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Examining the Coach Motivation Questionnaire in Fitness Professionals (CMQ-FP): Factor Structure, Invariance, and Predictive Analysis

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ABSTRACT

Purpose: To date, most research on the assessment of motivation has been exerciser-focused and has not considered how fitness professionals' motivations impact their behaviors toward exercisers during training sessions. The purpose of this study was to examine the factor structure of the Coach Motivation Questionnaire in a sample of fitness professionals (CMQ-FP) to ascertain its usefulness for this vocational grouping. Measurement invariance analysis was conducted between female and male fitness professionals, and predictive validity was tested considering need-supportive and need-thwarting behaviors as outcomes. **Methods**: Participants were 799 fitness professionals (female = 412) aged between 20 and 56 years (M = 28.71, SD = 3.24), who completed a multi-section survey assessing their motivation toward work and their interpersonal behaviors when engaging with exercisers. **Results**: The results of this research supported all three hypotheses. First, the hypothesized 6-factor measurement model showed acceptable fit to the data. Second, the factor structure of the CMQ-FP was invariant across gender (male and female fitness professionals). Third, fitness professionals' (autonomous or controlled) motivation was a valid predictor of need-supportive or need-thwarting behaviors. **Conclusion**: This study supported the factor structure of the CMQ-FP, presenting as a valid measure of motivation in fitness professionals. Understanding fitness professionals' perceptions of their coaching motivation can inform professional development activities to assist fitness professionals to increase understanding of what motivates these professionals and how they might be more need-supportive and less need-thwarting in their pedagogical behaviors.

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Exercise; interpersonal behaviors; measurement invariance; motivation

Regular exercise is a crucial component of a healthy lifestyle, since it provides the participant with numerous physical, psychological, and emotional benefits (e.g., Warburton & Bredin, 2017). There is empirical support for the inverse association between regular physical exercise and premature mortality, stroke, metabolic syndrome, several cancers, diabetes mellitus type II, and other chronic diseases (Garber et al., 2011; Moore et al., 2016), emphasizing the importance of regular physical exercise. Despite the well-known health benefits, globally, more than 30% of adults are physically inactive (Guthold et al., 2018). Furthermore, there remains an overwhelming prevalence of people not engaging in regular exercise, with more than half the European population not meeting the current international physical activity guidelines of 150 minutes of weekly moderate to vigorous intensity activity (Eurobarometer, 2018; World Health Organization, 2018). Moreover, among those individuals who initiate a training regime, few sustain this behavior for the long term, in which about 50% drop out within the first six months (Sperandei et al., 2016); therefore, exercise adherence remains a problem.

Fitness professionals have been viewed as leaders in terms of positively influencing participants' exercise adherence (Teixeira et al., 2012). Specifically, fitness professionals promote exercise persistence through their interpersonal and coaching behaviors (Ntoumanis et al., 2017). Motivation research, which has been used extensively to assess exercise adherence, has provided crucial insights into the reasons why some individuals demonstrate persistence in maintaining long-term habits of physical exercise (Rodrigues, Teixeira et al., 2019). However, to date, most research on the assessment of motivation has been exerciser-focused and has not examined how fitness professionals' motivations for coaching shapes their interpersonal behaviors toward exercisers during training sessions. It is assumed that fitness professionals' interpersonal behaviors influence

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the motivational climate they create. In a similar context, there have been several studies examining sport coaches' behavioral regulations that show that coaches' motivation has a significant impact on how they will endorse need-supportive or need-controlling behaviors with athletes (Rocchi & Pelletier, 2018; Smith et al., 2015). Similar to the influence of coaches' behaviors on athletes' motivation and subsequent behaviors, fitness professionals also play an important role in promoting exercise adherence and positive emotional experiences (e.g., enjoyment; Rodrigues, Teixeira et al., 2019), which likely fosters adherence. Indeed, fitness professionals might be considered as "coaches" in their context, albeit somewhat different to typical sport settings. For example, while coaches focus mainly on sport performance and overall winning in competitive games (Mallett & Côté, 2006), in the exercise context, fitness professionals endorse behaviors that are targeted at promoting physical and mental health, as well as endorsing in health-related behaviors as reported by Zhou et al. (2019). A greater understanding of fitness professionals' motivations has the potential to enhance our knowledge and understanding of their behaviors (Ntoumanis et al., 2017) and subsequent influence on exercisers' thoughts, feelings, and behaviors. Furthermore, it is important to understand the relationship between fitness professionals' motivations and their perceptions of psychological need-supportive and need-thwarting behaviors as a way to examine their potential influence on exercisers' psychological need satisfaction and need frustration, consistent within Self-Determination Theory (SDT; Ryan & Deci, 2017).

