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Autonomous vs. heteronomous mode of action control and task performance: The role of the situational context and action vs. state orientation

Abstract: The article presents the results of two experimental studies in which I investigated the effect of the situational context (autonomy-supportive vs. external control) and action vs. state orientation on perseverance and efficacy in task performance. The results of Study 1 ($n = 40$) confirmed that in a context which supports autonomy – as opposed to one which induces external control – people are much more likely to be not only more persistent and effective in their actions but also much more interested in the performed task. Interest in the performed task seems to also be – to some extent – a mediator in the relationship between persistence and efficacy. The results of Study 2 ($n = 69$) confirmed that a context, which supports autonomy positively, affects both persistence and efficacy. At the same time, the study shows that in a context, which supports autonomy, action-oriented people are more persistent and efficient in their actions than are state-oriented people. What is more, in an autonomy-supporting context, action-oriented people have a more positive attitude towards a given task than do state-oriented people.

Key words: autonomy, external control, self-regulation, state-orientation vs. action-orientation

Introduction

Both theoretical models in the psychology of motivation and experimental studies confirm that our decision to take action is a result of favorably evaluating both prospective gains and our ability to meet the demands of a task. For example, according to Gollwitzer (1996), intention formation ends the so-called deliberating phase. When we feel we stand to gain a lot from pursuing a given goal and we perceive it as attainable we are very likely to set this a goal for ourselves. This assumption is derived from classic theories called ‘expectancy x value’ theories (Larrick, 1993). These theories emphasize the fact that the motivation to act is a direct result of our expectations concerning prospective benefits we stand to gain by taking action.

However, presently researchers increasingly point out the existence of other important factors, which significantly affect two different stages of goal attainment: initiating action and continuing action (Łukaszewski & Marszał-Wiśniewska, 2006; Rothman, 2000; Rothman, Baldwin, & Hertel, 2004; Sansone & Harackiewicz, 1996; Sansone, Wiebe, & Morgan, 1999). Both research studies and everyday observations confirm that merely taking the first steps towards achieving a set goal is no guarantee of ultimately achieving that goal. According to some

researchers, people’s subjective attitude towards goal-related tasks is of paramount importance in the process of making consistent efforts to attain any goal. According to some researchers, our subjective attitude towards an activity is of major importance if we are to be consistent in our efforts (usually over a long time period of time) until we finally achieve our goal. These authors emphasize the fact that satisfaction and other positive subjective experiences are of key importance in staying motivated to achieve a goal – especially in the case of complex and/or long-term goals.

Subjective attitude towards a given activity as a determinant of perseverance in actions

The importance of the link between our motivation to persistently pursue a given goal and the way we experience goal-related activity was pointed out by Rothman and colleagues (Rothman, 2000; Rothman et al., 2004; Rothman, Baldwin, Hertel, & Fuglestad, 2011). According to these authors, the decision of whether or not to continue to pursue a given goal is based on individuals’ subjective feelings and sensations experienced during goal-related activity and individuals’ sense of whether these subjective feelings and sensations are important and satisfying enough

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to warrant further pursuit of a set goal. These subjective experiences directly translate into satisfaction derived from goal-oriented activity and underlie our decision to continue to pursue a given goal.

According to Rothman (2000), our willingness to persistently pursue a goal depends on whether we feel we are making progress towards achieving that goal. Satisfaction derived from having made progress towards achieving a goal is also of key importance – however, it is largely dependent on whether the goal we have set for ourselves is realistic. Very often people set themselves up for failure by setting unrealistic goals for themselves – as a result – over time they do not feel they are making any real progress towards achieving their goals and decide to give up on them. At this point, it is necessary to underline the importance of some other variables which – to a different degree- affect self-regulation efficacy at two different stages of goal attainment: action initiation and action continuation. For example, optimism can positively affect our evaluation of what we stand to gain by taking action and also our evaluation of our ability to meet the demands of a given task and thereby makes it easier for us to take action. At the same time, at a stage when it is crucial to continue to pursue a goal (by keeping up goal-oriented efforts) optimism can actually decrease the satisfaction we derive from both goal-oriented activity and the results we have achieved as they may seem dissatisfying in comparison to our initial expectations (Rothman, 2000; Rothman et al., 2004; Rothman et al., 2011). A concept consistent with Rothman's is one by Sansone and Harackiewicz (1996), although this model does not so much emphasize satisfaction derived from having made progress towards attaining a goal as it emphasizes the positive effect of being genuinely interested in the activity we are pursuing. These researchers differentiate between two different types of motivation which manage goal-oriented activity. According to this proposal, we decide to take action based on the value of the “expectancy x value” mental calculation – it allows us to evaluate the value of the outcome and the probability of attaining it (*outcome-derived motivation*), whereas we continue to pursue an activity if we are able to happily commit to it (*process-derived motivation*). This model proposed by Sansone and colleagues (Sansone & Harackiewicz, 1996; Sansone et al., 1999), emphasizes the importance of interest in a given activity which is a sort of direct reward in itself and a supporting factor essential to keeping up the motivation needed to attain a distant goal. Sansone and Harackiewicz (1996) underline that the influence of both these types of motivation (*outcome-derived vs. process-derived*) changes over time and very often an increase in one of them results in a decrease in the other one. For example, at times external factors may strengthen our outcome-derived motivation and simultaneously decrease our interest in the performed task.

Sansone and Harackiewicz's proposal makes references to research articles on motivation orientation and self-determination theory by Deci and Ryan (1985) and research on the phenomenon of flow or being

completely absorbed by a task by Csikszentmihalyi (1996). According to Deci and Ryan, the authors of the self-determination theory (*SDT-Self Determination Theory*), lack of efficacy and perseverance in our actions is often not the result of a low level of motivation but rather a low level of autonomous motivation. In accordance with the self-determination theory, our level of autonomous motivation indicates to what degree the actions we engage are consistent with our personal beliefs, needs and moral convictions and are not merely the result of peer pressure and attempts to please other people by fulfilling their expectations of us. According to Deci and Ryan, the situational context in which we are presented with a task significantly affects our subjective experiences during the performance of the task and this situational context is particularly conducive to greater task perseverance when it facilitates the formation of autonomous motivation.

Based on the results of multiple studies, these researchers have shown that the lower people are in autonomous motivation the less perseverant they are in their actions, the lower their task-performance scores are and the more likely they are to attribute their failures to factors beyond their control (Ryan & Deci, 2000). People low in autonomous motivation also tend to be less satisfied with what they achieve and even if they achieve great results it does not tend to improve their sense of well-being (Ryan, Mims, & Koestner, 1983). Studies confirm that, for example, teachers' self-determination – their levels of autonomous motivation – rub off on their students. Students have been shown to have different levels of autonomous motivation in their learning, different levels of interest in schoolwork and even different levels of achievement and perseverance depending on whether they are being taught by teachers who are self-determined (and thereby have strong autonomous motivation to teach) or are motivated rather by an external pressure to perform well (Ryan & La Guardia, 1999). Ryan and Connell (1989) also analyzed how different types of external motivation: external control, introjection, identification and integration are related to students' interest in and commitment to schoolwork. The researchers confirmed that the more students felt motivated by external pressure to perform well academically the less they were interested in schoolwork, the more they discounted the value of a good education, the less effort they put into preparing for upcoming classes, the less they felt responsible for their academic failures and the more likely they were to blame others for them, usually the teachers. Whereas, those students who felt motivated by introjection motivation to perform well academically were more committed to schoolwork but also experienced more stress and found it more difficult to deal with failures. A more autonomous motivation meant that those students were not only more interested in schoolwork but were also more committed to tasks which enabled them to acquire more knowledge.

