ČLOVEK A SPOLOČNOSŤ
Internetový časopis pre pôvodné teoretické a výskumné štúdie z oblasti spoločenských vied
ISSN 1335-3608

The progress that motivates - when we want to: Perceived progress as a mediator of the relationship between self-concordance and ongoing effort expenditure

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KAČMÁR, Pavol – LOVAŠ, Ladislav – BOBKOVÁ, Marcela. The progress that motivates - when we want to: Perceived progress as a mediator of the relationship between self-concordance and ongoing effort expenditure. In *Človek a spoločnosť [Individual and Society],* 2019, roč. 22, č. 2, s. 10-27. doi: https://doi.org/10.31577/cas.2019.02.554

Abstract:
The present study examines the proposal that perceived progress mediates the relationship between self-concordance and continued effort expenditure. According to Sheldon and Elliot (1999), goal-striving consists of a positive relationship between motivation, effort and goal attainment. There is a positive influence of motivation on the applied effort which is reflected in the progress in goal attainment. However, when goal pursuit is prolonged, the repeated monitoring of goal progress takes place and the result of this monitoring may influence further effort expenditure (Carver & Scheier, 2016; Uy, Foo, & Ilies, 2015). Accordingly, on the one hand, the actual state is influenced by the effort that has been exerted. On the other hand, perceived progress has some implications for the ongoing (consequent) effort. In fact, it was shown that the effect of perceived progress on further goal striving can be ambiguous (Fishbach, Eyal, & Finkelstein, 2010). In some cases, partial success results in increased effort, however, in other cases, the increase in effort is more apparent when previous progress does not meet expectations. The main aim of the present study was to verify the relationship between autonomous vs. controlled motivation and exerted effort in continuing goal achievement at the stage where the monitoring of goal progress is part of further goal attainment. In particular, if perceived progress acts as a mediator in the relationship between autonomous motivation (self-concordance) and ongoing effort. This focus on motivation can shed some light on why the achievement of partial progress sometimes leads to an increase and sometimes to a decrease in the consequent effort towards a goal.
In our study, it was hypothesized that our data are in line with a simple mediation model proposing that perceived progress accounts for the variance between self-concordance and effort expenditure, both cross-sectionally and longitudinally (H1). Additionally, it was expected that self-concordance is positively related to perceived progress (H2), and perceived progress is related to the effort (H3). However, as both directions are possible regarding this relationship, a further corroboration of this issue was the additional aim of this study.
In order to corroborate this issue thoroughly, one exploratory (N=280); and two additional confirmatory studies were conducted, a cross-sectional conceptual replication with N=191 high school students and longitudinal study with first-

year undergraduate university students (analyzed both longitudinally, N=135; and cross-sectionally - measurement 1 at the beginning of the semester, N=245, vs. measurement 2 at the end of the semester, N=190).
The results of the simple mediation analysis in study 1 have indicated that progress accounts for the variance between self-concordance and effort. The more self-concordant the goal was, the more progress was made, and the more effort was put in. The direct effect of self-concordance on effort was significant (b = .071, SE = .019, 95 % CI [.034, .108]); and the indirect effect of self-concordance through goal progress on effort was significant as well (b = .026, SE = .009, 95 % CI [.011, .046]). The pattern of results from study 2 was in line with study 1. Perceived progress accounted for the variance between self-concordance and effort. The direct effect of self-concordance on effort was not significant (b = .036, SE = .056, 95 % CI [-.074, .146]); and the indirect effect of self-concordance through goal progress on effort was significant (b = .201, SE = .045, 95 % CI [.118, .296]). In study 3, measurements were carried out twice, at the beginning of the semester, and at the end of the semester. Analysis of data at the beginning of the semester showed that the direct effect of self-concordance on effort was significant (b = .173, SE = .046, 95 % CI [.083, .262]). The indirect effect of self-concordance through goal progress on the effort was significant as well (b = .103, SE = .0,23, 95 % CI [.062, .153]). Analysis of data at the end of the semester showed that the direct effect of self-concordance on effort was not significant (b = .026, SE = .051, 95 % CI [-.074, .126]). The indirect effect of self-concordance through goal progress on effort was significant (b = .132, SE = .046, 95 % CI [.041, .222]). The results of study 3 at both measurement points were, therefore, in line with previous studies. The results of the longitudinal analysis were in line with previous results although only when the separate index of autonomous motivation was used. Using self-concordance index, the direct effect of self-concordance on effort was not significant (b = -.024, SE = .054, 95 % CI [-.132, .083]). Nor was the indirect effect of self-concordance through goal progress on effort (b = .038, SE = .035, 95 % CI [-.031, -.107]). However, when analyzing the autonomous and controlled motivations separately, as suggested e.g. by Koestner et al. (2008), full mediation occurred with the index of autonomous motivation. Perceived progress fully mediated the relationship between the variables. The direct effect of autonomous motivation on effort was not significant (b = .111, SE = .101, 95 % CI [-.088, .310]) while indirect effect of autonomous motivation through goal progress on effort was significant (b = .155, SE = .062, 95 % CI [.039, .282]).
To sum up, it has been shown that perceived progress either partially (studies 1 and 3) or fully (studies 2 and 3) mediated the relationship between self-concordance and effort. Furthermore, the results of the longitudinal study corroborated this pattern of results; although only when the separate index of autonomous motivation was used. The results were in line with the prediction that perceived progress mediates the relationship between self-concordance and consequent effort. Furthermore, both self-concordance and perceived progress were positively related to effort expenditure.

