# Moral Development as a Predictor of Moral Behavior in a Deterministic World

Research Proposal Psychological Research Methods

**Paul Lodder**

*University of Amsterdam, Amsterdam, The Netherlands*

Recent behavioral studies have indicated that people show immoral behavior if they are primed with a deterministic worldview. These studies, however, have several methodological flaws. For example, they use a definition of determinism that could be interpreted as fatalism, rather than determinism. Another problem is that they do not take individual differences in moral reasoning into account. The aim of this research project is to overcome these and some other limitations. The main research question that I will address is whether individual moral development influences the relationship between a deterministic worldview and immoral behavior. Recent studies have supported Kohlbergs theory of moral development. According to this theory, individuals with high moral development will not behave immorally, because they are against such behavior in principle. Therefore, it is expected that the negative influence of a deterministic worldview on morality only occurs within the group of people with low moral development, but not within the group of people with high moral development. The present study will investigate whether a deterministic worldview will lead to moral behavior in every type of people, or whether it depends on individual moral development. The results will shed light on the relationship between determinism and immoral behavior.

## Introduction

The question of whether people have free will is one of the most persistent problems within philosophy. The definition of free will used in the present article has to be distinguished from two other types of free will. First, there is the kind of free will we all *experience* when making a decision (phenomenological freedom) and second, there is a kind of free will we have when we are not limited in our actions by external factors (behavioral freedom). These two kinds of free will are different from the third type that is discussed in the present research proposal. This kind of free will – dubbed metaphysical freedom – can be defined as being able to make a decision that was not the result of a preceding deterministic process.

After centuries of mainly philosophical theorizing about the possible existence of metaphysical freedom, science has now also entered the debate. In his famous study, Benjamin Libet found that brain activity relating to a decision to flex a finger is already present 550 milliseconds before a person becomes aware of making this decision (Libet et al., 1983). Libets studies were criticized of using inaccurate brain scanning techniques and inappropriate measures of the subjective awareness of a decision (Trevena and Miller, 2002; Zhu, 2003; Trevena and Miller, 2009; Klemm, 2010). However, subsequent research solved those problems (Lau et al., 2004; Soon et al., 2008; Haynes, 2011) and by using single neuron recordings it even became possible to predict, with an accuracy of 80%, the outcome of individual decisions 700 milliseconds *before* people became aware of making the decisions (Fried, Mukamel and Kreiman, 2011). These studies, hence, indicate that there are plausible reasons to assume that metaphysical freedom is an illusion.

A question that thus arises is whether people can still be held morally responsible if they, indeed, do not have metaphysical freedom. Experimental studies indicate that there is no universal intuition about the compatibility of determinism with moral responsibility. It turns out that people think the two are compatible only if the definition of determinism and the stories they have to judge are described in concrete, rather than abstract terms, and if people have extrovert personalities (Nahmias et al., 2005; Nahmias et al., 2006; Nichols and Knobe, 2007; Nahmias, Coates and Kvaran, 2007; Roskies and Nichols, 2009; Feltz and Cokely, 2009). Yet, do people actually act in accordance with their intuitions? Two recent behavioral studies have indicated that if people are primed with a belief in determinism, they show increased cheating (Vohs and Schooler, 2008) and less helpful and more aggressive behavior (Baumeister, Masicampo and DeWall, 2008).

In the study about cheating, Vohs and Schooler (2008) primed participants with statements relating to either determinism (*deterministic* condition) or scientific facts not related to determinism or free will (*control* condition). Subsequently, participants had to solve math problems on a computer and they were told that the computer had a glitch and

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► E-mail: **p.lodder@uva.nl**

that the answer to the question would at some point appear on the screen, but not if the participants would press a spacebar as soon as the question appeared. Participants were told that the experimenter would not know whether they looked at the answers, but that they should try to answer the questions honestly. Cheating was measured by counting the number of times the participants did not press the spacebar in order to prevent the answer from appearing. It turned out that participants who were primed with deterministic statements showed increased cheating compared to participants who had been primed with neutral scientific facts.

