Assessing Coach Motivation: The Development of the Coach Motivation Questionnaire (CMQ)

Kristy N. McLean, Clifford J. Mallett, and Peter Newcombe
University of Queensland

The aim of this research was to develop and assess the psychometric properties of the Coach Motivation Questionnaire (CMQ). Study 1 focused on the compilation and pilot testing of potential questionnaire items. Consistent with self-determination theory, items were devised to tap into six forms of motivation: amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation. The purpose of the second study (N = 556) was to empirically examine the psychometric properties of the CMQ. Items were subjected to confirmatory factor analyses to determine the fit of the a priori model. In addition, the validity of the questionnaire was assessed through links with the theoretically related concepts of intrinsic need satisfaction, well-being, and goal orientation. Together with test–retest reliability (Study 3), these results showed preliminary support for the psychometric properties of the CMQ. Finally, using an independent sample (N = 254), the fourth study confirmed the factor structure and supports the use of the CMQ in future coaching research.

Keywords: coaching, motivation, measurement, self-determination theory

Current understanding of coaching suggests that coaches are involved with athletes at many different development levels, ranging from beginner, to intermediate, to elite. In addition, coaches, like athletes, are often required to perform under high levels of pressure, operate under intense public scrutiny, and are held to incredibly high expectations. At the same time, professional advancement and job security are often dependent on the performances and behaviors of their athletes, over whom they have little control once the athletic contest begins (Giges, Petitpas, & Vernacchia, 2004; Mageau & Vallerand, 2003). Indeed coaching encompasses a range of challenges, wherein its practitioners need to reconcile the often contrary goals of producing winning performances while also providing their athletes with positive personal experiences and personal development opportunities. In this climate, knowledge about why coaches coach can add to our understanding of

Kristy N. McLean and Clifford J. Mallett are with the School of Human Movement Studies, University of Queensland, Brisbane, QLD, Australia. Peter Newcombe is with the School of Psychology, University of Queensland, Brisbane, QLD, Australia.
the coach–athlete relationship and performance dynamic. Coaches’ motivation influences their behavior, which, in turn, impacts athletes’ cognitions, behaviors, and affect (Mageau & Vallerand, 2003). To date, however, coach motivation has been largely overlooked; this paper aims to stimulate work in this area through the development of a valid measurement tool.

Although coach behavior has long been the focus of coaching-related research, recently researchers have begun discussing the importance of understanding what drives this behavior. Amorose (2007) has argued that research exploring the antecedents of coaches’ behaviors should not only provide researchers and coaches with important theoretical information, but should also be useful for practical pursuits such as the design of coaching education programs. The literature contains many recommendations (e.g., Mageau & Vallerand, 2003) regarding the types of coach behavior (i.e., autonomy supportive) conducive to athlete experience, perception, and performance. Therefore, influencing coach behavior is critical in the optimization of the athlete’s learning environment. As noted by Horn (2002), the development of interventions to help change or modify coaches’ behavior will be made easier once we know why coaches exhibit the behaviors they do in the first place. Consequently, understanding the antecedents of coaches’ behavior will be beneficial for both theoretical and practical reasons.

Given the acknowledged influence of coaching behavior, it is imperative to attempt to understand why coaches behave the way they do. Self-determination theory (SDT; Deci & Ryan, 1985, 2000) is a social-cognitive theory that aims to address the “what” and “why” of behavior. Underlying SDT is the concept that motivation is multidimensional and can be conceptualized along a continuum of self-determination. At one end of the continuum is amotivation (AM), which entails a lack of motivation for an activity. Next is extrinsic motivation (EM), which contains four distinct forms that differ in the degree of autonomy internalized. Internalization is an active process through which an individual acquires an attitude, belief, or behavioral regulation and progressively transforms it into a personal value or goal that subsequently emanates from their sense of self (Deci & Ryan, 1985; Ryan & Deci, 2000a). The first two forms are driven by an external perceived locus of causality and are considered to be controlling. The most controlling form is external regulation (ER), whereby behavior is compelled by external contingencies such as tangible rewards or the avoidance of punishment (Deci & Ryan, 2000); for example, some coaches are involved to obtain public (media) attention and recognition. Slightly more internalized is introjected regulation (ITJ). Much like ER, ITJ is controlled by external consequences; however, these emanate from the self rather than from others. Deci and Ryan (2000) have stated that typical examples of ITJ are contingent self-worth (pride) or feelings of guilt or shame (e.g., coaches can feel personally responsible for their athletes’ performances). The next two forms of EM are driven by an internal perceived locus of causality and are thus increasingly more self-determined. With identified regulation (IDT), people begin to identify the underlying value of behavior and actions are endorsed by the self, but they are still instrumental for an extrinsic goal (e.g., coaches may attend accreditation programs, even though they do not enjoy them, as they are seen as necessary to keep up to date with valuable initiatives). The most autonomous form of EM is integrated regulation (INT). Behaviors motivated by this regulation have been fully integrated into the self, as they have been brought into coherence
with one’s values and identity (Deci & Ryan, 2000); for example, a coach may move to a rural setting because athlete development in this context is personally important to them. Finally, the most self-determined form of motivation, intrinsic motivation (IM), refers to interesting and enjoyable behaviors that are engaged in freely and out of choice.

