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The two sides of goal intentions: Intention self-concordance and intention strength as predictors of physical activity

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Objective: The present research introduces an extended conceptualisation of self-concordance, which is considered an attribute not only of goals, but also of goal intentions. Based on a corresponding operationalisation, we investigate the interplay of both intention strength and intention self-concordance in the prediction of physical activity.

Design: Data were taken from a longitudinal study of 134 obese people who were asked to fill out a questionnaire three times every six months.

Main measures: Physical activity and intention self-concordance were measured by validated scales. Intentions strength was assessed by an item typically employed in the extant literature.

Results: Logistic regression analyses and path analyses showed both intention strength and self-concordance to be significant predictors of changes in physical activity over time. Additional analyses found self-efficacy to be a significant predictor of intention strength and self-concordance; for outcome expectations this was not the case.

Conclusions: Findings support the idea that intention strength and self-concordance are two critical facets of a goal intention that need to be considered in the prediction of physical activity participation. Whereas intention strength refers to the degree of determination with which a goal intention is adopted, self-concordance rather captures the quality of this intention.

Keywords: physical activity; goal intention; self-concordance; self-efficacy; outcome expectations

Establishing the psychological factors and processes underlying regular physical activity is essential in developing effective interventions to help people adopt and maintain a physically active lifestyle (Glanz & Bishop, 2010). Different theoretical models have been proposed to predict and explain physical activity participation on the basis of social cognitions (Connor & Norman, 2015). The most prominent theories focusing on the motivational antecedents of physical activity behaviour are social cognitive theory (Bandura, 2004), the theory of planned behaviour (Ajzen, 2011) and the self-determination theory (Deci & Ryan, 2000). In recent years, these approaches were

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complemented by conceptual frameworks that consider the volitional dynamics of action planning and action control (Gollwitzer, 1999; Kuhl, 2000; Schwarzer, 2008; Sniehotta, 2009).

For the design of intervention programmes, researchers often use a multitheory perspective, that is, they draw from different theoretical frameworks to ensure that their interventions are based on a broader set of critical factors that might have an impact on physical activity participation (Conn, Hafdahl, & Mehr, 2011). Likewise, the MoVo intervention programme (Göhner & Fuchs, 2007) was grounded on the MoVo process model (Fuchs, Goehner, & Seelig, 2011; Fuchs, Seelig, Göhner, Burton, & Brown, 2012) that incorporates central elements from the above-mentioned motivation theories and from volition models of self-regulation. In the present study, we are using the MoVo process model as the theoretical framework to investigate the interplay of intention strength and intention self-concordance in the prediction of physical activity participation. A better understanding of the role of those two factors in motivating regular physical activity will help to develop more effective intervention programmes.

The MoVo process model (‘MoVo’ stands for ‘motivation’ and ‘volition’) posits that health behaviours, such as physical activity, are essentially determined by five factors: strength of the goal intention, self-concordance of this goal intention, action planning, barrier management and outcome experiences (Figure 1). *Goal intention* is the central motivational construct of the MoVo process model. Goal intentions are resolutions of the type ‘I intend to resume my fitness training’ (Sheeran, Milne, Webb, & Gollwitzer, 2005). They are the result of motivational processes of weighing up the costs and benefits of the behaviour (*outcome expectations*) and appraising one’s own ability to perform it successfully (*self-efficacy*). The MoVo process model contends that there are two dimensions of goal intentions that need to be distinguished to understand the initiation and maintenance of health behaviours: intention strength and intention self-concordance. Whereas *intention strength* refers to the degree of firmness a person expresses towards an intended action, *intention self-concordance* denotes the extent to which a specific

