PSIHOLOGIJA, 2012, Vol. 45 (4), 395–407
UDC 159.937.3.072 ; 159.9.072:616.89-008.454

DOI: 10.2298/PSI1204395N

Positive and Negative Affect in Illusion of Control

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Research regarding the illusion of control was dominated by the studies examining the effect of depressive affect on the overestimation of control over uncontrollable events. However, the relative contributions of high Negative Affect (NA) and low Positive Affect (PA), as underlying dimensions of depressive states, has remained unclear. This study researched how both PA and NA had affected the illusion of control. Two weeks before illusion induction, trait PA and NA of 54 first-year university students were assessed, and just before and after illusion induction task their state forms were estimated. The induction consisted of solving unsolvable tasks and obtaining positive feedback for all the answers. The illusion of control was significantly correlated with all three PA scores, and none of the NA. After controlling for trait measures, the PA after illusion induction remained the only significant predictor of illusion. The relation of positive affect and illusory judgement in maintaining mental health were discussed.

Keywords: *illusion of control; positive affect; negative affect*

In situations like games of chance there is no real influence the player has on the outcome. The player has minimal control over the win or loss: he can decide whether or not to buy a lottery ticket, whether to go to a specific casino or not, and the like. However, people, and gamblers in particular, tend to overestimate their ability to control gambling events and feel they can control outcomes that they have no influence over. They usually think their success is credited to buying a lottery ticket at a specific vendor, sitting at their "lucky" table in the casino, throwing dice with a specific movement of their hand, or to the help of some magical rituals, or lucky charms. This phenomenon of overestimating an individual's control in chance situations is known as "the illusion of control".

This notion was introduced by Elen Langer (1975) who defined it „as an expectancy of a personal success probability inappropriately higher than the objective probability would warrant" (Langer, 1975; p. 313). Since Langer's

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paper was published, the concept of illusion of control has been significantly broadend, and in order to produce it, researchers manipulated conditions that led people to make overgeneralised judgments of control, contingency, prediction ability, etc. In a meta-analytical study on the illusion of control, Presson and Benassi (1996) reported that over the years different studies have used different operational definitions of illusion of control. These definitions can be classified as: prediction of the success probability, determination of contingency, control estimation and ambiguous acts that are difficult to classify in one of the previous three classes. Presson and Benassi (1996), therefore, suggested that the term "illusory judgment" would better cover different cognitive processes induced and measured under the label "illusion of control".

Explanations of the illusion of control

Langer (1975) listed several reasons why people overestimate their control over random outcomes. First, control is desirable because of its adaptive function – control allows for having power over an environment. Second, when the control is really low or impossible, illusion of control can be a significant factor in reduction of anxiety caused by the absence of influence. As the illusion of control usually occurs in situations that are similar to skill based tasks, Langer argued that the similarity of „skill tasks" and „chance tasks" could also mislead people into illusion of control.

Thompson et al. (Thompson et al., 2004) explained illusion of control by "control heuristics" – simple rules used while determining the level of control over situations. They suppose that two factors are responsible for emergence of illusion of control. The first factor*, intentionality* in producing an effect, strengthens the impression that just experienced situation is the consequence of our behaviour – that the situation actually *is* under our control. Second factor, *connectedness,* refers to an association between behaviour and the outcome. If certain behaviour and a situation are closely related in time, there is a tendency for people to observe them as causally related.

Taylor and Brown (1988) considered overestimating control to be one of the positive, self-enhancement illusions which serve to maintain, improve, and defend mental health. The illusion of control is probably the result of a person's effort to assimilate uncertain and contradicting data about the world and the self into the positive self-scheme. It happens automatically and with minimal processing, with a clear purpose to maintaining of a positive self-view. Positive illusions are maintained by means of discarding or biasing negative information through a series of social and cognitive filters. Positive cognitive schemas are substantial for normal mental functioning as they generate positive affect and self-esteem, and are important characteristics of mentally healthy individuals. This approach to self-enhancing illusions has significant implications, not only for social and personality psychology, but also for clinical psychology and psychotherapy (Brown, 1991).