There are some methodological problems, however, with this study – and the study by Baumeister and his colleagues (2008). First, the scholars defined determinism in such a way that it could also be interpreted as fatalism, rather than determinism (Nahmias et al., 2007). Fatalism implies that every event in the universe is predestined to happen and there is nothing that can be done or occur to prevent a predestined event from happening. If people interpret determinism in this way then their immoral behavior might be caused by their beliefs/convictions that their actions cannot influence the future because everything is meant to happen in a certain fashion anyway.

Another problem with the behavioral studies is that these studies did not take individual differences in moral behavior into account. According to Kohlbergs (1984) model of moral development, people develop themselves morally during their lives by going through six stages. Most people will eventually develop to stage 4 or 5, and only a few to stage 6. Each stage represents a qualitatively distinct mode of moral reasoning. If Kohlbergs model is correct, then part of the variance in the cheating of participants in the behavioral study might be explained by the fact that people have different moral perspectives. Kohlbergs six stages of moral development are usually classified into three pairs of stages, where each pair corresponds to a general type of moral reasoning. (Kohlberg, 1984) In the two *preconventional* stages, people act out of egocentric motives, without taking into account the desires and plans of other people. In the two *conventional* stages the moral reasoning of people focuses on a group of which they are part of, such as a family, community, or even a society. Finally, in the last two *postconventional* stages, individual rights and universal principles inspire moral reasoning (Appendix A gives a more detailed description of the six stages). Kohlbergs theory is the best-known theory of moral development within psychology (Crain, 2010).

A third problem of the two behavioral studies is that the scholars did not check the intuitions people had about the compatibilism of determinism with moral responsibility. It can be argued that people who think that determinism still leaves room for moral responsibility, are less likely to show cheat behavior, than people who believe that moral responsibility is impossible in a deterministic universe.

A fourth problem, specific to the study of Vohs and Schooler (2008), is that their operationalization of cheating leaves room for a possible confounding factor. Participants are asked to press the spacebar in order to prevent the correct answer from appearing on the computer screen. Participants are thought to be cheating if they do not press the spacebar. However, it can be argued that not pressing the spacebar simply is the result of being lazy. Research has shown that people will have less motivation to act if they know that the causes of their actions are outside of their control (Mueller & Dweck, 1998). Since determinism implies that people do not control their own actions, it might be possible that not pressing the spacebar is simply the result of becoming demotivated and not of becoming immoral.

The aim of the present study is to overcome the four limitations of the study by Vohs and Schooler (2008). A motivation questionnaire will be used in order to control for the possible demotivational effects of belief in determinism. Furthermore, there will be controlled for differences in moral development and beliefs about the compatibilism of determinism and moral responsibility. Specifically, the research question that I will address is whether individual moral development (according to Kohlbergs theory) influences the relationship between a deterministic worldview and immoral behavior. The following hypotheses will be tested:

(1) People primed with a belief in determinism cheat more than people without such a belief
(2) People with a high moral development will cheat less than people with a low moral development
(3) The influence of a deterministic worldview on cheating will be larger if people have a low moral development, than if they have a high moral development.

In order to test this, the paradigm used by Vohs and Schooler (2008) will be used, but statements that were used to prime determinism are chosen in such a way that they cannot be interpreted as implying fatalism. Furthermore, participants are presented with Kohlbergs moral dilemma in order to discover their stage of moral reasoning. Cheating is operationalized as the number of times participants do not press a spacebar while answering the mathematical questions.

It is expected that, in line with the results of Vohs and Schooler (2008), participants in the deterministic condition will press the spacebar less (cheat more) than participants in the control condition. Furthermore, a negative linear trend is expected between moral development and the extent to which people cheat, in such a way that people with postconventional moral development will press the spacebar more often. Finally, an interaction between condition and moral development is expected. Participants with (pre)conventional moral development are expected to show a larger difference in the number of times they press the spacebar in the deterministic and control conditions than participants with postconventional moral development. This is expected because participants with postconventional moral development will most likely reason according to universal principles (for example: cheating is immoral in principle and one should therefore not cheat) and are therefore expected not to cheat at all, independent of whether they have been primed with statements relating to determinism.

