great importance, serving as a tool to boost the organizational performance. The aim of our paper is to shed more light on the happy-productive worker thesis. This is a thesis of great interest to all organizational scientists and a fruitful field for examination. We are going to conduct an experiment in an attempt to provide an answer to the question:

*‘Does happiness increase productivity?’*

In our paper we are going to focus on a particular type of happiness, known as positive affect. It is a “pleasurable engagement with the environment” (Cohen and Pressman, 2006), which can be either momentary or enduring. We picked positive affect because it is considered to have strong links with productivity (Lyubomirsky et al. 2005). We take a deeper look at this concept in the Theoretical Framework chapter.

In order to answer the research question, there will be formulated two hypotheses – 1) *Subjects with positive affect (treatment group) tend to be more productive compared to subjects with a neutral affect (control group)* and 2) *Subjects without recent bereavement or serious illness in close family or friends tend to be more productive compared to subjects with any of those negative traits*. This way we take a look at the happiness phenomenon from two perspectives – the presence of a positive affect and the lack of bad life event, which will allow us to see the broader picture of interaction between happiness and productivity.

Our experimental design draws ideas from a research developed by Oswald et al (2014). They investigated the relationship between workers' happiness and their levels of productivity and

managed to find that the increased happiness leads to higher productivity by almost 12%. In our experiment we will use similar approach by randomly creating two groups of subjects – treatment group and control group – and the comparison will be made between them. We are going to expose our treatment group to a comedy video in order to increase their happiness levels and affect them with positive feelings, while the control group is proceeding directly to the experimental task – solving simple mathematical additions. In such a way we are going to assess the subjects’ productivity and then compare it across groups. We are also going to collect some data regarding a recent bad life event and analyze how it correlates with the productivity of the participants and whether it impairs their performance. In addition to this, we will integrate in the experimental design the well-known measure of affectivity developed by Watson, Clark and Tellegen (1988), which will help us confirm that our treatment method did not “hurt” the happiness of our subjects and that they are positively affected.

This research belongs to a larger branch of literature mostly in Organizational Psychology. In this literature, it is recognized that the correct treatment of the workers is very important. Various researchers (Cropanzano and Wright (2001); Estrada, Isen and Young (1994)) confirm that the well-being of the workers promotes higher levels of productivity, meaning that the focus on the happiness of the employees can definitely be an investment with multiple potential pay-offs. In the next section, we will discuss this literature in more detail.

Before we continue to the next chapters, we need to discuss the importance of the present study. The findings of this paper would be both societally and theoretically useful and here we take a look at their implications in the real life.

This topic was chosen because there is little research of the happy-productive worker thesis among the teachers. Moreover, such experiments are not conducted in Bulgaria and thus our research would provide interesting results and we are eager to see whether they will be in line with the existing literature.

The research of this question has great societal relevance. All organizations, both in the public and private sectors, are going to be affected. If happiness is increasing productivity, then managers are going to concentrate more on making their subordinates happier. It might turn out to be a low cost method to increase the optimal organizational productivity. This topic is also

particularly relevant to teachers, who may draw some positives in relation with their students' performance. Our findings may not only be of use for managers in regard to their subordinates, but also workers can improve their own productivity by working on their happiness. This might be a revolutionary approach for both sides and could be extremely useful for the business environment.

Our paper is going to make an important contribution to the existing theoretical literature. We are going to provide new empirical data that will contribute to the better understanding of the happy-productive worker thesis. One of our main advantages is that we are using professionals for the purpose of our experiment. There are several differences between them and the students that are typically employed for experiments (Yockey, 2013; Dragone et al. 2015) and using our data, we can compare students' and professionals' behavior in similar settings. In addition to this, we are going to analyze subjects from Bulgaria. So far similar research has not been conducted with Bulgarians and our results might provide us with interesting cultural phenomena. Regardless of whether our results confirm the happy-productive worker thesis or not, these findings could be used for the development of new conceptual models and methods for boosting productivity. We keep in mind the possibility that additional contributing factors may appear and we try to analyze them later in the Discussion chapter.

The remaining of the paper is subdivided in six chapters. In *Chapter 2* we discuss the relevant literature on the correlation between happiness and productivity of the worker. We start with the earliest debates on the topic and continue with discussion of the different conceptualizations of "happiness" in an attempt to find the one with the strongest theoretical links with productivity. In *Chapter 3* we elaborate our theoretical framework and form our hypotheses. In addition to this, we make an overview of the concepts used in our research. In *Chapter 4* we provide detailed review of our experimental design. We introduce our participants and measures and introduce comprehensive timeline and procedure of the experiment. *Chapter 5* is dedicated to descriptive and statistical analysis of the data we gathered. In *Chapter 6* we present a discussion of our findings. Finally, the conclusion identifies the main implications of the results we collected and suggests directions for future research.



## 2. Literature Review

The relationship between happiness and productivity has been sparking the interest of organizational scientists throughout the years. This chapter will present the previous research on the topic in four groups, depending on the used variables.

### 2.1. Early Research

Earliest discussions date from 1930s and provide us with mixed findings. One of the earliest investigations that successfully established the correlation between happiness and productivity is developed by Hersey (1932). He conducted his research in a production plant and found that industrial production was increased by 8% if workers expressed positive emotions during their shifts compared to situations where greater negative emotions were present. Individual performance was also greater when workers were happier, ranging from 2 to 22%. Kornhauser and Sharp (1932) expand the discussion, despite providing us with rather insignificant results. They analyzed a group of woman factory workers who had different supervisors. They examined whether the workers that were pleased with their managers tend to be more productive. The groups that were satisfied with their supervisors had positive individual scores on productivity.

### 2.2. PANAS

The Positive and Negative Affect Schedule (PANAS) was elaborated by Watson, Clark and Tellegen (1988). It is a self-reported method that aims to acquire independent measures of positive and negative affect and is regarded as the most popular measure of affectivity (Wright and Cropanzano, 1998). The PANAS can not only measure the current affect, but the affect in a specific time frame as well. It consists of a list of 20 feelings: half of them associated with positive affect, the other half with negative affect. An example of the schedule is presented below:

<b>1. Interested</b>		<b>11. Irritable</b>	
<b>2. Distressed</b>		<b>12. Alert</b>	
<b>3. Excited</b>		<b>13. Ashamed</b>	
<b>4. Upset</b>		<b>14. Inspired</b>	

<b>5. Strong</b>		<b>15. Nervous</b>	
<b>6. Guilty</b>		<b>16. Determined</b>	
<b>7. Scared</b>		<b>17. Attentive</b>	
<b>8. Hostile</b>		<b>18. Jittery</b>	
<b>9. Enthusiastic</b>		<b>19. Active</b>	
<b>10. Proud</b>		<b>20. Afraid</b>	

Table 1 - Positive and Negative Affect Schedule (Watson et al. 1988)

The subjects report to what extent they felt each of the listed feelings using a scale from 1 (not at all) to 5 (extremely). An example of the scale is presented below:

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Not at All</b>	<b>A Little</b>	<b>Moderately</b>	<b>Quite a Bit</b>	<b>Extremely</b>

Table 2 - Scoring Scale for PANAS

The positive affect score is formed by adding the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17 and 19. The result ranges from 10 to 50 and higher scores are related with higher levels of positive affect. The negative affect score is formed in a similar manner: we add the scores associated with the rest of the items in the schedule and scores closer to 50 are affiliated with higher levels of negative affect.

As we mentioned above, PANAS is simple and popular measure of positive and negative affect and that is the reason why we include it in our research. By analyzing the responses of the participants we are going to be able to affirm that the comedy clip served its purpose: to positively affect the subjects. We can assess that by observing the positive affect scores of the participants in the treatment sessions.

### **2.3. Job Satisfaction**

It is important to mention that different researchers define a “happy worker” in various ways. One of the oldest operationalization of employee’s happiness is related with job satisfaction. Job satisfaction does not take into consideration worker’s emotions outside their workplace and focuses on their feelings toward their wage, work place conditions, opportunities for promotion, etc. (Brayfield and Rothe, 1951). Vroom (1964) analyzes the relationship between job satisfaction and performance but finds only an inconsistent correlation of 0.14. Similar results of 0.17 are found by Iaffaldano and Muchinsky (1985). However, recent research finds stronger relations between happiness and productivity and gives more insight on the topic. Edmans (2012) focuses on firm-level value rather than worker productivity and finds that job satisfaction and “corporate social responsibility” prove to be beneficial for firm’s future long-term stock-market returns. Bockerman and Ilmakunnas (2012) analyze a Finnish manufacturing plant and find that an increase in workers’ job satisfaction is positively related to productivity. A raise of one in the standard deviation of job satisfaction is related with an increase of 6.6% in “value-added per hour in manufacturing”.

