Viewing exercise goal content through a person-oriented lens: A self-determination perspective

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ABSTRACT

The present study examined profiles of exercise goal content and the associations with need satisfaction, motivation regulation and exercise behavior, combining variable-centered and person-centered analytical approaches. The participants were 1084 (279 men and 805 women) Swedish adults, aged between 18 and 78 years, that were all active members of an Internet-based exercise program. Latent profile analysis (LPA) and structural equation modeling (SEM) were used to analyze the data. In SEM analysis intrinsic goals were related to need satisfaction and autonomous motivation, whereas extrinsic goals were most strongly associated with controlled motivation. LPA revealed five unique latent classes of goal content. These five classes differed in need satisfaction, motivation regulation and exercise behavior, with classes being characterized by more intrinsic goal profiles reporting higher need satisfaction and autonomous motivation. The results are discussed from a self-determination theory perspective and the benefits of using both variable and person-centered analytical approaches are highlighted.

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Leading a physically active lifestyle during adulthood is associated with reduced risk of a number of chronic diseases (Lee et al., 2012) and benefits to health-related quality of life (Bize, Johnson, & Plotnikoff, 2007). However, many adults are insufficiently active to confer such health benefits (Hallal et al., 2012). As such, promoting physical activity has become a global public health priority (World Health Organization; WHO., 2010). Physical activity recommendations commonly focus on increasing time spent in physical activity of at least moderate intensity, which for many people will involve purposeful or planned activities. One approach to understanding how best to promote such behaviors is to study people's exercise motivation. One theoretical framework that has been used extensively to study motivation and self-regulation in the physical activity context is self-determination theory (SDT; Deci & Ryan, 2000) (cf. Teixeira, Carraca, Markland, Silva, & Ryan, 2012).

Self-determination theory provides a theoretical lens through which to conceptualize, understand, and define motivation from a quality perspective (see Standage & Ryan, 2012 for an exercise-related review). That is, within SDT, a person's motivation (i.e., the reasons 'why' they are moved to act) is characterized as being high in quality if it is autonomously driven, as opposed to 'controlled' (Deci & Ryan, 2012). Autonomous motivation is underpinned by *intrinsic motivation* (i.e., when engagement in a behavior is guided by the inherent interest, challenge and satisfaction that it brings), *integrated regulation* (i.e., engaging in the activity because it is concordant with an individual's other personal goals and values), and *identified regulation* (i.e., when behavior is volitionally engaged in for the identified value and benefit accrued from taking part). Controlled forms of motivation comprise *introjected regulation* (i.e., when behavior is underpinned and directed by intrapersonal sanctions such as shame, guilt, and pride) and *external regulation* (i.e., when behaviors are controlled by external contingencies such as tangible rewards and punishments). Lastly, whereas autonomous and controlled motivations represent types of motivation, SDT also considers a state of lacking intention to act (or passive engagement with activities) that is labeled *amotivation*. Within the exercise settings, empirical research has shown more autonomous forms of motivation toward exercise to be positively

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associated with adaptive outcomes such as better psychological well-being and increased exercise behavior (Sebire, Standage, & Vansteenkiste, 2009; Standage, Sebire, & Loney, 2008; Teixeira et al., 2012).

Three basic and innate psychological needs are posited within SDT as being nutrients to people experiencing high quality, or autonomous forms of motivation, effective functioning, and psychological well-being (Deci & Ryan, 2000). These needs are for *autonomy* (i.e., the need to experience activities as self-endorsed and volitionally enacted), *competence* (i.e., the need to interact effectively within one's environment), and *relatedness* (i.e., the need to feel cared for, connected, and close with others). When applied to the exercise context, a growing body of empirical research has shown exercise-related need satisfaction to be positively related to autonomous forms of exercise motivation, relative intrinsic exercise goal content, positive indices of well-being, and self-reported, and objectively-assessed exercise behavior (e.g. Edmunds,Ntoumanis & Duda, 2007; Standage & Ryan, 2012).

A more recent addition to the broader SDT framework is 'Goal Contents Theory' (GCT), a mini-theory that focuses on differentiating between the content of the goals that people pursue and how such pursuits are differentially associated with well-being, motivation, and effective functioning (see Vansteenkiste, Niemiec, & Soenens, 2010 for an overview). This distinction stems from previous work (Kasser & Ryan, 1993, 1996) labelling internally focused life goals or aspirations (i.e., growth, affiliation, community contribution, and maintenance of physical health) as *intrinsic* and those with an external orientation as *extrinsic* (financial success, social recognition, and image/attractiveness). It is hypothesized that intrinsic goals are satisfying of basic psychological needs whereas extrinsic goals are hypothesized to be less supportive, or even undermining, of the basic psychological needs (Kasser, 2002). Empirical studies have provided support for using the "intrinsic-extrinsic" goal content distinction when differentially predicting a number of well-being and adjustment outcomes (seeVansteenkiste et al., 2010).

To enable researchers to examine how holding exercise goals with diverse content may differentially predict cognitive, affective, and behavioral outcomes, Sebire, Standage, and Vansteenkiste (2008) developed the *Goal Content for Exercise Questionnaire* (GCEQ), which distinguishes between intrinsic (i.e., health management, skill development and social affiliation) and extrinsic (i.e., image and social recognition) exercise goals. Relative intrinsic exercise goal content (indexed by subtracting the mean of GCEQ intrinsic goals from the mean of extrinsic goal subscales) is positively associated with basic psychological need satisfaction, autonomous motivation toward exercise and various indices of well-being (via direct effects and indirectly through need satisfaction) (e.g. Gunnell, Crocker, Mack, Wilson, & Zumbo, 2014; Sebire et al., 2009).