Self-determined or autonomous motivation is underpinned by the satisfaction of three basic psychological needs—autonomy (the experience of choice, or an internally perceived locus of causality), competence (one’s propensity to interact effectively with one’s environment), and relatedness (a sense of belonging or social connectedness). These needs represent the necessary conditions for psychological health or well-being and their satisfaction is believed to be associated with effective functioning (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Sheldon, Ryan, & Reis, 1996). Studies with athletes (e.g., Amorose & Anderson-Butcher, 2007) have demonstrated that athlete perceptions of autonomy, competence, and relatedness mediated the relationship between perceived coaching behavior and athletes’ motivational orientations. Thus, outcomes (such as coaches’ behaviors) are driven by motivation, which, in turn, is a product of psychological need satisfaction.

Examining coach motivation is critical because it influences not only their own satisfaction and well-being, but also impacts their interactions with others (i.e., influences athlete motivation and performance) (Deci & Ryan, 2000; Mageau & Vallerand, 2003). The limited research examining the antecedents and consequences of coach motivation can be attributed to the lack of adequate measures for this population. Currently, a number of motivational measures are used in the sporting domain. Nonetheless, they are not appropriate for use with a coaching population because (a) they have been examined on (young) athlete samples (e.g., Pelletier et al., 1995), (b) many do not include all six forms of motivation outlined in SDT, and (c) some have been criticized for their unsatisfactory psychometric properties (e.g., Mallett, Kawabata, Newcombe, Otero-Forero, & Jackson, 2007; Martens & Webber, 2002).

To date, only one scale has been developed to measure coach-specific motivation. Frederick and Morrison (1999) devised their scale with the aim of measuring coaching motives using SDT. Several limitations, however, prevent the scale from being recommended for further application. Chief among these are the items used in the survey. Not only are their items based on a seemingly arbitrary appraisal of what may be reasons to coach, but the theoretical soundness of some of their items is dubious; for example, the authors included “because I enjoy the thrill of the competitive situation” as an item for IM; however, interpretation of this item could reflect differing motivations. For some coaches, the competitive “thrill” could be governed more by a controlling sense of competitiveness than by the intrinsic joy in the activity. Confirmatory factor analyses (CFA) on the intrinsic–extrinsic factors of Frederick and Morrison’s (1999) scale showed this item, along with the ER item “I like being in charge of others” recorded high measurement error and low standardized coefficients (Jowett, 2008). Moreover, the scale only encapsulates IM and EM, thus preventing a thorough examination of the motivation continuum and the collection of information valuable to the progression of knowledge in this area.

Coach motivation research is therefore yet to benefit from the systematic development of an adequate measure subjected to rigorous psychometric assessment. Given the importance of good research tools, and of furthering understanding of
coaching and coach-related outcomes, the Coach Motivation Questionnaire (CMQ) was developed to address this need. This article outlines the development of the scale through four studies. The aims are (1) to develop items and examine item content, (2) to finalize items for the CMQ and provide a preliminary test of psychometric properties, (3) to examine the questionnaire’s test–retest reliability, and finally (4) to replicate the psychometric validity of the CMQ in an independent sample.

**Study 1**

The purpose of the first study was to develop and pilot a bank of potential items for the CMQ. Questionnaire items were constructed based on theoretical definitions and findings from earlier qualitative research (McLean & Mallett, 2011), which established context and language use. These items reflected each of the six forms of motivation as conceptualized in SDT and were designed to be broad and applicable to a wide range of coaches and coaching contexts.

In terms of item construction, those items that were complex or necessitated a high level of reading comprehension were avoided (DeVellis, 2003). These aspects were important as coaches are usually short on time and are unlikely to spend time on something that appears lengthy or confusing. The initial phase of question development involved examining the ways the coaches qualitatively expressed sentiments indicative of each motivation type. Care was taken to ensure that item content reflected theoretical definitions consistent with SDT while remaining relevant to the sports coaching context. Items were developed over a number of iterations, each of which involved consultation with a focus group of researchers from the areas of motivation, sport psychology, and psychological measurement. The final list contained 42 items: 9 items for IM; 6 items for INT; 7 items each for IDT, ITJ, and ER; and 6 items for AM.1 This list is referred to as the CMQ-pilot. The aim of this study was twofold: first to empirically examine item content and secondly to receive qualitative feedback about the questionnaire from a sample of coaches.

**Method**

**Participants**

Eighty-six sports coaches (70 men) with a mean age of 36.13 years (SD = 10.09 years) participated in this study. These experienced coaches (range = 2–43 years, $M = 12.32$ years, $SD = 8.50$ years) had worked at the participation ($n = 72$, $M = 7.56$ years, $SD = 7.98$), developmental ($n = 74$, $M = 6.68$ years, $SD = 6.77$), national ($n = 42$, $M = 2.58$ years, $SD = 3.52$), and international ($n = 22$, $M = 1.01$ years, $SD = 2.44$) level. Both team ($n = 58$) and individual ($n = 28$) sports were represented, and 82 coaches were currently employed full-time or part-time, or worked on an honorary basis. Incomplete data entries reduced the final cohort to 83 participants.

**Measures**

In completing the 42-item CMQ-pilot, participants were asked to reply to the stem of “Why do you coach your sport . . .” on a seven-point Likert scale with anchors of
1 = not true at all and 7 = very true. In addition to the CMQ-pilot, participants were asked for a variety of demographic information and requested to respond to two open-ended questions (“Are there any other reasons you coach that have not been mentioned?” and “Were any of the items not clear [ambiguous]?”). These questions were designed to gauge the face validity and general clarity of the questionnaire content for the target population as well as to collect any additional information.