Determinants of the illusion of control

Langer (1975) was also the first to report that some characteristics of skill situations influence the illusion of control. For example, if an element of competition is introduced into a skill situation, subjects obtain illusive experience of control. Other factors that influence the creation of the illusion are: choice possibility (e.g. if a lottery participant has a chance to choose a ticket), familiarity (e.g. if a lottery participant is familiar with the picture on the ticket), as well as personal engagement vs. passivity (e.g. if a participant has an opportunity to practice activities connected with the chance situations).

The researchers of illusion of control suggested that other important factors also play significant role in illusion forming or reducing the illusion, such as: perceived success in the situation (Alloy & Abramson, 1979; Gollwitzer & Kinney, 1989; Matute, 1995), a real degree of control (Gino, Sharek & Moore, 2011), the focus of attention on objective aspects of the situation – so cold "intrusion of the reality" (Thompson, Armstrong, & Thomas, 1998), some personality traits, such as attributional style, or perception-of-control style (Alloy, Kelly, Mineka, & Clements, 1990), locus of control (Rotter, 1966), and desirability of control (Burger, 1984).

Affect and the illusion of control

The mood is also considered to be an important moderator of the illusion of control. Past research has demonstrated that depressed people are relatively "immune" to the illusion of control, and that the susceptibility to the illusion can be manipulated by induction of affect (Alloy, Abramson, & Viscusi, 1981). Induction of depressed mood reduced biased perception of control, whereas induction of elated mood (even in depressed individuals) augmented this irrational belief. The decreased liability to the illusion of the control of depressed patients, and subjects with induced depressed mood, was named „depressive realism" or „sadder but wiser effect" (Alloy & Abramson, 1979).

In another study, it was assumed that proneness to the illusion of control is an indicator of resilience to depression, whereas "depressive realism" indicates vulnerability to depression. As a matter of fact, the data suggested that an inclination to the illusion of control reduced the probability of negative affective reaction following experimentally induced failure. In addition, people who were prone to illusion of control have been significantly less discouraged and less desperate in the face of real-life negative life events (Alloy & Clements, 1992).

These two studies threw an oposite light on causal relationship between the mood and the illusion of control. The first study (Alloy et al, 1981) indicates that the mood had influence the illusion while the latter (Alloy & Clements, 1992) suggestes that the illusion of control can protect from depression. Thus, there is a possibility of a positive feedback loop: with the illusion having a mood-enhancing effect; and in turn, the elation having an enhancing effect on the illusion.

Curiously, there were very few attempts to directly study the relationship between the positive mood and the illusion of control in which positive mood would be directly measured. So far, majority of studies have focused on the relationship between the illusion and the negative affective states. For instance, Alloy and her colleagues (1981) have measured three *negative* affective states (depression, anxiety and hostility) and none of the positive, with the assumption that induction of the illusion will reduce them. We therefore still do not know whether the illusion of control in non-depressed individuals is causally related to the negative, or positive mood, or both. Also, we still do not know what oposes the illusion of control in depressed individuals: is it the (low) positive or the (high) negative affect, or both of them.

The need for separate measurement of positive and negative affective states related to the illusion of control, comes from the theory and research of Tellegen, and his colleagues. They suggested two-factor model of affect which can capture robust structural properties of self-rated mood (Watson & Tellegen, 1985). The model emphasised fundamental distinction between positive and negative affective experiences (PA and NA), as broad orthogonal dimensions which included specific positive and negative emotions. Watson and Clark reported that correlations between PA an NA ranged between –0.05 and –.35 (Watson & Clark, 1994), suggesting „quasi-independence" of these dimensions. The authors od two-factor model of affect operationalyzed it by Positive And Negative Affect Shedule – PANAS, and later by extended PANAS-X scales, as measurs of general PA and NA dimensions, as well as speciffic affects of which they are comprised. PANAS scales exhibited a significant level of stability reflecting the strong dispositional (trait) component of affect (Watson, Clark, & Tellegen, 1988; Watson & Clark, 1994). The same group of authors related depressive affect to both low PA and high NA, suggesting that this combination of afects is specific for depression as oposed to anxiety (Watson, 2005).

As the illusion of control related studies mainly researched the effects of negative affect, or depression, we wondered if PA and NA, being two inedependent aspects of depression, could be related to illusion of control in a different way. Since PA and NA have their trait, e.g. dispositional, as well as state expressions, the question arises as to what is the relation of the predisposition for enduring positive and negative mood states to the illusion of control. Is it different than the effect of transitory mood states? And finally, we wanted to explore the relation of the illusion of control to the affect that is emerging concurrently with a situation which is inducing enhanced control.

