



# All physical activities are not created equal: differential effects of goal contents, psychological need satisfaction, and flow in physical activity on satisfaction with life

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Accepted: 18 January 2024 / Published online: 9 February 2024  
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## Abstract

Regular physical activity (PA) is linked with greater satisfaction with life (SWL), but is this effect equivalent for all PAs? Or do effects and causal paths of PA on SWL differ depending on goal contents in PA? PA practitioners ( $N=1900$ ) reported goal contents in exercise (GCE), psychological need satisfaction (PNS), and flow in PA, as well as SWL. Cluster analyses and multi-group structural equation modeling were used to analyze differential effects of study variables on SWL. Four clusters based on GCE were identified and labeled (health-management,  $n=652$ ; team-skill,  $n=412$ ; social-recognition,  $n=494$ ; and low-goals,  $n=342$ ). Differential effects on SWL were observed via distinct causal paths: social affiliation and relatedness predicted SWL in the health-management cluster; skill development, competence, and flow in the team-skill cluster; and flow alone in the low-goals cluster. The amounts and the ways in which SWL can be derived from PA practice differ between clusters based on different goal contents. Thus, tailored PA programs may identify distinct goal profiles in order to cater to these separately, orienting them towards either sports-like team practices fostering skill development, perceived competence, and flow; or individually practised and autonomously endorsed PAs facilitating health management, group affiliation and relatedness.

**Keywords** Physical activity · Satisfaction with life · Psychological need satisfaction · Goal contents in exercise · Flow

## Introduction

### Physical activity (PA) and satisfaction with life (SWL)

The regular practice of physical activity (PA) has numerous benefits, such as improved physical (Heath et al., 2012; Piercy et al., 2018) and psychological health (Kim et al., 2016; Pacesova et al., 2019), and greater satisfaction with life (SWL) (Maher et al., 2014). Contrarily, physical inactivity is linked with increased anxiety (Edwards & Loprinzi, 2016), decreased hedonic well-being (Sui et al., 2021), and decreased SWL (Edwards & Loprinzi, 2017). However, this

generalist approach pays insufficient attention to the psychological dynamics that prompt PA and result from it. Firstly, because motivation for PA varies greatly; and secondly, because the potential favorable effects of PA on SWL may depend on the meaning that PA has for each person.

SWL is defined as a global evaluation of how close an individual perceives their actual life to be to their ideal, taking into account those domains they personally value, such as meeting with friends, doing sports, and going on vacation (Schmiedeberg & Schröder, 2017). It has been argued that people “most want to be happy by achieving the things they value” (Diener et al., 1985, p. 420)—an idea reminiscent of the Jamesian notion of self-esteem as a function of people’s successes relative to their own pretensions (James, 1890). This leads to the conjecture that, when an individual highly values PA, its practice could contribute more to SWL. Some evidence exists for this claim given that the favorable effects of sports practice on SWL have been found to be stronger when the associated goals were intrinsic (e.g. enjoyment) than extrinsic (e.g. competition) (Jetzke & Mutz, 2020). Furthermore, in adults between 50 and 70, PA was found to be

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positively associated with SWL via perceived health (Lera-López et al., 2017); whereas in Chinese college students, the effect of PA on SWL was found via positive emotion and core self-evaluation (Liu et al., 2021).

If it is known that PA contributes to SWL and the latter depends on what individuals value, it makes sense to ask *what* people value in PA, and *how* those motivators may moderate PA's contribution to SWL. In this regard, we argue that subjective benefits of PA, such as a surplus in SWL, cannot be anticipated without considering the motivators prompting the practice in the first place. In line with the above, given that self-concepts of physical ability and image are key to participation in PA (Parker et al., 2008), the prediction of SWL derived from PA may depend on psychological dynamics, like motivational processes, subjective expectations, goals, and self-beliefs. Furthermore, psychological need satisfaction (PNS) and autonomous motivation have been shown to have favorable effects on both PA and SWL, whereas the contrary has been shown for psychological need frustration and controlled motivation (Vaquero-Solís et al., 2019). Lastly, when PA is driven by intrinsic motivation, it has been shown to buffer the adverse effects of stress on SWL (Meyer et al., 2021). Given these antecedents, studying the benefits of PA without distinguishing its diverse motivational foundations may prove insufficient and superficial as this approach is unfit for explaining the diversity in the experiences that prompt PA and that result from its regular practice. Lastly, such a limited approach would preclude an important research objective: pinpointing specific mechanisms through which PA-derived experience may exert its favorable effects on SWL in different cases.

### Goal contents and PNS in PA

To further understand how the diverse motivational foundations of PA may result in differential effects on its various psychological outcomes, it is worth considering Goal Contents Theory (GCT, Kasser & Ryan, 1993, 1996), one of the mini-theories within Self-Determination Theory (SDT, Deci & Ryan, 1985, 2000; Ryan & Deci, 2000, 2017). According to GCT, *all goals are not created equal* (Ryan et al., 1996) and intrinsic goal contents can facilitate the satisfaction of the psychological needs for competence, autonomy, and relatedness, leading to greater motivational quality, enjoyment and well-being (Sebire et al., 2009). For instance, regarding exercise-related goals, skill development, social affiliation, and health management are considered goals with intrinsic content; whereas, contrariwise, image and social recognition are considered goals with extrinsic content linked with the heteronomy implied in looking good for or receiving recognition from others (Sebire et al., 2008). These divergent motivational foundations result in different meanings being ascribed to PA, meanings which are then used as criteria to subjectively judge its success. Without this evaluation, PA

could not possibly contribute to SWL, because the latter is also an evaluation, specifically, of how close actual life is perceived to be to ideal life (Diener et al., 1985). We will argue that intrinsic goals —when accomplished— contribute to a positive evaluation of life experience, because intrinsic goals are those highly *valued things that make people happy* (Diener et al., 1985) and, thus, reflect *Jamesian* pretensions or aspirations of the *self* (James, 1890).

From a theoretical standpoint, goal contents facilitate (or hinder) the satisfaction of psychological needs (Sebire et al., 2008, 2009), which in turn is expected to facilitate experiences of well-being, such as flow and SWL. Thus, the study of motivation cannot solely include the notion of goals understood as desired (future) end states, but must also consider the —intrinsic or extrinsic— value of the content of those goals for each individual (Ryan et al., 1996).

For instance, sports-based practices have greater favorable effects on motivation and enjoyment than fitness-driven ones (Frederick & Ryan, 1993). In exercise, intrinsic goal contents (i.e., social affiliation, skill development, and health management) are supposed to facilitate PNS; whereas, contrariwise, extrinsic-content goals (i.e., image and social recognition), given their heteronomy, are supposed to hinder it (Sebire et al., 2009). For example, as regards these exercise goals, the motivation to practice PA with friends could have two distinct types of goal contents: an intrinsic content reflected by the goal of social affiliation, which is supposed to facilitate relatedness need satisfaction (whilst at the same time safeguarding autonomy); and an extrinsic content reflected by the goal of social recognition, which is supposed to affect autonomy and relatedness adversely, because it entails an extrinsic (this is, heteronomous) desire for social approval (Sebire et al., 2008). Given the arguments expressed above, it is relevant to ask whether PA based on intrinsic goal contents is more robustly associated with PNS and SWL than PA based on extrinsic goal contents.

### Flow in PA and its relationships with intrinsic motivation, PNS and SWL

We will argue that, in some cases, the known favorable effects of PA practice on SWL (Edwards & Loprinzi, 2017; Maher et al., 2014) may be explained by the fact that an individual's evaluation of *how ideal* their *actual* life is (i.e., SWL; Diener et al., 1985) may depend —at least partly— on the evaluation of *how optimal* their event-based experiences *are* (i.e., flow; Csikszentmihalyi, 1988). People *fall into* the optimal experience of flow when successfully tackling intrinsically motivating activities, performed autonomously, and characterized by a relative equilibrium between the individual's competence level and the degree of challenge posed by an activity (Csikszentmihalyi, 1988). Consequently, by definition, flow requires satisfaction of the

psychological needs for autonomy and competence, and also intrinsic motivation (Csikszentmihalyi, 1988). People who enjoy flow tend to have clear attainable goals and immediate performance feedback; and they experience concentration, perceived control, merging of awareness into action, distortion of the perceived passing of time, a momentary loss of self-consciousness, and a deep sense of *autotelic reward* or enjoyment of the practice in itself (Csikszentmihalyi, 1988). We argue that this *eventual happiness* (in other words, the optimal experience of flow) may be associated with the more *global happiness* (in other words, SWL) due to the appropriation of the experience of flow by the *self*, an appropriation that happens during a retrospective *self-reflection* phase, in which the individual, based on reflection about the deep intrinsic reward, sets the goal to continue to practice the activity and develop more skill in it (Csikszentmihalyi, 1988). This is why flow can be thought of both as proof of *eventual happiness* and as a cornerstone for persistence and development in non-mandatory leisure practices, because—once sufficient skill is established—individuals who want to sustain the enjoyment of said happiness need to face gradually increasing challenges to avoid potential boredom from facing the same challenge every day (Csikszentmihalyi, 1988). Consequently, people who want to continue to experience flow, tend to set the goals of acquiring and using new skills in the domain of practice they enjoy so much (Csikszentmihalyi, 1988), in some cases, making steady serious efforts, leading to careers in serious leisure, where the long-lasting and increasingly competent practice of the favored leisure practice becomes a central part of the individual's identity, with positive effects on their subjective well-being (Stebbins, 2001).