Conceptual framework

Among contemporary motivational frameworks, SDT is a prominent theoretical lens because it helps explain motivations toward health-related behaviors (Ryan & Deci, 2017). More specifically, SDT provides an appropriate theoretical frame to examine why individuals engage in physical exercise and how personal and environmental cues explain and endorse motivation toward exercising (Hagger & Chatzisarantis, 2008). According to Organismic Integration Theory within SDT, different forms of motivation are viewed along a continuum between self-determined and non-self-determined regulations (Ryan & Deci, 2017). At one end of the motivational continuum is amotivation, representing the lack of any impetus or will to engage in a given behavior. At the other end of the continuum is intrinsic motivation, which is participating in an activity for the inherent and spontaneous satisfaction of engaging in something because it is interesting and enjoyable. Between these two ends of the self-determination continuum, are four extrinsic regulations that are driven by external goals; motivation that leads to engagement when material or social considerations are expected and perceived as valuable. The least self-determined form of extrinsic motivation is external regulation, which is defined as behavior that is controlled by external contingencies, such as, rewards and praise. Slightly more self-determined is introjected regulation, which is characterized by the self-imposed pressures, such as guilt, to engage in an activity. External and introjected regulations are classified as controlled forms of motivation (Deci et al., 2017). The other two forms of extrinsic motivation along the self-determination continuum are identified and integrated regulations, which have been labeled as autonomous forms of motivation (Deci et al., 2017). In identified regulation, the exerciser values and endorses their behavior; that is, the locus of causality for behavior is internal. The most autonomous form of extrinsic motivation is integrated regulation; the behavior is accepted as part of one's personal values and beliefs (Deci et al., 2017).

Despite the existing research, which has investigated the behavioral regulations of exercisers, there has been limited research examining those who lead the exercisers, the fitness professionals (Rodrigues, Pelletier et al., 2019). Research on the motivational regulations of fitness professionals is important because they create the motivational climate for the exercisers and have the potential to influence adherence. The behaviors they endorse, in turn, shape the quality of the exerciser's experience, including the degree to which the exerciser's psychological needs (autonomy, competence, relatedness as defined in Basic Psychological Needs Theory within SDT; Ryan & Deci, 2017) are supported or thwarted. Furthermore, people who feel that they positively impact others at work tend to feel more engaged and inherently motivated (Ryan & Deci, 2017). Thus, different forms of motivation can play an important role in shaping the fitness professional's interpersonal style with exercisers.

Motivation and interpersonal behaviors in fitness professionals

Research has shown that fitness professionals create a motivational climate in their setting through their enactment of an interpersonal style that either supports and/or thwarts exercisers' basic psychological needs as conceptualized in SDT (Rodrigues, Teixeira et al., 2019). A primary goal of the fitness professional is to promote adaptive outcomes for their exercisers; hence, it is important to examine fitness professionals' coaching motivational profile within the context of their psycho-social interactions with their

exercisers. According to the SDT framework, interpersonal behavior styles (need-supportive and need-thwarting) within a particular life domain are best understood at the contextual motivational level (Vallerand, 2001) and contingent upon an individual's motivations (Taylor et al., 2008). Within the framework of SDT, Rocchi and Pelletier (2017) found that sport coaches' autonomous forms of motivation for coaching were associated with perceived need-supportive behaviors. Furthermore, consistent with SDT, researchers have found a positive correlation between controlled forms of motivation and need-thwarting behavior in the sport context (Rocchi et al., 2017). Given that both coaches and fitness professionals are key actors in physical activity contexts (Gold & Weinberg, 2014), it is hypothesized that fitness professionals' interpersonal behaviors will influence exercisers' psycho-social outcomes (need satisfaction and need frustration). Fitness professionals shape the motivational climate and subsequently influence the quality of the psycho-social experiences of the exerciser.

The measurement of motivation in fitness professionals

Measuring motivation in many contexts, within the lens of SDT, has a long history. Nevertheless, there is no measure specific to fitness professionals and the closest to this vocational grouping are sports coaches. McLean et al. (2012) created the Coach Motivation Questionnaire (CMQ) in the sport domain, which was found to have both empirical and theoretical support. Initially, these authors created a 41-item pool measure examining the behavioral regulations that sport coaches experience during work. After psychometric examination across four interrelated studies, the authors reported support for the six-factor structure of the 22-item CMQ final version. Overall, the two-, four-, and six factor structures of the CMQ were supported and preliminary evidence for the scale's convergent and discriminant validity and reliability (internal consistency). The 22 items of the CMQ measures six forms of motivation (amotivation, external, introjected, identified, integrated, and intrinsic). Additionally, nomological validity was established, displaying consistent associations among theoretical constructs. Since this initial support for its validity and reliability, the CMQ has been supported and used as a valid and reliable measure in other studies (Rocchi & Pelletier, 2017), including a Portuguese version (Da Silva et al., 2018) and a German version (CMQ-G; Zepp et al., 2016).

When it comes to the measurement of motivational determinants, Ntoumanis and Biddle (1999) have stated that research should be performed within specific cultures and context and scales validated in one context should not be used in another prior to validation. Specifically in SDT research, Ryan (1995) explains the need to use context-validated scales to measure constructs inherent to the SDT framework. In this regard, important methodological limitations have been associated with generic rather than domain-specific questionnaires and thus potentially compromise the research (Chen, 2008). Hence, while the translated versions of the CMQ present reliable consistency and dimensionality, these measurement tools should be psychometrically examined in specific contexts such as fitness professionals who coach exercisers. The measurement of fitness professionals' motivation is therefore yet to benefit from the development of a specific context validated scale subjected to rigorous psychometric examination.