Keywords:
Self-concordance. Autonomous vs. controlled motivation. Perceived progress. Effort expenditure. Simple mediation analysis.

According to Sheldon and Elliot (1999), goal striving consists of a positive relationship between motivation, effort and goal attainment; there is a positive influence of motivation on the applied effort which is reflected in the progress. However, when a goal pursuit is prolonged, repeated monitoring of goal progress takes place and the result of this monitoring may influence further effort expenditure (Carver & Scheier, 2016; Uy, Foo, & Ilies, 2015). Accordingly, on one hand, the actual state is influenced by the effort that has been exerted, while on the other hand, perceived progress has some implications for ongoing (consequent) effort. In fact, it has been shown that the effect of perceived progress on further goal striving can be ambiguous (Fishbach, Eyal, & Finkelstein, 2010). In some cases, partial success results in increased effort. However, in other cases, the increase in effort is more apparent when previous progress does not meet expectations. The main aim of the present study is to verify the relationship between autonomous versus controlled motivation and exerted effort in continuing goal achievement at the stage where the monitoring of goal progress is part of goal attainment. In particular, we would like to corroborate

if perceived progress acts as a mediator in the relationship between autonomous motivation (self-concordance) and ongoing effort. This focus on motivation can shed some light on why the achievement of partial progress sometimes leads to an increase and sometimes to a decrease in the consequent effort towards a goal.

Self-Concordant Goals and Autonomous Motivation

Based on Self-determination Theory (SDT), the model of self-concordance distinguishes between goals that stem from internal values and interests and goals that stem from other, more extrinsic sources (Deci & Ryan, 2002; Sheldon, 2014; Sheldon & Elliot, 1998). In the terminology of SDT, this is captured by the self-concordant index which is calculated as autonomous motives (intrinsic and identified motivation) subtracted from controlled motives (extrinsic and introjected motivation). However, some authors prefer a separate analysis of autonomous and controlled motivation (see e.g. Koestner, Otis, Powers, Pelletier, & Gagnon, 2008).

Autonomous motivation is related to the goals that are inherently important for an individual and autonomously stem from the will of the individual (called "want-to" motivation). In contrast, *extrinsic* motivation is related to more extrinsic factors that determine goal pursuits such as the expectation of external rewards or avoidance of negative consequences (called "have-to" motivation) (Deci & Ryan, 2002; Milyavskaya, Inzlicht, Hope, & Koestner, 2015; Sheldon, 2014; Sheldon & Elliot, 1998). As indicated by the ample body of evidence, such a distinction seems to be an important factor with regard to goal attainment.

Effort expenditure and perceived progress in relation to self-concordant motivation

The relationship between self-concordance and various self-regulation processes such as effort and perceived progress can be found across the literature (e.g. Koestner, Lekes, Powers, & Chicoine, 2002; Koestner et al., 2008; Milyavskaya et al., 2015; Sheldon & Elliot, 1999; Sheldon & Houser-Marko, 2001). According to Sheldon and Elliot (1998, 1999), autonomous motivation positively influences the amount of effort exertion, adds to its quality and increases the likelihood of goal progress and goal attainment. In a similar vein, a meta-analysis conducted by Koestner et al. (2002) found that self-concordance is positively related to goal progress. In their meta-analytical study, Gaudreau, Carraro and Miranda (2012) examined the relationship between autonomous motivation and progress. They found that the relationship between these two variables was mediated by self-regulatory factors such as action planning and effort. However, the relationship between goal progress and effort seems to be more complex; especially when considering the longitudinal nature of goal pursuit. Invested effort influences progress, nevertheless, as goal striving continues, the monitoring of goal progress can influence the following effort expenditure in the later phases of goal striving. According to prominent self-regulatory theories such as the Cybernetic model (Carver & Scheier, 2016), monitoring of goal progress is crucial for successful goal attainment. Due to the fact that the present state is continuously compared to the existing standard, the identified discrepancy between present progress and standards leads to a change in effort investment.

Furthermore, if the effect of evaluating goal progress is understood as feedback in goal pursuing, an additional line of evidence can be found. Fishbach and Finkelstein (2012), for instance, pointed out that the feedback, either positive or negative, could increase the motivation for goal pursuit. Positive feedback increases motivation when it signals that the goal is valuable and the person is able to successfully pursue it. In addition, negative feedback increases motivation when it signals a discrepancy with the desired end state.