However, a lot of researchers conclude that positive affect is a stronger predictor of productivity than job satisfaction. Zelenski, Murphy and Jenkins (2008) conduct a research among Directors in the public and the private sector. The Directors self-reported their happiness over time and also their productivity. The analysis of their results confirms that job satisfaction is omitting some important aspects of work life that turn out to be important to productivity. In addition to this, they prove that positive affect is contributing more to higher productivity in contrast of their levels of satisfaction with their job. Fisher (2003) also confirms that positive affect predicts performance better than job satisfaction. She analyzed state (short-term) and trait (long-term) happiness and confirmed that both state and trait levels of happiness relate positively with performance, but that the state level has higher correlation with higher productivity. This is the reason why we chose to analyze the effect of positive affect, because it is considered a stronger predictor of productivity among various researchers.

### **2.4. Long-term Happiness**

A lot of scholars approach the happy-productive worker hypothesis by analyzing their happiness on the long-term. Fredrickson (2001) presents us her “broaden-and-build theory of positive

emotions” which states that experiencing different positive emotions broadens people’s “momentary thought-action repertoires” and builds their enduring physical and intellectual resources. According to her research, such positive emotions broaden people’s attention, cognition, action and psychological resilience. In addition to this, such emotions counter lingering negative emotions and are key for improving both psychological and physical functioning. This suggests that over time the experience of positive emotions should accumulate and compound its effects. Fredrickson and Joiner (2000) prove the existing reciprocity between positive emotions and coping with adversity – people experiencing more positive emotions deal better with adversity and those improved coping skills predict future increased positive emotions. Wright and Staw (1998) performed two longitudinal studies analyzing the relationship between positive moods over time and supervisory evaluations of performance. They found that dispositional affect (affect with “a more general or open-ended time horizon”, Berkman 1971) is a strong predictor of future positive supervisory ratings. Furthermore, Boehm and Lyubomirsky (2008) approach the hypothesis that happiness can predict future career success making a qualitative research on previous literature on the topic. They collected three different types of evidence: cross-sectional, longitudinal and experimental. Analyzing previous findings by other researchers they conclude that happy people not only perform better, but are also more cooperative, receive more support from their colleagues and are less likely to quit their jobs. Moreover, happy people are healthier and live longer (Lyubomirsky et al. 2005). All those factors suggest that happy people enjoy more successful careers compared to their less happy peers. Fisher (2003) researched the link between productivity and both state and trait happiness. She found positive correlation with both types of happiness, but the state level was a stronger predictor. Due to this we are going to analyze positive affect in our experiment.

## **2.5. Positive Affect**

One way to define happiness is the presence of positive affect and the absence of negative affect (Diener, 1994). So far we have found that positive affect is stronger predictor of performance than both job satisfaction (Fisher, 2000) and long-term happiness (Fisher, 2003). Recent research also suggest that the positive affect is a better predictor of job performance compared to other general or trait measures of happiness (Cropanzano and Wright, 2001) and it has strong theoretical link with productivity (Lyubomirsky et al. 2005). Of course, there are some researchers who failed to find a strong positive correlation (Wright and Cropanzano 1998,

Wright and Staw 1999). Nevertheless, most of the research on the topic managed to prove the importance and dominance of the positive affect in the validity of the happy-productive worker thesis.

Fredrickson (2001) provides us with an extensive analysis of the influences of the positive affect. She concludes that positively affected people tend to be more careful, flexible, creative, integrative, opened to information, efficient and with broadened cognition. Positive affect also boosts the preference for variety and the ability to integrate diverse material. Cropanzano et al. (1993) prove that positive affect is strongly related to performance, especially for those employees who have higher tenure, while negative affect led workers with low tenure to poor results. In addition to this, positive affect enhances creative problem solving, having stronger influence in more complex jobs compared to easier jobs (Estrada et al. 1997). Positive affect also makes people more cooperating, less aggressive (Isen and Baron, 1991) and more altruistic (Isen and Simmonds, 1978).

Oswald et al. (2014) develop very exciting research that serves as a starting point of our current analysis. They examine the happy-productive worker thesis, conducting two experiments. In the first experiment, the treatment group is exposed to a comedy video before engaging into a mathematical task, while the controls proceed directly to the numerical additions. One possible issue here is that subjects might want to reciprocate and put in more effort in order to repay or please the researchers and this is not the desired outcome of the treatment. However, Oswald et al. argue that this is not a significant problem since subjects get paid for every extra addition. If they actually perform better they will not help the investigators, but hurt them as the expenses for the experiment will increase. The productivity task in the experiment was developed by Niederle and Vesterlund (2007) and consists of adding five two-digit numbers. The subjects with positive affect performed better in the paid piece-rate Niederle-Vesterlund task, having 12% greater productivity compared to subjects in the control group. In the second experiment, the researchers investigate how a recent real-world unhappiness shock is affecting the subject's performance. The results reveal that having a bereavement or family illness during the last two years lowers the performance of the subjects by approximately 10%, proving the presence of a causal link between happiness and performance.

Isen and Reeve (2005) performed two experiments to investigate how both extrinsic and intrinsic motivations are influenced by the presence of positive affect. In the first one, the treatment group receives two small bags of candy and can take one of them as a gift. After that the participants engage into one interesting (three-dimensional puzzle) and one uninteresting task (identifying alphabetically ordered strings of letters from a large set). Results show that both control and treatment groups spend the same time on the uninteresting task, while the latter spend much more time on the interesting task, which suggest that people in positive affect are far more intrinsically motivated compared to controls. Participants in the treatment group also reported greater enjoyment and interest in both tasks. In the second experiment, the tasks were the same, but this time there was a “work-orientation” and “free-orientation” manipulations. The “work-oriented” subjects were expected to complete the uninteresting task within the first 8 minutes, while the other group did not have this requirement. This method was chosen by the experimenters in order to test whether people with positive affect would act responsibly in the presence of more interesting task. The results show that positive affect people in the work-orientation condition spent more time on the uninteresting task than the positive affect people in the free-orientation condition, indicating that the “work-oriented” subjects acted responsibly to the task. They enjoyed both tasks more than controls, while effectively performing and paying the required attention to their duty.

### **3. Theoretical Framework**

After discussing the main aspects of the debate on productivity in the previous chapter and explaining the importance of the present research, the current chapter will outline the main theories, on which the predictions are built. We will introduce the concepts’ definitions in order to clarify how they will be used in the present study. After that, will be formulated the two hypotheses, which will help us answer the research question and present the theories behind them.

#### **3.1. Conceptualization**

In this subchapter we will define the concepts behind the variables used in our paper in order to provide a better understanding of the experimental process and the analysis of the results.

### 3.1.1. Happiness/ positive affect

Different researchers have conceptualized happiness in a variety of ways. Earliest definitions originate from ancient China, between 5<sup>th</sup> and 1<sup>st</sup> century BC, where “*fu*” meant “fortunate, lucky, smooth and free of obstacles” (Lu, 2001). Ancient Greek term “*eudaimonia*” was associated by notions of both fortune and divinity, meaning that happiness is beyond human control (McMahon, 2006). Ancient philosophers like Plato, Socrates and Aristotle appreciated being happy as being fortunate (McMahon, 2006). During the Enlightenment era people started to perceive happiness in a different way. St. Augustine stated that happiness is “unattainable in our present life” and St. Thomas Aquinas added that happiness can be achieved only via theological virtues, such as faith and charity (McMahon, 2006). This new perspective meant that everyone can achieve happiness through religion, contrary to previous understanding where only a small number of fortunate people could. Thomas Jefferson includes private happiness in this Declaration of Independence from 1776, along with life and liberty as one of the fundamental human rights. He believes that personal happiness comes from being a good citizen, even though a lot of people understand it as accumulation of wealth. Nevertheless, this new view of the term contrasts with the previous ones, meaning that everyone can pursue his happiness by acquiring something personal and attainable (Oishi et al., 2013).

Ed Diener (1984) introduced the term *subjective well-being* (SWB) that represents subjective appraisal of life and the experience of positive emotions in place of negative ones. An abundance of future researchers substituted this term with the term happiness (e.g. Lyubomirsky and Ross, 1997). In our study we perceive happiness as the presence of positive affect, which is another conceptualization of the term introduced once more by Diener (1994). Clark et al. (1989) define positive affect as “feelings that reflect a level of pleasurable engagement with the environment”. We expect that the treated subjects participating in our experiment will be positively affected by the comedy video, meaning that they will have high scores from their responses on the positive affect feelings on the PANAS.