According to Sansone, Harackiewicz and Morgan (1999) in a situation where a given goal is of great value to us but the process of its attainment is by no means a source of positive subjective experiences – e.g. the tasks involved

are boring and monotonous – we may attempt to try and make the tasks more attractive to us. The authors assume that people have implicit theories on how to manage their motivation by inciting interest in a task – they do so by making use of specific strategies (declarative knowledge) and knowledge about how and when to use these strategies for them to be most effective (procedural knowledge). It is worth emphasizing that on the basis of research studies, Sansone and Harackiewicz (1996) confirmed that there is significant individual variability regarding this skill – some of us are more likely to do use this skill and/or are better at enhancing interest in a given task than others. The results of one such study showed that people who are high in ‘hardiness’ find it easier than people high in ‘conscientiousness’ to concentrate on the task itself but the latter find it easier to focus on the end-result of the task. As a result, when the instruction that came with the task included a meaningful rationale, people high in ‘hardiness’ made use of various strategies which allowed them to make the boring task of copying matrices more interesting. If there was no meaningful rationale for performing the task, people high in ‘hardiness’ did not use any of these strategies and were less perseverant in performing it. In contrast, people high in ‘conscientiousness’ made no attempts to make the task more interesting but were nonetheless more perseverant in performing it than people low in ‘conscientiousness’ whether there was a meaningful rationale for performing it or not (Sansone et al., 1999).

Thus, we may assume that results of research conducted by Sansone, Wiebe and Morgan (1999) indicate that, in the case of some people, perseverance in task performance is greater the more they want to avoid experiencing negative emotions such as boredom or the more they want to experience positive emotions such as interest. In his concept of willpower, Kuhl points out the connection between willpower and self-regulation of affect and on the basis of numerous studies confirms that the ability to induce positive affect and neutralize negative affect always underlies the ability to persistently pursue goals (Jasielska & Szczygieł, 2007; Kadzikowska-Wrzosek, 2012, 2013; Koole, 2009; Koole & Kuhl, 2007; Kuhl, 1996; Kuhl & Kazén, 1999; Kuhl, Kazén, & Koole, 2006; Szczygieł & Jasielska, 2008). This same researcher also assumes there is relatively constant individual variability in the ability to regulate affect and refers to this as state vs. action orientation. Both poor executive functioning – referred to as ‘state-orientation’ – and superior executive functioning – referred to as ‘action-orientation’ – are directly linked to the ability to induce positive affect when faced with challenging goals and neutralize negative affect when dealing with failures and unpleasant or threatening events.

Studies have shown that in autonomy-supportive conditions, state-oriented individuals are neither particularly perseverant nor effective in their actions. Such individuals obtain higher scores in perseverance and efficacy in situations of pressure and external control. However, in order to perform well in such contexts they have to put a lot of effort into controlling their behavior and as a result their levels of energy are depleted and they suffer from

exhaustion (Baumann & Kuhl, 2005; Baumann, Kaschel, & Kuhl, 2007; Brunstein, 2001; Kadzikowska-Wrzosek, 2011). An experimental study by Keller and Bless (2008) which investigated the link between the skills-demands compatibility of a task and the state of being completely absorbed in a task (also known as the phenomenon of *flow*) showed that in state-oriented individuals this connection does not exist. In other words, these individuals do not experience the positive consequences of task-personality compatibility in the form of complete absorption in a task. In contrast, action-oriented individuals have been found to completely lose themselves in a task when there was compatibility between their skills and the demands of a task. Action-oriented individuals are usually more perseverant and effective in their actions, they have a stronger sense of self-determination and tend to set goals for themselves which are consistent with their preferences and needs (Baumann, Kaschel, & Kuhl, 2005; Kazén, Baumann, & Kuhl 2003; Kuhl & Kazén, 1994).

Self-determination theory indicates that autonomous motivation has such a strong and solely positive influence on perseverance and efficacy mostly because it sparks interest in a task and is the source of other positive emotions during task performance. On the other hand, studies conducted on the basis of Kuhl’s theory prove that in the case of state-oriented people – due to their poor executive functioning – effective and perseverant task performance only occurs in situations of pressure and external control. Their behavior is usually regulated by external factors such as social pressure, marks or other types of rewards and punishments. Thus, we may assume that in the process of goal attainment such individuals do not rely greatly on the possibility to spark positive emotions related to a task – such as interest in it – but rather resort to negative sources of motivation, namely fear of failure or fear of negative outcomes that will ensue if they do not complete a given task (Baumann, 2004; Baumann & Kuhl, 2005; Fuhrmann & Kuhl, 1998; Keller & Bless, 2008; Kuhl & Fuhrmann, 2009). Thereby, we can expect an interactional influence of an autonomy-supporting situational context and individual differences in executive functioning on interest in a given task and as a result on perseverance and efficacy in task performance. The rationale for such prediction can be found also in results provided by Sansone, Wiebe and Morgan (1999) which were presented in the introduction.

State-oriented individuals are more persistent in contexts which induce pressure rather than ones which support autonomy whereas efficacy and perseverance in action-oriented individuals is more dependent on internal factors in self-regulation, including the ability to induce positive emotions (such as interest) in relation to a task.

Research Overview

Two experiments were conducted in an attempt to test hypotheses that linked perseverance and efficacy to the type of situational context as well as to action vs. state orientation. In Study 1 I wanted to find out whether perceived interest

in a task would mediate the relation between an autonomy supportive context and perseverance and efficacy in task performance. In Study 2 I aimed to show the influence of the situational context (autonomy vs. external control) and action vs. state orientation on efficacy, perseverance and subjective experiences after task performance.

Study 1

The goal of this study was to verify the following hypothesis:

Hypothesis (1) An autonomy supportive condition has a more positive effect on the persistence and effectiveness of task performance than an externally controlled condition.

Hypothesis (2) Perceived interest in a task mediates the relation between autonomy supportive condition and effective task performance.

Participants

Forty students participated (26 women, *mean age* = 17.53). All the participants were students of a high school in Gdansk. Each participant was randomly assigned between two experimental conditions: autonomy ($n = 20$, 14 women) vs. external control ($n = 20$, 12 women).

Procedure

The study was introduced as a cognitive task designed to find out more about the effect of the attention deficits on cognitive functioning. In the beginning of the study all the participants were given instructions in accordance with the type of group they were assigned to – the aim of this step was to make them feel as if they have little control over the situation (external control) or induce enthusiasm and commitment towards the task (autonomy-supportive). Twenty participants were asked to do their best on the experimental task in a controlling manner:

„The following task is not an easy one but you must try your hardest to get the highest score possible if we are to make any use your results. By performing this task correctly you will provide us with feedback on how well this task can be done. We will only use the results of those participants who score the highest. The scores you obtain will also be an important source of feedback to you about your intellectual capabilities – your result will be compared with those of other participants. Research shows that these types of tasks are a very effective and reliable test of people’s ability to perform intellectual tasks in general.”

Twenty participants were asked to do their best on the experimental task in an autonomy-supportive manner:

„The task you are about to solve is not easy, it may even irritate you a bit and/or induce a sense of impatience. We know how you feel because we performed this task ourselves earlier. Nonetheless, we kindly ask you to try and overcome these hurdles as we strongly believe that you will succeed in performing this task. By performing this task to the best of your abilities you will give us valuable feedback regarding the maximum score attainable in this task and this in turn will be of great help to us in our future research.”