However, this raises the question of how continuing effort occurs after monitoring goal progress in the broader context of the source of motivation. In particular, how autonomous or controlled motivation is related to ongoing effort expenditure after monitoring goal progress, which serves as important feedback for ongoing goal pursuit. We expect that motivation is an important predictor of ongoing effort even in the phase of monitoring goal pursuits; and that this effect is mediated by perceived goal progress (additionally, in theory, either positive or negative feedback are plausible). Specifically, we hypothesize that our data will be in line with the simple mediation model proposing that perceived progress will account for the variance (or more colloquially will mediate the relationship) between self-concordance and effort expenditure, both cross-sectionally and longitudinally (H1). Additionally, we expect that self-concordance will be positively related to perceived progress (H2), and perceived progress will be related to effort (H3). As both directions are possible, a further corroboration of this issue is an additional aim of this study.
In order to corroborate the proposed relationships more thoroughly, three studies were conducted. The first pilot study was exploratory and aimed to corroborate the pattern of relationships and proposed model. Studies two and three aimed to replicate the results of the first study. They were confirmatory in nature and, therefore, pre-registered[1].

Study 1

In the first study, we aimed to corroborate the model which predicted that perceived progress would account for the variance between self-concordance and effort expenditure.

Method

Participants and procedure

The participants were 280 undergraduate students[2] (158 females, 122 males; aged M = 21.84, SD = 2.06)[3]. A non-probability sampling technique was used. Respondents were asked to think of one goal they were pursuing at that moment and complete the scales related to that goal.

Measures

Three-goal variables were examined– self-concordance, goal progress and effort (adapted from Koestner et al., 2002; Werner, Milyavskaya, Foxen-Craft, & Koestner, 2016). The instructions were: *„Personal goals are projects and intentions representing different spheres of life. We think, plan, realize them and sometimes we are successful in their attainment. Please, think of one that you are pursuing."* The participants listed goals such as "successfully graduate"; "find employment" and "start a family."

Goal self-concordance

Participants were asked to rate their motivation. External, introjected, identified and intrinsic reasons were measured by using four items rated on a scale from 1 (not at all for this reason) to 7 (completely because of this reason). The items were: *„striving because somebody else wants you to or because you will get something from somebody if you do"*, *„striving because you would feel*

[1] Pre-registration of data analysis and open data can be found at osf.io/4j8zf
[2] Given previous experience with this kind of study and resource restriction, the sample size was set to 200-300 participants. To justify this decision, a Monte Carlo Power Analysis for Indirect Effects was conducted. The power analysis indicated that 200 participants is enough to detect 80% of the model power when the correlation among the variables is at least of a medium magnitude (r=0.3).
[3] In all studies, pairwise deletion was used if some missing data have occurred.

ashamed, guilty, or anxious if you didn't strive for this", *„striving because you really believe it's an important goal to have – you endorse it freely and wholeheartedly"*, and *„striving purely because of the fun and enjoyment that striving provides you"*. The self-concordance index was calculated by deducting the sum of the external and introjected regulation from the sum of the intrinsic and identified regulation (Koestner et al., 2002)[4].

Goal progress

Goal progress was assessed by three items: *„I have made a lot of progress toward this goal"*; *„I feel like I am on track with my goal plan"*; *„I feel like I have achieved this goal"*. They were rated on a 1 (completely disagree) to 7 (strongly agree) scale. McDonald's ω was .723 for all three items. This was acceptable and therefore none of the items were dropped.

Effort

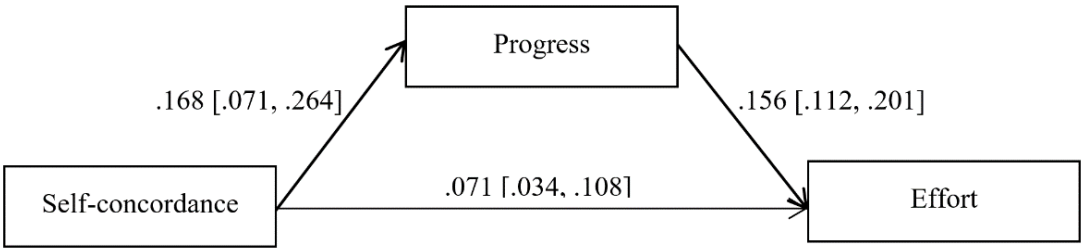
Goal effort was assessed using one item: *„I have tried really hard to achieve this goal"*. It was rated on a scale from 1 (completely disagree) to 7 (strongly agree).

Results

The Pearson´s correlation coefficient (see supplement) showed that all variables were positively correlated. In order to test whether goal progress accounted for the variance between self-concordance and effort, Process Macro v 2.16 for SPSS was used[5]. In the case that the 95 % confidence interval did not include 0, the effect was considered significant.

The simple mediation model was corroborated and the results indicated partial mediation. Perceived progress accounted for the variance between the self-concordance index and effort. The more self-concordant the goal was, the more the progress towards the goal was perceived and the more the effort that was put in. As illustrated in Figure 1, the direct effect of self-concordance on effort was significant (b = .071, SE = .019, 95 % CI [.034, .108]); and the indirect effect of self-concordance through goal progress on effort was significant (b = .026, SE = .009, 95 % CI [.011, .046]) as well. The total effect was (b = .097, SE = .020, 95 % CI [.058, .137]).