**Procedure**

A university ethics committee approved the studies. Information about the questionnaire was sent via e-mail to coaches who were enrolled in a graduate coaching program at the university. Coaches who were interested in participating then contacted the researcher and were sent the URL link to the study embedded in an e-mail. Research (e.g., Lonsdale, Hodge, & Rose, 2006) has shown similar response rates between online and paper and pencil versions of questionnaires. The questionnaire took between 5 and 10 min to complete.

**Results and Discussion**

Examination of the data revealed one multivariate outlier, $p < .001$, which was removed from the analysis. In general, means on self-determined forms of motivation were high, IM ($M = 5.95$, $SD= 0.78$), INT ($M = 5.21$, $SD= 0.93$), and IDT ($M = 5.43$, $SD = 0.98$), with the non-self-determined forms of motivation lower, ITJ ($M = 3.52$, $SD = 1.14$), ER ($M = 2.92$, $SD = 0.98$), and AM ($M = 2.99$, $SD = 1.22$).

Item analysis was carried out to assess the reliability of the items in each of the proposed six subscales. In addition, the interfactor correlations were reviewed as a preliminary measure of construct validity. Factor analysis methods were not employed at this stage due to the small sample size (DeVellis, 2003; Tabachnick & Fidell, 2001); however, the sample exceeded the threshold ($N = 67$) necessary to detect significant correlations based on a Type 1 error rate of .05, power of .80, and a medium effect size. The internal consistencies for the six types of motivation in the CMQ-pilot are displayed in Table 1. All were above the criterion of $\alpha = .70$ suggested by Nunnally and Bernstein (1994) for acceptable reliability in the psychological domain.

Examination of the interfactor correlations revealed a general simplex pattern in which factors closer together on the continuum were more closely related than those more distal. However, scores on INT and IDT were consistently more strongly related to scores on ER than ITJ. Interitem correlations were calculated within each of the six subscales. Inspection of these identified one item in the IDT subscale that did not load significantly with the others. In addition, one item in the ER subscale was negatively related to the others in this group.

**Qualitative Feedback**

Twenty-four participants provided responses to the open-ended questions. Three responses to the first question (“Are there any other reasons you coach that have not been mentioned?”) highlighted the financial gains of coaching as an impor-
tant motivation not covered in the questionnaire. Monetary items were excluded because previous data showed that not all coaches were paid, and of those that are, many do not perceive themselves to be paid well; therefore, it was decided to continue without questions pertaining to financial gain. In terms of clarity, issues were raised with two items. The first, “because I enjoy the reward from winning,” was identified as being too ambiguous, which reinforced earlier empirical findings that demonstrated the lack of positive, significant relationships between this item and the other ER items. Together, these results suggest that some coaches may have privileged the intrinsic elements of the term *rewards*. Accordingly, the item was reworded for Study 2 to “Because of the extrinsic rewards (e.g., money) I get from winning” to make the extrinsic aspect of the reward element more salient. The second contentious item was an IDT item with a problematic correlation pattern. A review of attempts to make the item clearer did not produce a theoretically sound alternative and the decision was made to delete the item. Therefore at the end of the pilot process, 41 items (CMQ-41) were retained for further examination in the second study.

**Study 2**

The purpose of the second study was to finalize items for the CMQ and assess the preliminary validity and reliability of the scale. Relationships between motivational types and measures of psychological needs, well-being, and goal orientations were investigated to examine the validity of the measure. Based on earlier work (e.g., Amorose & Anderson-Butcher, 2007; Eklund & Cresswell, 2007; Hollembeak & Amorose, 2005; Ntoumanis, 2001), it was predicted that more autonomous forms of motivation would be associated with higher intrinsic need satisfaction, well-being, and a mastery orientation. Conversely, stress, burnout, and a performance orientation were predicted to be associated with more controlling forms.
Method

Participants

Five hundred and fifty-six coaches (193 females) participated in the study. Coaches ($M_{age} = 41.50$ years, $SD = 13.70$ years, age range: 15–79 years) had spent an average of 12.71 ($SD = 10.66$) years coaching (range: 1–58 years). Participant coaches worked mostly within the developmental context ($M = 8.38$ years, $SD = 9.44$ years, range: 0–58 years), with less time in participation ($M = 6.04$ years, $SD = 8.26$ years, range: 0–45 years), national ($M = 2.98$ years, $SD = 6.10$ years, range: 0–40 years), and international ($M = 1.22$ years, $SD = 4.06$ years, range: 0–35 years) spheres. Coaches were sampled from all levels to promote the production of a general measure of coach motivation. Of the 556 who completed the demographics portion, 452 (81.4%) coaches identified themselves as Australian. Several sports were covered (e.g., rugby, netball, cycling), with 313 (56.3%) coaches identifying as team sport coaches. Coaches were employed in a variety of organizations, including clubs (50.0%), state and national academies (12.1%), private practice (20.1%), and schools (16.2%). This employment was not always full-time (15.6%), but also casual (21.6%), part-time (22.7%), voluntary (34.2%), and some (5.9%) who were not currently coaching. The majority of coaches (93.5%) held some form of coaching accreditation; 64.0% indicated that they would like to attain higher levels of accreditation than they currently held, and 5.6% had reached the highest level available in their sport.