Construct examination of motivation

Several authors (e.g., Morin et al., 2016) note that construct-relevant psychometric testing needs to be modeled according to previous literature, exploring the possibility of multidimensionality assessed within an instrument, as is the case of the CMQ. Construct-relevant psychometric multidimensionality relates to the notion that item ratings may be associated with more than one latent construct (Tóth-Király et al., 2020). Specifically, Exploratory Structural Equation Modeling (ESEM) combines the benefits of traditional confirmatory and exploratory factor analyses procedures (Asparouhov & Muthén, 2009; Marsh et al., 2014) allowing for cross-loadings to be modeled on each factor of a multidimensional scale. In doing so, it maximizes construct relevant information captured by these factors and minimizes bias in the estimation of factor loadings and latent factor inter-correlations (Howard et al., 2020). Hence, testing and comparing confirmatory factor analysis (CFA) and ESEM model specifications for motivational scales derived from SDT is of upmost importance, as a way to evidence the best model for the CMQ to best illustrate motivational regulations as theoretically proposed by SDT (Howard et al., 2020).

The present study

Empirical studies exploring the relationships between leaders' (coaches and trainers) motivation and interpersonal behavior styles are limited (Rocchi & Pelletier, 2017, 2018). Indeed, to the best of our knowledge, no study has addressed the importance of examining why fitness professionals' coach, and how their motivation at work might influence their need-supportive and need-thwarting behaviors. This line of research is important because understanding the antecedents of interpersonal behaviors

(controlled and autonomous motivations) allows for examination of some important relationships between key factors, such as, motivation, behaviors, motivational climate, psychological needs, and exercise adherence.

Hence, the purpose of this study was to examine the factor structure of the CMQ in a sample of fitness professionals. We hypothesized that the 6-factor structure of the CMQ would be tenable for fitness professionals, consistent with the original English scale (McLean et al., 2012), and other translated and validated scales (Da Silva et al., 2018; Zepp et al., 2016) in the sport context. McLean et al. also examined factor structure invariance across gender, providing support for invariance. The authors encouraged future research to provide further evidence of the validity of the CMQ. Therefore, the second aim of this study was to examine factor structure invariance across gender (male and female fitness professionals). A third aim of the study was to determine the predictive validity of fitness professionals' motivation on interpersonal behaviors. Hence, we tested the following hypotheses based on previous literature (Rocchi & Pelletier, 2017): a) autonomous forms of motivation would positively predict need-supportive behaviors as perceived by fitness professionals; b) controlled forms of motivation would positively forecast need-thwarting behaviors; c) autonomous forms of motivation would be negatively associated with need-thwarting behaviors; and d) controlled forms of motivation would be negatively correlated with need-supportive behaviors.

Method

Participants

Participants were 799 fitness professionals (female = 412; male = 387) aged between 20 and 56 years (M = 28.71, SD = 3.24), who were recruited using different social media and professional platforms. Regarding their level of education, 387 (48%) had a bachelors' degree, 212 (27%) had a masters' degree, 22 (3%) had a doctoral degree, all in sport and exercise science, and 178 (22%) had completed certified postgraduate courses for exercise prescription in gym and health clubs. Fitness professionals were licensed professionals for exercise prescription, having a mean work experience as full-time employees of 10.34 years (SD = 3.21).

Procedures

Data collection procedures were conducted in accordance with the Declaration of Helsinki and its later amendments. Additionally, approval of the Institutional Research Ethics Committee was obtained prior to data collection. This study was cross-sectional in design and researchers contacted several fitness professionals working in Portuguese gyms and health clubs using online platforms (i.e., LinkedIn, Instagram, and professional Facebook profiles). Fitness professionals were defined as those working actively in gyms and health clubs in Portugal, endorsing in personal training sessions, fitness group classes, weight training supervision and/or wellness coaching. Prior to data collection potential participants were first informed about the main objective and the topics of the study. Individuals who agreed to participate, had to check a box within the online survey, before moving on to completing the questionnaires. No participant received compensation, but where thanked for their contribution. Mean time taken to complete the multi-section survey was 15.28 minutes (SD = 3.14; Range = 12–21).

Measures

The CMQ (McLean et al., 2012) was used to capture fitness professionals' motivation toward working with exercisers. The stem "*Why do you coach your sport?*" was adapted to the exercise context "*Why do you coach exercisers in gym and/or health clubs?*". The questionnaire items were adapted (i.e., the CMQ Fitness Professional version: CMQ-FP) to the context of exercise, to reflect the motivation to work with exercisers, namely: amotivation (4 items; e.g., "*Sometimes I question my desire to continue coaching exercisers*"); external regulation (4 items: e.g., "*To be respected by others*"); introjected regulation (4 items: e.g., "*Because if I quit it would mean I had failed*"); identified regulation (3 items: e.g., "*Because it contributes to my development as a person*"); integrated regulation (3 items: e.g., "*Because it personifies my values and beliefs*"); and, intrinsic motivation (4 items: e.g., "*Because I find it stimulating*"). Participants were asked to rate the extent to which they experienced each behavioral regulation on a Likert-type scale ranging from 1 ("*totally disagree*") to 7 ("*totally agree*").