The study was conducted in small groups. After reading the instruction participants got to work on the study task which involved copying matrices. Participants were told that although they were not expected to copy every matrix, they were to copy as many matrices as they could before quitting. Participants individually signaled that they had finished the task by raising their hand. Once participants raised their hand I would make a note of the time it took them to solve the task. To finish off the study, all participants rated their interest in the performed task using the IMI Inventory (*Intrinsic Motivation Inventory*) scale developed on the basis of the self-determination theory (Ryan, 1982).

Measured variables

The Intrinsic Motivation Inventory (IMI; Ryan, 1982) was administered to assess participants’ interest in the experimental task. The IMI is a measurement device intended to assess participants’ subjective experience related to a target activity in laboratory experiments. It is a Likert-type scale where each item is rated on a scale from 1: *definitely disagree* to 7: *definitely agree*. This scale, which measures interest in the performed task, is believed to measure intrinsic motivation and consists of 7 items. Some of the items featured in the scale are as follows: *“I thought this was a very interesting task”*, *“I had a lot of fun doing this task”*, *“I did not find solving this task the least bit engaging”*. In the researched sample this inventory obtained a satisfactory reliability coefficient of α -Cronbach = 0.92.

The dependent variable was the effectiveness and perseverance in performing the task, which involved copying matrices taken from Raven’s Tables. I adopted the following indicators of perseverance and efficacy (Łukaszewski & Marszał-Wiśniewska, 2006):

- *perseverance* – time taken to perform the task measured in minutes;
- *efficacy* – the level of task performance measured by the number of copied matrices;
- *effective perseverance* – a synthetic type of indicator – takes into consideration the time taken to perform the task and the level of performance. I calculated it by multiplying ranked (the highest rank was attributed to the best score) raw data on perseverance and efficacy.

Results

An independent-samples t tests indicated that the autonomy condition participants persisted significantly longer ($M = 17.78$; $SD = 2.79$) than the external control condition participants ($M = 14.52$; $SD = 5.38$), $t(28.53) = 2.41$, $p < .05$, $d = .76$. On the efficacy measure, an independent-samples t test indicated that the autonomy condition participants also scored significantly higher ($M = 10.80$; $SD = 8.12$) than those in the external control condition at the coping activity ($M = 5.40$; $SD = 4.37$), $t(29.15) = 2.62$, $p < .05$, $d = .83$. As a result, participants from the autonomy condition obtained significantly higher scores in the synthetic indicator of effective perseverance ($M = 6939.71$; $SD = 3833.23$) than participants from the

external control condition ($M = 3108.58$; $SD = 3579.67$), $t(38) = 3.27$, $p < .01$, $d = 1.03$. The results of the performed analyses are shown in Figures 1, 2 and 3 below.

Independent-samples t tests indicated also the existence of between-group differences in participants' reported interest in the performed task. Participants in the autonomy condition reported greater interest in the task ($M = 3.79$; $SD = 1.28$) than those in the external control

condition ($M = 2.06$; $SD = .93$), $t(38) = 4.91$, $p < .001$, $d = 1.55$. The results are shown below in Figure 4.

The follow-up analyses were done to check whether participants' reported level of interest in the performed task would mediate the relation between autonomy condition and the synthetic indicator which measured both perseverance and efficacy – effective perseverance. In order to do this I performed a three-step regression analysis in

Figure 1. Time taken to perform the task in the autonomy and external control groups

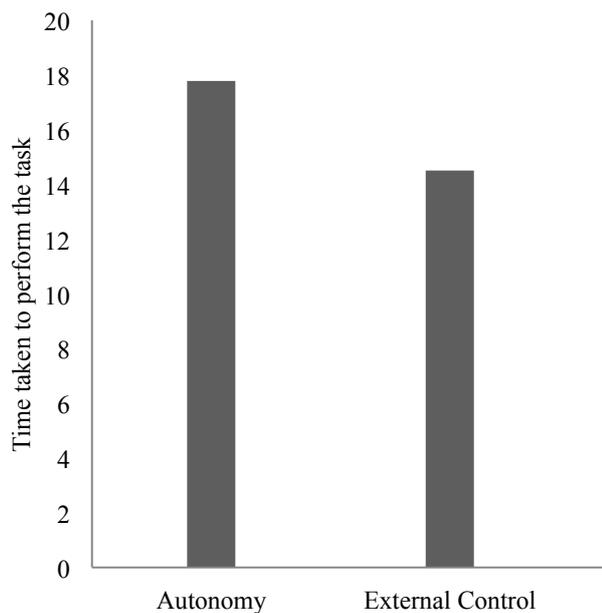


Figure 2. Efficacy of task performance in the autonomy and external control groups

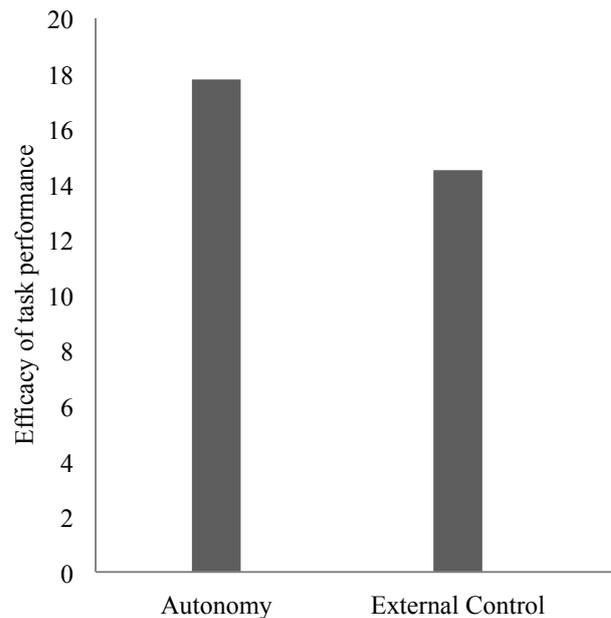


Figure 3. Effective perseverance in the autonomy and external control groups

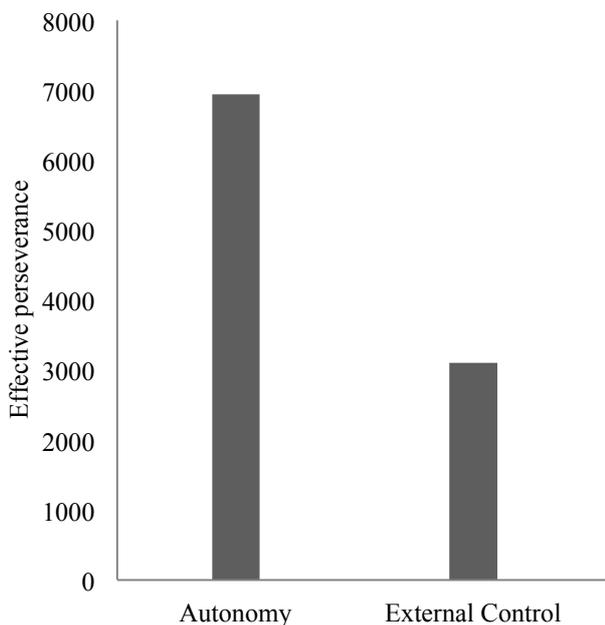
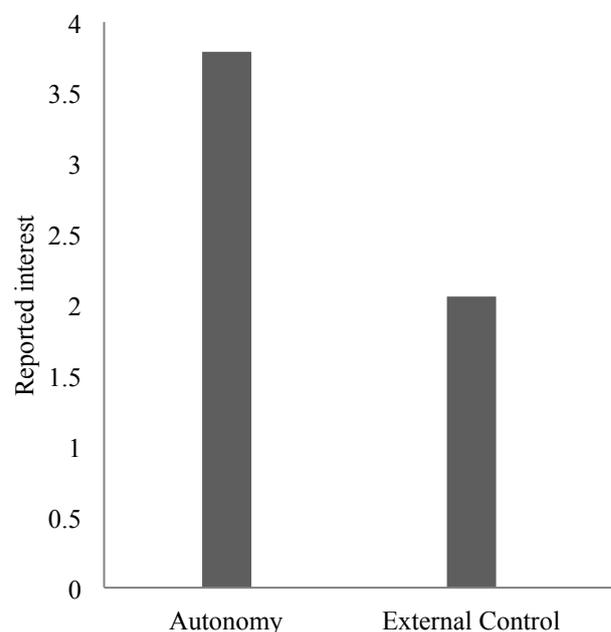