### **3.1.2. Bad life event**

For the purposes of our study we will consider as bad life events bereavement, divorce or serious illness in close family or friends, drawing ideas from the experimental design developed by Oswald et al. (2014). The period of one year is chosen because of the different situations we have combined in this concept. For example, a divorce and an illness could affect people in various ways and some deal with them for a few months, while for others it could take years. Therefore, we consider a year to be feasible term for the goals of our research. We also need to motivate our choice of events. These three were picked because they are relatively common and would be easy to find them among our sample. This is also the reason we use three bad life events instead of only one, which would not be representative in case we have only one or two people who had a divorce with their partner within the last year. Moreover, there are many more bad life events we did not consider in this research – e.g. job loss, financial problems or quarrels with family members or friends. These events could also affect people, but are way too common and thus there would hardly be an object that did not experience a bad life event, which would result in a bias in our findings.

### **3.1.3. Productivity**

Productivity is a term with various definitions depending on the context of its use. It is both technical and managerial concept and can be identified as effectiveness, efficiency, output measure and rate of turnover, among others. One of the most popular and generally accepted definitions is that productivity is a quantitative relationship between output and input. It is introduced by various theorists (e.g. Iyaniwura and Osoba, 1983, Antle and Capalbo, 1988) and represents the relationship between the amount and quality of goods and services and the magnitude of the resources invested in their production (Prokopenko, 1987). Eatwell and Newman (1991) illustrate productivity as a ratio between the quantity of production and the quantity of investment. One of the main organizational goals is to have an optimal level of productivity and thus an important indicator of enhanced productivity is the decreasing rate of input to output at constant or improved quality (Oyeranti, 2000).

It is indisputable that both input and output are consistently present among the definitions of productivity in the academic literature and as a consequence we offer the rationale of these



concepts with regard to our experiment. The investment (input) is the amount of money we are going to distribute to the participants and the efforts provided in organizing the experiment. In addition to this, as input we regard the effort of our participants, motivated by expected economic profit and also by the expected increased positive affect among the subjects in our treatment groups. As output we perceive the quantity of the mathematical additions that are solved correctly. We expect that our treatment groups will be more productive compared to the control groups as a result of our additional investment – the efforts in increasing their happiness levels.

### 3.2. Hypotheses

There are mixed findings in the happy-productive worker literature, but the majority of it finds a positive correlation between the two constructs. That is the reason why we suggest that the self-reported level in subjects' happiness will have a positive relationship with their productivity in the paid mathematical task. Therefore, we construct the following hypotheses based on recent literature and theorizing:

**Hypothesis 1:** *Subjects with positive affect (treatment group) tend to be more productive compared to subjects with a neutral affect (control group).*

We base our first hypothesis on an investigation by Estrada, Isen and Young (1994). They conducted an experiment with physicians divided into two groups: a positive affect treatment group and a control group. The researchers concluded that problem solving was improved through the presence of positive affect induced by a small gift – a package of candy. Cropanzano and Wright (2001) make an extensive analysis based on the previous literature on the effect of happiness on productivity. Their general conclusion, supported by the findings of other researchers, is that better job performance is promoted by happiness. As a result, we predict that we will observe the same positive relationship between the two constructs.

However, we are aware that productivity can be enhanced by the comedy clip through different channels. Our goal is to increase the happiness levels of the subjects, but additional contributing effects may appear. Black (1984) confirms that laughter can decrease aggression. Dunbar et al (2011) verify that the laughter releases endorphins that elevate the pain threshold. Amir et al.

(1980) add that the release of endorphin can decrease the stress levels. It is expected that such a release will be triggered among the participants if they laugh, meaning that productivity can be boosted not only by the presence of positive affect, but also by the decreased levels of stress, pain and aggression. Despite these physical effects of laughter, for the purposes of our analysis, we will consider the emotional dimension and thus the alteration of happiness. Moreover, the impact on the physical condition as a combination of lower stress levels and increased production of endorphins, among others, can also be interpreted as components of happiness. Many people do not accurately identify the causes for their happiness, they just know that they are happy or not, which is the thing we need for our experiment.

**Hypothesis 2:** *Subjects without recent bereavement or serious illness in close family or friends tend to be more productive compared to subjects with any of those negative traits.*

We base our second hypothesis on a research by Zelenski, Murphy and Jenkins (2008). They analyzed the self-reported happiness and productivity of Directors in both private and public sectors. They confirmed that happiness is strongly related to productivity at both state (positive affect) and trait (long-term happiness) levels. And since people with recent bad life event will have lower general happiness compared to those without one, we expect that they will also have a lower productivity. We are going to conduct our analysis for the control and the treatment group separately.

## 4. Experimental Design

The structure of our experiment aims at obtaining the productivity levels of the participants, who receive different happiness shocks at the beginning of the task. We are focused on the differences in their productivity and how they relate to their initial levels of happiness.

The experiment conducted in our research draws ideas from Niederle and Vesterlund (2007) and Oswald et al. (2014). The main task in our experiment is similar to the task performed by Niederle and Vesterlund (2007). It is a simple math exercise that consists of adding various five

two-digit numbers for a limited amount of time. We are aiming at simulating a typical office environment, challenging both the intellectual ability of the participants and their levels of effort. To test the former we allow subjects to use pen and paper, but calculators are strictly forbidden. The latter is going to be assessed by the number of calculations that participants solved successfully.

The participants in our experiment are Bulgarian kindergarten teachers working in three kindergartens in Sofia. We are going to randomly assign these subjects into two groups:

*Control group:* the subjects proceed directly to the mathematical task after receiving the instructions.

*Treatment group:* the subjects are exposed to a comedy clip before completing the mathematical task.

For the aim of our experiment we used a simple randomization technique - flipping a coin, in order to ensure that we do not hurt causality and that any subject can be selected in any group. By assigning “control” and “treatment” to each side of the coin, we managed to organize the subjects into the different groups.

In order to raise the happiness of the participants in the treatment group we are going to use a short video composed of comedy routines. This type of videos is a good way to induce a short-run happiness shock (Oswald et al. 2014). We selected a famous Bulgarian comedian to make sure that all the subjects are familiar with the language and the humor.

The treatment and the control groups differentiate each other for the presence of a comedy video in the former. The time spent watching this clip turned out not to be an important factor in previous research (Isen et al. 1987, Oswald et al. 2014), so we decided not to present one to the control group.

Throughout the experiment the subjects are going to respond to three questionnaires (detailed schedule of the timeline of the experiment is presented in chapter 4.3). Similar to the instructions, the questionnaires are going to be in Bulgarian, but an English version will also be present in the Appendix. Among questions related with personal characteristics (age, gender), we are going to ask the participants in the control group to rate their happiness, using a simple 7-

point scale (1- extremely sad, 2- very sad, 3- sad, 4- neutral (neither sad, nor happy), 5- happy, 6- very happy, 7- extremely happy). The treated participants are also going to report their happiness before and after watching the clip and whether they enjoyed watching it. In an attempt to ensure that the treated subjects are not negatively affected, they report in the PANAS how they felt about watching the clip. We have two additional questions asking about recent serious illness and recent bereavement among family and close friends. Such information is going to help us analyze how those unpleasant circumstances affect the productivity levels of the subjects and also their reaction to the comedy clip.

#### **4.1. Participants**

Our participants are 48 Bulgarian kindergarten teachers selected from 3 kindergartens in Sofia. After contacting the kindergartens' headmasters, both they and the teachers expressed their own desire to participate in our paid experiment. They were not informed about the topic we were investigating. We consider this as the main advantage of our research. While most papers on the topic use students for the purpose of their experiments, we selected professionals who have already finished their studies. We believe that our subject selection will give us more external validity. Firstly, on average our participants have more working experience compared to the students and analyzing their behavior will have greater relevance for real-life working situations. Secondly, the experiment is going to be conducted in specifically provided rooms in each working place. This way the subjects will feel closer to their working environment compared to a lab setting and this might be an important factor. In addition to this, Yockey (2013) proves that there are differences between students' and experienced workers' perceptions of corporate culture. Dragone et al. (2015) confirms that students tend to be more selfish and tend to contribute less than workers in a Public Goods Game setting.

#### **4.2. Measures**

##### **4.2.1. Productivity**

We are going to use quantifiable, objective indices of productivity – number of correct additions. In such a way we make sure that we perceive correctly the correlations between productivity and positive affect (Fredrickson, 2001). The mathematical task is previously used in Niederle and Vesterlund (2007). It represents a good measure of typical white-collar job productivity, where both intellectual ability and effort are required (Oswald et al. 2014). This is a better method to

assess the productivity of the participants compared to the self-reported productivity, because the latter might not be accurate due to biased responding from the participants (Butler et al. 2007).