This study was designed to address all these questions, capitalizing on the assessment of the positive and the negative affect before and after the induction of the illusion, and on the assessments of permanent and transitory affective states of our subjects.

Method

Sample. The *ad hoc* sample consisted of 54 first-year Psychology students (41 women and 13 men, average age 19 years) from the University of Novi Sad, Serbia who have participated in both phases of the study. Since there was no statistical gender-related difference in the assessment of control (t_{51}=0.09; p=0.92), information about respondents' gender was excluded from all ensuing statistical analyses.

Instruments. Serbian Inventory of Affect Based on Positive and Negative Affect Schedule (SIAB-PANAS; Novović, Mihić, Tovilović, & Jovanović, 2008), a Serbian adaptation of PANAS (Watson & Clark, 1994), is a 20-item self-report measure of Positive (PA) and Negative affect (NA). In this study we have used both the *state* and *trait* version of the scale by giving two consecutive different instructions to the subjects ("at this moment" or "generally"). Previously, we have demonstrated satisfactory internal consistency for both the PA (α = 0.83) and the NA (α = 0.83) subscale (Novović et al., 2008).

For the purpose of this study the original 20 items of the state-SIAB PANAS were divided in two parallel forms each containing 10 items (5 for PA and 5 for NA). This was done in order to obtain Form I (for the pretest) and Form II (for the post-test) of the scale, enabling us to assess PA and NA, both immediately before, and immediately after the illusion of control induction task. Descriptive statistics and correlations between scores of two forms are given in table 2.

Attributions of success on the experimental task were measured as responses on two independent 7-degree Likert scales. Respondents were asked to report their assessment about to what extent has luck and skills attributed to their success (ranging from 1 – not at all, to 7 – completely).

Judgment of control was measured as response to a single 10-degree Likert item examining respondents' belief about their control over the favourable outcome of the task.

Illusion of control induction task involved computer-generated presentation of 18 different slides displayed consecutively in a Power Point presentation. Each slide depicted an abstract shape, an unusually shaped archaic object or a microscopic enlargement of some small particle. In this way, it was impossible for our subjects to correctly answer the question: what is in this picture, what does it represent? This question was asked following the presentation of each slide and respondents were offered three incorrect answers to choose from. Following the completion of the task, all respondents' protocols were 'graded' and 'grades' were randomly distributed within the 89% to 100% range (between 16 and 18 'correct' answers). Consequently, each respondent was told that her/his achievement on the test corresponds to an IQ score above 130. Thus, all respondents have received a positive feedback.

Procedure. During the preliminary phase of the study, after giving informed consent, *the trait* version of the SIAB-PANAS scale was administered to the respondents, and they were told that their participation in the next phase of the study was expected after 2 weeks. At this stage the respondents were blinded with respect to the real purpose of the study. Instead, the researcher explained that she was investigating a possible connection between the IQ and some unspecified psychological phenomena and that the real purpose of the study will be revealed following its completion in order to avoid any contamination of the data. In the second phase of the study, the respondents were administered the first half of *the state* form of the SIAB-PANAS[2] (form I) comprising five items on the PA subscale and five items on the NA subscale (see Table 1 for the summery of the procedure).

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2 Later in the text we refere to these two forms as PA and NA state before, and PA and NA state after illusion induction.

Table 1. *Summary of the procedure*

2 weeks before the illusion of control induction task	Pre-test – immediately before the illusion of control induction task	Illusion of control induction task	Post-test – immediately after the illusion of control induction task
SIAB-PANAS – as a trait	SIAB-PANAS – as a state – form I	The task + positive feedback	Assessment of control + Assessment of attribution + SIAB-PANAS – as a state – Form II

Following pretest, the respondents were presented with the illusion of control induction task. They received the positive feedback, and completed the attribution of success and judgment of control scales. Finally, the remaining 10 items of *the state* SIAB-PANAS scale (form II) were used as parallel form of the scale at retest. At the next lab meeting, respondents were debriefed and the real purpose of the study was revealed.