# Methods

## *Participants and Design*

The type I error that is going to be used in this study is 0.05 and the power to detect a difference between conditions is preferred to be 0.90. The effect size of the original study by Vohs and Schooler (2008) is calculated and turns out to be 0.88. Subsequently, the program G*power is used to calculate which sample size is needed in order to achieve a power of 0.90, given an alpha of 0.05 and an effect size of 0.88. It turns out the required sample size is 58. Therefore, the present study aims to acquire approximately 60 psychology freshmen at the University of Amsterdam.

## *Materials*

Participants in the deterministic condition are required to read a scenario that represents determinism but prevents any reference to fatalistic characteristics (Nichols and Knobe, 2007). A fatalistic interpretation is prevented by putting emphasis on the fact that events are not *meant* to happen, but are only caused by preceding events combined with natural laws:

> Scientists recently discovered that in our universe everything that happens is completely caused by whatever happened before it. This is true from the very beginning of the universe, so what happened in the beginning of the universe caused what happened next, and so on right up until the present. For example one day John decided to go to the casino and gamble all his money. Like everything else, this decision was completely caused by what happened before it. For example, John has a particular type of genes that lets him enjoy risky situations. The reason that John did not choose other kinds of risky situations, such as mountain climbing or paradiving can easily be explained by taking into account whatever happened before. Remember that everything that happens is caused by whatever happened before it. The evening before, numerous casino pop-ups appeared while John was surfing the Internet. This, together with the fact that he sometimes wins money with gambling explains his motivation to choose a casino instead of other kinds of risky behaviors. It is not true that John is somehow *meant* to go the casino and gamble all his money. If the preceding events would have been different then this would for example have determined John in such a way that he would simply watch a movie.

Participants in the control conditions are required to read a text that does not in any way relate to determinism or free will. It is a neutral text about the solar system (http://en.wikipedia.org/wiki/Nature):

> Earth is the only planet presently known to support life, and its natural features are the subject of many fields of scientific research. Within the solar system, it is third closest to the sun; it is the largest terrestrial planet and the fifth largest overall. Its most prominent climatic features are its two large polar regions; two relatively narrow temperate zones, and a wide equatorial tropical to subtropical region. Rainfall varies widely with location, from several meters of water per year to less than a millimeter. Saltwater oceans cover 71 percent of the Earths surface. The remainder consists of continents and islands, with most of the inhabited land in the Northern Hemisphere. Although the planet Earth is currently the only known body within the solar system to support life, current evidence suggests that in the distant past the planet Mars possessed bodies of liquid water on the surface. For a brief period in Mars' history, it may have also been capable of forming life. At present though, most of the water remaining on Mars is frozen. If life exists at all on Mars, it is most likely to be located underground where liquid water can still exist. Conditions on the other terrestrial planets, Mercury and Venus, appear to be too harsh to support life as we know it.

Six true-false statements are used in order check whether participants read and understood the text they are asked to read. The statements relate either to the text about determinism or the text about the universe. Participants are expected to score high only on statements about the particular text they are asked to read. The odd statements are about the solar system text and the even statements are about determinism text. statements marked with an * are false. The six true-false statements are displayed below.

(1) Most of the water on Mars is frozen.
(2) John decided to go to the casino out of free will.*
(3) Saltwater oceans cover 64 percent of the Earths surface.*
(4) John was meant to go to the casino.*
(5) Earth is the sixth largest planet of our solar system.*
(6) John sometimes wins money with gambling.