#### **4.2.2. Positive affect**

We are going to measure the positive effect with a self-report measure, which is regarded as an unbiased method by numerous researchers (Zelenski et al. 2008, Oswald et al. 2014). After being exposed to the comedy video and having completed the mathematical task, the subjects are given a questionnaire to complete, in which they are going to respond to questions about their happiness levels. The control group is asked how they rate their happiness at the moment on a 7-point scale. The participants in the treatment groups are asked whether they enjoyed the comedy video. In addition to this, we ask them to rate their happiness before and after watching the clip and whether it made them feel happier.

#### **4.2.3. Bad life event**

To measure the existence of a recent bad life event we used a self-report measure again. At the final stage of our experiment, the subjects are going to self-report bereavement, divorce or serious illness in close family or friends within the last two years. They are going to respond to this question after reporting their happiness level throughout the experiment and they are not going to be biased by a possible negative affect provoked by the recall of such a negative life event.

### **4.3. Timeline of the experiment**

We plan to conduct the experiment over 3 days and 6 sessions:

*Day 1:* session 1 with control group and session 2 with treatment group in the first kindergarten.

*Day 2:* session 3 with treatment group and session 4 with control group in the second kindergarten.

*Day 3:* session 5 with control group and session 6 with treatment group in the third kindergarten.

Each group is going to consist of 8 subjects. Each subject can participate only in one of the sessions. We are going to make sure that the participants in the first session of each day are not going to meet with the subjects who participate in the experiment later that day in order to deter any effort to exchange information.

We have developed a timeline in order to follow strictly the steps of the experiment.

1. The subjects enter the room. They receive basic instructions about the experiment and report their initial levels of happiness in Questionnaire 1.
2. The subjects in the treatment group are shown a comedy clip, while those in the control group proceed directly to the next step. The treated subjects report their levels of happiness after watching the video and fill the PANAS in Questionnaire 2.
3. The subjects receive additional detailed instructions about the experiment and are given the opportunity to ask questions.
4. The subjects complete the mathematical task.
5. The subjects fill Questionnaire 3.
6. The subjects receive their payment and leave the room.

#### **4.4. Procedure**

The participants enter the room that we specifically set in advance, and take their seats. They are informed that the experiment is paid and that it consists of solving simple mathematical additions. They are also warned against talking with each other. The subjects are asked to complete the first questionnaire, containing questions about age, gender and happiness level. The participants in the treatment group are presented a short comedy video that aims to increase their happiness levels. After that they complete a second questionnaire asking about their happiness level after watching the comedy clip, whether they enjoyed it and how the clip made them feel using the PANAS. Then the treated subjects proceed to further instructions. The participants in the control group directly receive the detailed instructions about the experiment after filling in the first questionnaire.

Before engaging in the productive task, the subjects are informed that the experiment is anonymous and receive detailed information about their payment. Every subject will receive an initial show-up payment of 2 Bulgarian levs and 0.2 Bulgarian levs for every correct addition. This way we aim to make subjects aware that their payment is heavily related to their performance and they will benefit from every additional correct answer. Subjects are also allowed to use pen and paper, but calculators are strictly forbidden. Additional paper will be provided upon request. Furthermore, subjects are warned that every attempt to cheat and talk

during the time given for completing the task will lead to excluding the participant from the experiment and cancelling their initial show-up payment.

The mathematical task will last 10 minutes and subjects will try to solve correctly as many additions as possible. Every addition consists of five two-digit numbers and an example is provided below in Figure 1.

27	65	77	12	49	
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Figure 1 - Addition Example

There were more additions provided that a subject could possibly solve during the time allowed for completing the experiment. Despite adding such numbers is considerably easy, they are deliberately chosen as it is proven that this method is an excellent assessment of intellectual effort (Niederle and Vesterlund, 2007).

After completing the numerical task, the subjects proceed to the next step of our experiment – answering to a final questionnaire. Subjects give answers about recent bereavement, serious illness or a divorce in the family or close friends. The subjects are reminded that their names are not required due to the anonymity of the experiment.

The final step of our experiment is calculating the correct answers of each participant. The experimenter collected the answers from the subjects and verified the number of correct additions. Every subject receives their payment according to the number of correct additions plus an initial show-up fee. After receiving their payments the subjects are allowed to leave the room.

The average duration of the experiment was different across groups due to the presence of a comedy clip and extra questionnaires for the treated subjects. The treatment groups spent 55 minutes per session, while the control group spent less than 40 minutes on average at the lab. The total payment to all the participants for all sessions was 207.8 Bulgarian levs (106.35 Euro).

## 5. Analysis

So far we have looked at the academic literature on the topic of research, formulated two hypotheses based on the existing theoretical background, explained the concepts used and detailed the research design. In the current chapter we will present the analysis of the empirical data and see whether the predictions will be confirmed or rejected. Therefore, the structure of the analysis follows the hypotheses and consists of two subchapters.

### 5.1. Positive affect and productivity

In table 3 we present a summary of the means and standard deviations of the main variables for the subjects in the treatment and the control group. We included information about the number of attempted and correct additions, the happiness levels of the participants in the treatment group before and after watching the comedy clip, how much they enjoyed it and the happiness of the participants in the control group.

Group	Variable	Observations	Mean	Standard Deviation	Min	Max
Treatment	Attempted Additions	24	15.79167	3.216522	11	22
	Correct Additions	24	12.33333	3.130032	6	17
	Happiness Before Clip	24	4.291667	.9545847	3	6
	Happiness After Clip	24	5.666667	1.167184	3	7
	Enjoyment of Clip	24	5.958333	1.122078	3	7
Control	Attempted Additions	24	13.58333	2.827146	9	18
	Correct Additions	24	10.95833	2.561914	4	15
	Happiness	24	4.583333	.8805466	3	6

Table 3 - Data Description 1



Figure 2 helps us illustrate how effectively the comedy clip served its purpose of increasing the happiness levels of the participants. As expected, the levels of happiness of the control group and the treatment group before watching the clip are almost identical, with average difference of 0.29. The presence of the positive affect after watching the clip can be clearly seen due to the 1.375 points increase of the happiness of the subjects in the treatment group, with a p-value smaller than 0.5. In addition to this, the positively affected subjects are happier than the subjects from the control group by 1.08 points on the scale of 1 to 7. This result is also statistically significant with p-value of 0.018.

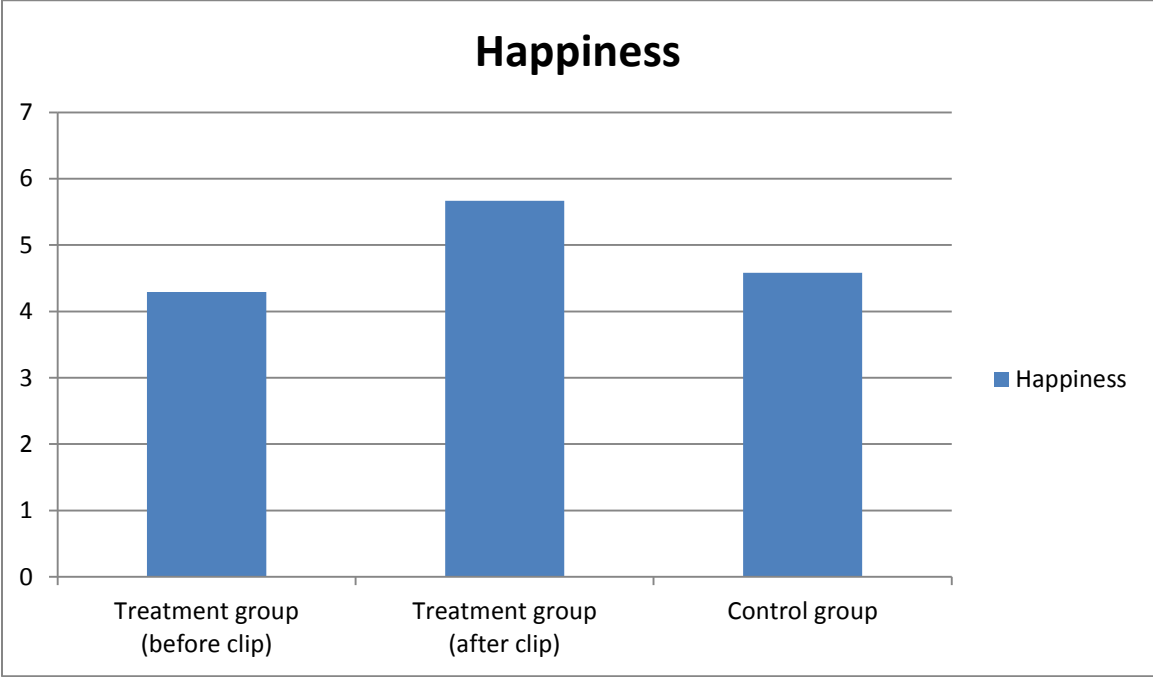


Figure 2 - Reported Happiness

The histogram in Figure 3 will help us analyze the distribution of the reported happiness across groups. We can see the similar distribution of the answers of the control group and the treatment group before watching the comedy clip. The distribution of the reported happiness of the treatment group shifts toward higher levels of happiness, confirming the positive effect of the clip on the treated subjects' happiness.