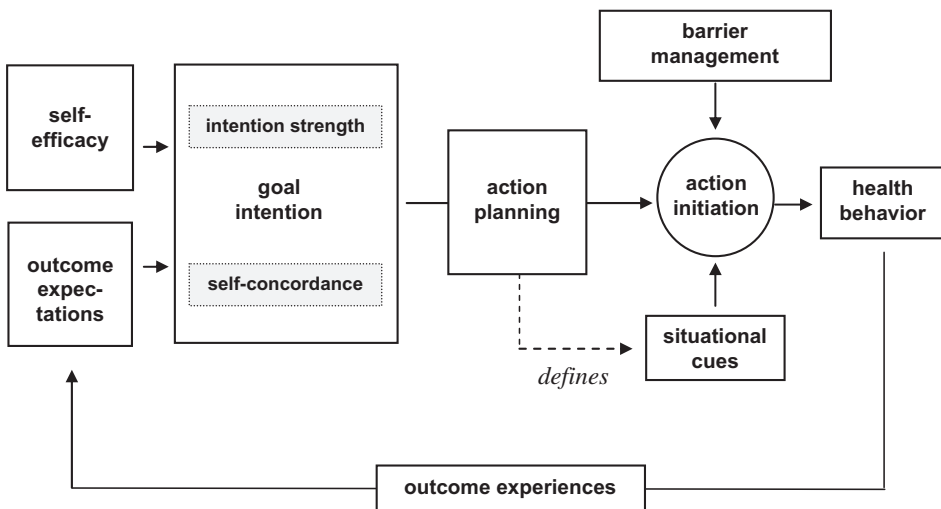


Figure 1. MoVo process model.

goal intention is congruent with the basic needs, interests and values of the person (cf., the concept of goal self-concordance by Sheldon & Elliot, 1999; Sheldon, 2014).

To translate goal intentions into real actions, goal intentions need to be furnished with *action plans* in which a person specifies the when, where, and how of an intended action (cf. implementation intentions; Gollwitzer, 1999). For instance: ‘I intend to participate at the fitness course on Tuesday 6 pm at the City Health Center.’ Action plans can significantly enhance the likelihood of initiating and continuing regular physical activity (de Vet, Oenema, & Brug, 2011). However, even carefully elaborated action plans can be challenged by external (e.g. workload at the office) and internal (e.g. lethargy) barriers. Volitional strategies of *barrier management*, such as mood regulation, stimulus control, cognitive restructuring or attention control, (Kuhl, 2000) can keep the intended action on target. Such self-regulatory processes play an important role in the realisation of exercise-related action plans (Scholz, Schüz, Ziegelmann, Lippke, & Schwarzer, 2008). Finally, the MoVo process model introduces a construct called *outcome experiences*. This variable reflects the personal experiences and appraisals regarding the new behaviour. For example, after the first exercise meetings a person may conclude: ‘This training really helps me to improve my fitness’ or ‘The pain in my arm has reoccurred’. Based on positive or negative outcome experiences, people confirm or change their corresponding outcome expectations and thus maintain or modify their future goal intentions (cf., Rothman, [2000] concept of ‘perceived satisfaction with received outcomes’).

Intention strength and self-concordance

As stated earlier, the MoVo process model differentiates two dimensions of goal intentions: intention strength and intention self-concordance. In the literature goal intentions (or behavioural intentions) are typically measured by asking ‘How strong is your intention to resume your fitness training within the next weeks and months?’, with response options ranging from ‘I do not have this intention at all’ to ‘I do have a very strong intention’ (Ajzen & Madden, 1986). Such operationalisations focus on the strength of a goal intention. A meta-analysis by Armitage and Conner (2001) demonstrated that on average 22% of exercise behaviour variance is accounted for by the strength component of goal intentions. Evidence from adherence research suggests that the strength of an exercise-related goal intention mainly depends on outcome expectations and self-efficacy beliefs (Williams, Anderson, & Winett, 2005).

According to the MoVo process model goal intentions do not vary only on the dimension of strength, but also on the dimension of self-concordance. The construct of self-concordance was introduced by Sheldon and Elliot (1999) and denotes ‘the extent to which a goal reflects personal interests and values versus something one feels compelled to do by external or internal pressures’ (Koestner, Lekes, Powers, & Chicoine, 2002, p. 231). Goal self-concordance is a concept that stands in the tradition of goal theory. The MoVo process model, however, belongs to the group of health behaviour approaches that use the concept of intention – and not the concept of goal – to capture the actual motivational state of a person towards a specific behaviour (Connor & Norman, 2015). To transfer the idea of goal self-concordance (originated in goal theory) to the intention-based MoVo process model the new concept of ‘intention self-concordance’ was introduced. In the same way as goal self-concordance is considered

to be an attribute of a goal, intention self-concordance is regarded an attribute of the goal intention. Thus, self-concordant goal intentions reflect peoples' authentic choices as well as their personal beliefs and preferences. By contrast, non-self-concordant goal intentions are not endorsed by the self; they are pursued with a sense of 'having to', as the person does not really enjoy or believe in the intended actions (cf., Sheldon, Ryan, Deci, & Kasser, 2004).