Figure 4. Reported interest in the performed task in the autonomy and external control groups



accordance with Baron and Kenny's approach (1986) to seek out mediation. Steps 1 and 2 involve showing that the independent variable (i.e., autonomy condition) is related to the outcome (i.e., effective perseverance) and showing that the independent variable is related to the mediator (i.e., reported level of interest). These effects were confirmed and reported below. Step 3 requires that the mediator affect the outcome variable, controlling for the independent variable. The performed regression analyses confirmed that an autonomy condition encourages task performance and is a significant predictor of effective perseverance ($\beta = .40$; $p < .05$). In the first step I therefore confirmed that supporting autonomy significantly increased both efficacy and perseverance in task performance – based on the synthetic indicator of effective perseverance. In the next step I confirmed the existence of a significant relationship between a context that supports autonomy and a mediator which signifies the level of reported interest in the task ($\beta = .62$, $p < .001$). In a model which involved both an autonomy condition and a level of the mediator (level of reported interest in a task), the effect of condition on effective perseverance dropped from significant ($\beta = .40$) to nonsignificant, $\beta = .17$, *ns.*, whereas the mediator remained significantly related to the dependent variable ($\beta = .36$, $p < .05$). The Goodman Test value, which was used to monitor the significance of mediation in small samples $Z = 1.86$, $p < .1$ indicates however that this is rather a statistical trend. The relationships described above have been illustrated with Figure 5.

Discussion

Hypothesis 1 which predicted that participants would be more persistent and effective in task performance in autonomy-supportive conditions rather than external control conditions has therefore been confirmed by the results of Experiment 1. Participants motivated to perform the task in an autonomy-supportive manner and thereby brought out natural enthusiasm and commitment for the task spent a significantly longer time on it and were more effective in their performance than participants in external controlling

conditions. The analyses I obtained only partially confirmed Hypothesis 2 which predicted that interest in the performed task is a mediator in the relationship between an autonomy-supportive condition and the efficacy and perseverance of task performance. However, the value of the Goodman test confirmed that this relationship is merely a statistical trend.

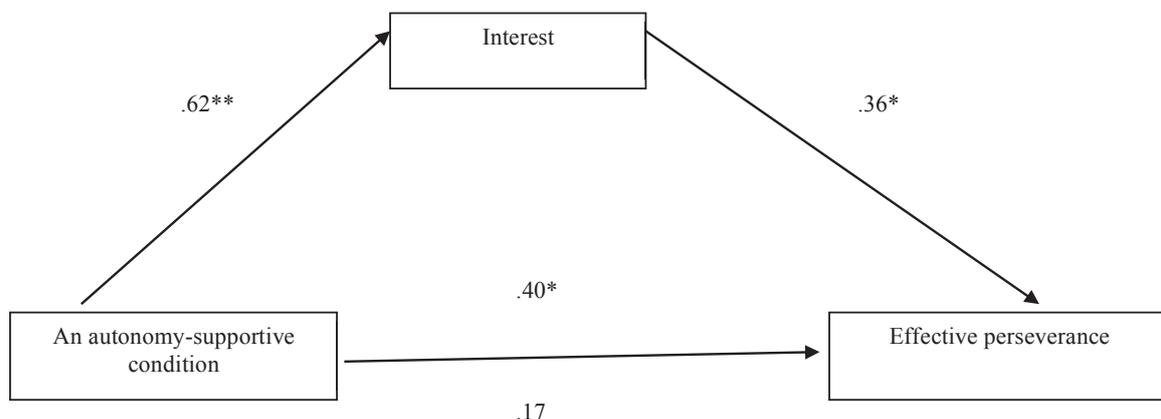
Thus, I may conclude that the results of Experiment 1 are generally consistent with the self-determination theory and studies conducted based on this theory. Ryan and Deci (2000, 2004, 2006, 2008) proved that in contrast to an external controlling context, an autonomy-supportive context fosters performance efficacy and begets more creative solutions.

Study 2

The research results obtained by Kuhl and colleagues (Baumann & Kuhl, 2005; Fuhrmann & Kuhl, 1998; Koole, 2004; Kuhl & Fuhrmann, 2009) suggest that action oriented individuals who are characterized by superior self-regulation competencies are highly effective in controlling their actions. They can both defend themselves against external pressure and maintain a sense of autonomy despite unfavorable circumstances and are also able to fully commit to a task in circumstances which allow them to integrate specific standards with their self. Research studies also confirm that individuals who are characterized by poor self-regulation competencies – state oriented individuals – are more likely to succumb to pressure generated by external factors. As a result, in such circumstances state-oriented individuals are actually likely to be more persistent and effective in their actions than in circumstances that support autonomy. Action regulation in state-oriented individuals is not so much based on inducing positive emotions (such as interest) as it is on avoiding negative emotions such as fear of negative outcomes that are likely to ensue if we fail to attain a set goal (Kuhl & Fuhrmann, 2009; Kadzikowska-Wrzosek, 2012, 2013).

The goal of Study 2 was to verify hypotheses concerning the effect of contextual factors (external control

Figure 5. Mediation of effective perseverance by interest in the performed task



* significance level $p < .05$; ** significance level $p < .001$

vs. autonomy support) and dispositional factors (state vs. action orientation) on persistence and efficacy, and on the subjective experiences after performing the activity. Therefore I formulated the following hypotheses:

Hypothesis (1) In the autonomy condition participants persist for significantly longer and work more efficiently than in other experimental conditions.

Hypothesis (2) An autonomy-supportive condition is of greatest benefit to action-oriented individuals than to state-oriented individuals. In autonomy supportive conditions action-oriented individuals work more persistently and effectively than state-oriented individuals.

Hypothesis (3) Subjective feelings experienced during task performance depend both on the contextual factors (external control vs. autonomy support) and dispositional factors (state vs. action orientation). In action-oriented individuals an autonomy supportive condition is conducive to positive subjective experiences. In contrast state-oriented participants are not expected to profit from autonomy-supportive condition and their mood and other subjective experiences after completing the task would be less positive than action-oriented individuals.

Participants

Sixty nine university students participated (47 women, aged 18 to 27). They were randomly assigned to one of the three conditions: autonomy ($n = 23$, 14 women), external control ($n = 23$, 17 women) and control condition ($n = 23$, 16 women).