The Interpersonal Behavior Questionnaire Self exercise version (IBQ-Self; Rodrigues, Pelletier et al., 2019) was used to examine how fitness professionals perceive their engagement in need-supportive and need-thwarting behaviors. It is a 24-item scale comprising six factors based on the SDT framework: autonomy support
(4 items: e.g., "*I support exercisers decisions during training session*"); competence support (4 items: e.g., "*I encourage exercisers to improve their skills*"); relatedness support (4 items: e.g., "*I am interested in what my exercisers do*"); autonomy thwarting (4 items: e.g., "*I pressure exercisers to do the things in my own way*"); competence thwarting (4 items: e.g., "*I have doubts on*

the exercisers capacity to improve their skills"); and, relatedness thwarting (4 items: e.g., "*I am distant when I spent time with the exercisers*"). Participants rated the items using a Likert-type scale of 7 points anchored from 1 ("*do not agree at all*") to 7 ("*totally agree*"). The results from previous studies (Rodrigues, Teixeira et al., 2019) provide support for the factorial validity, dimensionality, and reliability of the assessment of fitness professionals' own perception of interpersonal behaviors. In the current study, the six-factor CFA model displayed adequate fit to the data as seen in Table 1 (Model 5). All hypothesized factors displayed acceptable internal consistency, in which composite reliability coefficients ranged from 0.71 (autonomy-thwarting behaviors) to 0.85 (competence-thwarting behaviors).

Statistical analyses

Factorial validity

The measurement model was tested in *M*plus 7.3 (Muthén & Muthén, 2010) using the Robust Maximum Likelihood (MLR) estimator as it provides tests of model fit and standard errors that are robust to the non-normality of the data. Full Information robust Maximum Likelihood (FIML) was used to handle the small amount of missing data at the item level (missing at random = 4%) as proposed by several authors (Enders, 2010). The examination of the CMQ responses was conducted in two phases. In the first one, several alternative models were tested and compared: a) six-correlated factor CFA (Model 1), and ESEM (Model 2). See Appendix 1 for illustration of the model specifications. Following previous applications of CFA and ESEM model specifications (Marsh et al., 2014; Morin et al., 2016), the ESEM model was specified with target rotation procedures (Browne, 2010). In the second phase, to investigate factor structure of the retained model specification, the best CFA and ESEM model of the CMQ were examined for convergent and discriminant validity, internal consistency, and factor loadings and uniqueness.

Measurement model evaluation was carried out based on the following common goodness-of-fit indexes: the comparative fit index (CFI; Bentler, 1990), the Tucker Lewis Index (TLI; Bentler & Bonnett, 1980), the standardized root mean square residual (SRMR; Hu & Bentler, 1998), the root mean square error of approximation (RMSEA; Steiger, 1990) and its respective 95% confidence interval (CI95%). The chi-squared test (χ^2) and the degrees of freedom were reported, but it is well known that the statistics is affected by the sample size (Hair et al., 2019). Considering traditional cutoffs reported elsewhere (Byrne, 2011; Hair et al., 2019), CFI and TLI were considered acceptable and adequate with values over or equal 0.90, while values below or equal 0.80 were indicative of good fit for SRMR and RMSEA.

Based on previous literature (Morin et al., 2016), the selection of the most optimal model should not be solely based on the overall goodness-of-fit indexes, but should be coupled with the examination of other relevant theoretical and statistical measures and key estimates (i.e., factor loadings, factor correlations). Hence, the correlation matrix of the six-correlated factor CFA and ESEM models should be compared. ESEM (Marsh et al., 2014), a combination of exploratory analyses, CFA, and SEM into a single model, has proven to be an all-embracing methodology. Hence, ESEM encompasses the assets from each technique into a single analytic measurement where exploratory factors integrating cross-loadings can cohabitate with factors defined according to CFA assumptions (Marsh et al., 2014). In a typical CFA model, each item loads on its target factor only and all non-target cross-loadings are constrained to be zero. On the other hand, all items load on every factor and all factor loadings are estimated in the ESEM model by imposing appropriate restrictions on the factor loading matrix and the factor covariance matrix (Marsh et al., 2010). The ESEM model should be retained as long as factor definitions are reasonably adequate and the correlations are reduced compared to the CFA specification, given the fact that ESEM models provide more exact parameter estimate (Asparouhov & Muthén, 2009).

The Average Variance Extracted (AVE) was used to investigate discriminant validity. AVE is an established approach to test discriminant validity (Fornell & Larcker, 1981). Constructs are identified as distinct when the square root of each AVE value is larger than the correlation between the two constructs and when the AVE for

Table 1. Summary of goodness-of-fit indexes for the tested models.

Model	*χ2*	df	CFI	TLI	SRMR	RMSEA	[90% CI]
1. Six-correlated factor CFA	1305.182*	194	.909	.885	.058	.080	.080,.089
2. Six-correlated factor ESEM	570.647*	114	.946	.907	.018	.071	.065,.077
3. Six-correlated factor ESEM—female	641.112*	114	.927	.891	.019	.078	.071,.087
4. Six-correlated factor ESEM—male	537.369*	114	.912	.888	.021	.081	.075,.089
5. CFA model of the IBQ-Self	7425.365*	237	.954	.941	.048	.038	.034,.054

CFI = Comparative Fit Index; TLI = Tucker Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; * $p < 0.001$.

each construct is above 0.50 (Fornell & Larcker, 1981). We analyzed internal consistency through composite reliability (CR) and calculated it by Raykov (1997) formula, adopting .70 as the cutoff value (Hair et al., 2019).