Results

Manipulation check – success in illusion of control induction

Success in illusion of control induction was verified by intensity of subjects' beliefs that their skills, and not sheer luck, are responsible for their almost perfect completion of the task. As a matter of fact, respondents were more prone to attribute their success to their skills than to luck: M_1 = 3.94 (1, 86) and M_2 = 3.22 (1, 54) respectively; t(53) = 2.20; p=0.03, Cohen's d =0.25 for within subjects' data. Average judgment of control on a 10-degree Likert scale (ranging from absolutely no control to absolute control) was M = 7.22; SD = 2.36 indicating that majority of respondents possessed a strong feeling of control over a chance outcome. Taken together, these data indicate that our experimental manipulation induced cognitive fallacy in our respondents since they viewed their success as being under their control.

Descriptive statistics and bivariate linear relationship between affect and the illusion of control

Table 2 summarizes linear relationship between illusion of control and PA or NA affect, measured either as a trait or a state. It also offers descriptives for all variables included in the study. Because the distributions of NA variables were significantly skewed (skewness was 1.11; 1.91; 1.81 for trait NA, NA before and NA after induction task, respectively), we normalized variables using Blom's formula in subsequent analysis.

The illusory judgement significantly correlated with all three forms of PA: as a trait, as a state before and a state after induction of the illusion. Interestingly, NA in any form had no correlation with the illusion of control. As expected, different forms of NA positively correlated among themselves, and negatively with different forms of PA.

Table 2. *Bivariate correlations and descriptive statistics for different measures of affect and estimate of control*

	Estimate of control	PA as a trait	NA as a trait	PA as a state before	NA as a state before	PA as a state after	NA as a state after
PA as a trait	0.35*						
NA as a trait	–0.05	–0.44**					
PA as a state before	0.39**	0.53**	–0.37**				
NA as a state before	–0.17	–0.40**	0.59**	–0.21			
PA as a state after	0.49**	0.45**	–0.25	0.70**	–0.26		
NA as a state after	–0.14	–0.23	0.44**	–0.11	0.78**	–0.20	
Means (SD)	7,27 (2,35)	35,15 (5,61)	19,78 (7,67)	13,26 (3,99)	6,83 (2,25)	13,65 (4,72)	6,76 (2,23)

**p<0.01 *p<0.05

Affective predictors of illusion of control

Hierarchical regression analysis was used to examine the role of affectivity in induction of illusion of control. Subjects' *judgment of control* (response on a single 10-degree Likert item examining one's belief about her/his control over the favourable outcome of the task) was used as a criterion variable. Predictor variables involved PA and NA as traits (Model 1), as well as PA and NA as states before and after the task[3] (Model 2). Controlling the trait variables allowed us to establish relative contributions of transitory affective states, over and above the general proneness to PA and NA.

Table 3. *Hierarchical regression analysis: affective predictors of estimate of control*

Model	Predictors	B	Beta	sr2	R2	ΔR2	F	ΔF
1	PA as trait	.38	,41**	.13**	.14	.14	4.21*	4.21*
	NA as trait	.10	,11	.01				
2	PA as trait	.20	.21	.03	.28	.14	3.10*	2.33†
	NA as trait	.18	.19	.02				
	PA as state before	,06	.06	.00				
	NA as state before	,00	,00	.00				
	PA as state after	,34	,36*	.06**				
	NA as state after	-,14	-,13	.00				

**p<.01 *p<.05 †p=.07

3 Although state PA and NA in retest were measured after the questions about control, we supposed that we captured affect that was concurrent with enhancing sense of control, and that this affect was not changed by the very question about control. That's why we considered that posttest affect could be treated as predictor in the regression analysis.

Both regression models displayed significant predictive power (Fs $p<0.05$) and Model 2 shows marginally significant increase of prediction. It is also obvious that PA was essential for perception of control. According to Model 1, lasting tendency towards PA is a significant predictor of perception of control accounting for over 13% of total variability of the criterion variable.

Model 2, introducing affective states before and after the task as predictors, also indicates significant predictive power of PA and not NA. The beta coefficient of transitory PA after the task is significant ($p=0.04$), as well as its unique contribution to explained variance (6%). Due to significant inter-correlations among the three PA variables their individual predictive power is diminished in Model 2. Nevertheless, the conclusion about superior importance of PA relative to NA still holds. Cohen's f^2 effect size measure for Hierarchical regression analysis (0.21) is of medium size (Cohen, 1988).