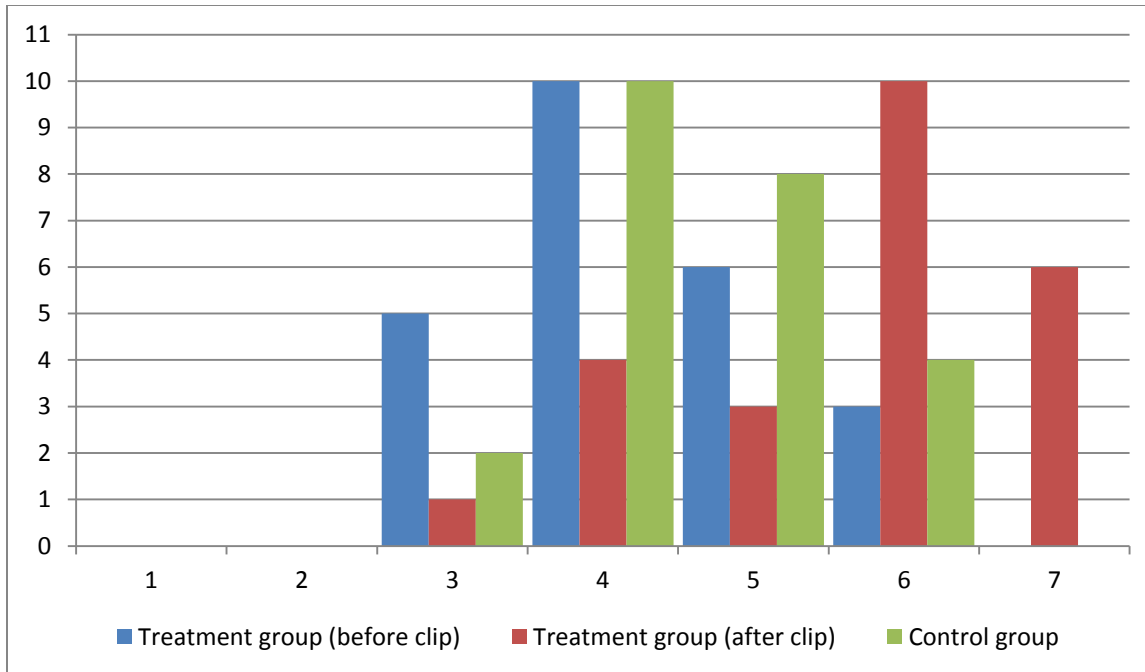


Figure 3 - Distribution of Reported Happiness

We can clearly see that the subjects in the treatment group attempted and managed to solve correctly more additions compared to the subjects in the control group. Our main variable of interest is the correct additions per subject. Treated subjects solved accurately 1.375 additions more than non-treated subjects. This difference in productivity is substantial. Moreover, after running a two-sided t-test we can find that this difference is statistically significant ( $p < 0.1$ ). Figure 4 provides us with a visualization of the productivity levels of the participants. An interesting sub-group emerges in our data – the treatment group participants who reported no increase in their happiness after watching the comedy clip. They have similar levels of productivity to the control group (0.2 additions per participant less) which is a result of great importance in relation with the effect of the comedy clip. This finding may suggest that the catalyst of the increased performance of the treatment group is the presence of the positive affect rather than the act of watching a clip.

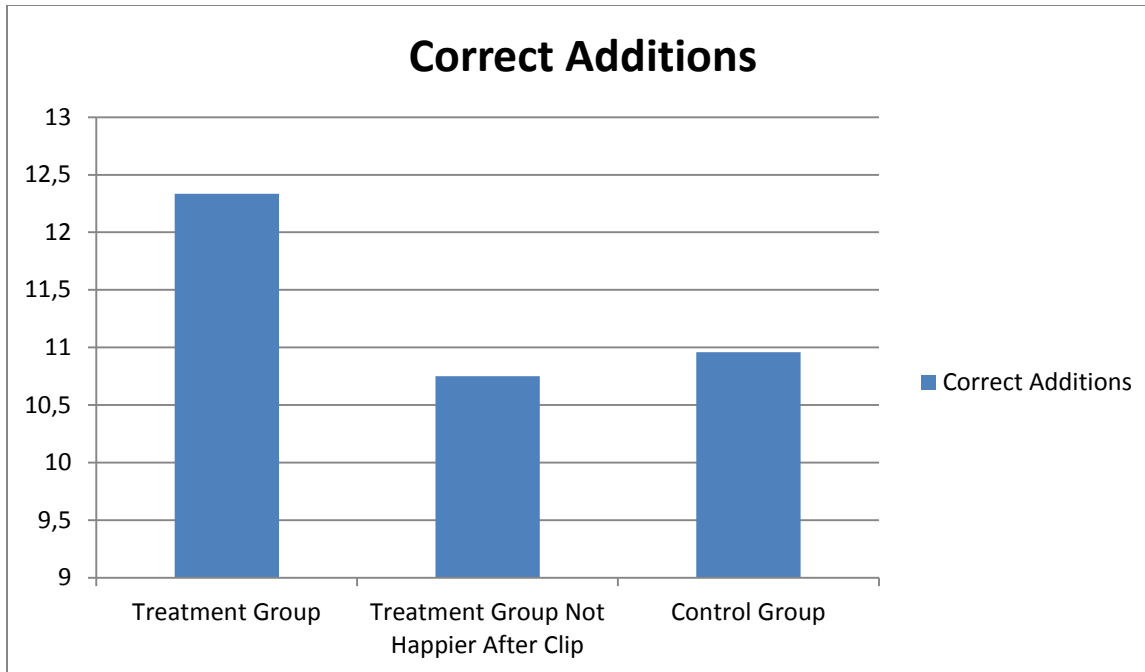


Figure 4 - Correct Additions

In Table 4 we display the average scores of the participants on PANAS. It can be clearly seen that after watching the comedy clip the subjects have high average scores of present positive affect and low average score on negative affect. They scored 32 points, from maximum of 50, on the positive affect scale. Their score on the negative affect scale is far lower – only 14 points which means they are experiencing low levels of negative affectivity.

	Positive Affect	Negative Affect
Average Scores	32.04167	14.125

Table 4 - Average Scores on PANAS

Figures 5 and 6 will help us analyze in depth which feeling and to what extent was experienced by our subjects. The strongest positive affect feeling among the treated participants was “Excited”. They scored the impressive 4.04 on average on the scale of 1 to 5. Other feelings that were highly rated by the subjects are “Enthusiastic” (3.79), “Interested” (3.58) and “Attentive” (3.54).