Although support for GCT has emerged, previous research of exercise goal content has typically taken a variable-centered approach (Laursen & Hoff, 2006) which is primarily concerned with the examination of associations between people's endorsement of intrinsic and extrinsic exercise goals and cognitive, affective and behavioral outcomes (Gunnell et al., 2014; Sebire, Standage, & Vansteenkiste, 2011; Sebire et al., 2009, 2008). Variable-centered approaches are underpinned by the assumption that these associations are similar across the population of interest (Laursen & Hoff, 2006), and studies have typically investigated associations using statistical techniques such as correlation, hierarchical regression and structural equation modeling (e.g. Gunnell et al., 2014; Sebire et al., 2008, 2009, 2011). Few studies of exercise goal content have taken a person-centered approach, which assumes that the associations between people's goals and

outcomes are not necessarily the same for everyone in the population (Bergman & Andersson, 2010; Laursen & Hoff, 2006). The person-centered approach allows types or profiles of people to be identified based on the patterning of their intrinsic and extrinsic goal endorsement. A person-centered approach is of potential relevance to the study of people's exercise goals because is it likely that people endorse and are motivated by multiple goals and there may be consistencies among individuals with regards to the pattern of goal endorsement. Therefore, such an approach may yield a more holistic account of exercise goal pursuit. Also, a person-oriented approach may be better suited to examine theoretical frameworks and hypotheses that involve sophisticated interactions among more than two variables at the same time (Bergman & Andersson, 2010), in particular if these interactions exist on a within-person as well as between-person level. As highlighted in previous work (e.g. Sebire et al., 2009), there are theoretical arguments for the assumption that individuals pursue different goals, and different goal contents, simultaneously, and that these contents interact at the within-person level. Hence, adopting a person-centered analytical approach may help to identify unique patterns of interactions among goals; patterns that may be very hard to detect using more traditional variable-centered approaches. Identifying goal content profiles may also facilitate the targeting of interventions (Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001) towards individuals who may be at particular "motivational risk", in particular if certain profiles are associated with deleterious motivational or behavioral outcomes.

In the present study we use Latent Profile Analyses (LPA) to identify different profiles. Compared to more traditional methods of person-centered analysis, such as cluster analysis, LPA offer several benefits (Marsh, Lüdtke, Trautwein, & Morin, 2009; Pastor, Barron, Miller, & Davis, 2007). For example, although LPA, like cluster analyses is exploratory in its nature, LPA is a model-based technique that offers more flexibility in terms of model specification. In fact, cluster analysis may be viewed as a very restricted form of LPA (Pastor et al., 2007). Further, LPA offers several fit indices, providing researchers with an important tool when comparing different models, ultimately resulting in a stronger platform for making less arbitrary and potentially biased choices in terms of determining the number of profiles.

In the present study, we used a combined variable-centered and person-centered analytical approach. The first aim was to examine if different latent profiles existed in the sample in terms of goal content and, if so, to look at possible differences in exercise-related need satisfaction, motivational regulation toward exercise and exercise behavior across these goal content profiles. The secondary aim was to examine associations of the latent variables of exercise goal content with exercise-related need satisfaction, motivational regulations toward exercise and exercise behavior using a traditional variable-centered approach.

1. Method

1.1. Participants

The participants (N = 1084, 279 men, 805 women), aged between 18 and 78 years, were all active Swedish members of an Internet-based exercise program offering web-based health-care services (e.g. pedometer step contests, weight-loss programs, etc.) mainly in the private sector.

1.2. Measures

1.2.1. Goal Content for Exercise Questionnaire (GCEQ)
The Goal Content for Exercise Questionnaire (GCEQ; Sebire et al.,

2008) measures people's endorsement of five groups of exercise goals, separated into intrinsic and extrinsic pursuits; social affiliation, health management, skill development (intrinsic goals) and social recognition and image (extrinsic goals) through 20 items on a 7-point Likert scale where 1 represents "not at all important" and 7 represents "extremely important". Cronbach alphas for the five GCEQvariables were 0.90 (social affiliation), 0.88 (image), 0.86 (health management), 0.88 (social recognition), and 0.89 (skill development).

1.2.2. Leisure Time Exercise Questionnaire (LTEQ)

The Leisure Time Exercise Questionnaire (Godin & Shephard, 1985) was used to measure self-reported exercise. The LTEQ consists of three questions regarding the frequency of performing strenuous, moderate and light exercise during a regular week. The total exercise score was calculated and transformed into a metabolic equivalent of exercise (MET) scores.

1.2.3. The Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2)

Five types of exercise-based motivation regulation (i.e., amotivation, extrinsic, introjected, identified & intrinsic motivation) were measured using the Behavioral Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004) that contains 19 items (e.g. *"It's important to me to exercise regularly"*) on a five-point Likert scale, where 0 = "not true for me" and 4 = "very true for me". Cronbachs alpha for the five regulations were: 0.68 (amotivation), 77 (extrinsic), 0.75 (introjected), 0.78 (identified), and 0.90 (intrinsic). Variables representing controlled and autonomous motivation were created by averaging scores on external and introjected regulation for controlled motivation and identified and intrinsic regulation for autonomous motivation. The Swedish version of the BREQ-2 has in previous studies (using the same sample) displayed acceptable factor validity when tested via confirmatory factor analysis (Weman Josefsson, Lindwall, & Ivarsson, 2015). The five-factor model of the BREQ-2 demonstrated acceptable fit to data ($\chi2$ = 408.60 (142df), CFI = 0.94; RMSEA: 0.044 (0.039–0.049).