### Previous cluster and profile analyses based on PA motivators in SDT

From a person-oriented standpoint, when cluster or profile analyses are performed based on PA motivators in the context of SDT, typically, three core and two peripheral profiles tend to arise (Tóth-Király et al., 2020): *autonomous or self-determined*, with high autonomous and low controlled motivation (core); *average*, with moderate autonomous and controlled motivations, but low amotivation (core); *controlled or non-self-determined*, with low autonomous and high controlled motivation (core); a *moderately autonomous* one, with moderate autonomous and low controlled motivation (peripheral); and a *self-determined one with high introjected regulation* (peripheral). Such profiles are readily observable from an early age. Using hierarchical (Ward's method) followed by iterative (K-means) cluster analyses on the scores of 2969 11-to-15 year old school students in self-determination theory constructs (autonomous and controlled regulations and amotivation), achievement goal orientations

(task/ego), ability beliefs (incremental/entity), and perceived competence, Wang and Biddle (2001) identified five clusters: self-determined; highly motivated (with both autonomous and controlled motivation); poorly motivated; moderately motivated; and amotivated. Among adults, three to five clusters tend to be found, for example, Nuviala Nuviala et al. (2013) found three, based on K-means clustering of raw scores of 2707 adult users of public and private sport center facilities (ages:  $M = 25.29$ ,  $SD = 12.83$ ) in five motives for physical activity (Ryan et al., 1997; appearance, fitness, social, competence, and enjoyment): a first cluster with high scores in all motives; a second one with an average enjoyment motive and an above-average social motive; and lastly one with below-average scores in all motives except for an average appearance motive. Using the same five motives for physical activity (Ryan et al., 1997), Valenzuela et al. (2021) conducted hierarchical (Ward's method) followed by iterative (K-means) cluster analyses based on the data of 433 university students (ages:  $M = 19.91$   $SD = 1.97$ ) identifying four clusters: a first one (labeled *all-motives*), with above-average scores in all five motives; a second one (labeled *intrinsic-motives*), with all three intrinsic-motives (enjoyment, competence, social) above-average; a third one (labeled *extrinsic-motives*), with above-average extrinsic motives of fitness and appearance; and a fourth one (labeled *low-motives*), with all motives below-average. Similarly, Kercher et al. (2022), also using hierarchical (Ward's method) followed by iterative (K-means) cluster analyses based on goal contents in exercise of 1604 participants (743 women) with a mean age of 46.5 years ( $SD = 16.8$ ), also found four clusters: a first one (labeled *multi-reason positive*), with high scores in all motives; a second one (labeled *autonomous focused*), with above-average scores in autonomous motives like competition; a third one (labeled *multi-reason negative*), with all motives below average; and a fourth one (labeled *control-focused*), with above-average scores in controlled motives like appearance. Alternatively, Lindwall et al. (2016) used latent profile analysis and identified five latent profiles based on goal contents in exercise scores of 1084 Swedish adults between the ages of 18 and 78 years (279 men) participating in an internet based exercise program: a first class (*low goals*), with overall low scores; a second one (*health management*), with above-average health goals; a third one (*extrinsic content*), based on social recognition and image goals; a fourth one (*intrinsic*) based on social affiliation and skill development goals; and a fifth one (*all goals*) characterized by high scores on all five goal contents.

### The present study:

The present study combines a person-centered approach (analysing clusters of goal contents in PA) with a variable-centered approach (testing cluster-dependent

differential effects of goal contents, PNS and flow in PA, on SWL variations, via a theory-based structural model) to investigate three main issues: What combinations of goal contents characterize PA practice in a normative general population (in other words, *what* do people commonly value in PA practice)? Are intrinsic relative to extrinsic goal contents in PA differentially associated with SWL (in other words, is SWL greater in clusters with predominance of intrinsic exercise goal contents)? And, does flow in PA practice predict variations in SWL, acting also as mediator for the (sequential) effects of skill development goals and competence need satisfaction (in other words, is it possible that flow in PA makes people *happy* via their success or perceived competence in achieving their own goals of skill development (and deployment) in *highly valued leisure activities* to continue to enjoy flow in them)?

### Cluster analytical approach based on goal contents in PA

The present study is conducted in a sample of normative adults who practice PA regularly, whereas previous research has been mainly based on purposive sampling methods and has included participants selected from specific exercise and sports programs or homogeneous populations (Sebire et al., 2009). In this way the present work extends existing knowledge about motivator profiles based on PA motivators in the context of SDT.

As regards the person-centered approach, the present study investigates motivational profiles of PA practice based on goal contents in PA, where intrinsic goal contents (i.e. skill development, social affiliation, and health management) are expected to facilitate PNS and this satisfaction, in turn, is expected to promote flow and SWL; the opposite being true for extrinsic goal contents (i.e., social recognition and image). Similarly as in previous studies (Kercher et al., 2022; Lindwall et al., 2016), we analyze clusters based on goal contents rather than on motives (i.e., enjoyment, competence, social, fitness, and appearance; Ryan et al., 1997), because goal contents reflect specifically *what* individuals pursue in activities (Kasser & Ryan, 1993), whereas motives are more general motivational forces including needs, emotions, and cognitions that may even guide more specific goal setting (Ryan & Deci, 2000, 2017). Furthermore, measuring goal contents in exercise (Sebire et al., 2008) has the advantage of distinguishing social affiliation (a goal with intrinsic content) from social recognition (a goal with extrinsic content), instead of measuring only one intertwined social motive.

### PNS and flow as mediators between goal contents in PA and SWL

As regards the variable-centered approach of the present study, we argue that PNS and flow can act as mediators in a theory-based sequence going from goal contents, to PNS (first mediator), to flow (second mediator), ultimately predicting variations in SWL. Firstly, supporting the first step in this sequence, based on SDT predictions, Sebire et al. (2009) argued that intrinsic goal contents, via the mediation of PNS, facilitate favorable outcomes such as intrinsic motivation (Ryan & Deci, 2017).

Secondly, perceived competence (or PNS of the need for competence) is critical for intrinsic motivation *and both are required for flow* (Csikszentmihalyi, 1988). When practicing activities for intrinsic motivation, individuals do not only want to choose their activity freely, but want to perform well at it (Deci, 1975). Few people enjoy doing *that* what they do *not* perform well at. Furthermore, one does not become more competent because of one's greater motivation, but instead one becomes more motivated due to one's initial perceived competence: Increments in reported intrinsic motivation can be predicted by previous reports of perceived competence, but not the other way around (Vallerand and Reid, 1984). Thus, it is established that PNS, especially competence need satisfaction, facilitates intrinsic motivation (Ryan & Deci, 2017), which is also indispensable for flow (Csikszentmihalyi, 1988).

Thirdly, according to flow theory (Csikszentmihalyi, 1988), flow requires contextually-mediated antecedents such as competence need satisfaction and its derived intrinsic motivation. By definition, individuals *fall into flow* when practicing intrinsically motivating activities which allow for a relative balance between task challenge and individual competence levels (Csikszentmihalyi, 1988). Furthermore, flow demands satisfaction of the psychological need for competence (perceived competence), insofar flow entails concentration, perceived control, clear goals, and immediate performance feedback (Csikszentmihalyi, 1988). To maintain flow in the long run, individuals need to face incremental challenges, thus, making skill development necessary (Csikszentmihalyi, 1988), typically originating careers in serious leisure and identification with the practice, which has benefits for the individuals identity and well-being (Stebbins, 2001), potentially contributing to SWL. Thus, flow can be thought of as resulting—at least partly—from skill development goals, satisfaction of the psychological need for competence, and intrinsic motivation, and in turn—as we will argue—promoting SWL.

Lastly, we argue that one of the plausible ways in which PA practice could contribute to SWL is flow experience in PA. When people ask themselves if their *life is close to their ideal* (in other words, if they have SWL), they must assess



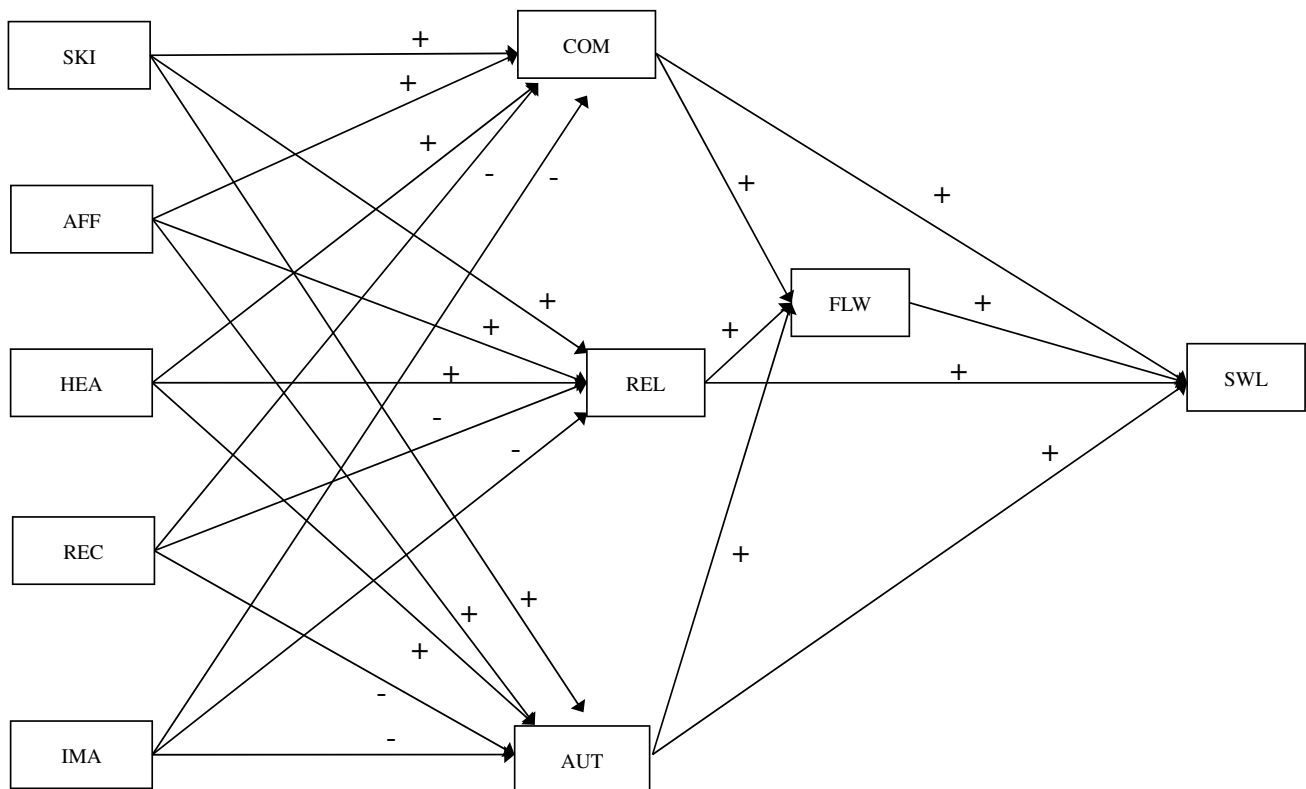
their actual experiences. SWL is “a cognitive, judgmental process” of satisfaction with life as a whole, “dependent upon a comparison of one’s circumstances with what is thought to be an appropriate standard” according to one’s own chosen criteria (Diener et al., 1985, p.71). Thus, based on the experiences that subjectively stand out more to them, one must leave “the respondent free to weight various domains and various feeling states in whatever way he or she chooses” (Diener et al., 1985, p. 75), and, consequently, optimal experiences such as flow would be expected to contribute to a more positive evaluation, regardless of the domain they have happened in. In this regard, flow —defined as an optimal experience— is a good candidate to contribute to life satisfaction, because of the deep sense of autotelic reward it provides, and its aforementioned close links with skill development goals, competence need satisfaction, personal growth and identity processes. In this regard, one interesting feature of flow that supports this idea is that, when awareness is merged into action during flow, individuals experience a momentary lack of *self*-consciousness, after which —paradoxically— the *self* returns highly into focus, in retrospect, when evaluating the experience as optimal and pertaining to the *self* (Csikszentmihalyi, 1988). Thus,

following Goal Contents Theory (Kasser & Ryan, 1993, 1996), intrinsic goal contents, via greater PNS (as mediator), are expected to promote not only intrinsic motivation and performance, but also quality of experience (a notion resembling to flow) and well-being (Sebire et al., 2008), leading to the conjecture that SWL could be facilitated by the intrinsic skill development goal, sequentially, via competence need satisfaction and flow.