DISCUSSION

So far, it has been established that depressed mood is among factors countering the illusion of control. Depressed subjects, relative to their undepressed counterparts, more realistically assess their control over events that are noncontingent on their actions (Presson & Benassi, 2003). The fostering effect of PA on the illusion was assumed based on the negative effect of depression and NA. Our study clearly demonstrates the positive effect of PA on the induction of the illusion.

Previous studies suggested independence between the PA and NA, the two broad dimensions of affectivity (Watson & Clark, 1994). In our study, similarly to those of other authors (e.g. Watson & Clark, 1994), correlation between PA and NA ranges between –0.20 (correlation between PA and NA measured as states after induction of the illusion) and –0.48 (between trait PA and NA). Thus, one can not draw conclusions about PA's effect on the illusion of control based on NA's effect. Here we found that NA had no significant effect on the illusory perception of control regardless of the time (before or after the induction of the illusion) or the mode (measured as a trait or as a state) of assessment. Our data strongly suggest that pronounced PA, rather than NA, is related to illusion of control.

Our results, showing significant predictive relationship between the illusion and PA, but not with NA, look contradictory to several previous reports documenting relationship between depression, and the illusion (e.g. Alloy & Abramson, 1979; Alloy, Abramson, & Viscusi, 1981; Alloy & Clements, 1992). According to Watson's hierarchical model (Watson, 2005), depression entails symptoms that are based on high NA (distress and negative emotions), but also the symptoms that are based on low PA (loss of enthusiasm, joy of life, ability to enjoy everyday routines, general loss of motivation and the like). Thus, our data suggest that depression is acting against the illusion of control, rather through low PA, than through high NA. The absence of (or low) depression fosters the

illusion of control since it enables the rise of PA. Some recent research also supports this line of reasoning in pathological states. In a clinically depressed sample, positive self-bias (another self-enhancement illusion) decreased as severity of anhedonia (syndromal expression of low PA) increased across three different symptom measures of depression (Dunn, Stefanovitch, Buchan, Lawrence & Dalgleish, 2009).

Because we have measured affectivity on three different occasions, and either as a trait, or a state (before and after the induction of the illusion), our data allow us to comment on the role of the mood that has appeared simultaneously with the illusion of control, relative to the mood preceding the induction of the illusion. Although all measures of PA significantly correlated with the illusion (Table 2), bivariate correlation between the illusion of control and PA measured after the induction was the highest of the three. Due to significant partial contribution of the predictor variable "PA after the induction" to multiple regressions Model 2 (Table 3), we can assume that the task-induced PA contributed mostly to the cognitive bias. The predictor variable "PA after the induction" contributes to explanation of the criterion variable (illusion of control) above the variance that was already explained by the variables "PA before the induction" and "PA as a trait".

The very correlational nature of our findings allows us at least two interpretations: that our induction procedure induced PA which enabled the illusory judgement, but also a reversed interpretation of the observed relationship. It may well be that the induction of the illusion of control and the ensuing perception of success have induced the PA. Significant relation of PA and the illusion that was demonstrated here could be a consequence of the fact that our respondents assessed their control over a successfully completed task. Our respondents were in a situation that was best described as a success. Congruence between valence of the affect and the situation to which control is attributed to, could, therefore, be responsible for biased attribution of control for a purpose of maintaining PA.

This interpretation of the data can be related to several hypotheses accounting for congruency of affect and cognitive operations. Isen and Patrick (1983) argues that people have a tendency for maintaining positive mood and are avoiding situations that can disrupt it, so they use cognitive process in accordance with this purpose. Similarly, Johnson and Tversky (1983) demonstrate that exposure to information eliciting NA increases perceived (assessed) frequency of negative events even if those events are not directly related to the information that has elicited NA. Furthermore, they have shown that experimentally-induced PA also affected cognition: subjects' risk assessments were reduced. Both accounts suggest the interplay of cognition and affect in which predominant affect should be maintained by means of cognition.