Modes of self-concordance

Based on the work by Sheldon and Elliot (1999), the MoVo process model differentiates four modes of intention self-concordance: (a) *External*: pursuing a goal intention with a feeling of being controlled by external pressures or contingencies (e.g. performing a sport activity to avoid being criticised by one's partner); (b) *Introjected*: pursuing a goal intention on the basis of internalised norms that are not fully integrated into the self-system; the person acts to avoid feelings of shame, guilt, or anxiety (e.g. joining cardio-fitness training to avoid letting down one's doctor); (c) *Identified*: pursuing a goal intention with a sense of choice and the belief that the action leads to important outcomes (e.g. exercising because this is good for fitness); and (d) *Intrinsic*: pursuing a goal intention because the activity is inherently interesting and challenging (e.g. engaging in a sport activity just because of the fun and enjoyment it provides).

Goal intentions of external and introjected modes are categorised as *non-self-concordant*. They are considered to provide an unstable basis for sustained goal pursuit because persons do not fully adhere to their goals (Healy, Ntoumanis, van Zanten, & Paine, 2014). Goal intentions of identified and intrinsic modes are classified as *self-concordant*. They are often shown to lead to enhanced levels of sustained effort which, in turn, increases the probability of goal attainment (Ntoumanis et al., 2014).

Self-concordance and physical activity

The pursuit of self-concordant (otherwise called authentic, autonomous, intrinsic or self-congruent) goals seems to be a critical aspect for the maintenance of physical activity participation. In a prospective study over a one-month period, Carraro and Gaudreau (2011) found students with self-concordant physical activity goals to be more likely to develop detailed implementation intentions, which, in turn, led to greater physical activity goal progress. Chatzisarantis, Hagger, and Thøgersen-Ntoumani (2008) showed that goal self-concordance was predictive of physical activity participation after five weeks. Similarly, Vansteenkiste, Simons, Soenens, and Lens (2004) found intrinsic goals had strong effects on the level of physical activity after four months. Other studies demonstrated the importance of self-concordant goals in the field of competitive sports (Smith, Ntoumanis, & Duda, 2007; Healy et al., 2014). For example, using a longitudinal perspective, Smith, Ntoumanis, Duda, and Vansteenkiste (2011) found autonomous goal motives to be positively related to goal-directed effort 3 months later, which subsequently predicted goal attainment another 3 months later in university athletes.

Self-concordance and intention strength

There are only few investigations looking at self-concordance and intention strength as concurrent predictors of physical activity participation. In a cross-sectional study by Chatzisarantis, Hagger, Smith, and Sage (2006), intrinsic motivation (a construct similar to goal self-concordance) and intention strength both significantly predicted physical activity participation, when they were entered into the hierarchical regression analysis simultaneously; however, their interaction was not significant. de Vet et al. (2011) reported the results of a longitudinal regression analysis in which both goal self-concordance and intention strength were not predictive of moderate intensity physical activity two weeks later. Using the MoVo process model as a theoretical framework, Fuchs et al. (2012) found intention strength to be a significant predictor of physical exercise at the adoption and maintenance stage of the behaviour; in contrast, intention self-concordance was only predictive at the maintenance stage (interactive effects of both predictors were not tested). In sum, available data are inconclusive; they do not yet adequately demonstrate to what extent intention strength and (goal or intention) self-concordance may contribute independently and interactively to the prediction of future activity behaviour.

Purpose of present investigation

The MoVo process model is a relatively new approach that needs further testing (Göhner, Seelig, & Fuchs, 2009; Gerber, Fuchs, & Pühse, 2010; Fuchs et al., 2011, 2012). In the present research, we are examining the model's assumption that the two dimensions of a goal intention, intention strength and intention self-concordance, both contribute independently and substantially to the longitudinal prediction of physical activity participation. Testing this assumption will have theoretical implications for our understanding of goal intentions and practical implications for the design of intervention programmes that aim at facilitating sustained changes in health behaviour. In an exploratory analysis, we are also examining whether self-efficacy beliefs and outcome expectations are not only predictors of intention strength (that has been proven in many studies before, e.g. Armitage & Conner, 2001), but also of intention self-concordance.

Method

Participants and procedures

The sample was drawn from the German population of obese people (>18 years of age; self-reported body mass index (BMI) 30–40 kg/m²). Recruitment of participants was conducted by public advertisements in the local press. A total of 285 people responded to the public advertisement to participate in a longitudinal questionnaire study on 'Health and Health Behaviour'; $n = 213$ of them fulfilled the age and BMI inclusion criteria and were invited to participate in the study. Data were collected at three time points (T1–T3) with intervals of 6 months between T1 and T2, and between T2 and T3. A total of $n = 197$ (100%) participants returned the questionnaire at T1, $n = 169$ (86%) returned the questionnaire at T2, and $n = 160$ (81%) returned the questionnaire at T3. The analyses reported in this paper are based on the *longitudinal sample* of those $N = 134$ (68%) who sent back all three questionnaires (male: $n = 29$, female: $n = 105$;