1.2.4. The Basic Psychological Needs in Exercise Scale (BPNES)

The 12-item Basic Psychological Needs in Exercise Scale (BPNES; Vlachopoulos & Michailidou, 2006) was used to assess the satisfaction of the three needs for autonomy, competence and relatedness in the exercise domain (e.g. *"The way I exercise is in agreement with my choices and interests"*). A five-point Likert scale, where 1 = "I don't agree at all" and 5 = "I completely agree" was used. The BPNES has been successfully validated as supporting the theoretically based three-factor model and the needs hypothesis of SDT (Vlachopoulos & Michailidou, 2006). Cronbach alpha values for the three needs were 0.82 (autonomy), 0.82 (competence), and 0.90 (relatedness). The theoretical a-priori three-factor model has demonstrated (Weman Josefsson et al., 2015) good fit with data, $\chi2$ = 246.45 (51df), CFI = 0.96; RMSEA: 0.059 (0.052–0.067).

1.3. Procedures

The BPNES, GCEQ and BREQ-2 were translated from English to Swedish according to the Back-Translation-method (Brislin, 1986). A bilingual (English and Swedish) expert first translated the questionnaires from English to Swedish, and then another bilingual expert translated the inventories back to English. Differences in the translated versions and the originals were discussed in the research group and formed the foundation of the final versions. Collection of data was performed within a research project initiated by XX at XX University and financed by XX and the XX. Participants were contacted by e-mail (according to a list of members provided by the health care service company), informing the participants of the aim of the study, ethical concerns and providing a link to the web survey. Collected data were stored at a web account only accessible by the scientists. No personal data were asked for; hence no personal register was created. Prior to data collection, the study was approved by the regional ethical board.

1.4. Analyses

Descriptive statistics, t-tests and bivariate correlations were conducted using SPSS version 20. Multivariate outliers were identified using Mahalanobis distances with $p < 0.001$ (Tabachnick & Fidell, 2007). Structural equation modeling, including confirmatory factor analyses) was used to conduct variable-centered analyses using Mplus version 7.1. Specifically we performed a confirmatory factor analysis on the GCEQ scores and examined correlations between latent (measurement-free) constructs of goal content, basic psychological needs and motivation regulation and exercise. Mplus was also used to perform the person-centered analyses of latent profile analysis (LPA). Model parameters were estimated using maximum likelihood (ML) estimation. The LPA was performed with the five continuous goal content observable variables as input variables. When using LPA, it is recommended that solutions with varying numbers of groups/classes (e.g., groups of participants with similar patterns of goal scores) are examined and the solution is selected that makes most sense in relation to theory, previous research, the nature of the groups and interpretation of the results as well as alternative goodness-of-fit indexes and tests of statistical significance (Marsh et al., 2009). A general framework is, using nested models, to test if more complex models (including more latent profiles) fit the data better than more simple models (with fewer latent profiles). In the present study we tested models including one to seven latent classes to identify the ideal number of classes. This strategy was adopted because several indices indicated that adding more classes than seven would result in a worse fitting model. Model fit criteria, were inspected across solutions to determine the best fit to the data. A bootstrapped Lo-Mendell-Rubin likelihood test (LMR; Lo, Mendell, & Rubin, 2001) was used to compare the fit of two models. Classes were added iteratively to identify the best model fit. A significant LMR test ($p < 0.05$) indicates that the target class solution fits the data better than a class solution with one fewer class. Also, the Bayesian Information Criterion (BIC; Henson, Reise, & Kim, 2007) and the sample-size adjusted BIC (SSA-BIC; Yang, 2006) were inspected, with lower values indicating better model fit. The entropy criterion was also examined, which indicates how accurately people are classified into their respective profiles, with higher values indicating a better fit for a given solution. In addition to the fit criteria, interpretability, theoretical meaningfulness and parsimoniousness was also taken into account when deciding upon the best solution. To support the interpretation of the best-fitting solution, z-scores of the five goal content factors constituting the latent classes were used. To examine how these latent classes differed in terms of exercise-related psychological need satisfaction, motivations regulations toward exercise and exercise behavior, the nine variables (i.e., three need satisfaction variables, five motivation regulation variables and total exercise score) were included as outcome variables (technically labeled auxiliary variables and distal outcome) (see Muthen & Asparouhov, 2014). To test if differences in the outcome variables (here regulations and need satisfaction) exist across the latent classes, Mplus conducts an overall test of association using Wald's test and pairwise class comparisons between the auxiliary variable means and probabilities for classes. To calculate effect sizes for these analyses, Mplus output with regards to class membership for

all participants was saved, imputed into SPSS and general linear models was used to calculate partial η^2.

2. Results

Descriptive statistics of the goal content variables are described in Table 1. Using mahalanobis distances (p < 0.001), 7 multivariate outliers were detected and deleted, leaving a total of 1077 participants for main analyses.

2.1. Confirmatory factor analyses of GCEQ and correlations between latent factors of goal content, need satisfaction and motivation regulations

A confirmatory factor analysis revealed that the theoretical a-priori five factor model of the GCEQ displayed adequate fit to the data, Satorra-Bentler $\chi2(160) = 929.74$, p < 0.001; CFI = 0.94; RMSEA = 0.067 (90% CI = 0.063 to 0.071). All standardized factor loadings were >0.70 (all p-values < 0.05) with one exception, $\Lambda = 0.69$ for item 12 ("To be slim so to look attractive to others") loading on Image.