Measures

The participants completed a questionnaire package online that included the CMQ-41, and measures of psychological needs (Deci et al., 2001; Ilardi, Leone, Kasser, & Ryan, 1993), burnout and well-being (Kellmann, 2009), and goal orientations (Van Yperen & Janssen, 2002).

Coach Motivation Questionnaire (CMQ-41). As outlined in Study 1, the CMQ-41 consisted of 41 items. Participants were asked, “why do you coach your sport?” and responded on a 7-point Likert scale ranging from $1 = not at all true$ to $7 = very true$. The opportunity for further expert review of the questionnaire resulted in the additional deletion of two INT items based on conceptual clarity (L.G. Pelletier, personal communication, October 16, 2008). These items had also returned nonsignificant interfactor correlations in Study 1 but had been retained for further consideration. Pelletier also suggested the deletion of an IM item because it related to passion. While this was a strong item, recent progression in the conceptualization of passion (e.g., Vallerand, 2008) raises the possibility of its inclusion causing a confound in the data. Removal of these items resulted in the CMQ-38. In the present sample, the internal consistencies of items within each dimension were high: $IM \alpha = .87$, $INT \alpha = .80$, $IDT \alpha = .77$, $ITJ \alpha = .71$, $ER \alpha = .81$, and $AM \alpha = .79$. Therefore all alphas were above the criterion of .70 recommended by Nunnally and Bernstein (1994).

Psychological Needs. Basic needs were measured using the 21-item Intrinsic Need Satisfaction at Work Scale (Deci et al., 2001; Ilardi et al., 1993). This scale
assesses the extent to which employees experience satisfaction of their three intrinsic needs—autonomy, competence, and relatedness—from their job (in this case, coaching). Participants responded on a 7-point Likert scale ranging from 1 = *not at all true* to 7 = *very true*. The measure included seven items for autonomy (e.g., “I feel like I can make a lot of inputs to deciding how my job gets done”), six items for competence (e.g., “People at work tell me I’m good at what I do”), and eight items for relatedness (e.g., “I get along with people at work”). These three factors have been combined to form a measure of intrinsic need satisfaction (INS), and previous work (e.g., Baard, Deci, & Ryan, 2004) has supported the factor structure of the scale using principal components analysis. In the present sample, INS had an alpha value of .79.

**Well-Being.** Adapted from the Recovery-Stress-Questionnaire (Kellmann & Kallus, 2001), the Recovery-Stress-Questionnaire-Coach (RESTQ-CO; Kellmann, 2009) was designed to address specific details of the stress and recovery process of coaches. It assesses possible stressful events and their consequences and recovery activities and asks coaches to rate retrospectively how often these events have occurred “In the past 3 days/night.” For each item, coaches rate the frequency of a given situation on a 7-point Likert response set from 0 = *never* to 6 = *always*. Of the 19 subscales within the measure, four were chosen for the current study. These included general stress (GS; e.g., “everything was too much for me”), general well-being (GWB; e.g., “I felt content”), burnout/personal accomplishment (BPA; e.g., “I accomplished worthwhile things as a coach”), and burnout/emotional exhaustion (BEE; e.g., “I felt burned out from coaching”). In the present sample, the scales carried Cronbach alpha levels of .87 for GS, .89 for GWB, .80 for BEE, and .82 for BPA.

**Goal Orientations.** Goal orientations were assessed with scales based on the Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda, 2001) and applied to the context of work by Van Yperen and Janssen (2002). Participants were asked to think of when they felt most successful in their jobs (coaching) and to indicate their degree of agreement with 19 items designed to assess performance- and mastery-oriented criteria. Responses were provided on a 5-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. The general stem was, “I feel most successful in my job (coaching) when . . . ” Performance orientation was assessed with eight items, such as “. . . I perform better than my colleagues” (norm referenced), whereas mastery orientation was assessed with 11 items, such as “. . . I master new knowledge or a new skill” (self-referenced). Van Yperen and Janssen (2002) reported Cronbach alphas of .86 for both scales. In the current sample, alphas were .88 for performance orientation and .90 for mastery orientation.

**Procedure**

One hundred and eighty-two sporting organizations were contacted, involving 47 different sports. Organizations contacted their coaches about participation in the study. Participants were also encouraged to contact other coaches within their networks about the study. Coaches were invited to participate by accessing the online questionnaires via a URL link embedded in an e-mail. At the beginning of
the study, participants were asked to provide a unique participant code that would allow their results across measures to be matched.

**Data Analyses**

Preliminary analyses were conducted to examine violations of the assumptions of multivariate analyses. Several cases of nonplausible data were identified in the demographic information, which were removed and labeled as missing data. No missing data were identified within the other measures. The strength of correlational relationships were assessed using the criteria of Cohen (1992), with small, medium, and large effect sizes categorized at 0.10, 0.30, and 0.50 respectively. Statistical analyses were conducted using LISREL 8.8 (Jöreskog & Sörbom, 2006).