Based on the previous arguments and research antecedents, the following theory-driven model (Fig. 1) was proposed, with intrinsic goals predicting PNS positively, extrinsic goals doing so negatively; PNS, in turn, predicting flow and SWL positively, and flow partially mediating between PNS and SWL.

## Research question and hypotheses

**Question 1 (Q1):** Antecedents suggest that PA practitioners can be classified into between three and five clusters according to their intrinsic relative to extrinsic motivators (Tóth-Király et al., 2020), however, in most cases data has come from purposive samples and homogeneous participants recruited from specific programs, mak-



**Fig. 1** Theory-driven model of goal contents in physical activity (PA), psychological need satisfaction (PNS) and flow in PA predicting satisfaction with life (SWL). *Notes:* goal contents: SKI=skill development; AFF=social affiliation; HEA=health management;

REC=social recognition; IMA=image. PNS: COM=perceived competence; AUT=perceived autonomy; REL=perceived relatedness

ing it desirable to extend such findings in more diverse populations (Sebire et al., 2009). Thus, we asked (Q1): In a diverse sample of participants, drawn individually from the normative population, who practiced PA at least weekly, what clusters of PA practitioners can be identified based on their goal contents in PA?

**Hypothesis 1 (H1):** Goal Contents Theory (Kasser & Ryan, 1993, 1996) proposes that intrinsic relative to extrinsic goal contents are more conducive to facets of well-being (such as SWL) than extrinsic goal contents (Sebire et al., 2009). Thus, practicing PA based on intrinsic goal contents would be expected to predict more variations in SWL than doing so based on extrinsic goal contents. Thus, we hypothesized that (H1) intrinsic relative to extrinsic goal contents in PA in a given cluster will be linked with greater SWL variations explained by study variables in said cluster.

**Hypothesis 2 (H2):** Flow theory (Csikszentmihalyi, 1988) holds that people who enjoy flow and want to continue *regularly doing so*, tend to set the (intrinsic) goal of developing their skills (Sebire et al., 2008) in order to tackle gradually increasing challenges in the practice they enjoy so much (Csikszentmihalyi, 1988). This reflects a high commitment to the activity, stemming from the *self-reflection* phase occurring after flow, in which they have evaluated said experience as optimal, based on its intrinsic reward and on their own perceived competence (Csikszentmihalyi, 1988). Consequently, we argue that a high relative skill development goal is expected to predict to greater competence need satisfaction (Sebire et al., 2008), promoting (intrinsic motivation and) flow (Csikszentmihalyi, 1988). Furthermore, during the *self-reflection* phase after flow, intrinsic reward gets *ascribed* to the *self* (Csikszentmihalyi, 1988), thus, flow as an optimal experience is expected to be positively associated with SWL, given that the latter is an evaluation of how close actual life is to ideal life, or of having *achieved valued things in life* (Diener et al., 1985). Based on the previous arguments, we hypothesized that (H2) greater relative importance of the (intrinsic) skill development goal in a given cluster of PA practitioners will be associated in the model with a significant indirect effect of the skill development goal on SWL variations, via the sequential mediation of competence need satisfaction and flow.

## Method and materials

**Participants** were 953 men and 947 women, who practiced PA at least weekly ( $N=1900$ , 18 to 28 years old,  $M=25$ ,  $SD=2.53$ ). They practiced PA on average 3.17 days per week ( $SD=1.44$ ), 66 min per day ( $SD=53$ ), and 212 min per week ( $SD=215$ ).

**Procedure** of this study followed APA ethical guidelines and complied with all requirements by the Bioethics Commission (CBUB Institutional Review Board IRB00003099) of the University of Barcelona. No animal or clinical experimentation was conducted, thus, no additional approval was necessary. An online panel of Spanish residents, from 17 regions and 50 provinces, was used to recruit young adults, 18 to 28 years old, who responded to an invitation sent by the researchers with a link to the research instrument. Participants, were included in the study if their main occupation was work or study (work,  $n=860$ ; study,  $n=537$ ; both,  $n=503$ ), and if they answered affirmatively to practice PA regularly (at least, weekly). Participation was voluntary and anonymous and required informed consent. This study complied with the recommendations of the General Council of Psychology in Spain (Consejo General de la Psicología de España), the Spanish Organic Law on Data Protection (15/1999: Jefatura del Estado, 1999), and the Declaration of Helsinki (World Medical Association, 2013).

**Measures** were the Spanish versions of the following scales. Firstly, we used the Goal Contents in Exercise Questionnaire (Moreno-Murcia et al., 2016; Sebire et al., 2008), scored on a 7-point Likert-type scale ranging from 1 = Not at all important to 7 = Extremely important (4 = Moderately important), to measure the goal contents of Social affiliation (sample item: i.e., *To develop close friendships*), Social recognition (i.e., *To gain favorable approval from others*), Health management (i.e., *To improve my overall health*), Image (i.e., *To be slim so to look attractive to others*), and Skill development (i.e., *To develop my exercise skills*). Secondly, we measured participant's psychological need satisfaction in physical activity using the Basic Psychological Need Satisfaction Scale (Moreno-Murcia et al., 2008; Vlachopoulos & Michailidou, 2006), scored on a 5-point Likert-type scale ranging from 1 = Totally Disagree to 5 = Totally Agree (3 = Neutral), and comprising items regarding the needs for autonomy (sample item: i.e. *The exercise program I follow is highly compatible with my choices and interests*), competence (i.e. *I feel that I execute very effectively the exercises of my training program*), and relatedness (i.e. *I feel extremely comfortable when with the other exercise participants*). Thirdly, to measure the optimal experience of flow, we used the Short Flow Scale (Jackson & Marsh, 1996; Jackson et al., 2008; García-Calvo et al., 2008; sample items: *I do things spontaneously and automatically without having to think* and *The experience is extremely rewarding*), scored on a 5-point Likert-type scale, ranging from 1 = Completely Disagree to 5 = Completely Agree. And lastly, we used the Satisfaction with Life Scale (Diener et al., 1985; sample item: *In most ways my life is close to my ideal*) in its Spanish version (Atienza et al., 2000), scored on a Likert-type scale ranging from 1 = Completely Disagree to 7 = Completely Agree (4 = Neither Agree nor Disagree).

**Data analyses** Before answering research questions, we present descriptive statistics, Cronbach's alphas, and bivariate correlations between study variables. To answer Q1, we use a two-stage cluster analysis strategy, following previous work within SDT (Soenens et al., 2009), to investigate the existence of different groupings based on goal contents in PA. These groupings are not conceived of as latent profiles of individuals, but rather as different types of dynamic motivational foundations of individuals regarding their PA practice. In a first stage, Ward's hierarchical method is used to begin with 1900 one-person clusters and permanently join the two most similar ones into a new group, based on their squared Euclidean distances, repeating this procedure until –after 1899 steps– there is only one group of 1900 participants left. A fusion coefficient assesses the dissimilarity of the two merged clusters in every step, and the number of clusters is determined by a sharp increase in fusion coefficients, signaling two dissimilar groups having been merged in said step. In a second stage, center points of the clusters emerging from the hierarchical stage are used as initial centers for an iterative K-means clustering procedure, allowing units to be freely classified into different clusters in every iteration, stopping when the change in cluster centers is smaller than 2% of the initial minimum distances (Soenens, et al., 2009). The stability of the solutions of the two stages is assessed via Cohen's Kappa. To assess H1, we use multi-group SEM analyses (with AMOS 26.0; Arbuckle, 2019) to assess model invariance (See Supplemental material) and differential relations between goal contents and SWL across groupings. Lastly, to assess H2, we carry out multi-group SEM (with AMOS 26.0; Arbuckle, 2019) to analyze the direct and indirect effects of goal contents in PA on SWL

(via PNS and flow). In order to assess H1 (regarding the differential effects of study variables on SWL) and H2 (regarding the differential effects of the skill development goal on SWL variations via competence need satisfaction and flow), we tested a theory-driven structural model (Fig. 1).

## Results

**Descriptives** Similarly as in previous studies, the health management goal yielded the highest average endorsement (and smallest standard deviation) among goal contents (Sebire et al., 2008), followed by skill development and image goals; social recognition and social affiliation goals had the lowest means. PNS, flow, and SWL yielded moderate-to-high means. Bivariate correlations were significant and mostly robust (yet below  $r=0.7$ , signaling separate constructs).

As predicted by theory, regarding the connection between intrinsic motivation and competence in general (Deci, 1975; Vallerand & Reid, 1984), and between intrinsic goal contents and PNS, in particular (Sebire et al., 2008), the skill development goal correlated robustly and positively with competence, relatedness, and flow (Table 1). Also the social affiliation goal correlated robustly and positively with relatedness. The extrinsic content goal of social recognition was positively associated with the intrinsic content goal of social affiliation but not with relatedness need satisfaction; furthermore, in line with theory, social recognition goal was negatively related with autonomy need satisfaction. The intrinsic-content health management goal was robustly associated with competence and autonomy need satisfaction, and

**Table 1** Descriptives, reliability, and bivariate correlations between study variables (goal contents, psychological need satisfaction, flow in PA, and satisfaction with life)

	SKI	AFF	HEA	REC	IMA	COM	AUT	REL	FLW	SWL										
SKI	(.80)	.45**	.57**	.25**	.28**	.41**	.33**	.39**	.39**	.16**										
AFF		(.89)	.15**	.60**	.16**	.18**	.06**	.42**	.16**	.15**										
HEA			(.84)	.00	.44**	.41**	.42**	.29**	.41**	.14**										
REC				(.89)	.39**	-.04	-.09**	.04	-.04	.06**										
IMA					(.86)	.11**	.15**	.04	.12**	.03										
COM						(.83)	.75**	.60**	.68**	.29**										
AUT							(.82)	.50**	.63**	.23**										
REL								(.90)	.52**	.29**										
FLW									(.85)	.28**										
SWL										(.84)										
Range	1–7	1–7	1–7	1–7	1–7	1–5	1–5	1–5	1–5	1–7										
M	4.70	1.20	3.75	1.52	5.32	1.15	3.14	1.51	4.61	1.36	3.84	0.75	3.90	0.75	3.81	0.90	3.73	0.63	4.50	1.16
SD																				

Cronbach's alphas are shown on the diagonal (within parentheses). SKI=skill development goal, AFF=social affiliation goal, HEA=health management goal, REC=social recognition goal, IMA=image goal. COM=competence need satisfaction, AUT=autonomy need satisfaction, REL=relatedness need satisfaction. FLW=Flow, SWL=satisfaction with life

also with flow. Both SWL and flow significantly correlated with PNS and with intrinsic goals.