Correlations between latent factors of exercise goal content, exercise-related need satisfaction, motivation regulations toward exercise and exercise behavior are also shown in Table 1. The latent goal content factors were all positively associated. The correlations between the goal content latent factors ranged from 0.17 to 0.60. The largest correlations were found between social recognition and social affiliation ($\Phi = 0.60$, p < 0.01), social recognition and image ($\Phi = 0.57$, p < 0.01) and skill development and social affiliation ($\Phi = 0.55$, p < 0.01). In terms of the association between goal content and needs, the intrinsic goals of skill development and health management (and to some extent social affiliation in regards to relatedness) revealed the largest positive associations with need satisfaction, ($\Phi = 0.18$-0.38, ps < 0.01). The extrinsic goals of image and social recognition were not associated with need satisfaction. Looking at the relations between goal content and motivation regulations, health management and skill development were negatively associated with amotivation ($\Phi = -0.41$ and -0.17 respectively, ps < 0.01), and positively associated with identified regulation ($\Phi = 0.58$ and 0.45 respectively ps < 0.01) and intrinsic motivation ($\Phi = 0.38$ and 0.46, ps < 0.01 respectively). The two extrinsic goals, (image and social recognition) were most strongly associated with introjected regulation ($\Phi = 0.54$, p<.& $\Phi = 0.44$,

p < 0.01 respectively). Social affiliation was most strongly correlated with intrinsic motivation ($\Phi = 0.24$, p < 0.01). Skill development revealed the strongest association with exercise behavior ($\Phi = 0.18$, p < 0.01).

2.2. Latent profile analysis: identifying the optimal number of profiles for goal content

In total, seven models were tested and reported. In general, the fit of LL, BIC and SSA-BIC decreased, indicating a constant improvement of the model, as additional classes were added with fit being lowest in the 7 class model (Table 2). Similarly, the BLRT indicated that each model fitted the data better than a one less class (k-1) model, again supporting a 7 class model. However, other indices indicated that a model with fewer than 7 classes would be a better solution. For example, according to the entropy measure, the model with the best ability to correctly classify participants in their class was the 3 class model, although the differences in entropy between the models were quite small. According to the Adjusted Lo-Mendell-Rubin likelihood ratio test (LMR), the 2, 3, 4 and 5 class models fitted data better than models with one less class. The 6 and 7 class models, however, did not fit substantially better than the 5 or 6 class models, supporting a 5-class model solution. In addition to the statistical fit indices, the 5, 6 and 7 class solutions were closely inspected and compared independently by all four authors to examine their substantive and theoretical meaningfulness. The result was that the 5 class model was interpreted to constitute the

Table 2
Fit indices, entropy, and model comparisons for estimated latent profile analyses models.

Model	LL	BIC	SSA-BIC	Entr	LMR	BLRT	nC < 10/5%
1 class	−7438.41	14946.64	14914.88	–	–	–	
2 class	−6996.95	14105.62	14054.80	0.75	<0.001	<0.001	0/0
3 class	−6844.62	13842.85	13772.98	0.78	<0.001	<0.001	0/0
4 class	−6778.67	13752.83	13663.90	0.71	<0.001	<0.001	0/0
5 class	−6707.16	13651.71	13543.72	0.74	<0.05	<0.001	1/0
6 class	−6661.54	13602.36	13475.31	0.71	0.15	<0.001	1/0
7 class	−6623.65	13568.46	13422.36	0.72	0.34	<0.001	3/0

Note: LL = Log-likelihood; BIC = Bayesian Information Criterion; SSA-BIC = Sample Size Adjusted Bayesian Information Criterion; LMR = p-value for Adjusted Lo-Mendell-Rubin likelihood ratio test; BLRT = p-value for bootstrap likelihood ratio test. nC < 10/5% = number of classes with less than 10 and 5% of the cases respectively.

Table 1
Descriptive statistics and correlations between goal contents, needs, regulations and exercise.

	M	SD	1	2	3	4	5
Goal contents							
1 Social affilliation	2.96	1.46	–				
2 Health management	6.21	0.77	0.17**	–			
3 Skill development	4.13	1.48	0.55**	0.37**	–		
4 Image	4.05	1.49	0.24**	0.43**	0.33**	–	
5 Social recognition	2.78	1.39	0.60**	0.23**	0.43**	0.57**	–
Needs							
Competence	3.80	0.82	0.18**	0.32**	0.36**	0.02	0.10*
Autonomy	4.07	0.81	0.08*	0.20**	0.18**	-0.09*	−0.06
Relatedness	3.82	1.04	0.38**	0.22**	0.38**	0.02	0.11**
Regulations							
Amotivation	1.08	0.23	0.02	−0.41**	−0.17**	-0.08	0.02
External regulation	1.16	0.35	0.09*	−0.03	-0.08	0.19	0.30
Introjected regulation	2.17	0.77	0.09*	0.32**	0.22**	0.54**	0.44**
Identified regulation	3.22	0.63	0.19**	0.58**	0.45**	0.23**	0.24**
Intrinsic motivation	3.28	0.68	0.24**	0.38**	0.46**	0.06	0.16**
Exercise	44.45	25.38	0.03	0.11**	0.18**	0.03	0.10*

*<0.05; **<0.01 Note: Mean values for all goal content, needs and regulations variables are scale means (range 1−7 for goal content; range 1−5 for needs; and 1 to 4 for regulations). Correlations are based on latent constructs (using structural equation modeling) for all variables except for exercise.

most substantive, theoretical meaningful and parsimonious solution. Given that both statistical and substantive arguments favored the 5-class model, we moved forward with this model in subsequent analyses.