The Free Will and Determinism scale (FAD; Paulhus and Margesson, 1994; see Appendix B) is used to check the beliefs participants have about free will and determinism. This scale is especially useful because it also contains questions relating to fatalism. In this way it can be checked whether participants primed with the determinism text confuse determinism with fatalism. The FAD is not a widely used measure of the intuitions people have about determinism and free will. This might be caused by the low number of studies conducted on this topic. The reason the FAD will be used in the present study is that the scale is considered valid by the other authors in the field (Baumeister et al., 2008).

The Positive and Negative Affectivity Schedule (PANAS; Watson, Clark, and Tellegen, 1988; see appendix C) is used In order to detect whether the reading task influences the mood of the participants in any way. This is to ensure that it is not mood that influences the extent to which people cheat, because mood and cheating are thought to be related (Dienstbier and Hunger, 1971). The PANAS turns out to be a valid measure of positive and negative affect (Mackinnon et al., 1999). If the reading task influences the mood of the participants in any way, then the affect might influence the cheating behavior and therefore in the final analysis the cheating effect

will have to be controlled for mood.

The Student Opinion Scale (SOS; Sundre & Moore, 2002; see appendix D) is used in order to discover the motivation participants had to solve the math questions. This scale is used to ensure that a belief in determinism does not lead to demotivation. If it turns out that participants in the deterministic condition show less motivation to solve the math problems than participants in the control condition, then the cheating scores will be controlled for motivation. The validity of the SOS in measuring motivation has been confirmed by subsequent research (Thelk et al., 2009).

A computer is used to present the mathematical problems to participants. The computer is rigged in such a way that the answer to each problem will appear after 5 seconds if the participants do *not* press the spacebar. The number of times participants press the spacebar will be counted as an indication of the extent to which they cheat. In total there are 20 mathematical questions (appendix E) that are not too easy because otherwise participants will most likely have less motivation to cheat. It might also be possible that participants that are good in mathematics will show less cheating behavior than participants who are not very good in math. In order to control for any differences between participants in mathematical ability, participants are asked to indicate the grade for their mathematics high-school exam. Finally, the moral development of each participant will be measured by using the classic moral dilemma of Kohlberg (1963, p. 19) shown below:

> In Europe, a woman was near death from a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging ten times what the drug cost him to make. He paid $200 for the radium and charged $2,000 for a small dose of the drug. The sick woman's husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about $1,000 which is half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said: "No, I discovered the drug and I'm going to make money from it." So Heinz got desperate and broke into the man's store to steal the drug-for his wife.

Each participant is then asked to answer two questions:

(1) Should Heinz have done that?
(2) Why or why not?

Answers to these questions will be scored by using a manual written by Kohlberg and Colby (1987). Because there are so many different possible answers to question 2, the length of the scoring manual is approximately 40 pages and will therefore not be included in this research proposal. Interested readers are referred to the original document of Kohlberg and Colby (1987).

## *Procedure*

Students participate individually in the experiment. First, they are randomly assigned to either the deterministic or the control condition. The condition they are assigned to determines whether they will have to carefully read the text about determinism or the text about nature. After reading the text, they will have to answer the six questions that are used to check whether participants read and understood the text. Subsuquently, participants are asked to answer mathematical questions on the computer and they are told that the computer has a bug and that it will show the answer to each question after 5 seconds, but that it is possible to prevent this from happening by pressing the spacebar in less than 5 seconds after each question appears. Participants are also told that the experimenter does not know whether they pressed the spacebar or not, but that they are requested to answer the questions honestly and by themselves. After completing the math questions, participants are asked to read the Kohlberg scenario and answer the related questions. Subsequently they are asked to fill out the Student Opinion Scale (SOS), the Free Will and Determinism scale (FAD) and the Positive and Negative Affectivity Schedule (PANAS). Afterwards, they are thanked and debriefed.

## *Data analysis*

First, the scores on the questions about the two texts will be compared between groups with an independent samples t-test in order to check whether participants read and understood the text they were asked to read. It is expected that participants who read the determinism text score higher on the determinism questions than participants who read the solar system text. Conversely, it is expected that participants who read the solar system text score higher on the solar system questions than participants who read the determinism text.