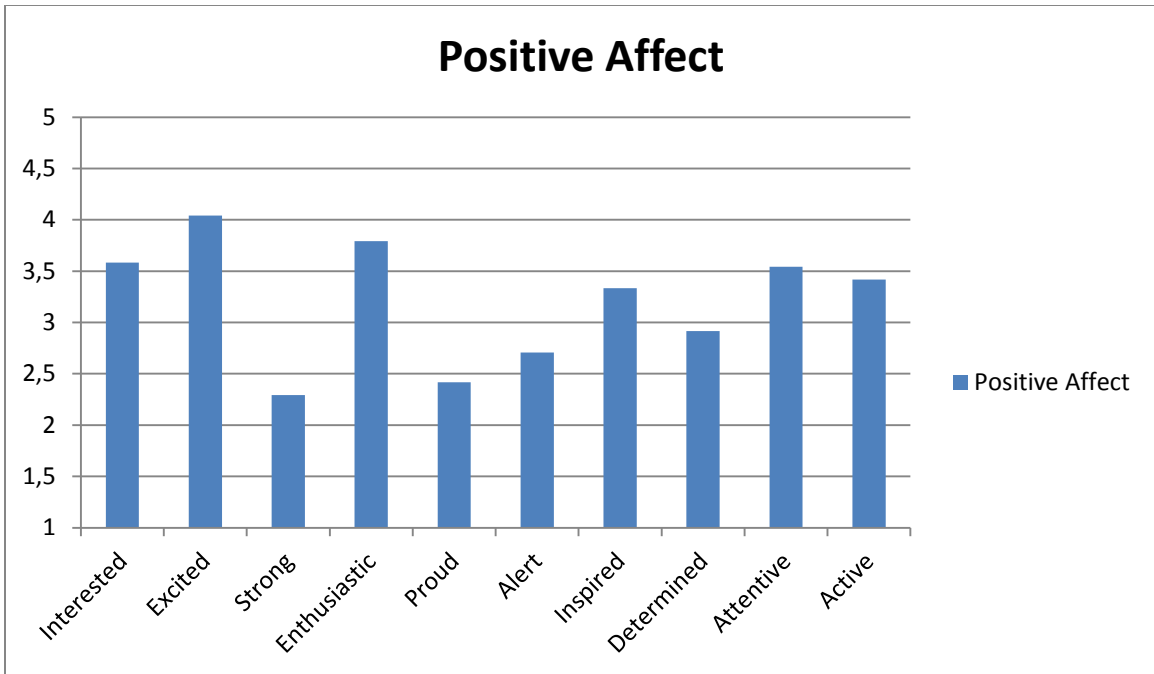


Figure 5 - Positive Affect Average Scores

The strongest negative affect feeling that was experienced by our participants is “Nervous”, with the average score of 2.7 points. It is the only notable negative feeling, with only “Distressed” (1.79) and “Scared” (1.79) scoring over 1.5 points.

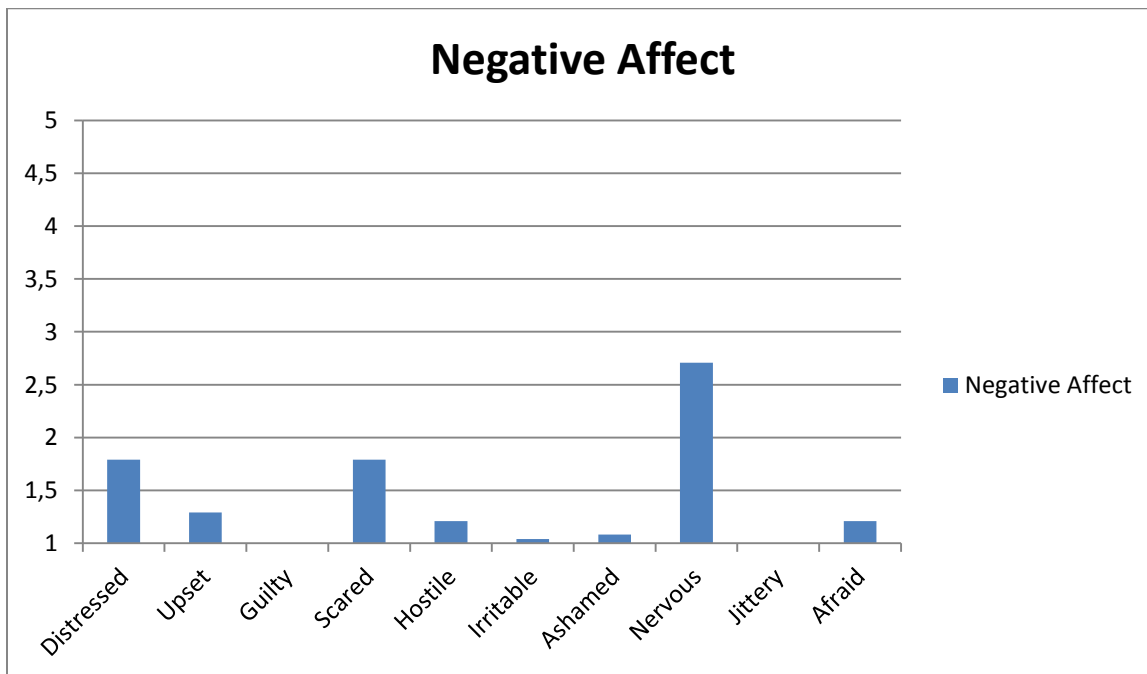


Figure 6 - Negative Affect Average Scores

In an attempt to provide an answer to our main research question, we have to establish some important causal relationships. Firstly, we have to confirm that the comedy clip served its purpose in effectively increasing the happiness levels of the participants. Secondly, we have to verify the effect of the comedy clip on the subjects' productivity. In addition to this, we are going to analyze the relationship between the levels of happiness and productivity of the subjects. We will analyze the absolute and the logged values of the determinants of performance, attempts and precision by running Ordinary Least Squares regressions. We will also include an Instrumental Variables regression that is going to help us estimate the causal relationship between the happiness, as caused by the treatment effect, and the productivity levels of the participants. This regression is crucial for our research as it is going to help us provide an answer to our main research question: "Does happiness increase productivity?". Results of the logged values are presented below, while the absolute values can be found in the Appendix. The logged values are chosen for providing us with a convenient interpretation of the results in terms of percentages and also for improved model fit.

Table 5 will provide us with an analysis of the relationship between the level of happiness of the subjects and the effect of the treatment procedure. We can see that the treatment has a strong and statistically significant effect ( $p < 0.01$ ) on happiness. Treated subjects tend to have almost 1.1 points more on the 1 to 7 scale of happiness compared to the subjects from the control group. This relationship is very important in order to confirm that the treatment actually caused the increased happiness among the subjects.

	(1) Happiness
<b>Treatment</b>	1.09361*** (0.3043322)
<b>Male</b>	-0.4711877 (0.4975332)

<b>Age</b>	0.0036812 (0.0129725)
<b>Constant</b>	4.444214*** (0.6692017)
<b>Observations</b>	48
<b>R-squared</b>	0.2407

**Table 5 - Average Treatment Effect on Happiness**

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The first regression in table 6 confirms the positive effect of the treatment on the logged variable of additions, when we control for gender and age. The treatment caused an increase of 11.3% in the subjects' performance. The p-value of this coefficient is equal to 0.184, meaning that there is a probability of 0.184 to mistakenly reject the null hypothesis. The second regression in the table reveals the relationship between the levels of happiness of the participants and the number of additions they managed to solve correctly. The "Happiness" coefficient here represents a combination of two things. On one hand, it represents a standard correlation between happiness and productivity, valid for both the treated and non-treated participants. On the other, it is the effect of the treatment that leads to an increased productivity. Happier subjects have an increased productivity of almost 14.2% ( $p < 0.01$ ). These results strongly support the beneficial impact of the positive affect on the subjects' performance. Another interesting result emerges when check for correlation between the happiness and the productivity of the treatment and the control group separately. The relationship between the logged additions and the happiness of the treated subjects remains positive and statistically significant ( $p = 0.022$ ). While the happiness of the subjects in the control group appear to be negatively correlated with performance. The last two results reveal that effect of the treatment, as part of the happiness coefficient, has a substantial effect on performance.

	(1) Log(Productivity)	(2) Log(Productivity)	(3) Log(Productivity) Treatment Group Only	(4) Log(Productivity) Control Group Only
<b>Treatment</b>	0.1132186 (0.083889)			
<b>Happiness</b>		0.1418388*** (0.0305467)	0.1143931*** (0.0472806)	-0.0462509 (0.0507129)
<b>Male</b>	-0.1312905 (0.1371447)	-0.0699012 (0.1147334)	-0.1820946 (0.1638027)	-0.2998896 (0.1756939)
<b>Age</b>	0.0029257 (0.0035759)	0.0021973 (0.0029824)	0.0008967 (0.0046317)	-0.0011815 (0.004968)
<b>Constant</b>	2.229777*** (0.1844651)	1.589289*** (0.2101951)	1.804598*** (0.3631404)	2.720441*** (0.3895023)
<b>Observations</b>	48	48	24	24
<b>R-squared</b>	0.0774	0.3551	0.2824	0.1475

Table 6 - Determinants of Subjects' Performance (Logged)

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Another dependent variable of great interest is the number of additions the subjects attempted to solve, irrespective whether they solved them correctly or failed. Analyzing this will help us to understand whether the subjects increased their accuracy or the number of answers they provided. To investigate this we will start with an analysis of the regressed absolute and logged values of the attempted mathematical additions to the same independent variables – “Treatment” and “Happiness”, while still controlling for participants’ gender and age.

The first regression in table 7 reveals that the treated subjects attempted to solve almost 15% more additions than their non-treated colleagues ( $p=0.019$ ). Through the second regression we can observe that happier subjects attempted 12.1% additions more, providing us with strong and

statistically significant evidence ( $p < 0.001$ ) for the beneficial effect of the positive affect on effort.