### Question 1: Clusters based on goal contents in PA

We assessed whether distinct profiles of practitioners could be identified based on their goal contents in PA. Thus, to answer Q1, we followed a two-stage procedure previously used within SDT (Soenens, et al., 2009) to test the existence of distinct groupings of PA practitioners based on their goal contents in PA. In a first stage, Ward’s hierarchical method was used to assess variations in fusion coefficients (Table 2), finding evidence for a four-cluster solution: merging four into three clusters originated a sharp increase in fusion

coefficients (22%), greater than increases resulting from the previous steps (11%, 11%, 8%, 7%, 4%).

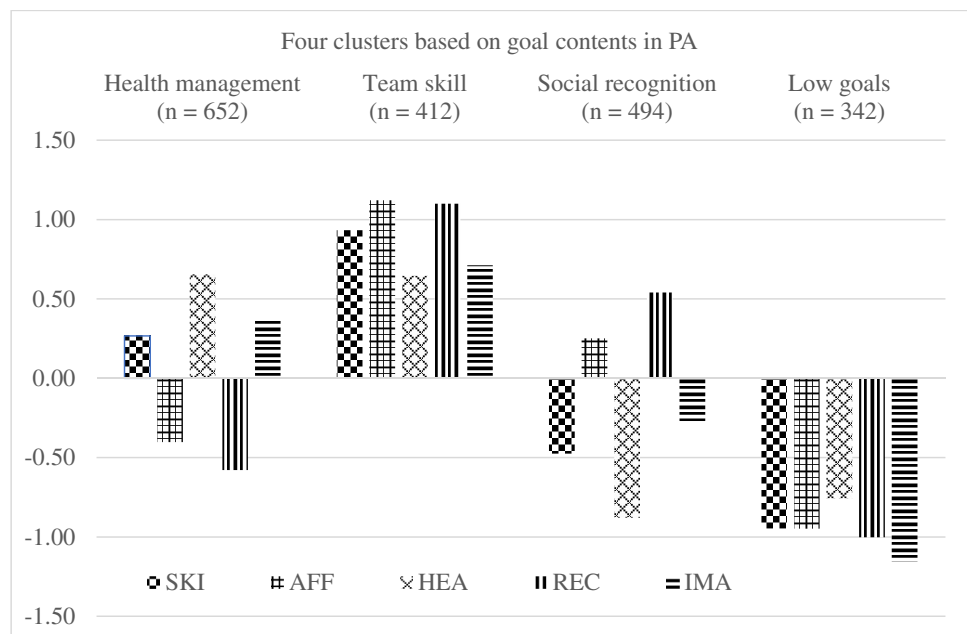
Final group centers emerging from the Ward’s hierarchical cluster analysis (first stage) were then used as initial centers in the iterative K-means cluster analysis, and the iterations were stopped when the change between cluster centers was less than 2% of the minimum initial distance between centers. The stability of both emerging solutions was acceptable (Cohen’s Kappa = 0.707). The four emerging profiles are shown below (Fig. 2).

A *first* and biggest *cluster* (hereinafter referred to as “health management”,  $n = 652$ , 62% women) was characterized by high Z-scores in the health management goal and moderate Z-scores in image and social affiliation goals. A *second cluster* (hereinafter “team skill”,  $n = 412$ , 55% men) was characterized by a high Z-score in the (intrinsic) skill development goal and also by high Z-scores in social affiliation and recognition goals; practitioners of team sports (such as soccer, handball, volleyball, or basketball) were overrepresented in this second cluster (as well as in the team skill cluster) as compared to in health management and low goals clusters. A *third cluster* (hereinafter “social recognition”,  $n = 494$ , 61% men) was characterized by a high Z-score in the (extrinsic) social recognition goal and a moderate Z-score in the (intrinsic) social affiliation goal; and lastly, a *fourth cluster* (hereinafter “low goals”,  $n = 342$ , 53% men) was characterized by low Z-scores in all five goals, suggesting their PA practice could be based on external regulation, this is, not on the individual’s goals but

**Table 2** Fusion coefficients

Fusion coefficient	Number of groups
9495.00	1
7547.95	2
6399.62	3
5252.21	4
4748.05	5
4281.14	6
3959.80	7
3678.25	8
3436.13	9
3302.64	10

**Fig. 2** Four groupings of PA practitioners, based on their Z-scores in goal contents in PA. *Notes.* PA = physical activity, SKI = skill development, AFF = social affiliation, HEA = health management, REC = social recognition, IMA = image





rather on motives reflecting external regulation and negotiations with contextual conditions.

### Structural model of goal contents, psychological need satisfaction, and flow in PA predicting SWL

Figure 3 shows the theory-driven structural model tested in a single group of 1900 participants (Chi square = 47.945,  $df = 10$ ,  $p < 0.001$ ,  $RMR = 0.019$ ,  $SRMR = 0.0176$ ,  $TLI = 0.979$ ,  $CFI = 0.995$ ,  $RMSEA = 0.045$  [95%  $CI = 0.032–0.058$ ],  $PCLOSE = 0.732$ ). The model predicted  $R^2 = 0.11$  in SWL variations and four out of five goal contents had significant effects on PNS. In addition, these effects were observed in the directions predicted by theory: The intrinsic goal contents of skill development, social affiliation, and health management yielded positive effects on SWL; whereas, the extrinsic goal contents of social recognition yielded negative effects. The only non-significant paths in the model were three predicting PNS from the image goal, one predicting autonomy need satisfaction from the social affiliation goal, and one predicting SWL from autonomy need satisfaction.

### Hypothesis 1: Intrinsic relative to extrinsic goal contents in PA and their roles in the prediction of SWL variations

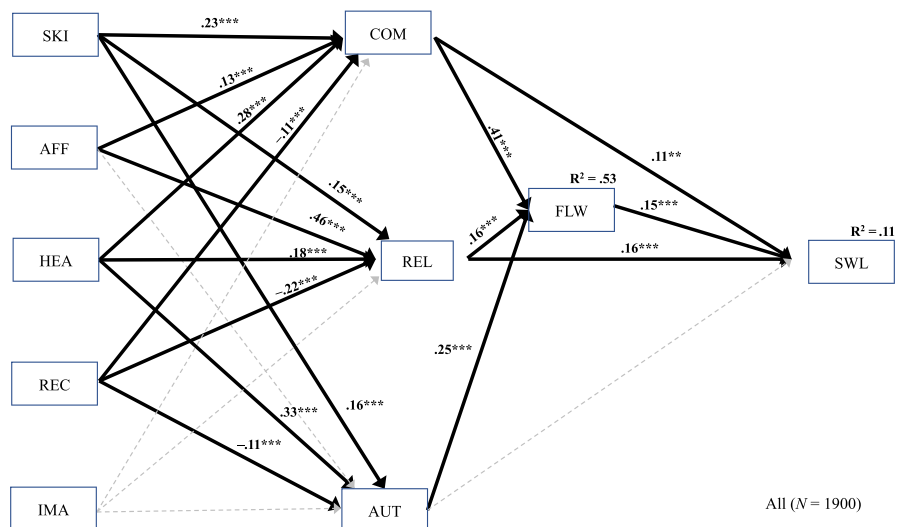
To analyze whether the effects of goal contents, PNS, and flow in PA on SWL were equivalent across the four clusters, a partially invariant (See Tab S1 in Supplemental materials) structural model (Chi square = 130.83,  $df = 94$ ,  $p = 0.007$ ,  $RMR = 0.030$ ,  $SRMR = 0.0212$ ,  $TLI = 0.986$ ,  $CFI = 0.993$ ,  $RMSEA = 0.014$  [95%  $CI = 0.008–0.020$ ],  $PCLOSE = 1.000$ ) was compared across groups via path analysis. Testing the model in the four groups, showed that

the effects of study variables on SWL (as well as on flow) were different across the groups (for a visual inspection of the path coefficients in the four different clusters, see Fig. 4).