The scores of the FAD will be compared between groups with an independent samples t-test in order to check whether participants differ in their believes about determinism, fatalism and free will. Subsequently, comparing the PANAS scores between groups with an independent samples t-test checks the possibility of mood differences as a result of reading the text about determinism or nature. The SOS scores will also be compared between the two groups with an independent samples t-test in order to check whether there are any differences in motivation between the deterministic- and the control condition.

Kohlberg and Colby (1987) classified all possible answers to the questions above and indicated to which stage of moral development each answer corresponds based on Kohlbergs original theory (1984). The answers participants give to the questions above are going to be evaluated independently by two researchers. Each researcher will indicate to which developmental stage each answer corresponds., based on the scoring manual developed by Kohlberg and Colby (1987). In order to check for any mistakes, they will compare their evaluations and discuss the possible cases in which they do not agree until they reach an agreement. Each participant will be

assigned a stage of moral development between 1 and 6.

The computer records each time the participants press the spacebar. The cheating score of each participant is calculated by subtracting the number of spacebar presses from the total number of questions. A high score indicates more cheating (for example: 6 spacebar presses gives a cheating score of 20 6 = 14). In order test the hypotheses, a two-way ANOVA will be used in which the cheating score is the dependent variable, moral development an ordinal factor, and condition a nominal factor. The expected statistical results, including a visual representation of the results are shown in appendix F. These results are simulated in such a way that they support the three hypothesis of the present article.

There has been a lot of debate on the question of whether Kohlbergs stages are actually qualitatively distinct stages instead of a continuum. Recent longitudinal studies combined with sophisticated statistical methods such as Rasch analysis have moral development proceeds through stages and cannot be seen as a continuum (Dawson, 2002; Boom, Wouters and Keller, 2007). Therefore, when analyzing the results of the present study, moral development will be treated as an ordinal – and not a continuous variable.

The relevance of the expected results is twofold. First, the results will shed light on the relationship between a deterministic worldview and immoral behavior. The conclusion that a belief in determinism produces immoral behavior in a lab setting would be an indication that is important to discover whether the effects can be replicated in field studies with people who already believe in determinism. Secondly, the expected results are relevant because they might indicate that moral development moderates the relationship between determinism and immoral behavior. If it turns out to be the case that only people with a low moral development are influenced in their immoral behavior by a belief in determinism, then future research could focus on finding out what reasons those people have for acting immorally and how their moral development could be stimulated.

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# Appendix A: Kohlberg's Six Developmental Stages

## *Preconventional Stages*

*Stage 1: Obedience and Punishment Orientation*. Moral reasoning at this stage is dominated by the thought that there is some authority that must be obeyed without any question, because otherwise you will get punished. A person in this stage of moral development will respond in Kohlbergs dilemma (see methods section) by saying that Heinz should not steal the drug because stealing is bad and you will get punished if you steal.

*Stage 2: Individualism and Exchange*. People that have developed to the second stage no longer think that there is one correct moral view handed over by some authority figure. They realize that each person has a different viewpoint and what's just to do depends on what the individual interest is of Heinz. If he want to save his wife, then he should steal the drug, if he does not want to save his wife, then he should not do so.

## *Conventional Stages*

*Stage 3: Interpersonal Relationships*. In this stage, people no longer see morality as a trade-off between gains and losses, but start to care for the interests of people close to them, such as family or the community. They start acting in ways that are considered morally good according the group they are part of. This stage can also be based on a trade-off, but the trade-off is not focused on gains and losses of the individual, but of the family or community. Furthermore, interpersonal feelings guide the moral reasoning of people in this stage. They will say that Heinz should steal the drugs, because then he will be a good husband to his wife. People in this stage will also often think that the druggist is selfish for net selling the drugs for a lower price.