2.3. Interpretation of the five-class solution

The 5-class solution is illustrated in Fig. 1 and the different profiles are described in Table 3. Class 1 (n = 84, 7.8%) is characterized by overall low goal content scores across all five variables. In particular health management stands out as being very low ($z = -2.01$, $p < 0.01$). The most strongly endorsed goal in this class is social affiliation, which is approximately 0.7 standard deviations below the total sample average. Consequently, this group may be labeled a general low goal content class. Class 2 (n = 357, 33.1%) displays similar low scores on social affiliation ($z = -0.80$, $p < 0.01$) and social recognition ($z = -0.82$, $p < 0.01$) to Class 1. They do however show a different profile based on image, skill development and health management. Scores on image ($z = -0.35$, $p < 0.01$) and skill development ($z = -0.47$, $p < 0.01$) are quite low and below sample average, but not as low as for Class 1. In stark contrast to Class 1 though, health management for Class 2 is just above the sample average ($z = 0.16$, $p > 0.05$). Consequently, Class 2 seems to be driven primarily by relatively strong Health Management goals. Class 3 (n = 171, 15.9%) displays a quite different profile compared to Class 1 and 2. Similarly to Class 2, health management is slightly over the sample average ($z = 0.14$, $p > 0.05$) and social affiliation scores are relatively low ($z = -0.45$, $p < 0.01$). However, skill development is just below average ($z = -0.10$, $p > 0.05$) which is different than Class 1 and 2. More importantly, both image ($z = 0.60$, $p < 0.01$) and social recognition ($z = 0.63$, $p < 0.01$) are more than half a standard deviation above average, yielding a quite different goal content profile compared with Classes 1 and 2. In general, Class 3 is characterized primarily by high scores on extrinsic exercise goal content variables. Class 4 (n = 228, 21.2%) is almost the opposite profile pattern to Class 3. Aside from health management, again being slightly over average ($z = 0.16$, $p > 0.05$), social affiliation is relatively high ($z = 0.62$, $p < 0.01$) and skill development is also clearly above average ($z = 0.39$, $p < 0.01$). In contrast, image is below average ($z = -0.25$, $p < 0.05$) and social recognition is also slightly below average ($z = -0.20$, $p > 0.05$). In general, Class 4 seems to be driven primarily by more intrinsic exercise goals. Class 5 (n = 237, 22.0%) displays high scores on all five variables. In particular, compared to the other classes, they display high scores on social affiliation ($z = 1.17$, $p < 0.01$), social recognition ($z = 1.28$, $p < 0.01$) and skill development ($z = 0.79$,
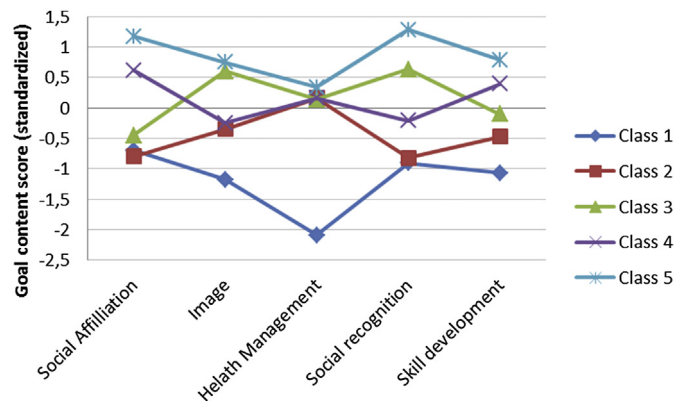
Table 3
Description of the five latent classes based on standardized goal content scores.

GCEQ- variables	Class1	Class2	Class3	Class4	Class5
Social affiliation	−0.70*	−0.80*	−0.45*	0.62*	1.17*
Image	−1.18*	−0.35*	0.60*	−0.25*	0.75*
Health Management	−2.09*	0.16	0.14	0.16	0.34*
Social recognition	−0.91*	−0.82*	0.63*	−0.21	1.28*
Skill development	−1.07*	−0.47*	−0.10	0.39*	0.79*

Note: Class 1 (n = 84, 7.8%) = Overall low goal content endorsers; Class 2 (n = 357 (33.1%) = Health management endorsers; Class 3 (n = 171, 15.9%) = Extrinsic goal content endorsers; Class 4 (n = 228, 21.2%) = Intrinsic goal content endorsers; Class 5 (n = 237, 22.0%) = extrinsic and intrinsic goal content endorsers.
*<0.05.

$p < 0.01$). Image ($z = 0.75$, $p < 0.01$) is slightly higher than Class 3 and health management is above average ($z = 0.34$, $p < 0.01$), but does not differ substantially from classes 2—4. Class 5 is thus best described as a subgroup for whom all five goal content variables, both more extrinsic and intrinsic goals, are endorsed and important (general high goal content). In terms of differences in the five variables across classes, health management scores displayed the least differences across classes, in particular if the small Class 1 is disregarded.

2.4. Differences in need satisfaction, motivation regulations and exercise behavior across goal content latent profiles

Latent profile differences in psychological need satisfaction, motivation regulations and exercise behavior are shown in Table 4. The overall test of equality of means were significant for competence χ^2 (4) = 12.33, $p < 0.05$, autonomy χ^2 (4) = 16.45, $p < 0.01$, relatedness χ^2 (4) = 39.18, $p < 0.001$, amotivation, χ^2 (4) = 15.67, $p < 0.01$, external regulation χ^2 (4) = 27.52, $p < 0.001$, introjected regulation χ^2 (4) = 100.95, $p < 0.001$, identified regulation χ^2 (4) = 12.33, $p < 0.001$ intrinsic motivation χ^2 (4) = 26.42, $p < 0.001$, controlled motivation χ^2 (4) = 95.58, $p < 0.001$, and autonomous motivation χ^2 (4) = 45.56, $p < 0.001$. The overall test was however not significant for exercise behavior χ^2 (4) = 5.77, $p = 0.22$.