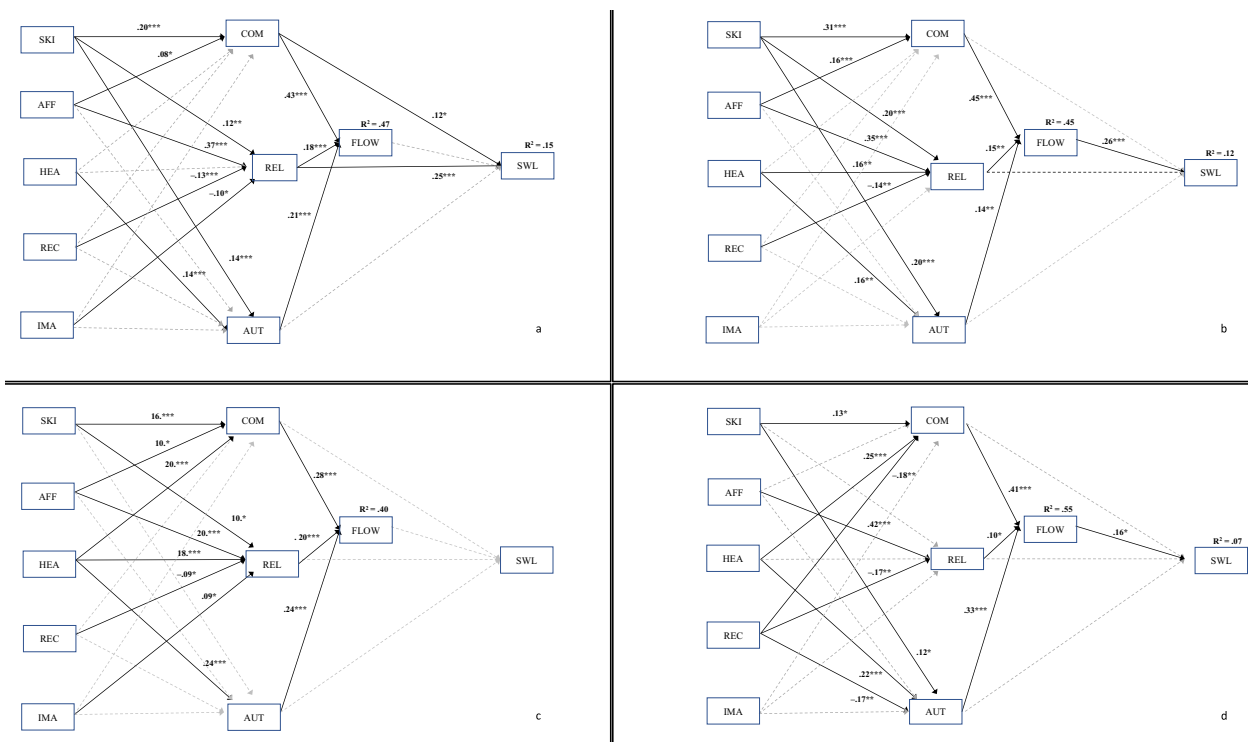
Among members of the *health management cluster* (Fig. 4a), the model predicted  $R^2 = 0.15$  in SWL variations. Intrinsic content goals positively predicted PNS; the skill development goal predicted the satisfaction of the needs for competence ( $\beta = 0.20$ ,  $p < 0.001$ ), relatedness ( $\beta = 0.12$ ,  $p < 0.001$ ), and autonomy ( $\beta = 0.14$ ,  $p < 0.001$ ); the social affiliation goal predicted relatedness ( $\beta = 0.37$ ,  $p < 0.001$ ) and competence ( $\beta = 0.08$ ,  $p < 0.05$ ) need satisfaction; and the health management goal predicted autonomy need satisfaction ( $\beta = 0.14$ ,  $p < 0.001$ ). Goals with extrinsic content had opposite effects. Relatedness need satisfaction was negatively predicted by the social recognition goal ( $\beta = -0.13$ ,  $p < 0.001$ ) and by the image goal ( $\beta = -0.10$ ,  $p < 0.05$ ). Furthermore, the satisfaction of the needs for competence ( $\beta = 0.43$ ,  $p < 0.001$ ), relatedness ( $\beta = 0.18$ ,  $p < 0.001$ ), and autonomy ( $\beta = 0.21$ ,  $p < 0.001$ ) predicted flow. And lastly, SWL was predicted by relatedness ( $\beta = 0.25$ ,  $p < 0.001$ ) and competence ( $\beta = 0.12$ ,  $p < 0.05$ ) need satisfaction.

Among members of the *team skill cluster* (Fig. 4b), the model predicted  $R^2 = 0.12$  in SWL variations. Competence need satisfaction was positively predicted by the skill development goal ( $\beta = 0.31$ ,  $p < 0.001$ ) and the social affiliation goal ( $\beta = 0.16$ ,  $p < 0.001$ ). Relatedness need satisfaction was also positively predicted by social affiliation ( $\beta = 0.35$ ,  $p < 0.001$ ), skill development ( $\beta = 0.20$ ,  $p < 0.001$ ), and health management ( $\beta = 0.16$ ,  $p < 0.01$ ), and negatively by the social recognition goal ( $\beta = -0.14$ ,  $p < 0.01$ ). Autonomy need satisfaction was positively predicted by skill development ( $\beta = 0.20$ ,  $p < 0.001$ ) and health management ( $\beta = 0.16$ ,  $p < 0.01$ ). Furthermore, flow was predicted by the satisfaction of the needs for competence ( $\beta = 0.45$ ,  $p < 0.001$ ), relatedness ( $\beta = 0.15$ ,  $p < 0.01$ ), and autonomy ( $\beta = 0.14$ ,

**Fig. 3** Structural model of goal contents, PNS, and flow in PA, predicting SWL ( $N = 1900$ ). All coefficients standardized



All ( $N = 1900$ )



**Fig. 4** Structural model of goal contents, PNS, and flow in PA, predicting SWL in four distinct clusters: a = *health management* ( $n=652$ ); b = *team skill* ( $n=412$ ); c = *social recognition* ( $n=494$ ); d = *low goals* ( $n=342$ ). All coefficients standardized

$p < 0.01$ ). Flow in turn was the sole direct predictor of SWL ( $\beta = 0.26, p < 0.001$ ) in this group.

Among members of the *social recognition cluster* (Fig. 4c), the model did not predict SWL variations. Competence need satisfaction was positively predicted by health management ( $\beta = 0.20, p < 0.001$ ), social affiliation ( $\beta = 0.10, p < 0.05$ ), and skill development ( $\beta = 0.16, p < 0.001$ ); autonomy need satisfaction was predicted by the health management goal ( $\beta = 0.24, p < 0.001$ ); and relatedness need satisfaction was predicted positively by skill development ( $\beta = 0.10, p < 0.05$ ), social affiliation ( $\beta = 0.20, p < 0.001$ ), health management ( $\beta = 0.18, p < 0.001$ ), and image ( $\beta = 0.09, p < 0.05$ ), and negatively by social recognition ( $\beta = -0.09, p < 0.05$ ). On the other hand, flow was significantly predicted by the satisfaction of the needs for autonomy ( $\beta = 0.24, p < 0.001$ ), competence ( $\beta = 0.28, p < 0.001$ ), and relatedness ( $\beta = 0.20, p < 0.001$ ).

Lastly, among members of the *low goals cluster* (Fig. 4d), the model predicted  $R^2 = 0.07$  in SWL variations. Competence need satisfaction was positively predicted by skill development ( $\beta = 0.13, p < 0.05$ ) and health management ( $\beta = 0.25, p < 0.001$ ), and negatively by social recognition ( $\beta = -0.18, p < 0.01$ ). Relatedness was positively predicted by social affiliation ( $\beta = 0.42, p < 0.001$ ) and negatively by social recognition ( $\beta = -0.17, p < 0.01$ ); whereas autonomy was predicted positively by health management ( $\beta = 0.22,$

$p < 0.001$ ) and negatively by social recognition ( $\beta = -0.17, p < 0.01$ ). In this group, the social recognition goal negatively predicted the satisfaction of all three needs. Flow was predicted positively by the satisfaction of all three needs: competence ( $\beta = 0.41, p < 0.001$ ), relatedness ( $\beta = 0.10, p < 0.05$ ), and autonomy ( $\beta = 0.33, p < 0.001$ ). Flow was the only direct predictor of SWL ( $\beta = 0.16, p < 0.05$ ) in this group.

**Hypothesis 2: Indirect effect of skill development goal on SWL, via competence and flow**

**Indirect effects of study variables on flow and SWL: evidence of group-specific mediation effects**

We analyzed the indirect effects of study variables on flow and SWL in the model introduced above, for each of the four clusters (Table 3). Among *low goals* (LG) cluster members, although flow mediated between PNS and SWL, the effects were small. In this cluster, the health management goal had positive indirect effects —whereas the social recognition goal had negative effects— via PNS on both flow and SWL.

Among *social recognition* (SR) cluster members, intrinsic content goals had positive indirect effects on flow and SWL. Noteworthy was the indirect effect of the health management goal on flow via all three needs.

**Table 3** Standardized total indirect effects of study variables on flow and SWL in the hypothesized model

	IMA	REC	HEA	AFF	SKI	AUT	REL	COM
FLOW <sub>HM</sub>	-.04 (.03) [-.10, .02]	-.06* (.03) [-.11, -.01]	.07* (.03) [.01, .12]	.10** (.03) [.04, .16]	.14** (.03) [.09, .21]			
SWL <sub>HM</sub>	-.03* (.02) [-.07, -.01]	-.05* (.02) [-.08, -.02]	.03 (.02) [-.01, .06]	.11** (.02) [.08, .15]	.07** (.02) [.04, .11]	.02 (.01) [-.01, .04]	.02 (.02) [-.01, .04]	.04 (.00) [-.01, .08]
FLOW <sub>TS</sub>	-.01 (.03) [-.07, -.07]	-.03 (.03) [-.10, .02]	.09* (.04) [.01, -.18]	.14** (.03) [.06, .20]	.20** (.04) [.12, .28]			
SWL <sub>TS</sub>	-.01 (.02) [-.04, .03]	-.02 (.02) [-.06, .01]	.04 (.02) [-.01, .09]	.07** (.03) [.02, .12]	.09** (.02) [.04, .14]	.04* (.02) [.01, .07]	.04** (.02) [.01, .08]	.12** (.03) [.06, .18]
FLOW <sub>SR</sub>	.04 (.03) [-.02, .10]	-.04 (.03) [-.11, .03]	.15** (.03) [.09, .22]	.08* (.04) [.02, .15]	.08* (.04) [.01, .16]			
SWL <sub>SR</sub>	.01 (.01) [-.02, .04]	-.02 (.01) [-.05, .01]	.05** (.02) [.02, .08]	.03* (.02) [.01, .07]	.03* (.02) [.01, .07]	.03 (.02) [-.01, .07]	.02 (.02) [-.01, .07]	.03 (.02) [-.01, .08]
FLOW <sub>LOG</sub>	-.03 (.05) [-.13, .06]	-.15** (.05) [-.24, -.04]	.18** (.05) [.07, .29]	.08* (.04) [.01, .17]	.10 (.05) [.00, .20]			
SWL <sub>LOG</sub>	.01 (.02) [-.05, .02]	-.05** (.02) [-.10, -.02]	.06** (.02) [.02, .11]	.05 (.03) [-.01, .11]	.04 (.02) [-.01, .08]	.05* (.03) [.01, .13]	.02* (.01) [.00, .06]	.06* (.03) [.01, .15]

\* =  $p < .05$ , \*\* =  $p < .01$ . Goal contents: IMA = image, REC = social recognition, HEA = health management, AFF = social affiliation, SKI = skill development. SWL = satisfaction with life. HM = health management cluster, TS = team skill cluster, SR = social recognition cluster, and LG = low goals cluster

In line with theory, among *health management (HM)* cluster members, goals with intrinsic content had positive indirect effects on flow and SWL via PNS (except for the non-significant indirect effect of health management on SWL); whereas goals with extrinsic content had negative indirect effects on flow and SWL (except for the non-significant indirect effect of image on flow). In this cluster, PNS also acted as mediator between goals and SWL, especially, relatedness need satisfaction between the social affiliation goal and SWL.

Lastly, to test **Hypothesis 2**, among *team skill (TS)* cluster members (the cluster featuring highest Z-scores in the skill development goal), we assessed the direct effect of flow, and the indirect effects of goal contents and PNS on SWL in the model: firstly, flow yielded a significant direct effect on SWL variations ( $\beta = 0.26$ ,  $p < 0.001$ ) (Fig. 4b); and, secondly, the total indirect effect of the skill development goal on SWL via PNS and flow was also significant (Table 3). In general, intrinsic goals had positive total indirect effects on SWL via PNS and flow (except, as in the previous cluster, for the non-significant indirect effect of health management on SWL). Especially relevant was the total indirect effect of the skill development goal on SWL in the model, which—in line with theory—evidenced serial mediation by both PNS and flow.