	(1)	(2)
	Log (Attempts)	Log (Attempts)
<b>Treatment</b>	0.1495896*** (0.0611812)	
<b>Happiness</b>		0.1212355*** (0.0217382)
<b>Male</b>	-0.1123818 (0.1000212)	-0.0530477 (0.0816487)
<b>Age</b>	0.0024966 (0.0026079)	0.002134 (0.0021224)
<b>Constant</b>	2.475968*** (0.1345325)	1.941281*** (0.1495829)
<b>Observations</b>	48	48
<b>R-squared</b>	0.1644	0.4439

Table 7 - Determinants of Attempts (Logged)

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 8 will help us understand whether happiness increased subjects' effort or their accuracy. We are going to use a new dependent variable "Correct/Attempts" which represents the ratio of the correctly solved to the number of attempted additions. We can see that the variables for treatment and happiness are not statistically significant. Their values are very close to zero, confirming that the precision of the subject was not increased.



	(1)	(2)
	Correct/Attempts	Correct/Attempts
<b>Treatment</b>	-0.0278302	
	(0.0342818)	
<b>Happiness</b>		0.0118536
		(0.0149366)
<b>Male</b>	-0.0141246	-0.0138392
	(0.0560451)	(0.0561019)
<b>Age</b>	-0.0002881	-0.0005325
	(0.0014613)	(0.0014583)
<b>Constant</b>	0.8218328***	0.7592942***
	(0.0753828)	(0.1027803)
<b>Observations</b>	48	48
<b>R-squared</b>	0.0185	0.0179

Table 8 - Determinants of Subjects' Precision

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

So far our results show that the treatment effect has caused an increased level of productivity among the subjects. It did not only improve performance, but also contributed to increased rates of effort. However, subjects failed to show more accuracy. We can also confirm that the happiness of the subjects has strong positive correlation with their productivity.

In order to provide even further depth of our analysis, we are going to use a two stage least squares estimator, where we are going to use the treatment dummy as an instrument for happiness. This approach will help us establish whether the increase in happiness as caused by the treatment leads to greater productivity. Thereby we will be able to focus on the actual contribution of the presence of the positive affect on the performance. Our results are presented in Table 9. We observe a positive and statistically significant ( $p=0.031$ ) relationship between the

two variables, meaning that the happiness caused by the treatment leads to higher productivity levels.

	(1) Productivity
<b>Happiness</b>	1.272619** (0.6131241)
<b>Male</b>	-0.8807148 (1.111195)
<b>Age</b>	0.0129938 (0.0289293)
<b>Constant</b>	4.569232* (3.23757)
<b>Observations</b>	48
<b>R-squared</b>	0.3626

Table 9 - 2SLS-IV of Happiness on Productivity

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

To recap, the presence of positive affect, or treatment effect, led to an increased happiness of 1.1 points on a 1-7 scale among the subjects. The treated subjects increased their performance by 11.3% and attempted to solve approximately 15% more mathematical summations compared to the subjects from the control group. Nevertheless, the participants in the treatment group did not improve their accuracy. The levels of happiness and the productivity of the subjects remain positively correlated: happier subjects had increased performance of 14.2% and engaged into solving 12.1% more summations. By running 2SLS estimation, we also confirmed that the happiness, caused by the treatment, contributed to subjects solving 1.27 additions more.

## 5.2. Bad life event and productivity

In table 10 we present a description of our data that will help us analyze the validity of our second hypothesis. The number of attempted additions averages 14.7, while the correctly solved ones average 11.6. The variable “Happiness” obtains numerical mean of 4.44 on the 1 to 7 scale and takes the combined value of the happiness of the non-treated subjects and the happiness of the treated subjects before watching the comedy clip, prior to any question related with negative life events. This was critical for not influencing their judgment on the level of their happiness at the moment. Unfortunately for our research, only relatively few subjects reported bad life events. However, in this sub-chapter we will examine the correlation of this variable with happiness and productivity.

Variable	Observations	Mean	Standard Deviation	Min	Max
Attempted Additions	48	14.6875	3.196782	9	22
Correct Additions	48	11.64583	2.913575	4	17
Happiness	48	4.4375	0.9203665	3	6
Bad Life Event	48	0.0625	0.244623	0	1
Male	48	0.1041667	0.3087093	0	1

Table 10 - Data Description 2

In table 11 we use “Happiness” as our dependent variable and we perform two regressions. In the first one the subjects’ happiness is regressed to the dummy variable of a recent bad life event. As expected, the experience of such negative life circumstance has a strong negative correlation with the current happiness of the subject. We also ran a second regression, where in addition to the same independent variable we controlled for gender and age. The result not only remains negative, but shows an increased negative correlation with “Happiness”.

	(1)	(2)
	Happiness	Happiness
<b>Bad Life Event</b>	-0.4666667	-0.5718581
	(0.55045)	(0.5336035)
<b>Male</b>		-0.9837054**
		(0.4245517)
<b>Age</b>		-0.0024015
		(0.0109944)
<b>Constant</b>	4.466667***	4.695134***
	(0.1376125)	(0.5677559)
<b>Observations</b>	48	48
<b>R-squared</b>	0.0154	0.1225

Table 11 - Determinants of Subjects' Happiness

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

In table 12 we present an analysis of the correlation between the occurrence of a bad life event and the performance of the participants. We observe a negative correlation between the variables, meaning that the presence of a bad life event associates with lower levels of performance, effort and precision. However, this effect remains statistically insignificant and with large standard errors due to the limited number of observations.

	(1)	(2)	(3)	(4)	(5)	(6)
	Additions	Additions	Log Additions	Attempts	Log Attempts	Correct/Attempts
<b>Bad Life</b>	-1.4	-1.566667	-0.1046387	-0.566667	-0.0129959	-0.0769499
<b>Event</b>	(1.74393)	(1.74744)	(0.1750785)	(1.92853)	(0.1345326)	(0.0693053)

<b>Male</b>		-1.5	-0.1368252	-1.7	-0.1058682	-0.0215292
		(1.38468)	(0.1387332)	(1.52818)	(0.1066044)	(0.0549179)
<b>Constant</b>	11.73333	11.9	2.438994	14.9	2.675051	0.7991721
	(0.43598)	(0.46156)	(0.0462444)	(0.50939)	(0.0355348)	(0.018306)
<b>Observations</b>	48	48	48	48	48	48
<b>R-squared</b>	0.0138	0.0389	0.0267	0.0276	0.0214	0.0285

Table 12 - Determinants of Subjects' Performance

## 6. Discussion

The main goal of our experiment was to investigate the influence of the positive effect (increased happiness state) and real-life happiness shocks on the productivity of a worker. In order to analyze this we conducted two parallel experiments with the same sample of subjects. Our treated participants were exposed to a comedy clip in an attempt to increase their happiness levels. Then both treated and non-treated subjects proceeded to the paid productivity task and completed a final questionnaire in which they reported their happiness on 1 to 7 point scale and the occurrence of a recent bad life event.

Our most important result was the robust relationship between positive affect and productivity. The treated participants in our experiment showed improved productivity in comparison to their colleagues from the control group by correctly solving 12% more additions. The treatment effect also induced the subjects to put more effort in their task, attempting to solve almost extra 16% of additions. The happiness of the subjects correlates positively with their productivity, leading to an increase of 14.4% in the number of correct additions. This result is accompanied with high statistical significance ( $p < 0.01$ ) and low standard errors. Even when we excluded the non-treated subjects and analyzed only the participants in the treatment group, the correlation remained positive. The presence in the treatment group managed to successfully increase the happiness of the subjects. Treated subjects had an increase of 1.1 points on the happiness scale of 1 to 7. In addition to this, by using a two stage least squares estimator we confirmed that the increase in the happiness of the subjects caused by the treatment procedure led to improved performance. Those

findings prove the validity of our first hypothesis '*Subjects with positive affect (treatment group) tend to be more productive compared to subjects with a neutral affect (control group)*'. Our results from the first experiment are strong and statistically significant. They contribute to the existing literature in support of the legitimacy of the happy-productive worker thesis.

The second experiment revealed the expected strong negative relationship between an unfavorable life event and subjects' happiness levels. Subjects who recently experienced serious illness or bereavement among family and close friends reported lower levels of happiness, along with decreased productivity of around 10%. Their effort, regarded as attempted mathematical additions, was also declining, while their accuracy or more precisely – their ratio of correct to attempted additions, remained unchanged. However, these results are accompanied by low statistical significance and high standard errors and we are unable to state clearly the validity of our second hypothesis that '*Subjects without recent bereavement or serious illness in close family or friends tend to be more productive compared to subjects with any of those negative traits.*'

Crucial result for the validity of our experiment are the similar levels of happiness of our non-treated subjects (4.58) and the treated subject before watching the clip (4.29) on the scale of 1 to 7.