age: $M = 52.1$, $SD = 10.4$; BMI: $M = 34.0$, $SD = 3.7$). Participants who did not fully complete the study did not differ significantly from the longitudinal sample in terms of gender ($\chi^2 [1] = .116$; $p = .116$), age ($F [1, 196] = .06$; $p = .804$), BMI ($F [1, 196] = .62$; $p = .507$), physical activity ($F [1, 191] = 1.39$; $p = .224$) and intention strength ($F [1, 194] = .05$; $p = .822$). All questionnaires were sent to the participants' home addresses and included a self-addressed stamped envelope. Participants did not receive remuneration for taking part in the study.

Measures

Intention strength was assessed by the item 'How strong is your intention to exercise regularly within the next weeks and months?' The response format was a 6-point scale ranging from 0 ('I do not have this intention at all') to 5 ('I have a strong intention') (cf., Ajzen & Madden, 1986).

Self-concordance of the goal intention was assessed by the SSK-scale, a German-language 12-item instrument that has proven to be a reliable and valid measure of the self-concordance of an exercise-related goal intention (Seelig & Fuchs, 2006). The SSK-scale has four subscales measuring the intrinsic, identified, introjected and extrinsic intentions for exercising. Each subscale was formed by three items. The item stem was: 'I intend to exercise regularly within the next weeks and months because ...' and were followed by statements like '... it's just fun for me' (*intrinsic*), '... I have good reasons to be active' (*identified*), '... otherwise I would have a guilty conscience' (*introjected*) and '... significant others urge me to do so' (*extrinsic*). Participants who indicated to have at least a weak exercise-related goal intention (intention strength ≥ 1) were asked to respond on a 4-point scale ranging from 1 ('not true') to 4 ('true'). Those who reported no intention to exercise (intention strength = 0) were asked to skip this part of the questionnaire (number of 'non-intenders' at T1: $n = 6$; at T2: $n = 6$; common subset T1/T2: $n = 3$). In order to keep these non-intenders in the analyses, their scores on the Self-Concordance Index (SC index; see below) were estimated by the following regression equation: $SC\ index = -.55 + .47 \times\ intention\ strength$. This equation was derived from pooled T1 and T2 data. Thus, for non-intenders (intention strength = 0), the estimated value on the SC index was $-.55$. In the current study, Cronbach's alpha for the four subscales at T1 ranged from $\alpha = .61$ (identified) to $\alpha = .79$ (extrinsic). In line with previous research (Koestner et al., 2002), our SC index was derived by summing the identified and intrinsic mean scores and subtracting the introjected and extrinsic mean scores. High scores on the SC index indicate a strong self-concordant goal intention whereas low scores indicate a strong non-self-concordant goal intention (theoretical range = -6 to $+6$).

Self-efficacy. Consistent with Schwarzer (2008), we assessed two types of exercise self-efficacy: the confidence to begin regular exercise (adoption self-efficacy), and the confidence to maintain regular exercise over a longer time period (maintenance self-efficacy). Each variable was measured using a single item with a response format ranging from 0 = 'I am not confident at all' to 5 = 'I am confident to 100%'. The average score of the two variables was used to form the Self-Efficacy Index.

Outcome expectations were assessed using an instrument developed and validated by Fuchs (1994) that included nine positive and seven negative outcome expectations towards regular physical exercise (e.g. 'If I exercise regularly, then I can control my

body weight'; with a response format ranging from 'not true' [=1] to 'exactly true' [=4]). The positive and negative expectations were averaged separately, and then, the difference (positive minus negative) was derived to provide an Outcome Expectations Index (OE Index; theoretical range = -3 to +3).

Physical activity participation. The measurement of physical activity participation was based on the 'Freiburg Questionnaire on Physical Activity', which has proven to be a reliable and valid instrument (Frey, Berg, Grathwohl, & Keul, 1999). Within this questionnaire, persons were asked whether they participated in any sport or exercise activities during the last four weeks. If so, respondents were requested to write down these activities, and to indicate for each activity the duration per week (minutes per week). Only activities that involve larger groups of skeletal muscles and lead to the acquisition or maintenance of endurance capacity (e.g. jogging), strength (e.g. gym exercises), flexibility (e.g. yoga) and/or coordination skills (e.g. dancing) were counted. Activities such as playing billiards, fishing and chess were, therefore, excluded. The total activity time was derived from the sum of the weekly duration for all relevant activities.