Pairwise comparisons demonstrated that Class 1 in general was lower in both need satisfaction and self-determined motivation compared to other classes. More specifically, Class 1 had lower scores on competence, introjected regulation, identified regulation and intrinsic regulation and higher scores on amotivation compared to all other classes. Also, class 1 had lower scores on both controlled and autonomous motivation. Class 2 (being relatively low on all goals except for health management) displayed higher need satisfaction, introjected, identified and intrinsic motivation than Class 1 who had low endorsement of all goals, in particular health management. Also, class 2 had higher controlled and autonomous motivation compared to class 1, lower controlled motivation than classes 3 and 5 and lower autonomous motivation compared with classes 4 and 5. Despite having a very similar health management goal endorsement to Class 2, Class 3, who additionally endorsed the two extrinsic goals, scored lower on autonomy need satisfaction and were not different on competence and relatedness. This group reported higher external and introjected motivation (and consequently higher controlled motivation) and had similar levels of identified, intrinsic and autonomous motivation as Class 2. Comparing Classes 3 and 4 is useful as it resonates with the more traditionally performed comparisons of intrinsic versus extrinsic goal endorsement. Class 3 (extrinsic focussed) had lower need satisfaction, similar levels of amotivation, higher external and introjected regulation and lower levels of intrinsic motivation than Class 4 (intrinsic focussed). Levels of identified motivation did not differ between Classes 3 and 4. Class 3 also had higher overall

Fig. 1. Description of the goal content profiles (using standardized scores) in the 5-class model.

Table 4
Differences across the five latent classes in motivational regulations, basic psychological need satisfaction and exercise.

Variables	Class 1[1] M (S.E.)	Class 2[2] M (S.E.)	Class 3[3] M (S.E.)	Class 4[4] M (S.E.)	Class 5[5] M (S.E.)
Comp	13.47 (0.43)[c]	14.99 (0.20)[b]	14.89 (0.28)[b]	15.68 (0.23)[a]	16.05 (0.22)[a]
Auto	15.22 (0.42)[b]	16.49 (0.19)[a]	15.62 (0.30)[b]	16.43 (0.25)[a]	16.76 (0.23)[a]
Relat	13.14 (0.60)[c]	14.64 (0.27)[b]	13.80 (0.34)[bc]	16.60 (0.25)[a]	16.84 (0.23)[a]
Amot	4.83 (0.17)[a]	4.23 (0.05)[b]	4.30 (0.14)[b]	4.27 (0.07)[b]	4.34 (0.07)[b]
Extrin	4.48 (0.13)[b]	4.40 (0.07)[b]	4.90 (0.14)[a]	4.42 (0.09)[b]	5.04 (0.13)[a]
Introj	4.72 (0.20)[c]	6.00 (0.12)[b]	7.58 (0.19)[a]	6.33 (0.17)[b]	7.32 (0.17)[a]
Ident	10.15 (0.32)[d]	12.72 (0.14)[c]	13.08 (0.21)[bc]	13.26 (0.18)[ab]	13.70 (0.16)[a]
Intrin	11.00 (0.38)[c]	12.93 (0.17)[b]	12.79 (0.23)[b]	13.76 (0.18)[a]	14.02 (0.16)[a]
Controlled	1.35 (0.04)[c]	1.55 (0.02)[b]	1.88 (0.04)[a]	1.61 (0.03)[b]	1.85 (0.04)[a]
Autonomous	2.63 (0.08)[c]	3.21 (0.04)[b]	3.22 (0.05)[b]	3.38 (0.04)[a]	3.47 (0.04)[a]
Exerc	36.93 (3.05)[b]	43.59 (2.03)[ab]	44.90 (2.07)[a]	43.72 (1.71)[a]	48.42 (1.98)[a]

Note: Comp = Competence; Auto = Autonomy; Relat = Relatedness; Amot = Amotivation; Extrin = Extrinsic regulation; Introj = Introjected regulation; Ident = Identified regulation; Intrin = Intrinsic motivation; Exerc: Total LTEQ score (Met). [1]Overall low goal content endorsers; [2] Health management endorsers; [3] Extrinsic goal content endorsers; [4] Intrinsic goal content endorsers; [5] Extrinsic and intrinsic goal endorsers. Values in the same row that do not share a common subscript (a,b,c or d) are significantly different at $p < 0.05$ level in pairwise tests. All variables scores are based on total scores. Effect sizes for the class differences in regard to needs, regulations, and exercise: 0.05 for competence, 0.02 for autonomy, 0.12 for relatedness, 0.03 for amotivation, 0.05 for external regulation, 0.15 for introjected regulation, 0.13 for identified regulation, 0.10 for intrinsic motivation, 0.15 for controlled motivation; 0.13 for autonomous motivation, and 0.02 for exercise behavior.

controlled motivation and lower autonomous motivation compared to class 4. Comparing Class 4 (intrinsic) with Class 5 (intrinsic + extrinsic) is informative as it addresses the question of whether individuals who endorse extrinsic goals *alongside* intrinsic goals have a different motivational profile than those who endorse relatively strong intrinsic goals only. Class 5 (intrinsic + extrinsic) did not differ from Class 4 on autonomy, competence or relatedness. On average, members of both classes reported similar (relatively low) levels of amotivation. Class 5 were higher on extrinsic, and introjected regulations than Class 4 and consequently higher on controlled motivation, but the groups did not differ on identified and intrinsic regulation or autonomous motivation.