In addition to this, the subjects from the control group and the treated subjects that did not increase their happiness after watching the comedy clip showed similar levels of productivity. The difference of only 0.21 additions per subject shows that the productivity of treated subjects who did not like the clip was not affected in an extremely negative manner.

Another important result that emerged from our experiment is that the positive affect failed to raise the level of precision of our participants, but still encouraged them to engage in solving greater number of additions. When we were analyzing the ratio of correct to attempted additions for the treated subjects, we found that this ratio remained the same. On the other hand, subjects attempted to solve more additions, which can help us conclude that the positive affect in our experiment did not affect the precision of our subjects, but only motivated them to put effort into solving more additions, despite failing to do so correctly. This result may prove to be of greater value for simpler tasks, where precision is not of great importance. The presence of positive

affect can boost productivity even further, because the effort of the subjects will be repaid and the difficulty of the task will be lower and they will need to be less precise.

The PANAS helped us prove that the comedy video served its purpose and managed to affect positively our treated subjects, since the results on positive affectivity were far greater than the results on negative affectivity. In addition to this, we can confirm that positive feelings like “Excitement”, “Enthusiasm”, “Interest” and “Attention” contribute to boosting productivity as they are highly rated measures of the positive affect experienced by our treated subjects.

## **7. Conclusion**

The current study intended to analyze the relationship between happiness, conceptualized as the presence of positive affect, and productivity. We chose positive affect due to its strong theoretical links to productivity examined in previous research and decided to put them to test. Our research question was: ‘Does happiness increase productivity?’ and our results allow us to state that there is a strong correlation between happiness and productivity. The two experiments we conducted proved the positive relationship between increased happiness levels and the performance of the treated subjects. In our first experiment we exposed our subjects from the treatment group to a comedy clip, which successfully managed to increase their happiness levels. Then both treated and non-treated subjects engaged into solving mathematical additions. The treated subjects showed greater productivity compared to their colleagues from the control group, managing to solve 12% additions more. The subjects from the treatment group also attempted to solve more additions, despite not showing increased precision. In the second experiment we analyzed the recent bad life events among our participants and we managed to find strong negative relationship with productivity and happiness. Our results are in line with the conclusions of the majority of the related literature and serve as a proof for the validity of the happy-productive worker thesis.

### **7.1. Limitations and Future Research**

In this section we will pay attention to the limitations of the present research and the flaws that may have slightly affected the results. Then we will provide options for further research that emerge from this study. Firstly, there are the data collection limitations. Participants have filled questionnaires and the data about the bad life events, happiness levels and PANAS is self-

reported. This may have resulted in personal bias due to possible misunderstanding of the questions, forgotten events or misinterpretation of the current emotional state. Secondly, our research can be improved if the subjects from the control group also fill the PANAS questionnaire. In such a way, it is possible to establish which emotions in particular are provoked in the subjects and which of the emotions are related to their productivity. Another flaw may be the nature of the comedy clip, which was used to induce a positive affect. People have different sense of humor and although it was selected to be considered as funny by the broad public, some may have still thought it was inappropriate. This would have resulted in the reported happiness levels in the treatment group and could have been omitted if we chose different video or comedian. Next, the size of the sample is not as big as desired due to the limited time and opportunities. The results would have been more significant if we could count with larger sample. Moreover, we need to acknowledge that in our sample there is significant difference in the number of male and female participants. Therefore, the results regarding gender specifications may have been affected by the small male sample and some of them could be isolated cases.

Despite the significant conclusions we made, there are some, which need to be further explored. As mentioned above, such experiments are not conducted with Bulgarian workers and thus it would be interesting to see whether our findings for teachers would be supported by such for other professional fields in the country. This will help us understand if the happy-productive worker thesis could be applied universally or it could vary across nations. Another option for future research is to conduct an experiment with more male participants and check if the findings will support the differences we found with the current study.



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## Appendices

### Absolute values

Table 13 provides us with an analysis of the absolute values of the additions regressed to the presence in the treatment group and the increased levels of happiness after the treatment clip, including a control variable related with subjects' gender. The independent variable "Treatment" remains statistically significant ( $p=0.088$ ). The treated subjects showed greater productivity, managing to solve correctly 1.44 additions more than the subjects from the control group. The variable "Happiness" in the second regression remains strong and statistically significant ( $p<0.01$ ). Subjects who experienced positive affect increased their correct additions by almost 1.5. Contributing to previous results, we can clearly see from table 6 that the treatment had huge positive effect on the performance of the subjects.

	(1) Productivity	(2) Productivity
<b>Treatment</b>	1.439642*	
	(0.824699)	
<b>Happiness</b>		1.482037***
		(0.2993561)
<b>Male</b>	-1.551402	-0.8530285
	(1.349856)	(1.124915)
<b>Constant</b>	11.08762***	4.139852**
	(0.5925674)	(1.587189)
<b>Observations</b>	48	48
<b>R-squared</b>	0.0838	0.3667

Table 13 - Determinants of Subjects' Performance (Non-logged)

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

The regressions in table 14 show us the strong and consistent effect of the treatment and the increase in happiness to the number of attempts. The treated subjects attempted almost 2.3 additions more, while those who increased their happiness undertook solving nearly 3 additions extra. Both results are strong and statistically significant from zero, providing us with  $p=0.012$  and  $p=0.001$  respectively.

	(1) Attempts	(2) Attempts
<b>Treatment</b>	2.288162**	

	(0.8685037)	
<b>Happiness</b>		1.758314***
		(0.3118605)
<b>Male</b>	-1.915888	-1.022565
	(1.421555)	(1.171904)
<b>Constant</b>	13.74299***	5.78266***
	(0.6240422)	(1.653497)
<b>Observations</b>	48	48
<b>R-squared</b>	0.1559	0.4290

Table 14 - Determinants of Attempts (Non-logged)

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Instructions and Questionnaires

In **bold** we present the instructions to the treatment group.

### Instructions

Welcome to the session and thank you for participating in our research. Your task today consists of completing a set of simple tasks and answering a questionnaire. All of you will receive a show-up fee and you will also have the chance to increase your earning based on how you perform. Please remain quiet through the rest of the session. If you have any questions please raise hands and try not to distract your colleagues.

We will start with a short questionnaire (Questionnaire 1) that we kindly ask you to complete.

**Now we are going to present you a short clip.**

**We will proceed further by asking you to complete another questionnaire (Questionnaire 2).**

Now we proceed to the task we want you to complete. Your results are completely anonymous. Now we will distribute you the task materials. You are allowed to use pen and paper, but calculators and any attempts to cheat are strictly forbidden.

For the task you will have 10 minutes to add a sequence of numbers together and enter your answers in the corresponding column. You will be paid 0.2 Bulgarian leva for every correct addition. I will inform you when your time is over.

Please stop with your calculations. I will collect your answers and distribute you a final questionnaire to complete.

Thank you for completing your final questionnaire and for participating in our session today. Now we will calculate your results and distribute your payments.

### Questionnaire 1

What is your age?

What is your gender?

How would you rate your happiness at the moment on a scale from 1 to 7?

(1- extremely sad, 2- very sad, 3- sad, 4- neutral (neither sad, nor happy), 5- happy, 6- very happy, 7- extremely happy)

### Questionnaire 2

How would you rate your happiness after watching the comedy clip on a scale from 1 to 7?

(1- extremely sad, 2- very sad, 3- sad, 4- neutral (neither sad, nor happy), 5- happy, 6- very happy, 7- extremely happy)

How much did you enjoy seeing the comedy clip on a scale from 1 to 7?

(1- completely disliked, 2- very disliked, 3- disliked, 4- neutral (neither dislike, nor enjoyed), 5- enjoyed, 6- very enjoyed, 7- completely enjoyed)

Please report below to what extent you felt each of the listed feelings using a scale from 1 (not at all) to 5 (extremely).

<b>1. Interested</b>		<b>11. Irritable</b>	
<b>2. Distressed</b>		<b>12. Alert</b>	
<b>3. Excited</b>		<b>13. Ashamed</b>	
<b>4. Upset</b>		<b>14. Inspired</b>	
<b>5. Strong</b>		<b>15. Nervous</b>	
<b>6. Guilty</b>		<b>16. Determined</b>	
<b>7. Scared</b>		<b>17. Attentive</b>	
<b>8. Hostile</b>		<b>18. Jittery</b>	
<b>9. Enthusiastic</b>		<b>19. Active</b>	
<b>10. Proud</b>		<b>20. Afraid</b>	

### Questionnaire 3

Have you experienced any of the following unfortunate events during the last year?

A recent bereavement in the family or close friends.

A serious illness in the family or close friends.

A divorce in the family or close friends.