Figure 1 Mediation model (university students; 95 % CI)



[4] Due to fact that the self-concordance index captures four heterogenous types of motivation, we will not report the reliability of self-concordance as it is common practice.

[5] In the case that the 95% confidence interval did not include 0, the effect was considered significant (Hayes & Rockwood, 2016; Hayes, 2017). To calculate the lower and upper bounds of the confidence interval for the indirect effect, the bootstrap method was used with a number of bootstrap samples 10 000.

Discussion (Study 1)

The results of the simple mediation analysis have indicated that progress accounts for the variance between self-concordance and effort. The more self-concordant the goal was, the more progress was made and the more effort was put in. Nevertheless, to further corroborate the issue and eliminate alternative explanations, we aimed to conceptually replicate study one by varying the basic parameters.

For instance, there is a possibility that the observed pattern of results could emerge due to the specific manner in which the participants were instructed to think about their goals. In study one, participants thought about one idiosyncratic goal – "the goal that they are wishing to attain" and the area was not specified. While such an approach has some merits, potential pitfalls can also be identified. In addition, the instructions could prime participants to report only goals that are the most important. Thus, in the following study, we chose a more nomothetic approach. All participants were asked to think about one specific goal – an academic goal.

Secondly, the observed pattern of results could occur due to the specific operationalization of constructs; in study 1, effort was assessed by only one item, therefore, in the following study we used a more comprehensive scale with three items which were adapted from Nelissen, de Vet and Zeelenberg (2011).

Thirdly, the pattern of results that has been observed could have occurred due to the specific characteristics of the sample. We were, therefore, further interested if the same pattern of results would replicate in a different sample.

Study 2

Method

Participants and procedure

The participants were 191 high-school students (127 females, 63 males, 1 did not respond; aged M = 17.54, SD = 1.01). A non-probability sampling technique was used. In contrast to study one, respondents were asked to think of an academic goal – studying[6].

Measures

Goal self-concordance

Goal self-concordance was assessed in the same manner as in study 1.

Goal progress

Progress was operationalized by three items from Brunstein's (1993) scale. The scale consisted of: *"I have made a great deal of progress concerning this goal"*; *„I have had quite a lot of success in pursuing this goal"*; and *„many things have happened that have obstructed this goal"*. Items were rated on a scale ranging from 1 (completely disagree) to 7 (strongly agree). The reliability of the scale was McDonald's ω = .578. Due to the relatively low level of reliability, we analysed the "If one item is deleted score" which indicated better reliability if item three was dropped. As this omission can be justified (the third question regards obstacles in goal pursuit) as well as there being instances of using only two items in the literature (e.g. Uy et al., 2015), we worked with only two items in the consequent analysis. The McDonald´s ω (two items) was .707.

[6] This study was part of a bigger project related to goal dimensions.

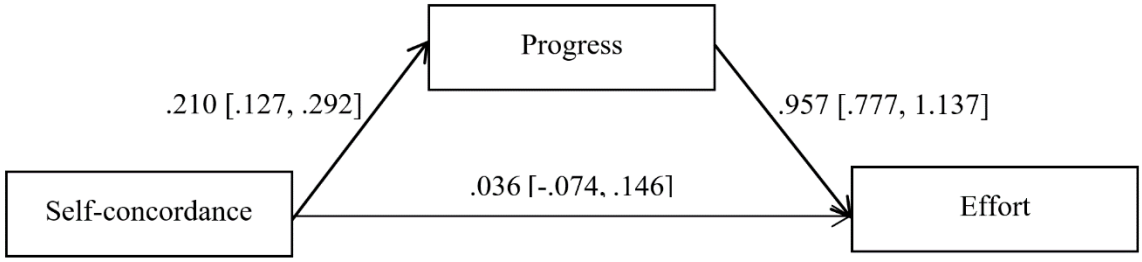
Effort

Effort was assessed by Nelissen et al.'s (2011) scale that consisted of 3 items: *"How much effort do you make to achieve your goal?"*; *"To what extent do you do your best to attain your target goal?", "How much energy do you spend achieving your goal?"* McDonald's ω was .891.

Results

As in the previous study, Process Macro v 2.16 for SPSS and the same inferential criteria were used. In the case that the 95 % confidence interval did not include 0, the effect was considered significant. Figure 2 illustrates the proposed model where full mediation occurred. Perceived progress accounted for the variance between self-concordance and effort. As depicted below, the direct effect of self-concordance on effort was not significant (b = .036, SE = .056, 95 % CI [-.074, .146]). However, the indirect effect of self-concordance through goal progress on effort was significant (b = .201, SE = .045, 95 % CI [.118, .296]). The total effect was (b = .236, SE = .066, 95 % CI [.106, .366]).

Figure 2 Replicated mediation number 1 (high-school students; 95 % CI)



Discussion dedicated to Study 2

The pattern of results from study 2 was in line with study 1. Self-concordance increases goal progress which in turn increases effort. Furthermore, progress accounted for the variance between the self-concordance index and effort. However, study two was conducted in the middle of a semester and it is therefore possible that the proposed pattern of results is specific for the time of measurement. Therefore, in the next study, measurements were carried out twice at two extreme time points: at the beginning of the semester and at the end of the semester[7].