3. Discussion

The purpose of the present study was to examine exercise goal content and associations with exercise-related need satisfaction and motivational regulation toward exercise and self-reported exercise behavior. Extending previous studies in this area (e.g. Gunnell et al., 2014; Sebire et al., 2008, 2009, 2011), we used a combined variable-centered and person-centered analytical approach, which enabled us to both look at linear associations between variables from a between-person perspective as well as to identify distinct profiles of exercise goal endorsement at the within-person level.

Aligned with SDT that specifies the nature of intrinsic goals to be conducive to the satisfaction of basic needs (e.g., given a focus on inwardly oriented aspects such as developing interests and one's potential), the variable-centered analyses demonstrated that the more intrinsic exercise goals of skill development and health management (and to some extent social affiliation in regards to relatedness) were weakly-to-moderately positively associated with exercise-related need satisfaction. Equally consistent with SDT, extrinsic exercise goals that are characterized by an outward focus (or on external indicators) were unrelated to exercise-related need satisfaction. Such results are also aligned with the findings of Sebire et al. (2008) who found similar, but somewhat stronger, associations between exercise goals and need satisfaction when using partial correlations (removing the shared variance of, for example, extrinsic goals, when examining the correlation between intrinsic goals and need satisfaction). Contrary to the unexpected finding of Sebire et al. which showed autonomy to be unrelated to intrinsic goals, in the present work, we found evidence for this relationship, albeit small associations ($r = 0.18$–0.20) were noted. In the present

study latent (measurement-free) variables were used, that may have resulted in stronger associations, compared to the work of Sebire and colleagues in which manifest variables were used. Different instruments, with different item formulations for measuring autonomy, were used in the two studies, which may also have contributed to the different results.

From a SDT perspective (e.g. Deci & Ryan, 2000), goal content and motivational regulation should covary as they share associations with need satisfaction. Previous work pertaining to exercise goal content (e.g. Sebire et al., 2008, 2011) has shown intrinsic goals to be moderately and positively associated with autonomous motivation whereas extrinsic goals are related to controlled motivation. In these previous studies, composite scores of intrinsic and extrinsic goals were computed and used in the analyses. When examining the relation of each separate goal content factor in the GCEQ with motivation regulation in the present study, we found that the pattern of results largely converged with the results of previous work (Sebire et al., 2008, 2011). However, we also found that both social recognition and image goals were positively associated with identified regulation. This finding suggests that a general hypothesized link between, on one hand intrinsic goals and autonomous motivation and on the other hand extrinsic goals and controlled motivation, may be somewhat premature and simplified and may not fully represent a more complex reality. Within SDT the *what* (i.e., *goal content*) and the *why* (i.e., *behavioral regulation*) of goal pursuit are differentiated (Ryan & Deci, 2002) and it is hypothesized that the two constructs can be "*empirically crossed*" (Vansteenkiste et al., 2010, p. 147). That is, both intrinsic and extrinsic goals can be pursued for autonomous or controlled reasons. Such potential "empirical crossing" between the content of goals and reasons for pursuing goals constitute a robust argument for moving away from unidimensional models containing only single paths, or even multidimensional models containing only main effects, to more holistic interactional models, in order to shed more light on the interplay between the *what* and the *why* of exercise goal pursuit.

The person-centered analyses of the present study (i.e., the latent profile analysis) offered an unique opportunity to unravel complex interactions in terms of the interplay of the five goal content variables within-persons, tapping the importance of a holistic approach when understanding the process of goal content (e.g. Sebire et al., 2008; Vansteenkiste et al., 2010). More specifically, the five latent profiles found in the present study each constitute a unique pattern of combinations, within-persons,

reflecting the extent to which people endorse different exercise goals simultaneously. When linking these latent profiles of goal content to motivation regulation, interesting results emerge; results that even though born out of a more complex analytical platform than commonly used (consisting of both between- and within-person level information), still provide support for the basic tenets within SDT, yet from a new angle.

As advocated by Marsh and colleagues (Marsh et al., 2009), when a solution derived from LPA depicts differences across latent profiles in both level and shape, LPA may offer a theoretically meaningful, justified and important alternative perspective to traditional variable-centered approaches. The five latent profiles found in the present study are characterized by different levels of goal content and qualitatively different shapes. For example, although Classes 1 (general low content) and 5 (general high goal content) displayed relatively similar shapes and primarily differed from each other in terms of level, the other classes did demonstrate qualitatively different shapes, compared to one another as well as compared to Classes 1 and 5. Consequently, in the present data, LPA helped to disentangle and identify consistent patterns of within person interactions in goal content. Such information may help to increase the understanding of how combinations of multiple goals form within individuals, and may help to disentangle the micro-mediational processes between goal content and relevant outcomes (e.g., Vansteenkiste et al., 2010).

Viewed from the theoretical lens of GCT (Vansteenkiste et al., 2010), primarily Classes 3 and 4 may be interpreted as representative of a more distinct intrinsic versus extrinsic goal content structure. Members of Class 3 appear to be driven foremost by extrinsic goals (above average scores on image and social recognition) whereas Class 4 members show a quite opposite shape with above average scores on all three intrinsic goal variables in combination with below-average scores on both extrinsic goals. Compared to the variable-centered analyses and previous work (e.g. Sebire et al., 2008, 2011) these mixed person-centered and variable-centered analyses (comparing classes across variables) therefore demonstrate some support for the link between certain goal content (and their clusters), need satisfaction and motivational regulation, adding further support to the SDT and GCT. For example, the intrinsically-focused Class 4 reported higher need satisfaction, lower controlled forms of regulation, and higher intrinsic motivation compared with the extrinsically-focused Class 3.