**Stage 1: CFA—Item Identification.** The analysis of covariance structure within the framework of CFA was conducted using robust maximum likelihood (ML) estimation procedures to identify the best empirically supported items in the CMQ-38. Decisions to retain or remove items were based on the size of standardized residuals and modification indices. No cross-loading of items or error terms were postulated and all factors were allowed to correlate freely. Multiple fit indices were employed to evaluate the adequacy of the estimated models. These indices included the comparative fit index (CFI; Bentler, 1990), the non-normed fit index (NNFI; Bentler & Bonnett, 1980), the root-mean squared error of approximation (RMSEA; Steiger, 1990), and the standard root-mean square residual (SRMR; Hu & Bentler, 1998). In addition, the Akaike information criterion (AIC; Akaike, 1987) was used to facilitate model comparisons. Values on the CFI and NNFI that are 0.90 or greater have generally been considered indicative of an adequate fit, although Hu and Bentler (1999) suggested that a value of 0.95 might be preferable. For the RMSEA, values of 0.05 or less indicate a close fit, and 0.08 or less indicate an adequate fit (Browne & Cudeck, 1993). For completeness, the 90% confidence interval was also provided for the RMSEA. Finally, values on the SRMR that are less than 0.08 indicate an adequate fit (Hu & Bentler, 1998); however, in a well-fitting model, this should be 0.05 or less (Bollen, 1989; Byrne, 1998). Although there are no criterion values for the AIC, among competing models, the one that produces the smallest AIC may be considered to be a potentially useful model, as it values parsimony (Byrne, 1998).

For the estimate of the fit of individual parameters, statistical significance of each estimated parameter in the hypothesized model was examined by critical ratios ($t$ values). A $t$ value greater than $±1.96$ indicates a parameter is significantly different from zero. In the first stage, the measurement model was specified a priori and when model fit was poor, items were considered for deletion if they displayed (a) large standardized residuals, (b) low factor loadings (<.40; Mullan, Markland, & Ingledew, 1997), or (c) if modification indices suggested that an item cross-loaded on an unintended latent variable.

**Stage 2: Convergent and Discriminant Validity.** Items loading adequately on to their hypothesized factors were indicators of convergent validity. Discriminant validity was investigated through comparisons of average variance extracted and squared correlations between pairs of latent variables (Fornell & Larcker, 1981).
Demonstrating discriminant validity is especially important in cases such as this where the constructs are interrelated.

**Stage 3: Construct Validity.** Pearson correlations between the best fitting model of the CMQ and measures of psychological need satisfaction, goal orientations, and well-being were calculated to assess concurrent validity. In addition, the simplex pattern was examined for conceptual fit.

### Results

#### Data Screening

As significant skewness on the items was evidenced, the Satorra–Bentler chi-square (S-B $\chi^2$) was employed as an omnibus test of the full model (Satorra & Bentler, 1988). Examination of multivariate outliers using Mahalanobis distance, $p < .001$, resulted in the removal of 31 cases. In addition, factors displayed a simplex pattern with those conceptually closer on the motivational continuum more closely related than factors conceptually distant (see Table 2).

#### Stage 1: CFA

All factor loadings in the six-factor model using 38 items were significant ranging from 0.39 to 0.85 ($\text{Md}_n = 0.68$), providing evidence that all items loaded onto their proposed factors. Nonetheless, the model provided only reasonable fit to the data, RMSEA = 0.087 (90% CI = 0.084–0.09), NNFI = 0.92, CFI = 0.92, SRMR = 0.13. Internal consistencies ($\text{Md}_n = .78$) and interfactor correlations are presented in Table 2. As discussed above, this first model involved all items with multivariate outliers removed. As can be seen in Table 3, additional models were run to check the influence of outliers. Model 2, which used all items and all cases in the sample, resulted in slight improvements in model fit. Model 3 additionally considered the potential effect of a sample of coaches who had indicated they were

### Table 2 Interfactor Correlations Structural Equation Modeling (Lower Diagonal), and Internal Consistencies (Diagonal in Parenthesis) for the Six Factors of the CMQ-38, Study 2

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intrinsic</td>
<td>(0.87)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Integrated</td>
<td>0.82**</td>
<td>(0.80)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Identified</td>
<td>0.82**</td>
<td>0.94**</td>
<td>(0.72)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Introjected</td>
<td>0.03</td>
<td>0.32**</td>
<td>0.32**</td>
<td>(0.71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. External</td>
<td>−0.04</td>
<td>0.26**</td>
<td>0.28**</td>
<td>0.72**</td>
<td>(0.81)</td>
<td></td>
</tr>
<tr>
<td>6. Amotivation</td>
<td>−0.49**</td>
<td>−0.24*</td>
<td>−0.31**</td>
<td>0.44**</td>
<td>0.41**</td>
<td>(0.76)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
“not currently coaching” and removed these from the data. Results mirrored that of Model 2; however, an examination of model AIC values endorsed a preference for Model 3, as it produced the solution with the lowest value. Because the AIC values parsimony, using models with lower values is recommended. Finally, Model 4 was run with both groups (outliers and non-coaches) removed. Fit indices indicated reduced model fit so, for the sake of parsimony, the larger data set of Model 3 was retained for further testing.