Multigroup analysis

To test multigroup analysis between gender, the model with the best fit from the factor structure analysis was initially examined in each gender group separately. Then several levels of measurement invariance were measured according to several authors (Hair et al., 2019; Morin et al., 2016). As each set of new parameters is tested, the parameters known to be invariant from previous levels are constrained. Hence, the process of analyzing measurement invariance is essentially the testing of a series of increasingly restrictive hypotheses. These levels are: configural invariance (i.e., factor structure is the same between groups; same items associated with the same factors); weak factorial invariance (i.e., factor structure and factor loadings are equal between groups); strong invariance (i.e., item factor structure, factor loadings, and item thresholds are equal between groups), and; strict factorial invariance (i.e., item factor structure, factor loadings, item thresholds, and item residuals are equal between groups). Model comparisons were made according to several assumptions, specifically: a) differences in CFI ≤ 0.01, and; b) differences in RMSEA ≤ 0.015 (Chen, 2007; Cheung & Rensvold, 2002).

Predictive validity

Structural Equation Modeling (SEM) with latent variables were conducted, following the same rules of thumb for model acceptability as proposed by several authors (Byrne, 2011; Hair et al., 2019). Regarding sample size, we followed Hair et al. (2019) and Worthington and Whittaker (2006) recommendations, accepting a 5:1 ratio (participants per parameter to be estimated) to conduct SEM analysis. According to this ratio, we would need 550 participants for the 110 estimated parameters, which was respected in this study. Predictive validity analysis was performed considering need-supportive and need-thwarting behaviors as consequences of fitness professionals' behavior regulations based on the motivational continuum. We employed a latent SEM model where CMQ factors were specified based on the six-correlated factor ESEM model and need-supportive and need-thwarting behaviors as global factors of each need-supportive (i.e., autonomy support, competence support, and relatedness support) and need-thwarting behaviors (i.e., autonomy thwarting, competence thwarting, and relatedness thwarting) as latent factors. Direct effects of each behavioral regulation were analyzed according to standardized coefficients and its respective 95% CI (CI95%). Regression paths were considered significant if CI95% did not include zero (Worthington & Whittaker, 2006).

Results

Factorial validity

The six-factor CFA and ESEM models displayed adequate fit to the data. While TLI was below the cutoff value for the CFA model, it was close to achieving acceptable values. Additionally, CFI was above and SRMR and RMSEA were below the cutoffs stated earlier (Byrne, 2011; Hair et al., 2019). The six-correlated factor ESEM model showed adequate fit to the data according to all the goodness-of-fit indexes. However, the corresponding six-factor CFA model did not fit data satisfactorily given that the TLI value was marginally lower than .90 and indicated that there were some problems with the CFA model (see Table 1).

Analyses on the six-correlated factor CFA and ESEM models revealed that all item loadings on the target factor were greater than 0.50 and loaded significantly (p <.001), explaining at least 25% variance. According to the factor loadings of the six-factor ESEM model in the Table 2, Items 11, 15, 23, and 24 loaded onto non-target factors. However, their factor loadings on non-target factors were not substantial and most of them were next to the target factor (e.g., integrated and identified regulations). Thus, the observed factor loadings onto the non-target factors are understandable from a SDT theoretical perspective. It was considered that these items might be related to the non-acceptable fit of the CFA model.

Responses to each CMQ factor were found internally consistent as all factors within the six-correlated factor CFA and ESEM model had composite reliability coefficient scores above 0.70, except for integrated regulation (0.66) in the ESEM specification.

Based on the results of the factor analysis, convergent and discriminant validity, as well as correlations were examined using the six-correlated factor ESEM model. Convergent validity was achieved as the AVE scores were above acceptable, as seen in Table 3. Discriminant validity was evaluated by comparing the squared correlations rooted in each latent variable against the AVE scores in each latent variable. According to the squared correlations and AVE scores in Table 3, all factors demonstrated adequate discriminant validity. The correlations of the six-correlated factor ESEM model showed significant associations as theoretically expected.

Multigroup analysis

The six-correlated factors ESEM model was employed for measurement invariance analyses between gender

Table 2. Factor loadings, uniqueness, and composite reliability coefficients of the six-correlated models.