The comparison of different classes also facilitates an understanding of whether the quality of people's exercise experience benefits from endorsing intrinsic *and* extrinsic goals, compared to relatively strong intrinsic goals only. In general, Classes 4 and 5 displayed higher exercise-related need satisfaction and more autonomous forms of exercise motivation when compared with the other classes. When compared to one another there were no differences in psychological need satisfaction and autonomous motivation. However, the Class 5 members who endorsed extrinsic in addition to intrinsic goals, reported higher, introjected and external behavioral regulation and consequently higher controlled motivation. These results suggest that, notwithstanding the small gain in identified motivation, there is little added value, and perhaps some detriment, in motivational terms at least, in adding extrinsic goals to a profile where intrinsic goals are most prominent present. Similarly, Class 3 (extrinsic focused) reported lower autonomy need satisfaction and higher controlled motivation than Class 2, suggesting that adding extrinsic goals to a profile in which only a relatively strong health goal is endorsed is not motivationally beneficial. Similar findings have been found in educational settings (Mouratidis, Vansteenkiste, Lens, Michou, & Soenens, 2013; Vansteenkiste et al., 2004), pointing to the notion that "sometimes less is more" in terms of goal content. More specifically, the

combination of high extrinsic and intrinsic goal content seem to result in a less optimal pattern for performance, persistence, motivation orientation and learning outcomes. As suggested by Vansteenkiste and colleagues, adding extrinsic goals to already existing intrinsic goals may direct people attention away from the task at hand (in their context learning) to external indicators of worth. Translated to an exercise context, introducing extrinsic goals (image and social recognition) or ego/performance-oriented goals to an already existing platform of intrinsic goals, within the same individual, may result in negative effects on relevant cognitive, affective and behavioral outcomes. Some of these patterns are illustrated in the present study, mirrored by the combined intrinsic and extrinsic goal profile class demonstrating a more controlled motivational regulation compared with the intrinsic goal profile, which is aligned with the SDT theory.

A relevant question is why there were no clearer differences in exercise behavior across the different classes. Aside from classes 3,4 and 5 reporting being more active compared to the low goal content class (class 1), there were no other differences in this aspect. The only previous study in which goal content profiles where identified, again in an educational setting (Mouratidis et al., 2013), found differences in goal content profiles/groups in terms of effort regulation and grades, suggesting that profiles should differ not only when it comes to regulation and need satisfaction, but also behavior. Also, a previous study (Sebire et al., 2011) using variable-centered analyses found that exercise goal content had an indirect effect on physical activity, through autonomous motivation, albeit not a direct effect. These results indicate that goal content may primarily be an antecedent of regulation, which in turn affect exercise behavior. Viewed this way, the lack of differences in exercise behavior between the theoretically most interesting classes (3,4, and 5) may not be so surprising. Future studies using longitudinal data, and analyses that may separate within from between person associations, may provide a clearer insight into where goal content is situated in the motivational chain of environment, needs, regulations and behavior.

In terms of limitations of the study, the question of generalization of the results is important to raise. Even though the researcher is guided by model-based statistical indicators when identifying optimal number of classes in latent profile analysis, making it a less arbitrary compared to traditional cluster analysis (e.g., Pastor et al., 2007), it is still associated with subjectivity. Therefore, the analyses conducted in the present study, and the five-class pattern of goal content profiles found, are exploratory and should be replicated and verified by independent samples in future research. As sample size seems to affect the statistical indices used to select optimal number of groups (Marsh et al., 2009), using independent samples with smaller sample sizes compared to the one used in present one would most probably have lead to a different solution. Nevertheless, similar goal content profiles/classes as some of the ones identified in the present study (for example high intrinsic goal profile and high intrinsic plus high extrinsic goal profile) have also been reported in previous studies in another context (education) than exercise (Mouratidis et al., 2013), offering preliminary support for the robustness of these profiles across domains and indirectly for the generalization of some of the results.

Another limitation is the cross-sectional design of the study preventing conclusions of temporal ordering of associations or effects that would be afforded by using longitudinal data. Given the potential theoretical contribution of such longitudinal design and analyses, it would be valuable to examine how goal content changes across time, and the associations of changes in goal content with change in regulations and need satisfaction; both from a variable and person-centered perspective. Moreover, the convenience sample of adults in an exercise program limits

generalisation. A third limitation is the sole use self-report measures, increasing the risk for common-method-variance and overestimation issues, emphasizing the need to also use objective measures in future work (Sebire et al., 2011). Nevertheless, the combination of a firm theoretical foundation, the relatively large sample and both variable and person-centered analyses could be viewed as particular unique strength of the study.

In the present study, we used a novel analytical approach and identified distinct latent profiles of goals which were differently related to need satisfaction, motivation regulation and exercise behavior in a pattern supporting theoretical hypotheses. This new knowledge may be of both scientific and well as applied value, as it highlights how different goals simultaneously interact within persons to create unique patterns of motivational forces for the individual in the context of exercise behavior. Practitioners should be aware that the exercise motivation of individuals probably is affected by a combination of different goals, and that adding goals that are extrinsic may risk pushing individuals to a more controlled form of regulation, even if they also stand on a solid platform of intrinsic goals.

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