The descriptive statistics for the variable Physical Activity Time (PA Time; min per week) at T1 were: $M = 120.89$; $SE = 11.70$; $SD = 135.38$; median = 64.88; skewness = 1.13; kurtosis = .47; and range = .00 to 558.14. Because of the strongly skewed distribution of the variable PA Time (28% of the cases had the value .00 min per week), we decided to use a dichotomous index Physical Activity Participation (PA Participation): persons with PA Time ≥ 45 min per week were defined as 'PA participants' (coded as 1) and those with values < 45 min per week as 'PA non-participants' (coded as 0). The limit of 45 min per week was chosen for practical reasons; many lessons in the field of sport and exercise take 45 min per session (e.g. cardio training) and we wanted the weekly involvement in at least one such lesson to be regarded as 'physical activity participation'. Since in this study, we were interested in the behavioural aspects of physical activity participation (i.e. its regularity) and not in its health impact, classifying people according to health-related physical activity guidelines (WHO, 2010) would have not been appropriate.

Results

Descriptive statistics

Means, standard deviations, skewness scores, kurtosis scores and bivariate correlations are presented in Table 1. Note that intention strength (T1, T2) and self-concordance (T1, T2) were correlated within the range $.45 \leq r \leq .56$. Moreover, there were significant associations between intention strength (T1, T2) and physical activity participation (T1, T2, T3) ranging from $.24 \leq r \leq .51$ ($p < .01$), and significant associations between self-concordance (T1, T2) with physical activity participation (T1, T2, T3), varying between $.39 \leq r \leq .52$ ($p < .01$).

Regression analyses

Logistic hierarchical regression analyses were conducted to investigate the predictors of physical activity participation (dichotomous index PA Participation) from T1 to T2 and from T2 to T3 (Table 2). Baseline physical activity participation and intention strength

Table 1. Descriptive statistics and variable intercorrelations.

	Descriptives				Intercorrelations (Pearson)							
	M	SD	Skew	Kurt	PA T1	PA T2	PA T3	SC T1	SC T2	IS T1	IS T2	SE T1
PA participation T1	.58	.50	-.34	-1.92	1.00							
PA participation T2	.58	.50	-.34	-1.92	.356**	1.00						
PA participation T3	.57	.50	-.27	-1.95	.298**	.451**	1.00					
Self-concordance T1	1.94	1.83	-.11	-.64	.436**	.428**	.386**	1.00				
Self-concordance T2	1.97	1.77	.07	-.78	.403**	.477**	.518**	.739**	1.00			
Intention strength T1	3.44	1.43	-.69	-.33	.401**	.390**	.334**	.560**	.455**	1.00		
Intention strength T2	3.46	1.34	-.71	.01	.244**	.506**	.503**	.445**	.561**	.576**	1.00	
Self-efficacy T1	3.70	1.25	-.77	-.29	.392**	.352**	.367**	.568**	.492**	.756**	.516**	1.00
Outcome expectations T1	1.35	.80	-.47	.08	.273**	.247**	.269**	.523**	.468**	.401**	.235**	.398**

Note: N = 134; Skew = skewness; Kurt = Kurtosis; T1/T2/T3 = time point 1/2/3; PA = Physical activity (Participation); SC = Self-concordance; IS = Intention strength; SE = Self-efficacy.
 **p < .01.

Table 2. Logistic hierarchical regression with physical activity participation as criterion variable and baseline physical activity participation, intention strength and self-concordance as predictors.

Step	Predictor	Prediction period: T1 to T2					Prediction period: T2 to T3				
		B	SE	Wald	p	Exp (B)	B	SE	Wald	p	Exp (B)
1	Constant	-1.42	.56	6.366	.012	.242	-2.49	.72	11.841	.001	.083
	BL PA participation	1.08	.41	7.016	.008	2.933	1.24	.44	7.951	.005	3.448
	Intention strength	.50	.16	10.077	.002	1.640	.78	.20	14.841	.000	2.180
<i>Model statistics</i>		Cox & Snell R ² = .19; Nagelkerke R ² = .26					Cox & Snell R ² = .29; Nagelkerke R ² = .39				
2	Constant	-1.40	.57	5.993	.014	.246	-2.60	.75	11.979	.001	.074
	BL PA participation	.82	.42	3.700	.054	2.262	.91	.47	3.82	.051	2.481
	Intention strength	.31	.17	3.13	.077	1.359	.57	.22	6.811	.009	1.762
<i>Model statistics</i>		Cox & Snell R ² = .23; Nagelkerke R ² = .31					Cox & Snell R ² = .34; Nagelkerke R ² = .46				
3	Constant	-1.33	.64	4.338	.037	.266	-2.47	.79	9.714	.002	.084
	BL PA participation	.81	.43	3.656	.056	2.252	.93	.47	3.928	.048	2.525
	Intention strength (IS)	.29	.18	2.567	.109	1.338	.53	.23	5.506	.019	1.702
<i>Model statistics</i>		Cox & Snell R ² = .23; Nagelkerke R ² = .31					Cox & Snell R ² = .34; Nagelkerke R ² = .46				
<i>Model statistics</i>		Cox & Snell R ² = .23; Nagelkerke R ² = .31					Cox & Snell R ² = .34; Nagelkerke R ² = .46				