To zoom in on the specific hypothesized (H2) relationships between the skill development goal, competence need satisfaction, flow, and SWL, locally in the model, we conducted supplemental mediation analyses, using SPSS macro PROCESS version 3.5 (with 5000 Bootstrap samples), to assess the indirect effect of the skill development

goal on SWL variations via the sequential mediation of competence need satisfaction and flow. Signaling full mediation, the total (but not the direct) effect of the skill development goal on SWL was significant ( $\beta = 0.23$  [95% C.I. = 0.06–0.39], S.E. = 0.08,  $t = 2.7517$ ,  $p = 0.0062$ ). The only significant indirect effect of the skill development goal on SWL was the hypothesized sequential mediation path via competence need satisfaction and flow ( $\beta = 0.06$ , S.E. = 0.0173, [95% C.I. = 0.03–0.10]), whereas indirect effects either via competence only or, alternatively, via flow only were deemed insignificant due to their 95% confidence intervals including zero. Furthermore, at the univariate level, all three predictor variables showed positive direct effects on SWL variations: flow ( $\beta = 0.33$ ,  $t = 6.979$ ,  $p < 0.001$ ;  $R^2 = 0.11$ ,  $F(1/410) = 48.705$ ,  $p < 0.001$ ), competence need satisfaction ( $\beta = 0.27$ ,  $t = 5.661$ ,  $p < 0.001$ ;  $R^2 = 0.07$ ,  $F(1/410) = 32.048$ ,  $p < 0.001$ ), and the skill development goal ( $\beta = 0.14$ ,  $t = 2.752$ ,  $p = 0.006$ ;  $R^2 = 0.02$ ,  $F(1/410) = 7.572$ ,  $p = 0.006$ ). However, when included as predictors at the same time, flow ( $\beta = 0.53$  [95% C.I. = 0.28–0.78], S.E. = 0.13,  $t = 4.2113$ ,  $p < 0.001$ ), but not skill development nor competence, predicted SWL positively ( $R^2 = 0.11$ ,  $F(3/408) = 17.1611$ ,  $p < 0.001$ ). Full mediation by flow was observed between perceived competence and SWL, given that the indirect effect (and not the direct one) was significant via flow ( $\beta = 0.31$ , S.E. = 0.08, [95% C.I. = 0.15–0.46]). Also, full mediation by competence need satisfaction was observed between the skill development goal and flow, given that the indirect effect (and not the direct one) was significant via perceived competence ( $\beta = 0.21$ , S.E. = 0.3, [95% C.I. = 0.15–0.26]).

## Discussion and conclusions

The present study had three novel aims: firstly, contribute to person-centered analyses of clusters and profiles based on PA practice motivators in the context of SDT, doing so based on a sample of heterogeneous PA practitioners drawn individually from the general normative population, and not from specific programs (Q1); secondly, assess the effects of intrinsic relative to extrinsic goal contents, PNS and flow on SWL, depending on relevant goal contents in PA in a given cluster (H1); and, thirdly, assess the potential mediating roles of competence need satisfaction and flow between the intrinsic skill development goal and SWL in a cluster characterized by high relative scores in the skill development goal (H2).

To answer *Question 1*, we firstly identified four distinct statistically stable groupings based on different goal contents in PA, similar to those found in previous studies, characterized by high levels of both, only one, or none of the intrinsic or extrinsic motivators. The four found clusters (labelled health management, team skill, social recognition, and low goals) were aligned with the first four profiles (i.e. health management, intrinsic, extrinsic, and low goals) found by Lindwall et al. (2016), and not with the fifth one (all high goals cluster), which was not found in the present study. Such an all high goals cluster has been considered a peripheral type of cluster by Tóth-Király et al. (2020) and could potentially be the result of participants of said study being members of a specific, internet based, exercise program.

All in all, the four identified clusters are theoretically relevant and sensible. Health management cluster members (62% women), stood out for prioritizing the health management goal, and also because in this cluster SWL was robustly associated with relatedness even though individual PA practices were the norm. Team skill cluster members commonly prioritized skill development and affiliation goals, and SWL in this cluster was associated with flow, competence need satisfaction, and skill development goals. Social recognition cluster members (61% men), had overall average scores in all goals, with higher relative scores, compared to other clusters, in the social recognition goal, and SWL was not predicted by any goals, needs, or flow in PA in this cluster, suggesting that members of this cluster were extrinsically motivated and did not see any connection between the practice and their identity. Lastly, a somewhat smaller low goals cluster, with overrepresented team-sports practitioners, had scores relatively lower than all other clusters in all goals, and SWL was —albeit, weakly— predicted by flow in this cluster, suggesting that members of this cluster may have enjoyed flow some time before, but that now external regulation may be the cause of their PA.

To test *Hypothesis 1*, we compared predictive effects of study variables on SWL across the four clusters. Based on theory (Sebire et al., 2008), a prioritization of intrinsic relative to extrinsic goal contents in a cluster is expected to lead to greater favorable effects on outcomes; contrariwise, more extrinsic relative to intrinsic goal contents in a cluster is expected to lead to greater adverse effects on outcomes. In line with theory, these expectations held true in the present study (H1), given that, in the two clusters with goals of intrinsic content as main motivators (health management,  $R^2=0.15$ ; and team skill,  $R^2=0.12$ ), intrinsic goal contents yielded greater predictive effects on SWL variations (respectively,  $R^2=0.15$  and  $R^2=0.12$ ).

The expectation of lesser positive effects among extrinsically motivated clusters also held true, as study variables did not predict greater SWL in the extrinsic social recognition cluster, and only small proportions of SWL variations were predicted via flow in the low goals cluster. This latter effect (flow as mediator), even though small, was surprising in the context of the low goals cluster, as it would suggest that elements of quality motivation such as flow, competence need satisfaction, and intrinsic motivation must have been present at some point in time. Consequently, one interpretation —which, in the absence of a longitudinal design, cannot be addressed here— could be that this cluster would reflect a decline in the motivational trajectory of previous PA engagement that had once been producing flow. In the case of this cluster, the health management goal had positive (whereas the social recognition, negative) total indirect effects on flow and SWL, suggesting that the persistence of their members in PA may be based mostly on the health management goal.

In the health management cluster, the intrinsic content goal of social affiliation played a relevant role in the prediction of SWL via relatedness need satisfaction, interestingly, even though none of the two social goals had been reported as a relevant goal by members of this cluster. This finding could reflect that the social dimension of PA may not be a premeditated goal, but may nonetheless be a necessary condition for PA's contribution to SWL in such a cluster.

Furthermore, rather counterintuitively, in this cluster, the intrinsic health management goal itself was observed in the model to be only weakly predictive of only autonomy need satisfaction. This weak association in this cluster may be linked with two facts: Firstly, the health management cluster was the biggest and potentially most heterogeneous one ( $n=652$ , 62% women), with low relative scores in both social goals, and high prevalence of individual practices (such as gymnastics, bodybuilding, running, cycling, trekking, mounting climbing, track and field, and dance or similar), suggesting high heterogeneity explaining the diluted effects. And, secondly, this cluster was characterized mainly by high relative scores in the intrinsic content health management goal, and this goal is socially desirable



and semantically connected with PA practice per se; thus, typically all groups of PA practitioners tend to provide high reports and low variance in this goal, potentially, making it less discriminant among clusters and less predictive of the variances of other variables in the models.

Also, it is noteworthy to mention that an interesting aspect of the goal contents in exercise questionnaire, relevant to this cluster, is that health management is considered intrinsic because it reflects a personal gain of intrinsic value for the *self*, but not an intrinsic reward within the activity itself. This distinction is key, because if one practices for a skill development goal, one requires to achieve it within the activity, via competence need satisfaction; if one practices for an affiliation goal, one also requires to achieve it within the activity, in this case, via relatedness need satisfaction; but, arguably, if one practices for a health management goal, one does not require to achieve any specific result within the activity itself, but rather could be perfectly satisfied by having choice and personal control over what one is *just doing* autonomously and by thinking that they are already *doing something* to manage and improve their health. In other words, even though improved health may be an expected distal outcome of PA practice, with an intrinsic value for the *self*, it could not possibly be acquired within the activity itself.

These two plausible interpretations would also put into context the fact that we found no significant indirect effect of health management goal on SWL in this cluster: firstly, given that nothing has to happen in the practice itself for their members to feel that they did something health-oriented already; and, given that to some extent everyone, especially health management cluster members, report that they practice PA for health purposes. This may be a feature of the health management goal, not exclusive to this cluster, as the findings were similar in the team skill cluster.

To test *Hypothesis 2*, we assessed if in the team skill cluster, the skill development goal played a relevant role in the prediction of SWL via the sequential mediation of perceived competence and flow. Analyses of direct and indirect effects of study variables on SWL suggested that competence need satisfaction and flow were key variables via which, sequentially, the (intrinsic) skill development goal in PA exerted a favorable predictive effect on SWL variations in this group. We conducted local analyses of the sequence skill development goal, competence need satisfaction, flow, and SWL, finding that all possible mediations in the sequence were full mediations (i.e., SKI—COM—FLW; COM—FLW—SWL; and SKI—COM—FLW—SWL). This means that, as hypothesized, only indirect effects between predictors and outcomes were significant in all aforementioned sequences, showing support for the hypothesized sequence. Univariately, all three local predictors in the hypothesized sequence (i.e., skill development, competence need satisfaction, and

flow) were significant predictors of SWL variations, however, when including all together in a model, only flow predicted SWL variations. Similarly, in the same sequence, the local predictors of the skill development goal and competence need satisfaction both predicted flow univariately, however, when including both together in a model, only perceived competence predicted flow variations. Again, these findings show support for the hypothesized sequence based on the established relations between goal contents (Sebire et al., 2008), PNS (Ryan & Deci, 2000), intrinsic motivation (Deci, 1975), and flow (Csikszentmihalyi, 1988); and of the hypothesized relationships of the aforementioned variables with SWL (Diener et al., 1985).

### Main theoretical and practical contributions of the present study

It was important to know (Q1) *how many* and *what* clusters could be identified based on goal contents in exercise in the general normative population (Sebire et al., 2009), thus, the present findings should help program directors, coaches, teachers, parents, and similar decision makers in tailoring their value proposals to cater to the goals and psychological dynamics of diverse practitioners. For instance, among health management cluster members, who tend to practice individually performed activities, seemingly, a link exists between their sense of relatedness in PA practice and greater SWL, even though this was unexpected, given that they had reported relatively low scores in both social goals. This finding may lead to potentially successful program design paying attention to group dynamics, even in PA practices that are not team-based.