	CFA		ESEM						
	λ	δ	AMOλ	EXTλ	INTλ	IDEλ	ITEλ	IMOλ	δ
Amotivation	*.90*		*.86*						
Item 1	**.84****	.29	**.82****	.05	−.03	.09*	−.13**	.01	.27
Item 7	**.83****	.31	**.91****	−.07*	.06	.12**	−.05	.02	.26
Item 13	**.82****	.32	**.67****	.08	.07	−.15**	−.05	.03	.32
Item 19	**.84****	.29	**.81****	.07	.00	−.12**	.21**	.02	.23
External Regulation	*.92*			*.83*					
Item 2	**.90****	.19	.00	**.92****	.04	.15**	−.14*	−.01	.14
Item 8	**.78****	.38	.17**	**.57****	.20**	.02	−.09	.10*	.39
Item 14	**.92****	.14	.01	**.86****	.09	−.03	−.09*	.08*	.13
Item 20	**.84****	.29	.14**	**.59****	.23**	−.22	.23**	.06	.20
Introjected Regulation	*.89*				*.75*				
Item 3	**.81****	.33	.26**	.04	**.59****	.06	−.08	−.16**	.28
Item 9	**.84****	.28	−.09*	.15**	**.75****	−.04	.04	−.14**	.23
Item 15	**.83****	.31	.01	.35**	**.50****	.03	.05	−.21**	.32
Item 21	**.84****	.29	.04	.07	**.76****	−.05	.12**	−.10	.23
Identified Regulation	*.73*					*.70*			
Item 10	**.63****	.20	−.21**	.02	.06	**.55****	.03	.08	.23
Item 16	**.60****	.46	.06	−.01	.05	**.68****	.06	.02	.45
Item 22	**.82****	.33	.00	.00	−.10	**.74****	.25	−.06	.31
Integrated Regulation	*.80*						*.66*		
Item 11	**.78****	.39	−.16**	−.36**	.35**	.10	**.63****	.28***	.37
Item 17	**.69****	.52	−.06	−.07	.05	.27**	**.62****	.23**	.56
Item 23	**.79****	.28	−.06	−.11	.07	.34**	**.64****	.12**	.27
Intrinsic Motivation	*.90*							*.84*	
Item 6	**.87****	.34	−.02	.02	−.14**	−.02	.04	**.79****	.26
Item 12	**.86****	.26	.07*	−.01	−.10*	.04	−.22	**.97****	.08
Item 18	**.76****	.42	−.08*	.22**	−.16**	−.05	.28**	**.66****	.35
Item 24	**.81****	.34	−.02	−.04	−.17**	.08*	.34**	**.53****	.27

Amotivation; EXT = External; INT = Introjected; IDE = Identified; ITE = Integrated; IMO = Intrinsic Motivation; λ = standardized factor loadings; δ = uniqueness; target loadings are in bold; composite reliability coefficients are in italic; * $p < 0.05$; ** $p < 0.001$.

Table 3. Average variance extracted and latent correlations of the six-correlated factor ESEM model.

	AVE	1.	2.	3.	4.	5.	6.
1. Amotivation	.80	1	.42	.14	.12	.06	.10
2. External Regulation	.74	.65**	1	.29	.12	.01	.18
3. Introjected Regulation	.70	.38**	.54**	1	.01	.00	.16
4. Identified Regulation	.69	−.34**	−.34**	−.09**	1	.12	.14
5. Integrated Regulation	.73	−.24**	−.09**	.03	.35**	1	.13
6. Intrinsic Motivation	.74	−.31**	−.42**	−.40**	.38**	.36**	1

AVE = Average Variance Extracted; below de diagonal line = latent correlations; above the diagonal line = squared correlations; * $p < 0.05$; ** $p < 0.001$.

since the model fit the data better than the corresponding CFA model according to overall goodness-of-fit indexes and individual parameter estimates. The results indicated that the six-correlated factor ESEM model individually fit the data from the female and male fitness professionals reasonably well (see Table 1). Next, we tested configural, weak, strong, and strict levels of invariance. Statistical differences among constrained and nested models were below accepted cutoffs, as described earlier, which means that the CMQ-FP 22-item factor structure was invariant between gender (for more details see Table 4).

Predictive validity

All behavioral regulations and need-supportive and need-thwarting behaviors were examined in the SEM model. The specified SEM model fit the data reasonably ($\chi^2 = 1404.679$, $df = 296$, CFI = .901, TLI = .889, SRMR = .068, RMSEA = .077). The findings of this study provided further support for the earlier research using different versions of the CMQ. In overall: a) autonomous forms of motivation were positively associated with need-supportive behaviors; b) autonomous forms of motivation were negatively associated with need-thwarting behaviors; c) external regulation and amotivation were positively associated with need-thwarting behaviors, but not introjected regulation; and, d), controlled forms of motivation were negatively associated with all need-supportive behavior styles (for more details see Table 5).

Discussion

In the present study, which was grounded in the well-established SDT framework, the authors analyzed the

Table 4. Multigroup analysis using the six-correlated ESEM model specification between gender.

	χ2	df	CFI	ΔCFI	TLI	ΔTLI	SRMR	ΔSRMR	RMSEA	ΔRMSEA
Configural	825.086*	252	.929	-	.890	-	.056	-	.091	-
Weak	1008.035*	348	.920	.009	.892	.002	.061	.005	.092	.001
Strong	1034.573*	368	.919	.010	.897	.007	.063	.007	.090	.001
Strict	1018.205*	362	.919	.010	.897	.007	.057	.001	.090	.001

Δ = differences; * $p < 0.001$.

Table 5. Regression paths.