Furthermore, rather than using age-heterogenous university students (study 1), or younger high school students (study 2); first year university students were used in this study. We rationalized that the first semester could be especially challenging.

[7] The rationale for analyzing two time points in addition to the longitudinal analysis conducted below is two-fold. Firstly, higher statistical power is achieved. Secondly, additional information related to the pattern of relationships at two time points is obtained. When these two measurements are in line with studies one and two and with the longitudinal analysis, it provides further evidence in line with the proposed model.

Study 3 (Time point 1)

Method

Participants and procedure

The participants were 245 first year university students[8] (222 females, 21 males, 2 did not respond; aged M = 19.62, SD = 1.50). A non-probability sampling technique was used. The study was conducted at the beginning of the semester during the first two weeks. As in study two, respondents were asked to think of an academic goal and complete the scales related to the goal[9].

Measures

The measures were the same as in the previous study[10].

Goal self-concordance

Goal self-concordance was the same as study one and two.

Goal progress

Progress was operationalized by the same three items as in study two (Brunstein, 1993). Similarly, as in study 2, the reliability of the three items was not sufficient and therefore only the first two items were used. For the two items, the McDonald's ω was .662.

Effort

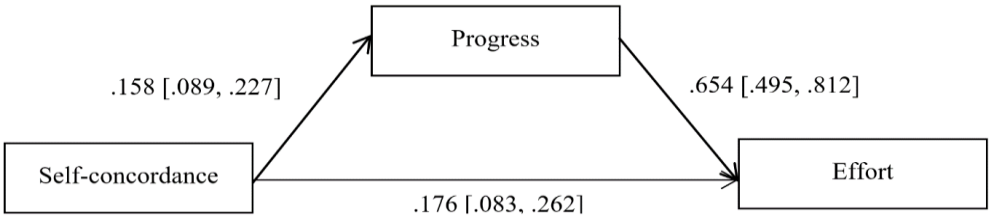
Effort was measured in the same manner as in study two. The McDonald's ω was .871.

Results

As in the previous studies, Process Macro v 2.16 for SPSS with the same inferential criteria was used. In the case that the 95 % confidence interval did not include 0, the effect was considered significant. Figure 3 illustrates the proposed model which indicates partial mediation. Progress accounted for variance between self-concordance and effort. As depicted below, the direct effect of self-concordance on effort was significant (b = .173, SE = .046, 95 % CI [.083, .262]).
The indirect effect of self-concordance through goal progress on effort was significant as well (b = .103, SE = .023, 95 % CI [.062, .153]). The total effect was (b = .276, SE = .049, 95 % CI [.179, .373]).

[8] The rationale for the sample size was the same as in previous studies.
[9] This study was part of a bigger longitudinal project related to goal dimensions.
[10] Except that a five-point scale was used.

Figure 3 Replicated mediation number 2 (first year university students; the beginning of the semester; 95 % CI)



Study 3 (Time point 2)

Method

Participants and procedure

The participants were 190 first year university students (167 females, 20 males, 3 did not respond; aged M = 19.72, SD = 1.334). A non-probability sampling technique was used. The study was conducted at the end of the semester during the last two weeks. As in study two and three, the respondents were asked to think of an academic goal and complete the scales related to the goal.

Measures

As in the previous studies, three-goal variables – self-concordance, goal progress and effort were examined. All three scales were measured in the same manner as in the previous study.

Goal self-concordance

Self-concordance was the same as in the previous studies.

Goal progress

As in the previous study, only two items were used. The McDonald's ω was .482.

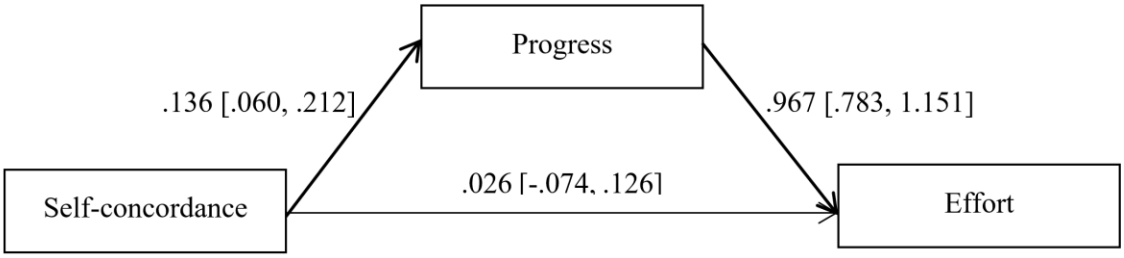
Effort

The McDonald's ω for effort was .875.

Results

Figure 4 illustrates the proposed model where full mediation occurred. Perceived progress accounted for the variance between self-concordance and effort. As depicted below, the direct effect of self-concordance on effort was not significant (b = .026, SE = .051, 95 % CI [-.074, .126]). However, the indirect effect of self-concordance through goal progress on effort was significant (b = .132, SE = .046, 95 % CI [.041, .222]). The total effect was (b = .158, SE = .061, 95 % CI [.037, .279]).