Modification indices and standardized residuals suggested areas for model respecification. An iterative process resulted in the removal of 15 items, with 4 items remaining for each of IM, IDT, ITJ, ER, and AM, and 3 items for INT. In addition, one of the IDT items loaded < .40 on its specified factor and was subsequently deleted, leaving a total of 22 items (Model 5). This modified six-factor model provided very good fit to the data, RMSEA = 0.05 (90% CI = 0.046–0.058), NNFI = 0.97, CFI = 0.98, SRMR = 0.069, and is henceforth referred to as the CMQ (see Table 4).2,3

**Internal Consistencies.** Cronbach alphas for the factors of the CMQ ranged from .62 to .81 (Mdn = .79). With the exception of ITJ, all were above .70 (Nunnally & Bernstein, 1994). Lonsdale, Hodge and Rose (2008) and Mullan et al. (1997) found similar poor results for ITJ and suggested that this construct might be multidimensional. While portraying an underlying feeling of guilt, closer inspection of the response pattern for the items retained suggested that the items were tapping into two aspects of ITJ. Specifically, two items referenced the internal pressure they felt related to their athletes (i.e., “Because I don’t want to let my athletes down”), whereas the other two items were more general (i.e., “Because if I quit it would mean I’d failed”). All introjected regulation items were reevaluated, on both conceptual and statistical grounds (i.e., theoretical definitions, internal consistency, variance explained). Nevertheless, an iterative process failed to produce a solution in which the retained items produced a stronger factor both theoretically and empirically. Alternative item combinations also resulted in overall decreased model fit.

<table>
<thead>
<tr>
<th>Model</th>
<th>N</th>
<th>Number of Items</th>
<th>S-B $\chi^2$ ($df$)</th>
<th>RMSEA (90% CI)</th>
<th>NNFI</th>
<th>CFI</th>
<th>SRMR</th>
<th>AIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>508</td>
<td>38</td>
<td>3162.88 (650)</td>
<td>0.087 (0.08–0.09)</td>
<td>0.92</td>
<td>0.92</td>
<td>0.13</td>
<td>3344.88</td>
</tr>
<tr>
<td>2</td>
<td>539</td>
<td>38</td>
<td>3022.12 (650)</td>
<td>0.08 (0.079–0.085)</td>
<td>0.92</td>
<td>0.93</td>
<td>0.12</td>
<td>3204.12</td>
</tr>
<tr>
<td>3</td>
<td>511</td>
<td>38</td>
<td>2890.75 (650)</td>
<td>0.08 (0.079–0.085)</td>
<td>0.92</td>
<td>0.93</td>
<td>0.12</td>
<td>3063.47</td>
</tr>
<tr>
<td>4</td>
<td>482</td>
<td>38</td>
<td>2973.71 (650)</td>
<td>0.086 (0.083–0.089)</td>
<td>0.92</td>
<td>0.93</td>
<td>0.13</td>
<td>3155.71</td>
</tr>
<tr>
<td>5</td>
<td>511</td>
<td>22</td>
<td>469.67 (194)</td>
<td>0.05 (0.046–0.058)</td>
<td>0.97</td>
<td>0.98</td>
<td>0.07</td>
<td>587.67</td>
</tr>
</tbody>
</table>

*Note. Model 1 = All items, multivariate outliers removed; Model 2 = All items, all cases included; Model 3 = All items, not currently coaching participants removed; Model 4 = All items, outliers and noncoaching participants removed; Model 5 = final 22-item CMQ.*
<table>
<thead>
<tr>
<th>Motivation Items</th>
<th>Factor Loading</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stem: Why do you coach your sport?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intrinsic</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because I find it stimulating</td>
<td>0.75</td>
<td>1–7</td>
<td>5.73</td>
<td>1.16</td>
</tr>
<tr>
<td>Because I get a good feeling out of it</td>
<td>0.84</td>
<td>1–7</td>
<td>5.90</td>
<td>1.05</td>
</tr>
<tr>
<td>Because I enjoy the effort I invest</td>
<td>0.77</td>
<td>2–7</td>
<td>5.76</td>
<td>1.09</td>
</tr>
<tr>
<td>Because I enjoy the interaction I have with athletes</td>
<td>0.74</td>
<td>2–7</td>
<td>6.19</td>
<td>0.91</td>
</tr>
<tr>
<td><strong>Integrated</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because coaching is fundamental to who I am</td>
<td>0.64</td>
<td>1–7</td>
<td>4.54</td>
<td>1.72</td>
</tr>
<tr>
<td>Because coaching is integral to my life</td>
<td>0.70</td>
<td>1–7</td>
<td>4.66</td>
<td>1.72</td>
</tr>
<tr>
<td>Because it personifies my values and beliefs</td>
<td>0.91</td>
<td>1–7</td>
<td>4.90</td>
<td>1.51</td>
</tr>
<tr>
<td><strong>Identified</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because it contributes to my development as a person</td>
<td>0.67</td>
<td>1–7</td>
<td>5.30</td>
<td>1.33</td>
</tr>
<tr>
<td>Because it is moving me toward my personal goals</td>
<td>0.91</td>
<td>1–7</td>
<td>4.41</td>
<td>1.77</td>
</tr>
<tr>
<td>Because it allows me to achieve my personal goals</td>
<td>0.95</td>
<td>1–7</td>
<td>4.44</td>
<td>1.71</td>
</tr>
<tr>
<td><strong>Introjected</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Because I don’t want to let my athletes down</td>
<td>0.67</td>
<td>1–7</td>
<td>4.98</td>
<td>1.70</td>
</tr>
<tr>
<td>Because if I quit it would mean I’d failed</td>
<td>0.63</td>
<td>1–7</td>
<td>2.21</td>
<td>1.56</td>
</tr>
<tr>
<td>Because I feel responsible for the athletes’ performance</td>
<td>0.70</td>
<td>1–7</td>
<td>4.96</td>
<td>1.46</td>
</tr>
<tr>
<td>Because I feel pressure from myself to win</td>
<td>0.63</td>
<td>1–7</td>
<td>3.08</td>
<td>1.66</td>
</tr>
<tr>
<td><strong>External</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To be respected by others</td>
<td>0.79</td>
<td>1–7</td>
<td>3.35</td>
<td>1.64</td>
</tr>
<tr>
<td>To get recognition from others</td>
<td>0.90</td>
<td>1–7</td>
<td>2.74</td>
<td>1.51</td>
</tr>
<tr>
<td>Because I want to be appreciated by others</td>
<td>0.87</td>
<td>1–7</td>
<td>3.13</td>
<td>1.59</td>
</tr>
<tr>
<td>Because I like the extrinsic rewards (i.e., money) associated with winning</td>
<td>0.63</td>
<td>1–7</td>
<td>2.42</td>
<td>1.58</td>
</tr>
<tr>
<td><strong>Amotivation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I often think my coaching efforts are a waste of time</td>
<td>0.61</td>
<td>1–7</td>
<td>2.07</td>
<td>1.21</td>
</tr>
<tr>
<td>Sometimes I don’t know why I coach anymore</td>
<td>0.71</td>
<td>1–7</td>
<td>1.99</td>
<td>1.34</td>
</tr>
<tr>
<td>Sometimes I feel the costs outweigh the benefits</td>
<td>0.64</td>
<td>1–7</td>
<td>3.03</td>
<td>1.80</td>
</tr>
<tr>
<td>Sometimes I question my desire to continue coaching</td>
<td>0.81</td>
<td>1–7</td>
<td>2.84</td>
<td>1.61</td>
</tr>
</tbody>
</table>
Stage 2: Convergent and Discriminant Validity