			IC95%	
	β	SE	LB	UB
Amotivation → Need-supportive behaviors	−.41	.09	−.51	−.22
Amotivation → Need-thwarting behaviors	.55	.07	.35	.65
External Regulation → Need-supportive behaviors	−.22	.03	−.62	−.30
External Regulation → Need-thwarting behaviors	.40	.05	.48	.69
Introjected Regulation → Need-supportive behaviors	−.31	.07	−.49	−.27
Introjected Regulation → Need-thwarting behaviors	−.17	.02	−.21	.01
Identified Regulation → Need-supportive behaviors	.39	.11	.53	.77
Identified Regulation → Need-thwarting behaviors	−.22	.04	−.49	−.11
Integrated Regulation → Need-supportive behaviors	.62	.15	.74	.81
Integrated Regulation → Need-thwarting behaviors	−.31	.02	−.60	−.37
Intrinsic Motivation → Need-supportive behaviors	.45	.09	.43	.56
Intrinsic Motivation → Need-thwarting behaviors	−.28	.04	−.44	−.08

β = standardized regression coefficient; SE = Standardized Error; CI95% = 95% Confidence Internal; LB = Lower Bound; UB = Upper Bound.

factor structure of the CMQ-FP to the data collected from fitness professionals in Portugal. Specifically, the authors examined the dimensionality of the behavioral regulations based on the motivational continuum, and on doing so, tested a measure of why fitness professionals coach exercisers. These results support all three hypotheses: (i) the 6-factor structure of the CMQ was tenable for fitness professionals; (ii) the proposed factor structure was invariant across gender (male and female fitness professionals); and (iii) the predictive validity of the CMQ responses on fitness professionals' interpersonal behaviors' (i.e., autonomous or controlled motivation on need-supportive or need-thwarting behaviors). We discuss these findings in more detail below.

Factorial validity

The data from the fitness professionals fit the 22-item, six-correlated factor measurement model of the CMQ (SDT; Ryan & Deci, 2017). These results support the psychometrically-sound original scale (McLean et al., 2012), as well as translated versions (Da Silva et al., 2018; Zepp et al., 2016).

All items loaded significantly onto their predefined factor, as well as on the freely estimated model specification. While some cross-loadings emerged in the six-correlated factor in the ESEM model, differences in factor loadings between target and non-target factor were below 0.15, suggesting that the item should be retained in the original predefined factor (Hair et al., 2019). Additionally, as seen in Table 3, existing cross-loadings were found between the target factor and the most proximal non-target factor next to the target factor. Hence, as theoretically expected, items could share some variance among factors and the closest ones; for example, between identified regulation and integrated regulation as both are related to more autonomous regulations, as proposed by Ryan and Deci (2017).

Interestingly, in the CMQ Portuguese sport coach's version, the authors removed two items (i.e., one for external regulation, and one for intrinsic motivation) for model acceptance. The authors from the CMQ Portuguese sport coach's version (Da Silva et al., 2018) claimed low factor loadings as a reason for their removal. Additionally, internal consistency for intrinsic motivation and introjected regulation were below the cutoff value previously recommended. These issues could be related to the item meaning. Another potential reason might be related to the statistical analyses. These authors (Da Silva et al., 2018) used only traditional-based CFA, lacking further examination of item interactions among factors, which can be overcome with ESEM specifications. These authors (Da Silva et al., 2018) proposed further examination of the CMQ, which was achieved in this study.

Furthermore, acceptable internal consistency coefficients in both analyzed CFA and ESEM model specifications were found. Thus, composite coefficients were similar to the ones found in other studies using the CMQ (McLean et al., 2012). Only integrated regulation displayed an internal consistency coefficient below recommended in the ESEM model specification. However, other studies have

also displayed some internal consistency issues, such as on the intrinsic motivation factor (Da Silva et al., 2018). It is noteworthy that the coefficient score was close to the cutoff of 0.70 as proposed by Raykov (1997).

Multigroup analysis

The analyses revealed that the six-correlated factor ESEM measurement model displayed a reasonable fit in both gender samples. Specifically, results revealed the following: the achievement of configural invariance indicated that the factor structure of the CMQ was similar for both female and male professionals. Weak factorial invariance was also achieved and therefore the factor loadings were equal between groups. Additionally, the establishment of strong invariance and strict invariance indicated that item thresholds and item residuals were equal between groups, respectively (Morin et al., 2016). The achievements of invariance at all the levels support the results from McLean et al. (2012) and respond to their recommendation for further examining invariance. The CMQ seems to be a valid and reliable measure in assessing coach motivation in both female and male fitness professionals in the context of gym and health club activities.

Predictive validity

The SEM model provided good fit to the data. Significant associations were found between factors under analysis in both scales (i.e., CMQ and IBQ-Self), as hypothesized earlier. Thus, the SEM model provided initial evidence for the predictive validity analysis between coaching motivation and interpersonal behaviors.