Note: N = 134; T1/T2/T3 = time point 1/2/3; BL=Base Line; PA = Physical Activity.

were entered in the first step, self-concordance in the second step, and the interaction of intention strength and self-concordance in the third step. For both prediction periods, self-concordance turned out to be a significant predictor of changes in physical activity participation six months later, even when intention strength was controlled for as a concurrent predictor (second step). At this second step, intention strength was significantly predictive of PA for the period T2–T3, but only borderline predictive for T1–T2 PA. The Nagelkerke R^2 increased from .26 to .31 (T1–T2) and from .39 to .46 (T2–T3) when self-concordance was added in the second step. Analogous increases were found for the Cox and Snell R^2 . The interaction of both predictors (third step) did not improve the prediction, neither for T1–T2 nor for T2–T3 PA.

Path analyses

Based on the MoVo process model (Figure 1), a causal model was specified in which the effects of intention strength and self-concordance on physical activity participation were tested for the two prediction periods simultaneously (Figure 2). Note that the baseline scores of physical activity participation at T1 were controlled for. The model also included self-efficacy and outcome expectations as direct determinants of intention strength and self-concordance. To test the model in Figure 2, path analyses were conducted with the program Mplus 7.11 (Muthen & Muthen, 2012), which offers parameter estimates for models with categorical dependent variables based on the robust weighted least square estimation algorithm (WLSMV).

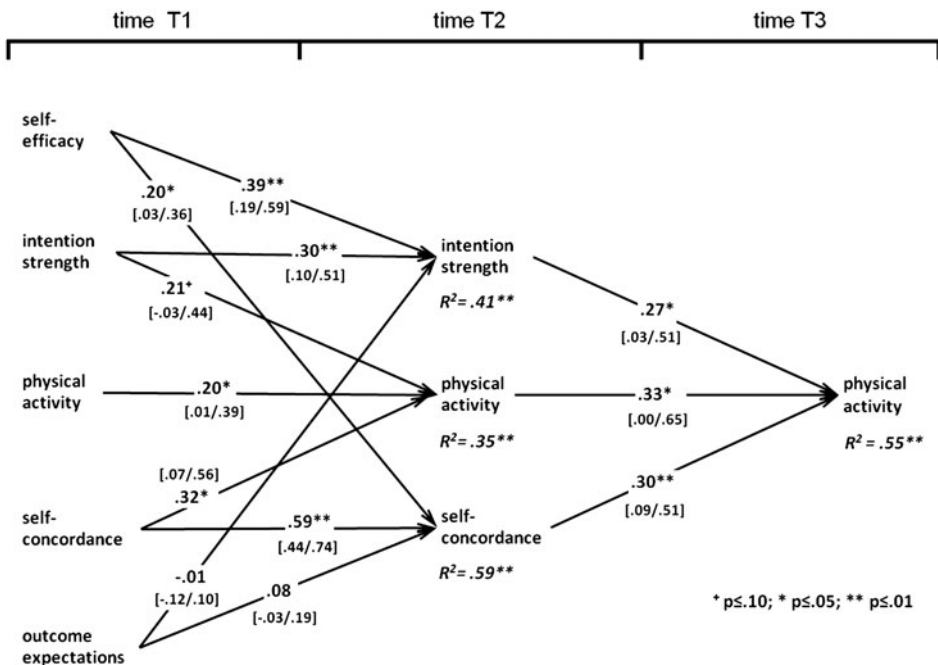


Figure 2. Path analysis covering the time periods T1–T2 (6 months) and T2–T3 (6 months) [numbers in brackets: 95% CI].

Figure 2 shows the standardised path coefficients, along with the variance explained (R^2) for each dependent variable in the model. The test of the model provided satisfactory fit-scores: $\chi^2(12) = 17.724$, $p = .124$; RMSEA = .060; TLI = .943; CFI = .981; WRMR = .305.