All standardized factor loadings were adequate and statistically significant ranging from .53 to .92 (\(Mdn = .77\)), supporting convergent validity. The variance-extracted estimate (Fornell & Larcker, 1981), which represents the average proportion of variance in the items accounted for by their underlying factors in relation to the amount of variance due to measurement error, also supported the convergent validity of the CMQ. With the exception of ITJ (0.33), all factors surpassed the accepted benchmark of 0.50 (Fornell & Larcker, 1981). Discriminant validity was investigated through comparisons of average variance extracted and squared correlations between pairs of latent variables. If the variance extracted is greater than the squared correlation, pairs can be considered to be discriminant (Fornell & Larcker, 1981), which was clearly observed between all factors supporting the discriminant validity of the measure.

Stage 3: Construct/Concurrent Validity

The interfactor correlations were examined as an indicator of construct validity. Self-determination theory proposes that factors are on a controlled-to-autonomous continuum in which factors closer to each other should be more closely related. This pattern was partially observed in the data (see Table 5). Concurrent validity of the CMQ was evaluated by examining the relationship between motivation types and indices of psychological needs, goal orientation, and well-being. Generally, results show support for the predicted relationships, providing additional evidence for the motivational continuum and further confirming the validity of the CMQ (see Table 6).

**Psychological Needs.** As expected, IM was most closely related to each of the three needs, while AM was negatively related. Overall, INS was significantly and positively related to IM and IDT and had a significant negative relationship with AM. The relationship with ITJ and ER was minimal and nonsignificant (0.02 and –0.04 respectively). These findings support the motivational continuum in which

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intrinsic</td>
<td>0.52**</td>
<td>0.49**</td>
<td>0.22**</td>
<td>0.17**</td>
<td>–0.34**</td>
<td></td>
</tr>
<tr>
<td>2. Integrated</td>
<td>0.62**</td>
<td>0.55**</td>
<td>0.35**</td>
<td>0.35**</td>
<td>–0.08</td>
<td></td>
</tr>
<tr>
<td>3. Identified</td>
<td>0.58**</td>
<td>0.66**</td>
<td>0.24**</td>
<td>0.40**</td>
<td>–0.16*</td>
<td></td>
</tr>
<tr>
<td>4. Introjected</td>
<td>0.36**</td>
<td>0.48**</td>
<td>0.40**</td>
<td>0.43**</td>
<td>0.24**</td>
<td></td>
</tr>
<tr>
<td>5. External</td>
<td>0.18**</td>
<td>0.40**</td>
<td>0.47**</td>
<td>0.57**</td>
<td>0.16**</td>
<td></td>
</tr>
<tr>
<td>6. Amotivation</td>
<td>–0.41**</td>
<td>–0.15*</td>
<td>–0.22**</td>
<td>0.29**</td>
<td>0.20**</td>
<td></td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
greater INS is related to increased self-determination and, as such, enhance the validity of the CMQ.

**Goal Orientations.** As expected, mastery was positively related to IM, INT, and IDT, and negatively related to AM. Nevertheless, mastery was also positively related to ITJ. In contrast, performance orientation had small positive relationships with all forms of ER and AM, with the strongest correlation occurring with ER. Overall, the magnitude of correlations for mastery orientation decreased as the degree of self-determined extrinsic motivation decreased. The one exception was that the relationship with IDT was slightly stronger than that with INT, which was not surprising given the interfactor correlations. Overall, the pattern of relationships between factors supports the validity of the CMQ.