Procedure

Participants were run in small groups. As a cover story they were told that the study dealt with the effects of psychological factors on the coping with different tasks. They were first asked to rate their momentary mood by means of the Overall Mood Scale (Wojciszke & Baryła, 2005). Subsequently all the participants filled in the Action Control Scale (ACS-90, Kuhl, 1994) (Polish adaptation of the Scale by Marszał-Wiśniewska, 2002). In the study I used both the AOD/SOD (*decision-related action versus state orientation*), and the AOF/SOF (*failure-related action versus state orientation*). Next, participants read the task instruction. The instruction was different for each condition and was written in a way which induced pressure (external control condition) or positive engagement (autonomy-supportive condition) or simply in a very informative manner (control condition). Instructions which were supposed to induce external control or support autonomy, were identical to those featured in Study 1. Then, I explained to the participants the rules of the Mathematics task they were going to perform – evaluations of their persistence and efficacy in solving the task were based on the length of time they spent on it and their overall score. Finally, participants rated their interest in the task on the IMI scale (*Intrinsic Motivation Inventory*) created on the basis of the self-determination theory (Ryan, 1982). Based on the scale, participants also stated the reason(s) they

stopped working on the experimental task. Subsequently, participants were asked to reassess their momentary mood by means of the Overall Mood Scale (Wojciszke & Baryła, 2005).

Measured variables

The independent variable in the study was individual variability in state vs. action orientation. I measured the differences between participants in this respect by means of the Action Control Scale (ACS-90) by Kuhl (the Polish adaptation by Marszał-Wiśniewska, 2002). Kuhl (2000) distinguishes between Threat-related Action Orientation (AOF), which relates to coping with negative affect, and Demand-related Action Orientation (AOD), which relates to coping with frustration of positive affect. Unique effects of state orientation linked with low ability to down-regulate negative affect have emerged in response to self-threatening conditions. While unique effects of state orientation linked with low ability to regulate positive affect have emerged in response to demanding conditions, such as performance-contingent rewards. However, abilities to regulate positive affect and to down-regulate negative affect are often positively correlated, and sometimes yield similar effects under similar circumstances (Diefendorff, Hall, Lord, & Streat, 2000). It seems that manipulation used in Study 2 targeted both low positive and high negative affect (Koole, 2004). For this reason in this study I used AOD/SOD scale (*decision-related action versus state orientation*), which is theoretically linked with regulation of positive affect (Baumann & Kuhl, 2005). In the study sample, the AOD/SOD scale obtained a satisfactory reliability (Cronbach's $\alpha = .76$). Participants also completed the AOF/SOF scale (*failure-related action versus state orientation*), which is theoretically linked with down-regulation of negative affect. The AOF/SOF scale also received a satisfactory reliability value (Cronbach's $\alpha = .73$). Each subscale ranges from 0–12 with lower scores indicating state-orientation and higher scores indicating action-orientation. For the analyses of data I classified participants into two groups, state vs. action oriented. As in other research (e.g., Jostmann & Koole, 2006; Kazén, Baumann, & Kuhl, 2005; Wojdylo, Kazén, Kuhl, & Mitina, 2014), I split the sample at the conceptual midpoint of the AOD/SOD and AOF/SOF subscales. The action control scales are not assumed to measure a continuous dimension from state to action orientation but it is proposed that one of two qualitatively different action control modes is associated with each pole of the continuum (Kazén et al., 2005).

Another dependent variable in the study was the momentary mood of the participants. Participants momentary mood was rated by means of the Overall Mood Scale by Wojciszke and Baryła (2005). In the study the scale obtained high reliability value (Cronbach's $\alpha = .95$).

I rated participants' interest in the study task the same way I did in Experiment 1 – by means of the IMI Scale (*Intrinsic Motivation Inventory*) (Ryan, 1982). In the researched sample, this scale had high reliability value (Cronbach's $\alpha = .94$).

Participants reported the reasons that caused them stop their work on the experimental task by filling in

a scale that suggested eight possible reasons (*felt bored, felt frustrated, felt physically tired, felt mentally tired, experienced a setback, completed the task, felt there was no sense in carrying on with the task, ran out of ideas*) (Liu & Gollwitzer, 1990 by Sansone et al., 1999). In the study I adopted a Likert type of scale where each statement was rated on a scale from 1: *completely not the case* to 7: *definitely the case*. In order to determine the inner structure of the scale I performed an explorative factor analysis using the method of main components. After performing the analysis with an orthogonal factor rotation using the Varimax method I realized that the first factor strongly loads the following dimensions: mental tiredness, physical tiredness, frustration (24.00% of variance). The second factor is made up of the following dimensions: running out of ideas, completing the task, encountering setbacks (19.64% of variance). The third factor includes two dimensions: no sense in carrying on and boredom (17.76% of variance). Interpreting the factors in psychological categories we introduced three variables which described the reasons for stopping the task:

- 1) *tiredness – effort put in the performance of the task;*
- 2) *objective reasons for finishing (stopping) the task;*
- 3) *boredom – lack of interest in the task.*

Indicators of each of these variables were obtained by averaging the scores of particular dimensions that make up each factor.

I took the Mathematics task that the participants performed from a classic work by Clark (1935) – the author presents it as a task which allows experimenters to evaluate participants' perseverance. The instruction, which was the same for all the participants, was as follows:

*The task you are about to perform is a Mathematics task. Do your best to find as many numbers in the range from 1 to 100 which can be presented by using various mathematical operations (such as addition, subtraction, multiplication and division) done on a maximum of six „3s”. Exactly as it has been shown in the example of the first 5 numbers. Remember that you have only six „3s” and are allowed to perform just the most basic mathematical operations such as **addition, subtraction, multiplication and division**. Spend as much time on the task as possible and try to be as diligent as possible. When you feel that you are no longer able to work on the task report this to the experimenter.*

I adopted the following indicators of perseverance and efficacy in solving the Mathematics task (Łukaszewski & Marszał-Wiśniewska, 2006):

- *perseverance*- time taken to complete that task measured in minutes;
- *efficacy*- the level of task performance, measured by the number of correctly solved task items (we excluded incorrect answers when calculating this indicator);
- *effective perseverance*- a synthetic type of indicator – takes into consideration the time taken to perform the task and the level of performance. We computed it by multiplying ranked (the highest rank was attributed to the best score) raw data on perseverance and efficacy.

Results

In order to find out if there were any significant between-group differences in the adopted indicators of perseverance and efficacy one-way ANOVA was conducted using condition as the independent variable. A planned comparison between the groups which contrasted perseverance and efficacy of task solution in the autonomy condition with that of the other groups indicated that participants in autonomy condition persisted for significantly longer and worked more efficiently. The comparison turned out to be statistically significant with respect to all of the adopted indicators: for perseverance $t(66) = 8.76, p < .001$, for efficacy $t(66) = 10.11, p < .001$, effective perseverance $t(66) = 5.86, p < .001$. Participants in the autonomy condition worked on the task longer ($M = 29.06$) than participants from the two other groups ($M = 26.68$), and also gave more correct answers ($M = 32.43$) than participants from the control condition and external control condition together ($M = 28.17$). What is more, participants from the autonomy condition made more attempts to solve consecutive task items ($M = 40.35$) than did participants from the external control condition and control condition together ($M = 36.39$). I also found that in the autonomy condition participants scored higher on both efficacy and perseverance ($M = 1762.74$) than participants from the two groups together ($M = 1375.16$).