The path coefficients in Figure 2 confirmed the findings from the logistic regression analyses and put those findings in a broader context: physical activity participation T2 ($R^2 = .35$) was predicted by intention strength T1 ($\beta = .21$; $p = .091$) and self-concordance T1 ($\beta = .32$; $p = .011$); likewise, physical activity participation T3 ($R^2 = .55$) was predicted by intention strength T2 ($\beta = .27$; $p = .029$) and self-concordance T2 ($\beta = .30$; $p = .006$). In both predictions, past PA behaviour (physical activity participation T1 or T2, respectively) was controlled for. Furthermore, there were significant paths from self-efficacy T1 to intention strength T2 ($\beta = .39$; $p < .001$) and to self-concordance T2 ($\beta = .20$; $p = .024$). However, the corresponding paths from outcome expectations T1 to intention strength T2 ($\beta = -.01$; $p = .892$) and to self-concordance T2 ($\beta = .08$; $p = .138$) were not significant.

Discussion

The present research introduces an extended conceptualisation of the construct self-concordance, which is considered an attribute not only of goals or goal motives (Sheldon & Elliot, 1999), but also of goal intentions ('self-concordance of the goal intention' or 'intention self-concordance'). Using this conceptualisation, we investigated the interplay of intention strength and self-concordance in the development of physical activity participation.

Logistic regression analyses and path analyses showed both intention strength and self-concordance to be significant predictors of physical activity 6 months later, even when the two predictors were tested concurrently in the same model. The predictive power of both constructs was similar; their interaction, however, did not explain additional variance in the criterion. These findings support the proposition of the MoVo process model that intention strength and intention self-concordance are two critical facets of a goal intention that both need to be considered in the prediction of health behaviours, such as physical activity participation. Whereas intention strength refers to the degree of determination to which a goal intention is adopted (a person is more or less motivated to do something), self-concordance rather captures the quality of this motivation. A goal intention is high on self-concordance when the reasons for pursuing this intention are closely aligned with the self. However, as we pointed out in the introduction section, this understanding of self-concordance as an attribute of a goal intention is not common in the literature where self-concordance is usually considered an attribute of a goal or goal motive (Sheldon, 2014). The predictive power of 'intention self-concordance' in the present study may also be considered an argument for the usefulness of our conceptualisation of this construct. Subsequently, we discuss the findings in detail.

Predicting physical activity participation

The current data confirm findings from an earlier study (Fuchs et al., 2012) demonstrating that both intention strength and intention self-concordance significantly contribute

to the prediction of future physical activity participation, when controlling for each another. Including self-concordance as additional predictor – besides baseline activity participation and intention strength – increased the amount of explained variance in physical activity participation six months later by 5% (prediction T1 to T2) and 7% (T2 to T3) (Nagelkerke R^2). The path model depicted in Figure 2 confirmed the major results from the regression analyses; in both time intervals, intention strength and intention self-concordance turned out to be significant and about equally powerful predictors of activity participation 6 months later. The replication of the same prediction pattern at two different time intervals lends further credibility to the findings suggesting that intention strength and intention self-concordance are two substantial and discriminable antecedents of regular physical activity.

Adoption vs. maintenance

Our results also support the idea that self-concordance may be a critical variable in particular at the maintenance stage of physical activity. Previous data by Fuchs et al. (2012) have demonstrated that intention self-concordance was a significant long-term (6 months period; maintenance stage), but not short-term predictor (6 weeks period; adoption stage) of exercise behaviour. In a study by de Vet et al. (2011), goal self-concordance was also not predictive of physical activity in the short-run (2 weeks follow-up). Together with these earlier findings, our current results support Sheldon and Elliot (1999) view of self-concordance as a fundament for *long-term* (sustained) goal striving, in our case, physical activity participation.

In contrast, intention strength seems to be important for both short-term and long-term predictions of health behaviours. In the present study, intention strength was predictive of physical activity participation over a relatively long period of time (6 months); however, other studies have demonstrated its predictive power for shorter time periods as well (Fuchs et al., 2012; Hagger, Chatzisarantis, & Biddle, 2002). Maybe, intention strength is the more fundamental motivational dimension; and self-concordance only comes in as a relevant dimension when the maintenance of physical activity requires higher levels of self-regulatory effort increasing the risk of ego-depletion and drop-out (Moller, Deci, & Ryan, 2006).