It was considered relevant to assess (H1) if SWL may be one of the favorable outcomes supposedly promoted by intrinsic goal contents in PA practice (Sebire et al., 2009). To the best of our knowledge it has not been tested if intrinsic goal contents in PA may be associated with SWL via the mediation of PNS and flow. As the answer to this question seems to be affirmative, it is reasonable to promote these intrinsic goals (i.e., skill development, social affiliation, and health management) via campaigns highlighting their importance and promoting the concepts and cultures that sustain their motivational dynamics, providing transitable opportunities with diverse foci on skill development, group affiliation, health management, and their possible combinations.

Lastly, we were interested in testing (H2) if the skill development goal in PA predicted variations in SWL via the sequential mediation of competence need satisfaction and flow; this is, we wanted to understand specific psychological dynamics via which PA practice could contribute to SWL, as these have not yet been uncovered completely. By corroborating the indirect effect of the skill development goal on SWL via the sequential mediation of competence



need satisfaction and flow, only in the hypothesized cluster (i.e., team skill cluster, with high skill development goal), we argue that there is evidence to propose that one of the potential processes via which PA practice could be contributing to SWL can be the sequence: skill development goal, competence need satisfaction, flow, SWL. We show that this sequential mediation is observed in the hypothesized cluster (team skill) and not in the others, while detailing the specific direct and indirect effects, and specific local mediations in the sequence. We argue that these findings reflect real-world phenomena, such as the important contribution of sports practices to SWL, in that sports offer opportunities for affiliation, perceived competence, intrinsic motivation, *self*-expression, and the enjoyment of flow; but at the same, in that sports or similar practices offer a scaffolding for personal growth and for the promotion of global subjective well-being (SWL), derived from the appropriation of optimal experiences of PA practice by the *self*, made possible by flow experience.

Alternatively, another candidate process via which PA practice could contribute to SWL, arises from the finding that, in the health management cluster, relatedness need satisfaction in PA predicted variations in global SWL. Individuals in this cluster practiced many different mainly individually performed non-sports PAs, suggesting that facilitating shared group experiences could support enjoyment and persistence in PA, with well-being potentially as a byproduct of group affiliation and relatedness need satisfaction, even when activities themselves do not require coordinated practice.

Professionals responsible for promoting health and well-being through PA practice need to consider that profiles based on different motivators typically lead to distinct types and quality of engagement in PA. In fact, promotion of PA with general non-tailored messages would be insufficient, because it would not distinguish and cater to different profiles based on distinct pursuits such as health management, skill development, social affiliation, image, or social recognition. Therefore, promoters need to distinguish and use different tailored arguments to promote PA and guide practitioners towards the types of PA that hold the greatest potential to originate viable alternatives for them, leading to satisfaction and wellbeing. We argue that a best case scenario would be a transitable system of PA opportunities catering to different individuals in different moments, allowing them to navigate these freely. For instance, as regards members, of extrinsic goal clusters such as social recognition, SDT theory (Ryan & Deci, 2000, 2017) proposes that by fostering positive emotions and an autonomy supportive environment, coaches and teachers are more likely to be able to get their students or *coachees* to autonomously internalize the importance of an activity and provide them with an optimal challenge scaffolding in order to develop the competence levels required

for intrinsic motivation to develop. In this regard, the initiation of an activity for extrinsic goal contents should be met with warm and informing coaches who aid practitioners in incorporating senses of importance, autonomy, competence, and enjoyment in PA. Intrinsic motivation may ultimately flourish via competence need satisfaction and flow. In the case of low goals cluster members, a potentially viable focus could be an attractive and realistic spectrum of alternative PA activities that fit the personal life-style. These activities would benefit from being marketed proactively at a public service local government level or other general population level venues, as low goal cluster members may not be proactive in searching for alternative PA practices.

All in all, the findings of the present study may help design specific sports programs at the recreational and competitive levels or, alternatively, provide insights into the tensions between boredom and excitement or between isolation and relatedness, helping professionals in promoting quality experience and retention among participants, also in non-sports physical activities, in which enjoyment and persistence may also be linked with avoiding boredom via scaffolding and growth, or with facilitating shared experiences and relatedness.

The effectiveness of PA to leverage SWL and the mechanisms via which this effect occurs may both depend on the content of the goals on which the practice is based. The psychological dynamics that support the role of PA for SWL seem to be mediated by the satisfaction of the basic psychological needs for competence, autonomy, and relatedness, and in specific cases, additionally, by optimal experiences promoted by PNS such as flow. Consequently, the training of teachers, coaches, and other support figures working in the field of PA, needs to address the incorporation of a set of conceptual tools that will aid them in distinguishing how to differentially promote specific psychological dynamics that underpin regular dedication to PA and its favorable outcomes in distinct motivation-based clusters.

## Limitations

Among the main limitations of the present study is its cross-sectional design; a longitudinal approach could allow for the analysis of PA practitioners' trajectories of engagement and disengagement, thus assessing, for example, if low-goals cluster members were once members of the team-skill cluster, which is suggested in the indirect effect of PNS on SWL via flow, shared by these two clusters, which for low goals cluster members may, potentially, be a vestige of flow experienced in the activity. We propose that future studies should test if low-goals clusters could be understood as profiles lingering at the end of their PA engagement trajectories, whereas trajectories in initial stages of engagement could be intrinsic-autonomous, extrinsic-controlled,

or a combination. Longitudinal approaches could test if low goals or low motives suggests a receding motivation, weakened habits, and lingering decreasingly endorsed motives or goals, with the corresponding change in cluster membership or even desertion of PA practice all in all. In the same spirit, mixed methods approaches could make enriched interpretations viable, regarding the meanings that specific practices take on for individuals in different moments of PA pursuit, along their trajectories of engagement. Lastly, the collection of data based on self-report measures in activities that participants practiced in absence of the researchers limit the possibility of objective coding of characteristics of the activities (e.g. sports structure, team or group conditions, organizational contexts, and relationships with others) that could have had effects on study variables such as goal contents and PNS, and consequently on flow and SWL. This kind of field study would enable an interpretation of the connection between diverse practices, their characteristics, goal contents that drive their practitioners to practice.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s12144-024-05678-2>.

**Acknowledgements** The authors would like to thank C. Gladwin for their invaluable help in reviewing the English language of the manuscript.

**Author contribution** Nuria Codina: Conceptualization, Resources, Writing—Review & Editing, Supervision, Project administration, Funding acquisition. Rafael Valenzuela\*: Conceptualization, Methodology, Formal analysis, Writing—Original Draft, Review & Editing. José Vicente Pestana: Investigation, Data Curation, Writing—Review & Editing, Supervision, Project administration, Funding acquisition.

**Funding** Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature. This research received financial support from the Ministry of Sciences, Innovation and Universities of Spain and the European Regional Development Fund (PID2021-123527OB-C21) and PsicoSAO Research Group in Social, Environmental, and Organizational Psychology (2021 SGR 00290; Secretaria d'Universitats i Recerca del Departament d'Economia i Coneixement, Generalitat de Catalunya). Open access publication processing charge was covered by the CRUE-CSIC agreement with Springer Nature 2021-2024. Sponsors provided financial support but had no role or influence in study design, conduction of the research, data collection, analysis or interpretation of the data, writing of reports decision on submissions concerning the study.

**Data availability** The data for this contribution can be found at: Codina, Nùria (Codina Mata); Valenzuela, Rafael; Pestana, José Vicente, 2022, "Practitioners clusters according to their goal contents for accomplishing physical activities (PA)", CORA. Repositori de Dades de Recerca, <https://doi.org/10.34810/data245>.

**Declarations** Authors declare that the present work is original, that it has not been published previously, and that it is not under consideration for publication elsewhere.

**Ethical approval** This submission fully follows the ethical guidelines of the American Psychological Association and complies with

all requirements by the Bioethics Commission (CBUB Institutional Review Board IRB00003099) of the University of Barcelona, Spain.

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

**Informed consent** Informed consent was obtained from all individual participants included in the study. Participants were informed about their right to withdraw from the study at any time and also that their self-reports about experiences in PA would be anonymous and analyzed at the group level.

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## References

- Arbuckle, J. L. (2019). Amos (Version 26.0) [MAC]. Chicago: IBM SPSS.
- Atienza, F. L., Pons, D., Balaguer, I., & García-Merita, M. (2000). Propiedades Psicométricas de la Escala de Satisfacción con la Vida en Adolescentes. *Psicothema*, 12(2), 314–319.
- Csikszentmihalyi, M. (1988). *Optimal experience: Psychological studies of flow in consciousness*. Cambridge University Press.
- Deci, E. L. (1975). *Intrinsic Motivation*. Plenum Press. <https://doi.org/10.1007/978-1-4613-4446-9>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227–268. [https://doi.org/10.1207/S15327965PLI1104\\_01](https://doi.org/10.1207/S15327965PLI1104_01)
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction With Life Scale. *Journal of Personality Assessment*, 49(1), 71–75. [https://doi.org/10.1207/s15327752jpa4901\\_13](https://doi.org/10.1207/s15327752jpa4901_13)
- Edwards, M. K., & Loprinzi, P. D. (2016). Experimentally increasing sedentary behavior results in increased anxiety in an active young adult population. *Journal of Affective Disorders*, 204, 166–173. <https://doi.org/10.1016/j.jad.2016.06.045>
- Edwards, M. K., & Loprinzi, P. D. (2017). Experimentally increasing sedentary behavior results in decreased life satisfaction. *Health Promotion Perspectives*, 7(2), 88–94. <https://doi.org/10.15171/hpp.2017.16>
- Jefatura del Estado. (1999). Ley Orgánica 15/1999, de 13 de diciembre, de Protección de Datos de Carácter Personal [Organic Law 15/1999, of December 13, on the Protection of Personal Data]. Boletín Oficial del Estado, 298(§23750), 43.088–43.099. Available online at: <https://www.boe.es/boe/dias/1999/12/14/pdfs/A43088-43099.pdf> (accessed Jul 30th, 2022).
- Frederick, C. M., & Ryan, R. M. (1993). Differences in motivation for sport and exercise and their relations with participation and mental health. *Journal of Sport Behaviour*, 16(3), 124–146.