According to their AOD/SOD scores, 28 participants were classified as state oriented because their scores were below the sample median (i.e., lower than 5, $M = 4.73$; $SD = 1.73$) and 41 as action oriented because their scores were above the median (i.e., a score of 7 or higher, $M = 9.54$; $SD = 1.37$). While according to their AOF/SOF scores, 37 participants were classified as state oriented because their scores were below the sample median (i.e., lower than 5, $M = 3.11$; $SD = 1.43$) and 32 as action oriented because their scores were above the median (i.e., a score of 5 or higher, $M = 7.97$; $SD = 1.40$).

Based on an independent-samples t test I compared perseverance, efficacy and effective perseverance in participants who were state vs. action oriented in particular experimental groups. The comparison yielded a significant effect of action vs. state orientation which relates to AOF/SOF Scale, but not to AOD/SOD Scale.

The results of the analysis confirmed there were differences between state-oriented participants and action-oriented participants from the autonomy –supportive condition in solving the task (related to perseverance) but they were on the level of a statistical trend, $t(21) = 1.92, p < .1, d = .70$. Action-oriented individuals in the autonomy –supportive condition spent more time on the task ($M = 34.99$; $SD = 16.65$) than state-oriented individuals ($M = 24.51$; $SD = 9.58$). No such differences were noted between state-oriented and action-oriented individuals in the other groups: external control condition (state-oriented: $M = 25.30$; $SD = 10.92$, action-oriented: $M = 28.38$; $SD = 15.22$) and control condition (state-oriented: $M = 29.02$; $SD = 9.36$, action-oriented: $M = 24.63$; $SD = 14.73$). The discussed relationships are shown in Figure 6.

Significant differences were also found in the autonomy –supportive condition between state vs. action oriented people in effective perseverance $t(21) = .06$, $p < .05$, $d = .85$. In this condition, action-oriented individuals scored significantly higher ($M = 2379.60$; $SD = 1452.34$) in effective perseverance which measured both perseverance (time spent on the task) and efficacy (number of solved items) than individuals who were state-oriented ($M = 1288.23$; $SD = 1096.01$). However, such differences regarding effective perseverance were not found in the remaining conditions: external control condition (state-oriented: $M = 1139.10$; $SD = 1105.37$, action-oriented: $M = 1426.03$; $SD = 1200.34$) and control condition (state-oriented: $M = 1606.59$; $SD = 1135.08$,

action-oriented: $M = 1376.33$; $SD = 1412.24$). The discussed relationships are shown in Figure 7.

Next based on an independent-samples t test I compared reasons for stopping the task, level of interest in the task, momentary mood ratings before and after experimental induction in participants who were state vs. action oriented in particular experimental groups. The comparison yielded a significant effect of action vs. state orientation which relates to AOD/SOD Scale, but not to AOF/SOF Scale.

An independent-samples t test yielded a significant ($p < .05$) differences between state vs. action oriented individuals in the autonomy –supportive condition in the reported levels of tiredness. In this condition, action-

Figure 6. Perseverance (time spent solving the task) in state-oriented individuals vs. action-oriented individuals in the conditions: autonomy, external control and control

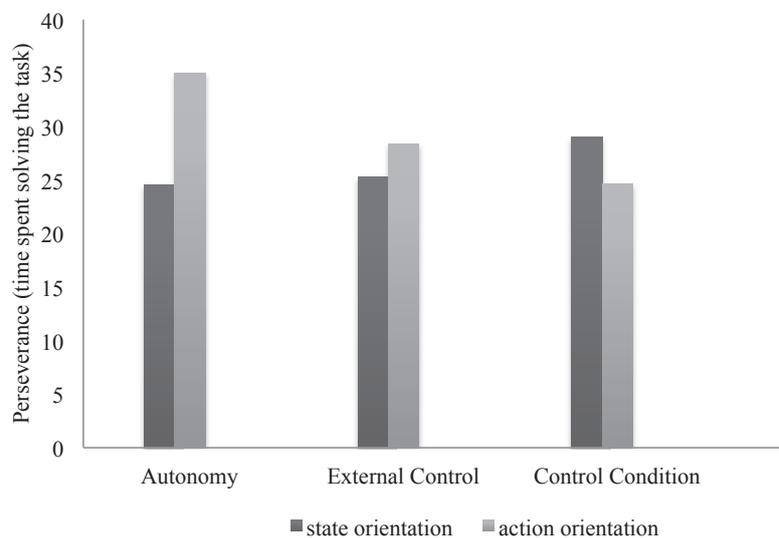
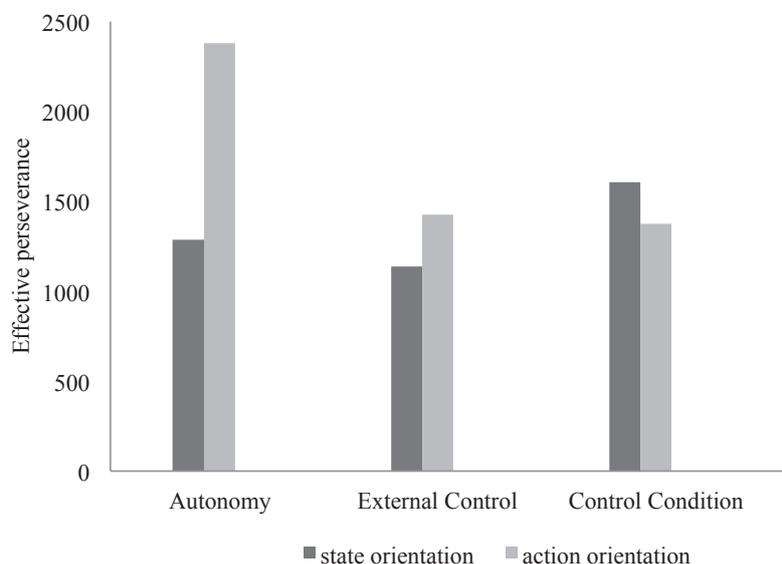


Figure 7. Effective perseverance in state vs. action oriented individuals in the conditions: autonomy, external control and control



oriented individuals reported a significantly lower level of tiredness ($M = 2.74$; $SD = 1.83$) than state-oriented individuals ($M = 4.00$; $SD = 1.50$), $t(21) = 1.98$, $d = .75$. Such differences were not found in the other conditions: external control condition (state-oriented: $M = 2.92$; $SD = 1.06$, action-oriented: $M = 3.57$; $SD = .97$) and control condition (state-oriented: $M = 3.24$; $SD = 1.42$ action-oriented: $M = 4.41$; $SD = 1.47$). The discussed relationships have been shown in Figure 8.

I also confirmed the existence of differences ($p < .1$) between state vs. action oriented individuals from the autonomy –supportive condition in the levels of interest in the task. In the autonomy –supportive condition, action-oriented individuals reported greater interest in the task

($M = 5.32$; $SD = 1.01$) than state-oriented individuals ($M = 4.05$; $SD = 1.73$); $t(21) = 2.22$, $d = .90$. Such differences were not found in the other groups: external control condition (state-oriented: $M = 4.24$; $SD = 1.51$, action-oriented: $M = 4.11$; $SD = 1.78$) and control condition (state-oriented: $M = 4.74$; $SD = 1.54$ action-oriented: $M = 4.19$; $SD = 1.55$). The discussed relationships have been shown in Figure 9.