Figure 4 Replicated mediation model (first year university students; the end of the semester; 95 % CI)



Discussion dedicated to Study 3

The results of study 3 at both measurement points were in line with previous studies. This further corroborates the proposed model. However, analysis conducted so far was cross-sectional in nature and further directional predictions are not warranted. Therefore, we paired the first and second measurements and conducted a longitudinal analysis of the two measurements with an analytical procedure recommended by Hayes (2017).

Analysis of the longitudinal data from study 3

Method

Participants and procedure

The participants were 135 first year university students (124 females, 10 males, 1 did not respond; aged M = 19.5, SD = 1.31)[11][12].

Measures

Goal self-concordance

Self-concordance was measured in the same manner as in the previous studies.

Goal progress

As in the previous studies, the reliability for perceived progress was not sufficient and therefore a 2-item alternative was used. For the second measurement, the McDonald's ω was .469 and for the first measurement the McDonald's ω was .561.

Effort

For the second measurement, the McDonald's ω was .872 and for the first measurement, the McDonald's ω was .862.

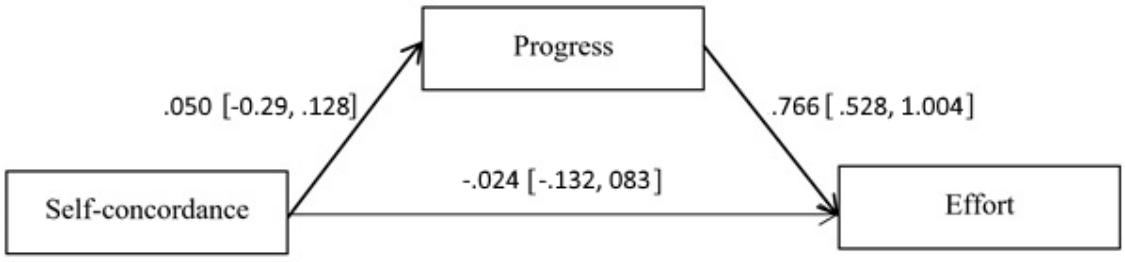
[11] Note that the data was paired from Time point 1 and Time point 2 of study three, according to the codes provided by the participants in both measurements. For pairing, only participants with the same code, gender, field of study and logically plausible age differences across both measurements were employed, leading to relatively high mortality.
[12] As in previous studies, we wanted to have sufficient power, although due to research mortality due to the pairing, the sample size and consequent statistical power are lower than in the separate analysis.

Results

In order to test whether goal progress mediated the relationship between self-concordance and effort in a longitudinal manner, Process Macro v 3.0 for SPSS was used with the same inferential criteria as before. In the case that the 95 % confidence interval did not include 0, the effect was considered significant. However, as recommended by Hayes (2017), in order to analyze the data from two time-points in a longitudinal manner, we modeled the later variables of Y and M while using lags (earlier measurements of Y and M) as co-variates.

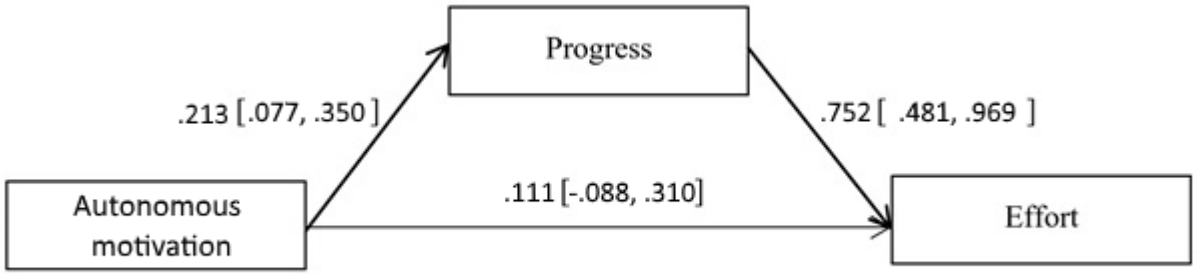
As depicted in Figure 5, mediation did not occur when using self-concordance index. When controlling for the first measurement of progress and effort, the direct effect of self-concordance on effort was not significant (b = -.024, SE = .054, 95 % CI [-.132, .083]). Nor was the indirect effect of self-concordance through goal progress on effort (b = .038, SE = .035, 95 % CI [-.031, -.107]). The total effect was (b = .014, SE = .062, 95 % CI [-.109, .136]).

Figure 5 Non-Replicated mediation model (first year university students; longitudinal data analysis; 95 % CI)



However, when analysing the autonomous and controlled motivations separately, as suggested by Koestner et al. (2008), full mediation occurred with the index of autonomous motivation. Specifically, as depicted in a Figure 6, perceived progress fully mediated the relationship between the variables. It accounted for the variance between the indicator of autonomous motivation in the first measurement and effort in the second measurement; controlling for effort and progress in the first measurement. The direct effect of self-concordance on effort was not significant (b = .111, SE = .101, 95 % CI [-.088, .310]) while indirect effect of self-concordance through goal progress on effort was significant (b = .155, SE = .062, 95 % CI [.039, .282]). The total effect was (b = .265, SE = .109, 95 % CI [-.050, .481). When the index of controlled motivation was used, mediation did not occur. The direct effect of self-concordance on effort was not significant (b = .100, SE = .070, 95 % CI [-,038, .238) and neither was the indirect effect of self-concordance through goal progress on effort significant (b = .014, SE = .044, 95 % CI [-.073, .102). The total effect was (b = .115, SE = .079, 95 % CI [-.042, .272).