The non-significant relationship between introjected regulation and need-thwarting behaviors reported by fitness professionals might be related to the avoidance-approach hypothesis proposed by Assor et al. (2009). Introjected avoidance motivation is related to negative and undesired experiences (e.g., feeling unworthy as opposed to feeling worthy) were it could be experienced as a more self-pressuring and controlling motivation. In contrast, introjected approach motivation involves a focus on feelings of high self-worth and social recognition by meeting the introjected standards (Assor et al., 2009). Since we measured introjected regulation as a global experience, rather than specific experience (i.e., introjected avoidance and introjected approach regulation), some fitness professionals could have rated higher in some items as a way to express avoidance or approach regulations. That is, fitness professionals experiencing greater levels of introjected regulation might not be representative of how they perceive their need-thwarting interpersonal behaviors, if the regulation is approach focused. Fitness professionals experiencing self-imposed pressures (i.e., "*I have to coach them because I do not want to let my clients down*") and feelings of guilt (i.e., "*If I quit it would mean I failed*" or "*I need to coach because it is my duty*") might not lead to higher but reduced perceptions of autonomy, competence, and relatedness need-thwarting behaviors. In other words, the self-imposed feelings fitness professionals have for coaching could lead to a more "positive" reflections about their engagement, experiencing a more autonomous engagement toward exercise prescription (i.e., approach introjected regulation). Nevertheless, more research testing the avoidance-approach hypothesis in the exercise setting is warranted.

Limitations and future research

Some limitations of the current study should be acknowledged when interpreting the results. This was the first study to provide support for validity of the CMQ in a physical activity-related context (i.e., exercise) rather than in a sport context. We encourage more empirical studies using the CMQ-FP in the exercise context, as well as replicate the current measurement findings in other cultural settings to assess its generalizability. Several scholars have underscored that construct validation is an ongoing process (Mallett et al., 2007; Marsh & Jackson, 1999). It is also noteworthy that this is a cross-sectional study, which precludes drawing causal conclusions. In order to effectively test the predictive value of this scale, longitudinal research is necessary.

Fitness professionals are known to exhibit varying degrees of experience, qualification, and educational background and thus heterogeneity was expected. Even though the sample was relatively large, future studies should recruit more balanced samples within the fitness professional population. For example, academic qualifications, age, working sector (i.e., public vs private), experience (early career, mid-career experienced professionals) and other sociodemographic moderators might influence coaches' motivation. Nevertheless, it is worthwhile re-iterating that the CMQ was consistent across gender, as previously reported.

We acknowledge the limitations associated with self-reporting interpersonal behaviors. Accurate self-report relies not only on honesty and a lack of social desirability bias, but also a level of participant self-awareness. We argue that some "controlling" fitness professionals might not perceive themselves as controlling, similar to coaches reporting their need-thwarting behaviors (Rocchi & Pelletier, 2018). Forthcoming studies might consider

independent measures of interpersonal behaviors, as well consider the exerciser's perspectives and cross reference all three data on fitness professionals' use of need-supportive and need-thwarting behaviors.

Finally, even though results displayed robust associations between behavioral regulations and interpersonal behavior styles, there are motivational determinants that could emerge as possible predictors of behavioral regulations. For instance, Rocchi and Pelletier (2017) have shown sport coaches' basic psychological needs satisfaction to positively predict autonomous motivation, having influence on the perception of need-supportive behaviors. In contrast, need-frustration has been associated with controlled forms of motivation, leading to higher levels of perceived need-thwarting behaviors. Hence, future studies are paramount to examine the associations among motivational factors in fitness professionals, an under-researched group of professionals. Fitness professionals create the motivational climate for exercisers to sustain their engagement to benefit from exercise; so, it is important that a program of research that examines the motivations of their leaders is developed to inform policy and practice in the exercise industry.

Conclusion

Data from this study supported the factor structure of the CMQ and its adaptation to fitness professionals. The behavioral regulations were identified again as distinct constructs representing the SDT motivational continuum. Additionally, the CMQ presented itself as a valid and reliable 22-item measure on assessing why fitness professionals coach exercisers in the gym and health club context. The reported results provide support for the use of the CMQ in fitness professionals, contributing further evidence of the factor structure of this instrument in physical activity context.

Implications for research

The use of the CMQ can make a significant contribution to the literature concerning motivational factors related to the exercise context, specifically in examining fitness professionals and their impact on promoting exercise adherence. Current evidence contributes to accumulating evidence supporting the CMQ measure for SDT research, providing scholars with a way to obtain robust estimates of fitness professionals quality of motivation for coaching. We hope that the presented evidence will promote more research examining the stability of the CMQ factor structure across a range of physical activity and work settings and in various cultures. The validation of this scale will help future researchers to examine the dimensionality of coaching motivation among fitness professionals and examine in detail possible antecedents related to their behavioral regulations (e.g., needs satisfaction and needs frustration), such as, cultural influences (Occhino et al., 2014).

Practical implications

In practical terms, gym and health club managers are encouraged to use the current instrument in assessing fitness professionals' motivation as a way to understand why fitness professionals coach exercisers during training sessions and how their motivations are related to their interpersonal behavior styles when engaging with exercisers. This assessment could provide valuable insight for the fitness professional that will hopefully help them to understand how and why they engage with exercisers and potentially foster exercise adherence. Thus, measuring fitness professionals' coaching motivation in advance could give club managers the required tools to inform professional development activities to assist fitness professionals to be more need-supportive and less need-thwarting in their behaviors. This insight, in turn, might balance the perception of need-supportive and need-thwarting behaviors between fitness professionals and exercisers. We hope that this measure can further advance intervention efforts in fitness professionals' motivational experiences during labor as a way to increase their engagement with exercisers, consequently resulting in higher rates of exercise adherence and persistence.

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