While Isen and Patrick and Johnson and Tversky describe how cognitive manipulation helps perseverance of affective states, and vice versa, Wegener et al. have developed a „hedonic contingency model" which tries to explain why this happens (Wegener, Petty & Smith, 1995). This theoretical framework can account

for the critical role of PA in induction of the illusion of control, as suggested by our data. Wegener et al. hypothesize that „behaviors resulting in more positive than negative feelings are rewarded while behaviors resulting in fewer positive than negative feelings are punished“ (Wegener & Petty, 1994, p. 1035). Thus, different patterns of reinforcement are at work in people experiencing PA from the ones experiencing NA. We learn affective consequences of our behaviour and what activities are instrumental in maintaining and intensifying our PA state of mind. Wegener and Petty further state that people with PA are more prone to mood management strategies, because they can not easily find the action which is in adequate hedonic relationship with their current affective state. Therefore they must search carefully to find the action that would be rewarded, and when they find it, the action and mood being contingent, their mood managing strategies are rewarded. Our results suggest that people, who were higher on PA, were more prone to overestimate control, thus making their success more valuable, leading them to more PA. On the other hand, people who are higher in NA mood, according to Wegener and Petty (1994), are not contingently rewarded for mood managing strategies, because hedonic rewards are relatively likely to occur, and almost any action leads to more positive consequence. As people with more NA are not conditioned to use mood managing strategies, this might be the reason why NA is not related to estimation of control over success as a strategy for achieving more valuable success and more PA in our study.

The relation of PA and illusory judgement can offer an additional explanation of the relationship between depression and proneness to the illusion rivalling the one offered by Alloy & Clements (1992), who claimed that illusion of control can protect from depression. If the general tendency towards PA (PA as a trait) is a factor that increases the tendency to illusion, then affective disposition can be an indicator of resilience to depression, while the illusion might be only one among other correlates (probably together with other cognitive biases) helping to maintain the positive mood (Isen & Patrick, 1983; Johnson & Tversky, 1983; Wegener & Petty, 1994).

Theoretical and practical implications of our findings are pertinent to established importance of PA to mental health (Koivumaa-Honkanen et al., 2001) and success in personal domains such as marriage, friendship, income and physical health (Lyubomirsky, King & Diener, 2005). Over the last decade, general significance of PA for individual well-being is recognised in positive psychotherapy (Seligman, Rashid & Parks, 2006), positive affect training (Leeds, 2009), and mindfulness-based cognitive psychotherapy (Teasdale, et al., 2000).

The greatest limitation of our study is that the sample was from general population (students). Therefore, the conclusions about what happens with clinically depressed patients could not be drawn. Our results suggest that NA is not important for illusory thinking, and this also means that rising NA doesn’t help in accurate control judgement in nonclinical population. We cannot conclude anything about the role of NA, as well as PA in more depressed individuals whose symptom lavel satisfies the criteria of the disorder. As we noted earlier, there are some indications that low PA, and symptoms based on it, can also have

important role in patients (Dunn et al., 2009). Nevertheless, a study similar to ours, having to do with a clinically depressed sample, would be desirable.

The omission of a control group can be seen as a potential limitation of our study. Control group would serve as a proof that we really induced illusion of control, and such group should solve the same unsolvable tasks with negative feedback, or solve different solvable tasks with true feedback. Therefore, it would be difficult to compare the results of those groups with the results of our group. Also, based on the differences between groups we would still not have been able to conclude why our experimental group had had higher sense of control. Is it because of bias in our group, because uncontrollable negative group had bias, or because group with real feedback had lesser sense of control since they had different kind of tasks? The great majority of papers on illusion of control suggest that differences in groups with and without induction procedure cannot be used for concluding that in a group with the induction the illusion of control is really induced. This difference can only indicate that one group has a greater sense of control. Illusory judgements of control can only be demonstrated by means of a standard, which is an objective measure of control (Presson & Benassi, 1996). In our study, participants' estimation of control, which was greater then zero in the situation with no objective control, indicated that we really induced the illusion. Our research question was about the role of positive and negative affect in different occasions, and of different duration as well, and this question required within-subject design.

CONCLUSIONS

Positive and not negative affect is a relevant predictor of the overevaluation of control over positive uncontrollable situation.

Disposition to experience PA is strong predictor of illusion of control, but transitory affect induced by illusion of control significantly adds to the explanation of the enhanced perception of the control.

Illusion of control could be mood management strategy that people with higher PA may be using to stay in that affective state.

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