Interaction of intention strength and self-concordance

Our data did not provide evidence of a significant interaction effect of intention strength and intention self-concordance on physical activity participation 6 months later. Similarly, in a cross-sectional study by Chatzisarantis et al. (2006) with 460 school pupils, university students and adults the interaction term ‘intrinsic motivation \times intention’ did not significantly contribute to the prediction of physical activity. Thus, there is no evidence suggesting that self-concordance may moderate the effects of intention strength on physical activity participation. The two components of a goal intention are likely to operate rather independently in regulating behaviour. Interestingly, this seems to be different for implementation intentions (Gollwitzer, 1999). Several studies demonstrated that people are doing better when their self-concordant goals are furnished with implementation intentions (Chatzisarantis, Hagger, & Wang, 2010; Koestner, Otis, Powers, Pelletier, & Gagnon, 2008). However, it was also found that individuals with

non-self-concordant goals may benefit from implementation intentions to gain control over the initiation and regulation of behaviour (Chatzisarantis et al., 2008, 2010).

Self-efficacy and outcome expectations

In an exploratory analysis, we also examined the possible determinants of intention strength and intention self-concordance. In health behaviour theories, both self-efficacy and outcome expectations are considered to be the major determinants of a goal intention (Ajzen, 2011; Bandura, 2004; Schwarzer, 2008). By looking at the two sides of a goal intention (strength and self-concordance), we can draw a more detailed picture of the roles of self-efficacy and outcome expectations in the process of intention formation. Our path analysis confirmed the importance of *self-efficacy* as a predictor of intention strength 6 months later, a finding that is well-established by many previous studies (for a review: Bauman et al., 2012). Interestingly, there was also a significant path from self-efficacy to self-concordance 6 months later. This is in line with an earlier finding by Fuchs et al. (2012), also demonstrating self-efficacy to be a longitudinal predictor of intention self-concordance at the maintenance stage of physical exercise. These results suggest that self-efficacy might have an impact on the qualitative aspects of a goal intention: people who are confident to achieve their physical activity goals may be more likely to integrate those goals into their self-system.

Surprisingly, *outcome expectations* did not predict intention strength 6 months later, after baseline scores of intention strength were controlled for. This finding is clearly in contrast with the literature usually showing outcome expectations as a significant antecedent of behavioural intentions (for a review, see Williams et al., 2005). Furthermore, the path from outcome expectations to intention self-concordance 6 months later reached only marginal significance ($p = .10$), leaving open the question whether those expectations are in fact relevant for the development of a more intrinsically based motivation.

Limitations of the current study

A potential limitation of the present study is the measurement of physical activity participation which was based on self-report and may be subject to memory bias. However, in this study, we were not interested in actual amounts of activity participation but rather in the intrapersonal longitudinal change on this variable. Assuming that self-report biases affected the three measurements of activity participation to the same extent, we do not expect our predictive findings to be substantially distorted. Another limitation is that, since our study was conducted with a sample of obese individuals, external validity of our results is limited to this specific group of people. Thus, it cannot be ruled out that any particular characteristics of this group might have influenced the findings reported in this work; hence their generalisation to the whole population should be treated with caution. Further, it should be acknowledged that the test of our theoretical assumption was based on longitudinal survey data; therefore, the findings do not allow for definite causal inferences.

Conclusions and implications

Central to the research presented here is the notion that goal intentions differ not only in their degree of determination (strength of the intention) but also in the extent to

which they are integrated with the self (self-concordance of the intention). Results suggest that those two aspects of a goal intention contribute to a similar extent and rather independently from each another to the long-term maintenance of physical activity participation. While the antecedents of intention strength are well-established (although not fully confirmed in our study) those of goal self-concordance are only beginning to emerge (cf., Milyavskaya, Nadolny, & Koestner, 2014). Our data show self-efficacy to play a determinant role for both dimensions of a goal intention.

The present findings have implications for the design of intervention programs to improve physical activity participation. Effective interventions not only need to focus on the formation of strong goal intentions, they also need to ensure that those intentions are self-concordant, i.e. they need to be based on autonomy and voluntariness, to protect them from being challenged by competing goals (Kuhl, 2000). Intervening on an intention's self-concordance is also a central concern of the MoVo intervention program (Göhner & Fuchs, 2007). In this programme, participants are guided through the different stages of the behaviour change process with the aim to establish a physically active life-style. At one point, after participants have thought about their different exercise options and may have committed themselves to a specific goal intention ('I intend to join a dancing class in the next weeks and months'), the next step is to reflect on the question how far this specific goal intention is really one's own intention and not only imposed by someone else (e.g. spouse) and to what extent this specific goal intention does really suit one's own interests and preferences (cf., Burke & Linley, 2007). Thus, the advocated concept of 'self-concordance of a goal intention' does not only open a new theoretical perspective, it also reflects a concrete intervention technique that is already used in the practice.

Disclosure statement

No potential conflict of interest was reported by the authors.

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