I analyzed momentary mood ratings of participants before and after the experimental induction. In any group there were no significant differences in momentary mood ratings of action-oriented and state-oriented participants before the experimental induction. The analysis revealed significant differences ($p < .05$) in momentary mood

Figure 8. Level of reported tiredness in state vs. action oriented individuals in conditions: autonomy, external control and control

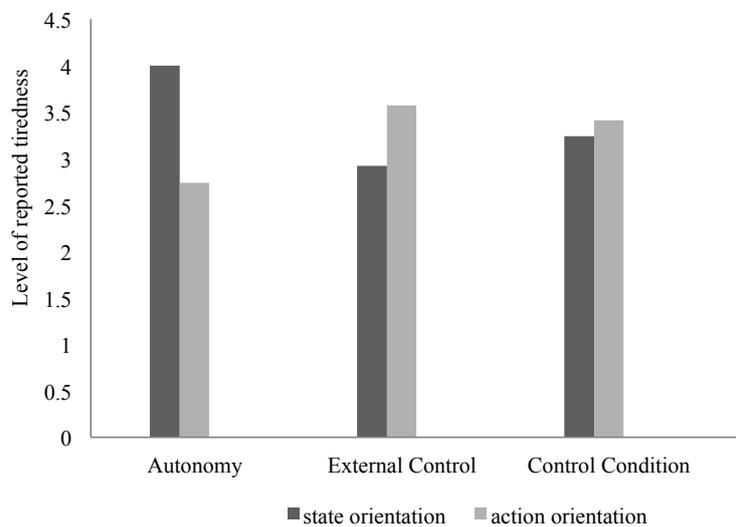
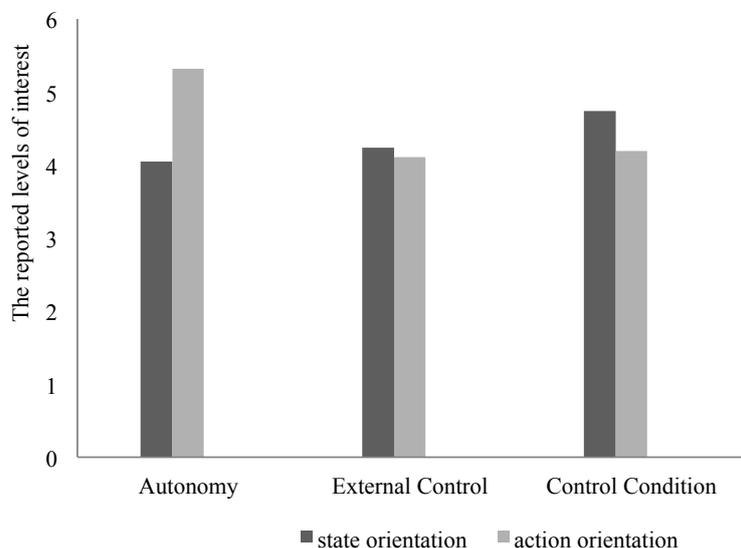


Figure 9. The reported levels of interest in the performed task in state vs. action oriented individuals in the conditions: autonomy, external control and control



only after experimental induction between state-oriented individuals and action-oriented individuals in the autonomy-supportive condition. Action-oriented individuals ($M = 4.41$; $SD = .79$) in the autonomy-supportive condition reported being in a more positive mood after performing the task than state-oriented individuals ($M = 3.64$; $SD = .86$), $t(21) = 2.16$, $p < .05$, $d = .93$. Such differences were not found in the other conditions: external control condition (state-oriented: $M = 4.02$; $SD = 1.04$, action-oriented: $M = 4.19$; $SD = .85$) and control condition (state-oriented: $M = 4.32$; $SD = .48$, action-oriented: $M = 4.22$; $SD = .76$). The discussed relationships are presented in Figure 10.

Discussion

As I expected, the performed analysis confirmed that a situational context which supports autonomy has a positive effect on both the level of achievement and perseverance in solving a mathematical task. Thus, I can state that Hypothesis 1 was confirmed by the results of the study. This result is consistent with theoretical assumptions and research studies conducted on the basis of Ryan and Deci's self-determination theory (2000). Participants in the autonomy condition attempted to solve more task items and gave more correct answers. This result suggests that supporting autonomy not only encourages greater commitment to a task – which is visible in the number of attempts participants in this group made to solve the task – but also helps people find solutions to an intellectual problem. Thus, I may state that supporting autonomy enables people to solve complex, intellectual problems and tasks. Consistent with Hypothesis 2 results obtained in the study 2 confirmed also that supporting autonomy has a particularly positive impact on action-oriented individuals. It was only in the autonomy-supportive condition that we saw differences between state and action oriented people in terms of the time spent on solving the task and the efficacy of effort put in solving the task. In

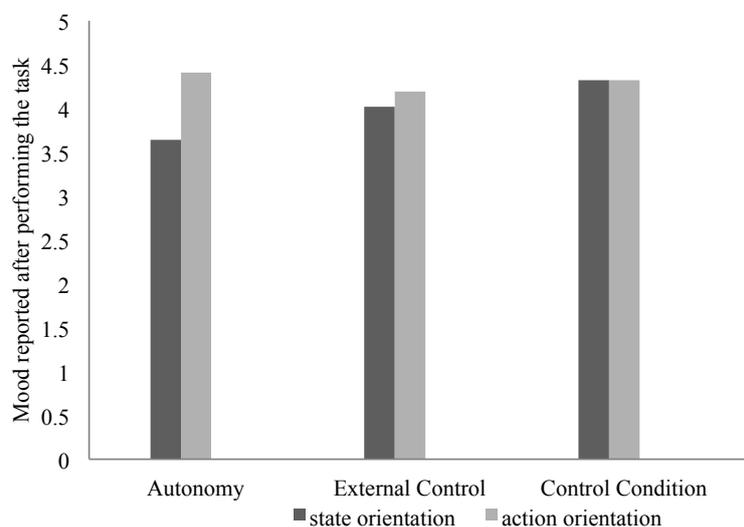
comparison to state-oriented people, action-oriented people spent significantly more time on the task and were more effective in solving it.

The analysis I performed also revealed that, in comparison to state-oriented individuals, action-oriented individuals in the autonomy-supportive condition reported a significantly lower level of tiredness after completing the task, said they had been more interested in the task and were in a better mood upon completing the task. I can therefore assert that supporting autonomy paired with superior self-regulation of affect allows individuals to perceive a task as more positive. This result is consistent with studies by Keller and Bless (2008) on the link between the phenomenon of flow and regulatory compatibility. These authors showed that a skills-demands compatibility of a task fosters flow experiences but only in action-oriented individuals. State-oriented individuals did not experience flow even with a skill-demands compatibility of a task. Similarly, the results of Experiment 2 confirmed that a certain compatibility between an autonomy supporting situational context and superior self-regulation of affect allowed action-oriented individuals to perceive the task as more positive. At the same time, this result serves as confirmation of the assumptions stated in Hypothesis 3.

General Discussion

Ryan and Deci (2000, 2006, 2008) claim that the way in which we approach all sorts of demands and expectations placed on us by others determines our level of commitment and engagement in the process of attaining any goal. Our subjective feelings translate into perseverance, accomplishments and creative solutions to intellectual problems we are faced with. Depending on whether the situational context supports autonomy or pressure, people experience a greater or smaller sense of self-determination. According to Ryan and Deci, this sense

Figure 10. Mood reported after performing the task in state-oriented vs. action-oriented individuals in the conditions: autonomy, external control and control



of self-determination seems to be of key importance in the process of regulating intentional activity. In line with Sansone's and Harackiewicz's (1996) concept which we presented in the introduction, a situational context which motivates by supporting autonomy not only promotes a sense of self-determination but can also spark greater interest in the task and other positive emotions in the process of completing the task. The model proposed by Sansone and Harackiewicz (1996) emphasizes the impact these emotions and attitudes have on our motivation to perform a task which in turn promotes perseverance and greater efficacy in task performance.