Figure 6 Replicated mediation model with autonomous motivation only (first year university students; longitudinal data analysis; 95 % CI)



Discussion dedicated to the longitudinal analysis of Study 3

The results of the longitudinal analysis were in line with previous results; although only when the separate index of autonomous motivation was used. This is congruent with Koestner et al. (2008). Their research found that only autonomous motivation was related to the goal characteristics, namely to the goal progress. Furthermore, they advocated the need for a separate analysis of autonomous and controlled motivation as autonomous and controlled motivation was not "mirrored" (correlated negatively). Therefore, it is possible that in some situations (for example, when autonomous and controlled motivation are positively related) controlled motivation could contaminate the self-concordance index, suppressing the autonomous part of variance, and explains why mediation did not occur when the self-concordance index was used.

General discussion

In the present set of studies, we aimed to corroborate the model predicting that perceived progress would mediate the relationship between autonomous motivation (self-concordance) and following effort. In order to address this issue in more robust fashion, one pilot study and two additional confirmatory conceptual replications were conducted. These studies varied in a number of factors such as sample characteristics (heterogenous university students vs. high-school students vs. first-year undergraduate university students); operationalization of the scales (e.g. one vs. three items and various sources of scales); type of goals (idiosyncratic vs. nomothetic – academic goal); and design (cross-sectional vs. longitudinal).

It has been shown that perceived progress either partially (studies 1 and 3) or fully (studies 2 and 3) mediated the relationship between self-concordance and effort. Furthermore, the results of the longitudinal study corroborated this pattern of results, although only when the separate index of autonomous motivation was used.

Additionally, the present results have indicated that perceived progress was positively related to effort expenditure in all studies. This is in line with Fishbach et al. (2010) who have argued that positive feedback regarding progress could motivate consequent goal striving in some cases. This is also consistent with the idea echoed in the Small wins theory (Weick, 1984) where small wins could be motivating. Uy et al. (2015) recruited early stage entrepreneurs and analyzed their perceived progress and effort longitudinally. The participants were asked to provide ratings of perceived progress and effort in their natural environment on their mobile phones on a daily basis.

In line with the present results, it was shown that perceived momentary goal progress positively predicted consequent goal effort.

The motivational consequences of goal progress are also postulated in the theory of goal gradient hypothesis which states that people exhibit more effort when approaching the termination of their respective goal striving. For instance, Kivetz, Uminsky and Zheng (2006) found that perceived progress, even illusory, influenced consequent goal striving. In their study, the acceleration of purchases based on the proximity to earning coffee for a free was examined. The results showed that participants who received a bonus beforehand felt closer to the goal and finished the task faster in comparison to the control participants. Similarly, in their research, Nunes and Drèze (2006), documented a phenomenon which is manifested through an increase in goal effort - the endowed progress effect.

Moreover, the general prediction that subjective progress will influence effort is in line with Carver and Scheier's theory which proposes a feedback loop as a basic self-regulatory mechanism (Carver & Scheier, 2016). This theory predicts, based on a comparison with a reference point, that progress should lead to positive affect and consequently to the reduction of effort. This prediction is the opposite of what has been found in the present study.

However, a possibility for theoretical reconciliation exists. Firstly, for the feedback loop to operate, a crucial aspect is the reference point in the form of a standard that is set by an individual. Even though an increase in perceived progress is related to an increase in effort, this does not necessarily mean that participants meet their standards. It is hypothetically possible that higher effort has emerged due to fact that the feedback loop signaled by that criterion (regarding the present level of progress) has not been met and therefore an exhibited effort has increased.

Additionally, Fishbach et al. (2010) have pointed out that the influence of feedback on consequent self-regulated goal striving is more nuanced than expected. Indeed, the specific influence of positive or negative feedback depends on various factors such as the level of expertise. While negative feedback could be beneficial in skilled experts as it helps them correct the course of goal striving, positive feedback could be motivating for novices as it helps them bolster their commitment and adhere to a goal. Consequently, after positive feedback, effort could be bolstered.

In addition, it is widely assumed that effort, as a mental and physical activity, is a negative experience and that an individual tries to avoid it at all costs. Nevertheless, it has been recently proposed that effort can be related to the addition of the value to the activity (Inzlicht, Shenhav, & Olivola, 2018). According to Touré-Tillery and Fishbach (2014), people may enjoy the process of goal attainment and this positive experience may appear in greater effort (operationalized as persistence or as time spent on a task). This is crucial, considering that we were not interested in the relationship of progress and effort per se, but rather in their relationship to self-concordance and goals that are more or less congruent with the self of the individual. However, in order to address this, further research is necessary.