*Stage 4: Maintaining the Social Order*. People in this stage broaden their concerns for other people to a whole society. Actions are no longer considered morally good if they only benefit the family or some other small group, but they are considered good if they are in line with the laws of the society those people live in. Every person is considered to have duties within a society and everybody is expected to respect the authorities. People at stage 4 of moral development will say that Heinz should not steal the drug, because it is against the law. They do think that Heinz has good intentions, but society would fall apart if we all started stealing things that we cannot afford.

## *Postconventional stages*

*Stage 5: Social Contract and invidual Rights*. At this stage, people start to realize that obeying the laws of a particular society is not always the best moral behavior one can show. For example, a totalitarian society might want people to behave in ways that go against individual rights, such as liberty and life. Therefore, people at this stage reason that every person has the same basic rights and societies should be democratic in order to be able to change unfair laws. These people claim that Heinz is wrong for breaking the law by stealing the drug, because the law is a social contract that is constructed through a democratic process. On the other hand, an individual life is worth more than money and therefore Heinz act does not have to be morally wrong.

*Stage 6: Universal Principles*. People in this stage think that a democratic society is not sufficient for achieving a moral society. It could be possible that people democratically choose laws that do not feel just intuitively. Based on the philosophy of Immanuel Kant, human beings should be considered as having intrinsic value and dignity as individuals. Laws that hurt minorities or particular individuals should never be approved when they conflict with this universal Kantian principle. When reasoning at this stage, people often say that the druggist in the Heinz dilemma should imagine the situations through the eyes of Heinz and his wife and subsequently try to think what he would have done if he found himself in Heinz shoes. After empathizing with Heinz, the druggist will most likely also prefer life over property.

## Appendix B: Free Will and Determinism (FAD) Scale

**[1 - Totally Disagree] [2 – Disagree] [3 – Unsure] [4 – Agree] [5 – Totally Agree]**

1. I believe that my future has already been pre-determined by fate.
2. People's biological makeup influences their talents and personality.
3. Chance events seem to be the major cause of human history.
4. People have complete control over the decisions they make.
5. No matter how hard you try, you can't change your destiny.
6. Bad behavior is caused by bad life circumstances.
7. No one can predict what will happen in this world.
8. People must take full responsibility for any bad choices they make.
9. Fate already has a plan for each of us.
10. Psychologists and psychiatrists will eventually figure out all human behaviors.
11. Life seems unpredictable – just like throwing dice or flipping a coin.
12. People can overcome any obstacles if they truly want to.
13. What will be, will be –there's not much you can do about it.
14. Your genes determine your future.
15. I like the idea that people can't be predicted.
16. Criminals are totally responsible for the bad things they do.
17. Whether we like it or not, mysterious forces seem to move our lives.
18. Science has shown how your past environment created your current intelligence and personality.
19. There are random events going on – even at the level of atoms and molecules.
20. *People do not choose to be in the situations they end up – it just happens.* *
21. I hate it when scientists try to take the mystery out of life.
22. *Scientists will never be able to predict human behavior precisely.* *
23. Life is hard to predict because it is almost totally random.
24. *We should avoid punishing people because many of them can't help doing what they do.* *
25. *I don't believe in destiny.* *
26. As with other animals, human behavior always follows the laws of nature.
27. *I don't believe in chance.* *
28. Strength of mind can always overcome the body's desires.
29. If genes and environment completely determine your future, then you cannot be held responsible for your actions

Reverse the scoring on items marked with an *. Then add up all 7 items for each of the four subscales.

| | *Items* | | | | | | |
|---|---|---|---|---|---|---|---|
| **Fatalism** | 1 | 5 | 9 | 13 | 17 | 21 | 25* |
| **Determinism** | 2 | 6 | 10 | 14 | 18 | 22* | 26 |
| **Randomness** | 3 | 7 | 11 | 15 | 19 | 23 | 27* |
| **Free Will** | 4 | 8 | 12 | 16 | 20* | 24* | 28 |

There are six fill-up items in total: 2 14 26 6 18 29

Appendix C: Positive and Negative Affect Scale (PANAS)