The results of Study 1 confirmed that motivating people by supporting autonomy as opposed to inducing external control – is not only conducive to greater perseverance and efficacy but also sparks greater interest in the task itself. What is more, performed analyses – to some extent – allow us to assume that interest in a task sparked by supporting autonomy plays the role of a mediator in the relationship between task context and efficacy.

Results of Study 2 confirmed the positive influence of a context that supports autonomy on perseverance and efficacy of task performance. The results of this experiment also showed that this positive impact pertains mostly to people characterized by superior self-regulation of affect namely action-oriented individuals. Action-oriented people who were motivated to perform the task through supporting autonomy spent more time on the task and were more effective in performing it than state-oriented people motivated the same way. What is more, in an autonomy supporting context action-oriented people who had just completed the task reported they were in a better mood, felt less tired and had been more interested in the task itself than their state-oriented counterparts. These results could suggest the positive impact autonomy supporting has on motivation – it strengthens motivation by inducing positive attitude during task performance. However, this positive impact is only limited to people who are already superior in self-regulation of affect and thereby are characterized by effective regulatory mechanisms.

According to Kuhl and colleagues (Fuhrmann & Kuhl, 1998; Kuhl, 1996, Kuhl & Fuhrmann, 2009), executive functioning – the ability to self-regulate affect – is closely tied to personality. Action-oriented individuals – due to their ability to call on positive affect and neutralize negative one – are able to effectively motivate themselves, make good decisions and set goals which are compatible with their needs and personal values. Due to superior self-regulatory mechanisms, the actions of such people are not only consistent with their goals but also with their self. This type of goal achievement is associated with a democratic type of regulatory control. In contrast, due to inferior mechanisms of affect control, state-oriented people find it difficult to initiate a task, persevere in completing it and generally have trouble setting goals consistent with their self. As a result, state-oriented people function well in circumstances of external control but even in such a context they are unable to accurately assess whether the goals set by the task are consistent with their personal needs and

values. Their actions are usually the result of negative forms of self-motivation which are not so much consistent with their self as they are with a set goal. This type of goal achievement is linked to an authoritarian type of regulatory approach (Fuhrmann & Kuhl, 1998; Kuhl, 1996, Kuhl & Fuhrmann, 2009).

Sansone and Harackiewicz (1996) emphasize the importance of different motivational factors in the stages of initiating task completion and continuing task completion. According to these researchers, perseverant and effective goal attainment results from our ability to happily commit ourselves to a task. Therefore, our ability to regulate subjective experiences in the process of completing a given task is of primary importance in the process of goal attainment. At the same time, Sansone and colleagues notice that the ability to happily commit to a task and regulate subjective emotions is a matter of individual variability. For example, people who are high in conscientiousness tend to work very persistently and effectively on a task whether their subjective experiences during task performance are positive (e.g., interest) or negative (e.g., boredom) (Sansone et al., 1999).

Based on their research, Keller and Bless (2008) have pointed out the fact that, on the one hand, the feeling of positive commitment, linked to the experience of flow, is the result of a skills-demands regulatory compatibility of the task but on the other hand this compatibility is subjectively experienced as the experience of flow only by action-oriented individuals. State-oriented individuals, despite the skills-demands compatibility of the task, did not exhibit the indicators of flow adopted in the study. The results obtained by Keller and Bless (2008) can be explained by referring to the differences between authoritarian and democratic mode of self-regulation. Kuhl and colleagues (Baumann & Kuhl, 2005; Kuhl, 1996; Kuhl & Fuhrmann, 2009) proved that the authoritarian mode of self-control – in which individuals mostly make use of negative incentives to motivate themselves – is typical for state-oriented individuals, whereas the democratic mode of self-regulation – in which individuals make use of positive incentives to motivate themselves – is typical for action-oriented individuals. It seems that it was the mode of self-control – characteristic of state vs. action oriented individuals – that was the main cause of individual variability in experiencing flow by participants in Keller and Bless's study (2008).

The results I obtained in Experiment 2 are consistent with these results. The results of study 2 have further confirmed that in the case of action-oriented individuals, a context which supports autonomy, is conducive to a more positive attitude towards a task. In comparison to state-oriented individuals, action-oriented individuals in the autonomy condition reported feeling less tired and in a better mood upon finishing the task and also found the task itself more interesting. Thus, we may conclude from this that a context, which supports autonomy is more compatible with a mode of behavior self-regulation typical for action-oriented individuals. Due to superior executive functioning, action-oriented individuals benefit more from

a context which supports autonomy. In such contexts they happily commit to a task and usually obtain high scores without suffering from personal costs such as tiredness or a decrease in mood. In turn, state-oriented individuals are usually more perseverant and effective in their actions in a context which induces external pressure. Their behavior is mainly regulated by external factors and their inferior executive functioning does not allow them to happily commit to a task. As a result, high efficacy in state-oriented individuals is usually associated with emotional costs such as a decrease in mood. What is more, in the case of these individuals a context which supports autonomy is not conducive to positive factors (e.g. interest) which regulate behavior.

Despite their contributions, presented studies are not without certain methodological limitations and thus leave many important issues to be explored by future research. First, in the Study1 perceived interest mediated the relation between autonomy-supportive condition and effective perseverance, but the value of the Goodman test confirmed that this relationship was merely a statistical trend. It is possible that factors other than interest might also mediate the relation between autonomy-supportive condition and effective perseverance. Based on the results of previous research, it appears that, a potential mediator could be further self-determination. Moller and colleagues (Moller, Deci, & Ryan, 2006) proved that self-determination mediates the effect of autonomy-supportive condition on task performance. Still, it seems important for future research to further explore the processes that underlie regulation of motivation in the autonomous context.

Another potential limitation is that it is not entirely clear why in the study 2 significant effect of action vs. state orientation on perseverance and efficacy was obtained only for the AOF/SOF subscale. On the other hand performed analysis yielded a significant effect of action vs. state orientation on participants' subjective experiences after performing task only for the AOD/SOD subscale. Future studies may benefit, however, by further exploring some potential functional differences between coping with negative affect (which relates to AOF/SOF subscale) and coping with frustrated positive affect (which relates to AOD/SOD subscale).

Concluding remarks

It is worth underlining that the results presented in this article confirm that both the results we obtain in a given task and our approach to the task itself are determined not only by the situational context of the task but also by our personality traits and the features of the task itself. All this is consistent with a now classic theory by Tomaszewski which was recently surfaced by Łukaszewski (Tomaszewski, 1966, by Łukaszewski, 2008). According to Tomaszewski, if we are to explain the actions of an individual we must take into consideration the following: firstly, the demands of the task, secondly – their abilities, including their competencies and their personality traits and thirdly, the circumstances in which the individual performs

the task (such as difficulties and setbacks or enablers and a support system readily available to us). In order for people to perform to the best of their abilities all the above factors have to work in perfect harmony. Thus, both efficacy and difficulty in performing a task can be analyzed from the perspective of compatibility (or lack of thereof) between the factors listed by Tomaszewski: demands, abilities and circumstances (by Łukaszewski, 2008, p. 377).

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