For future research, various extensions of the present study could be carried out. For example, Uy et al. (2015) found that besides the perceived level of progress, the variability of progress could be important as well. Given that self-concordance is related to long-term effort (Sheldon, 2014), progress variability could be an important measure that could be used in future research.

Furthermore, the present pattern of results does not grant that another variable cannot account for the variance between the proposed variables (Fiedler, Harris, & Schott, 2018). In fact, according to Fiedler et al. (2018), rather than saying that progress mediates the relationship between self-concordance and effort, it is safer to say that progress accounts for the variance between self-

concordance and effort. Indeed, other models which propose different mediators are plausible and therefore worthy of further examination.

Despite attempting rather extensive corroboration, a true causal nature of the proposed variables is not warranted as mediation analysis based on cross-sectional data cannot provide a definitive answer regarding the directionality (Fiedler et al., 2018; Preacher, 2015). In this case, one could propose reversing the proposed direction (X-Y-M) and consequently comparing the two models in terms of a better model fit. However, as the results could be misleading, this seems rather problematic (Lemmer & Gollwitzer, 2017). As stressed by Lemmer and Gollwitzer (2017), when M has a lower reliability than Y (as in the present case), reversing the proposed causal chain X-Y-M is not recommended. Alternatively, two solutions were employed. Firstly, the present statistical mediation analysis was based on a theoretical analysis assuming that: *"If a causal model is assumed, then a prediction derived from that causal model can account for a substantial part of the variance in a certain study context"* (Fiedler et al., 2018; p. 100). This reflects that while alternative models could be theoretically and computationally plausible, their corroboration is beyond the scope of the present study.

Secondly, to address if the proposed model is plausible, a longitudinal analysis was conducted. The proposed model was in line with the data (although only with the separate index of autonomous motivation). Nevertheless, to further corroborate the causal relationships, more measurement points and/or experimental investigations are welcome in future research. For instance, a priming manipulation of *have to vs. want to* motivation could be used, as was used by Leduc-Cummings, Milyavskaya and Peetz (2017). They used manipulation where participants were instructed to write down why they should (have-to condition) or want to (want-to condition) carry out their goal. Furthermore, various designs concerning experimental mediation could be used (Pirlott & MacKinnon, 2016).

Additionally, regarding causality, common causes could exist. For instance, as pointed out by a reviewer, it is possible that progress and effort could not be causally linked but they are both caused by another variable such as self-regulation. Therefore, a further, more complex, examination is necessary.

Moreover, for future research, alternative operationalizations and objective data could be used. This seems to be especially promising, considering the less conscious aspect of self-regulation. For instance, although these theories have been highly questioned in recent years, some accounts have proposed that goals could be activated and operate (more or less) non-consciously (e.g. Huang & Bargh, 2014; for a recent review see e.g. Kačmár & Lovaš, 2018).

In short, and despite some limitations, we have found and replicated an interesting pattern of results. In two cross-sectional and one longitudinal studies, we found that the model predicting that perceived progress accounts for the variance (or more colloquially mediates the relationship) between self-concordance and effort is in line with our data and therefore has some degree of verisimilitude. This pattern of results not only fills the existing gap in the literature but encourages future research and potential application. For instance, echoing Goal-setting theory (Locke & Latham, 1990), instead of proposing a general and poorly specified goal, one, preferably, should set a higher amount of smaller, feasible goals, where progress on a day to day basis can be traced; especially considering internal reasons for goal attainment.

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Supplement

Table 1
Correlations among variables

	Variable	M	SD	1.	2.	3.
Study 1	1. Self-concordance	4.73	4.32	–	.201***	.282***
	2. Progress	12.54	3.60		–	.418***
	3. Effort	5.33	1.50			–
Study 2	1. Self-concordance	2.11	3.92	–	.342***	.253***
	2. Progress	9.67	2.40		–	.639***
	3. Effort	14.70	3.67			–
Study 3 (Time point 1)	1. Self-concordance	1.95	3.06	–	.280***	.340***
	2. Progress	6.69	1.73		–	.516***
	3. Effort	11.34	2.49			–
(Time point 2)	1. Self-concordance	1.71	2.87	–	.251***	.185*
	2. Progress	7.12	1.66		–	.605***
	3. Effort	11.14	2.46			–
(Longitudinal data – Self-Concordance index)	1. Self-concordance	2.18	3.03	–	.206*	.130
	2. Progress (2nd measurement)	7.21	1.51		–	.578**
	3. Effort (2nd measurement)	11.40	2.27			–
(Longitudinal data – Controlled motivation only)	Controlled motivation	5.67	2.06	–	.014	.100
	2. Progress (2nd measurement)	7.21	1.51		–	.578***
	3. Effort (2nd measurement)	11.40	2.27			–
(Longitudinal data - Autonomous motivation only)	1.Autonomous motivation	7.75	1.77	–	.392***	.354***
	2. Progress (2nd measurement)	7.21	1.51		–	.578***
	3. Effort (2nd measurement)	11.40	2.27			–

Note. * p < .05. ** p < .01. *** p < .01.