**PANAS Questionnaire**

This scale consists of a number of words that describe different feelings and emotions. Read each item and then list the number from the scale below next to each word. **Indicate to what extent you feel this way right now, that is, at the present moment *OR* indicate the extent you have felt this way over the past week (circle the instructions you followed when taking this measure)**

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Very Slightly or Not at All | A Little | Moderately | Quite a Bit | Extremely |

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

**Scoring Instructions:**

Positive Affect Score: Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19. Scores can range from 10 – 50, with higher scores representing higher levels of positive affect. Mean Scores: Momentary = 29.7 (*SD* = 7.9); Weekly = 33.3 (*SD = 7.2)*

Negative Affect Score: Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20. Scores can range from 10 – 50, with lower scores representing lower levels of negative affect. Mean Score: Momentary = 14.8 (*SD* = 5.4); Weekly = 17.4 (*SD* = 6.2)

## Appendix D: Motivation Questionnaire

Please think about the math task you just completed. Mark the answer that best represents how you feel about each of the statements below.

A = Strongly Disagree
B = Disagree
C = Neutral
D = Agree
E = Strongly Agree

1. Doing well on this test was important to me.

2. I engaged in good effort throughout this test.

3. I am not curious about how I did on this test relative to others. *

4. I am not concerned about the score I receive on this test. *

5. This was an important test to me.

6. I gave my best effort on this test.

7. While taking this test, I could have worked harder on it. *

8. I would like to know how well I did on this test.

9. I did not give this test my full attention while completing it. *

10. While taking this test, I was able to persist to completion of the task.

* Denotes items that are reversed prior to scoring.

## Appendix E: Motivation Questionnaire

The programme R was used to randomly draw numbers between 1 and 20 twenty times. Subsequently, nine plus or minus symbols are randomly drawn twenty times with each symbol having a probability of 0.5.

1) 2 – 5 + 17 + 1 + 9 - 7 + 17 – 15 + 17 - 7 =
2) 4 + 9 + 11 – 4 – 8 - 11 + 10 – 11 + 13 + 20 =
3) 11 – 16 + 17 + 8 – 10 + 2 – 2 – 12 + 19 + 3 =
4) 10 + 19 – 14 – 9 – 7 – 1 – 3 + 15 + 15 + 14 =
5) 16 + 14 – 13 + 13 – 11 – 10 – 4 + 16 + 17 + 1 =
6) 4 + 20 + 8 – 15 + 10 – 4 + 7 + 7 + 15 + 14 =
7) 3 – 7 + 2 – 6 + 1 – 18 + 11 + 17 – 11 – 7 =
8) 6 + 11 – 11 + 5 + 2 + 15 – 8 – 15 – 4 + 3 =
9) 8 + 14 – 13 – 15 + 6 – 15 + 1 + 3 + 5 – 14 =
10) 20 – 14 – 5 – 12 + 16 + 19 + 19 + 18 – 7 – 1 =
11) 6 + 15 – 7 – 15 – 5 + 16 – 6 + 20 – 20 – 2 =
12) 17 – 4 + 4 – 4 + 3 + 17 – 13 + 6 – 11 – 15 =
13) 4 – 18 + 15 + 8 – 2 + 12 + 18 – 12 – 15 – 16 =
14) 10 – 16 – 9 + 1 – 7 + 16 – 11 – 6 – 20 + 11 =
15) 2 + 19 – 6 – 4 – 14 – 14 + 3 + 11 + 16 + 14 =
16) 15 – 2 + 20 + 17 – 2 – 17 + 17 – 17 + 18 + 1 =
17) 12 – 8 – 12 – 10 + 7 – 7 + 16 + 17 + 1 – 7 =
18) 3 – 6 + 16 – 16 – 11 + 6 – 20 – 1 – 3 + 11 =
19) 7 + 20 + 2 – 9 + 7 – 9 – 8 + 4 – 4 + 16 =
20) 12 + 19 – 3 – 15 + 13 + 17 – 6 – 8 + 20 + 2 =

Appendix F: Expected Results