- García-Calvo, T., Jiménez-Castuera, R., Santos-Rosa, F., Reina-Vaíllo, R., & Cervelló-Gimeno, E. (2008). Psychometric properties of Spanish version of the flow state scale. *The Spanish Journal of Psychology, 11*(2), 660–669. <https://doi.org/10.1017/s113874160004662>
- Heath, G. W., Parra, D. C., Sarmiento, O. L., Andersen, L. B., Owen, N., Goenka, S., Montes, F., & Brownson, R. C. (2012). Lancet Physical Activity Series Working Group Evidence-based intervention in physical activity: Lessons from around the world. *Lancet, 380*, 272–281. [https://doi.org/10.1016/S0140-6736\(12\)60816-2](https://doi.org/10.1016/S0140-6736(12)60816-2)
- Jackson, S., & Marsh, H. W. (1996). Development and validation of a scale to measure optimal experience: The Flow State Scale. *Journal of Sport & Exercise Psychology, 18*(1), 17–35. <https://doi.org/10.1123/jsep.18.1.17>
- Jackson, S., Martin, A., & Eklund, R. (2008). Long and Short Measures of Flow: The Construct Validity of the FSS-2, DFS-2, and New Brief Counterparts. *Journal of Sport and Exercise Psychology, 30*, 561–587. <https://doi.org/10.1123/jsep.30.5.561>
- James, W. (1890). *The principles of psychology*, Vol. 1. Henry Holt and Co. <https://doi.org/10.1037/10538-000>
- Jetzke, M., & Mutz, M. (2020). Sport for Pleasure, Fitness, Medals or Slenderness? Differential Effects of Sports Activities on Well-Being. *Applied Research in Quality Life, 15*, 1519–1534. <https://doi.org/10.1007/s11482-019-09753-w>
- Kasser, T., & Ryan, R. M. (1993). A dark side of the American dream: Correlates of financial success as a central life aspiration. *Journal of Personality and Social Psychology, 65*, 410–422. <https://doi.org/10.1037/0022-3514.65.2.410>
- Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin, 22*, 280–287. <https://doi.org/10.1177/0146167296223006>
- Kim, J., Lee, S., Chun, S., Han, A., & Heo, J. (2016). The effects of leisure-time physical activity for optimism, life e satisfaction, psychological well-being, and positive affect among older adults with loneliness. *Annals of Leisure Research, 20*, 406–415. <https://doi.org/10.1080/11745398.2016.1238308>
- Lera-López, F., Ollo-López, A., & Sánchez-Santos, J. M. (2017). How Does Physical Activity Make You Feel Better? The Mediation Role of Perceived Health. *Applied Research Quality Life, 12*, 511–531. <https://doi.org/10.1007/s11482-016-9473-8>
- Lindwall, M., Weman-Josefsson, K., Sebire, S. J., & Standage, M. (2016). Viewing exercise goal content through a person-oriented lens: A self-determination perspective. *Psychology of Sport and Exercise, 27*, 85–92. <https://doi.org/10.1016/j.psychsport.2016.06.011>
- Liu, F., Zhu, Z., & Jiang, B. (2021). The Influence of Chinese College Students' Physical Exercise on Life Satisfaction: The Chain Mediation Effect of Core Self-evaluation and Positive Emotion. *Frontiers in Psychology, 12*, 763046. <https://doi.org/10.3389/fpsyg.2021.763046>
- Maher, J. P., Doerksen, S. E., Elavsky, S., and Conroy, D. E. (2014). Daily Satisfaction With Life Is Regulated by Both Physical Activity and Sedentary Behavior, *Journal of Sport and Exercise Psychology, 36*(2), 166–178. Retrieved Jun 16, 2022, from <https://journals-humankinetics-com.sire.ub.edu/view/journals/jsep/36/2/article-p166.xml>
- Martin, A. J., & Jackson, S. A. (2008). Brief approaches to assessing task absorption and enhanced subjective experience: Examining “short” and “core” flow in diverse performance domains. *Motivation and Emotion, 32*(3), 141–157. <https://doi.org/10.1007/s11031-008-9094-0>
- Martin, A. J., Tipler, D. V., Marsh, H. W., Richards, G. E., & Williams, M. R. (2006). Assessing multidimensional physical activity motivation: A construct validity study of high-school students. *Journal of Sport & Exercise Psychology, 28*, 171–192. <https://doi.org/10.1123/jsep.28.2.171>
- Martinez-Kercher, V. M., Burton, D., Pickering, M. A., & Kercher, K. (2022). Profiling Physical Activity Motivation Based on Reasons for Exercise: A Cluster Analysis Approach. *Psychological reports, 127*(1), 124–141. <https://doi.org/10.1177/00332941221119413>
- Meyer, S., Grob, A., & Gerber, M. (2021). No fun, no gain: The stress-buffering effect of physical activity on life satisfaction depends on adolescents' intrinsic motivation. *Psychology of Sport & Exercise, 56*, 102004. <https://doi.org/10.1016/j.psychsport.2021.102004>
- Moreno-Murcia, J. A., González-Cutre, D., Chillón, M., & Parra, N. (2008). Adaptación a la educación física de la escala de las necesidades psicológicas básicas en el ejercicio. *Revista Mexicana De Psicología, 25*(2), 295–303.
- Moreno-Murcia, J. A., Marcos-Pardo, P. J., and Huéscar, E. (2016). Motivos de Práctica Físico-Deportiva en Mujeres: Diferencias entre Practicantes y no Practicantes. [Reasons for doing physical activity and sports in women: The differences between practitioners and non-practitioners]. *Revista de Psicología del Deporte, 25*(1), 35–41. Available at: <http://www.redalyc.org/articulo.oa?id=235143645005?>
- Nuviala-Nuviala, A., Gómez-López, M., Grao-Cruces, A., Granero-Gallegos, A., & Nuviala, R. (2013). Perfiles motivacionales de usuarios de servicios deportivos públicos y privados. *Universitas Psychologica, 12*(2), 421–431. <https://doi.org/10.11144/Javeriana.upsy12-2.pmsd>
- Pacesova, P., Smela, P., & Kracek, S. (2019). Personal well-being as part of the quality of life: Is there a difference in the personal well-being of women and men with higher level of anxiety trait regarding their sport activity? *Physical Activity Review, 7*, 201–208. <https://doi.org/10.16926/par.2019.07.24>
- Parker, P. D., Martin, A. J., & Marsh, H. W. (2008). Factors Predicting Life Satisfaction: A Process Model of Personality, Multidimensional Self-Concept, and Life Satisfaction. *Australian Journal of Guidance & Counselling, 18*(1), 15–29. <https://doi.org/10.1375/ajgc.18.1.15>
- Piercy, K. L., Troiano, R., Ballard, R. M., Carlson, S. A., Fulton, J. E., Galuska, D. A., George, S. M., & Olson, R. D. (2018). The Physical Activity Guidelines for Americans. *Journal of the American Medical Association, 320*, 2020–2028. <https://doi.org/10.1001/jama.2018.14854>
- Ryan, R. M., & Deci, E. L. (2000). The darker and brighter sides of human existence: Basic psychological needs as a unifying concept. *Psychological Inquiry, 11*, 319–338. [https://doi.org/10.1207/S15327965PLI1104\\_03](https://doi.org/10.1207/S15327965PLI1104_03)
- Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. *The Guilford Press*. <https://doi.org/10.1521/978.14625/28806>
- Ryan, R. M., Sheldon, K. M., Kasser, T., & Deci, E. L. (1996). All goals are not created equal: An organismic perspective on the nature of goals and their regulation. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (pp. 7–26). Guilford.
- Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology, 28*, 335–354.
- Schmiedeberg, C., & Schröder, J. (2017). Leisure Activities and Life Satisfaction: An Analysis with German Panel Data. *Applied Research in Quality Life, 12*, 137–151. <https://doi.org/10.1007/s11482-016-9458-7>
- Sebire, S. J., Standage, M., & Vansteenkiste, M. (2008). Development and validation of the goal content for exercise questionnaire. *Journal of Sport and Exercise Psychology, 30*, 353–377. <https://doi.org/10.1123/jsep.30.4.353>

- Sebire, S. J., Standage, M., & Vansteenkiste, M. (2009). Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes. *Journal of Sport and Exercise Psychology*, 31(2), 189–210. <https://doi.org/10.1123/jsep.31.2.189>
- Soenens, B., Vansteenkiste, M., & Sierens, E. (2009). How are parental psychological control and autonomy-support related? A cluster-analytic approach. *Journal of Marriage and Family*, 71(1), 187–202. <https://doi.org/10.1111/j.1741-3737.2008.00589.x>
- Stebbins, R. (2001). *New Directions in the Theory and Research of Serious Leisure*. Mellen Edwin Press.
- Sui, W., Sui, A., & Prapavessis, H. (2021). Relationships between indices of sedentary behaviour and hedonic well-being: A scoping review. *Psychology of Sport & Exercise*, 54, 101920. <https://doi.org/10.1016/j.psychsport.2021.101920>
- Tóth-Király, I., Amoura, C., Bőthe, B., Orosz, G., & Rigó, A. (2020). Predictors and outcomes of core and peripheral sport motivation profiles: A person-centered study. *Journal of Sports Sciences*, 38(8), 897–909. <https://doi.org/10.1080/02640414.2020.1736765>
- Valenzuela, R., Codina, N., & Pestana, J. V. (2021). University Students' Motives-for-Physical-Activity Profiles: Why They Practise and What They Get in Terms of Psychological Need Satisfaction. *Frontiers in Psychology*, 11, 621065. <https://doi.org/10.3389/fpsyg.2020.621065>
- Vallerand, R. J., & Reid, G. (1984). On the causal effects of perceived competence on intrinsic motivation: A test of cognitive evaluation theory. *Journal of Sport Psychology*, 6(1), 94–102.
- Vaquero-Solís, M., Sánchez-Miguel, P. A., Tapia-Serrano, M. Á., Pulido, J. J., & Iglesias-Gallego, D. (2019). Physical Activity as a Regulatory Variable between Adolescents' Motivational Processes and Satisfaction with Life. *International Journal of Environmental Research and Public Health*, 16(15), 2765. <https://doi.org/10.3390/ijerph16152765>
- Vlachopoulos, S. P., & Michailidou, S. (2006). Development and Initial Validation of a Measure of Autonomy, Competence, and Relatedness in Exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science*, 10(3), 179–201. [https://doi.org/10.1207/s15327841mpee1003\\_4](https://doi.org/10.1207/s15327841mpee1003_4)
- Wang, C. J., & Biddle, S. J. (2001). Young People's Motivational Profiles in Physical Activity: A Cluster Analysis. *Journal of Sport and Exercise Psychology*, 23(1), 1–22. <https://doi.org/10.1123/jsep.23.1.1>
- World Medical Association. (2013). World medical association declaration of Helsinki: Ethical principles for medical research involving human subjects. *JAMA*, 310, 2191–2194. <https://doi.org/10.1001/jama.2013.281053>

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