**Well-Being.** General well-being had a moderate positive relationship with IM. Positive correlations with INT and IDT were significant but small, as were the negative relationships with ER and AM. Personal accomplishment was increasingly positively related to ITJ, IDT, INT, and IM. It was also negatively related to AM. In contrast, GS and BEE were positively associated with ITJ, ER, and AM, and also negatively related to IM. In addition, BEE had a small significant negative relationship with IDT; however, the negative relationship with INT did not reach significance. Both GS and BPA demonstrated an ordered pattern of correlations consistent with the self-determination continuum. These findings support the theoretical connection between self-determined motivation and well-being and non-self-determined links to poor well-being and burnout, thus substantiating the validity of the CMQ.

**Table 6 Relationships Between CMQ Factors and Measures of Psychological Needs, Well-Being, and Goal Orientation, Study 2**

<table>
<thead>
<tr>
<th></th>
<th>IM</th>
<th>INT</th>
<th>IDT</th>
<th>ITJ</th>
<th>EXT</th>
<th>AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>INS</td>
<td>0.19**</td>
<td>0.08</td>
<td>0.13**</td>
<td>0.02</td>
<td>–0.04</td>
<td>–0.11*</td>
</tr>
<tr>
<td>MO</td>
<td>0.40**</td>
<td>0.23**</td>
<td>0.28**</td>
<td>0.12**</td>
<td>0.08</td>
<td>–0.14**</td>
</tr>
<tr>
<td>PO</td>
<td>0.08</td>
<td>0.22**</td>
<td>0.21**</td>
<td>0.29**</td>
<td>0.40**</td>
<td>0.13**</td>
</tr>
<tr>
<td>GWB</td>
<td>0.33**</td>
<td>0.09*</td>
<td>0.11*</td>
<td>–0.06</td>
<td>–0.09*</td>
<td>–0.27**</td>
</tr>
<tr>
<td>BPA</td>
<td>0.33**</td>
<td>0.26**</td>
<td>0.19**</td>
<td>0.09*</td>
<td>–0.03</td>
<td>–0.23**</td>
</tr>
<tr>
<td>GS</td>
<td>–0.22**</td>
<td>0.05</td>
<td>0.06</td>
<td>0.10*</td>
<td>0.13**</td>
<td>0.24**</td>
</tr>
<tr>
<td>BEE</td>
<td>–0.30**</td>
<td>–0.05</td>
<td>–0.15**</td>
<td>0.11*</td>
<td>0.10*</td>
<td>0.45**</td>
</tr>
</tbody>
</table>

**Note.** INS = intrinsic need satisfaction, MO = mastery orientation, PO = performance orientation, GWB = general well-being, BPA = burnout: personal accomplishment, GS = general stress, BEE = burnout: emotional exhaustion.

IM = intrinsic motivation, INT = integrated regulation, IDT = identified regulation, ITJ = introjected regulation, EXT = external regulation, AM = amotivation.

INS (N = 482); MO and PO (N = 473); GWB, BPA, GS, BEE (N = 482). Different sample sizes are due to dropout and outliers.

*p < .05; **p < .01.
Discussion

The aim of Study 2 was to finalize items and evaluate the psychometric properties of a new measure of coach motivation, the CMQ. The factorial validity of the CMQ was supported using CFA. Moreover, an excellent fit of the measurement model to the data were obtained following the exclusion of 16 items based on their high standardized residuals, low factor loadings, or indications of cross-loading. The final solution consisted of 22 internally consistent items representing the six forms of motivation proposed in SDT.

In addition, analysis of correlations between the hypothesized motivation factors and theoretically related constructs provided evidence for the concurrent validity of the CMQ. Self-determined motivation factors were found to correspond with the satisfaction of intrinsic psychological needs, perceptions of well-being and personal accomplishment, and a mastery goal orientation. An exception was the correlation between INT and intrinsic need satisfaction. While positive, this relationship did not reach significance. Given the balance of evidence, it is possible that this finding is a reflection of the growing literature criticizing the psychometric properties of existing psychological needs scales (Van den Broeck, Vansteenkiste, Witte, Soenens, & Lens, 2010). In contrast, non-self-determined forms of motivation were negatively or nonsignificantly related to these constructs and positively associated with perceived stress, burnout, and a performance goal orientation. These relationships were in line with the contention that motivation has a number of cognitive, affective, and behavioral outcomes that differ in relation to whether they are considered autonomous or controlling (Deci & Ryan, 2000, 2008; Ryan & Deci, 2000b).

Unlike some previous measures of motivation in sport settings (e.g., Mallett, et al., 2007; Standage, Duda, & Ntoumanis, 2003), each factor was clearly discriminant from the others, and relationships with related constructs fell in a graduated pattern, partially supporting the controlled-to-autonomous continuum and its hypothesized consequences. While the present findings are indicative of the CMQ’s potential to assess motivation in the coaching context, a number of issues must be addressed.

The evidence for the reliability of the items representing ITJ was not as strong as for the other five factors and suggested that only a portion of variance was explained by the latent variable. Such responses could suggest one of two alternatives. First, it is possible that ITJ is uncommon among coaches. Internalization of ER may trend toward IDT rather than the partial integration of ITJ. Ryan and Deci (2000b) have stated that the motivational continuum is not developmental, and rather that individuals can internalize regulations at any point depending on experiences. It is suggested that it is unlikely that coaches pursue the vocation because they are driven by the compulsion to “have to” or “ought to,” which would therefore limit the need for behaviors to be driven by an ITJ motivation. Second, ITJ may be perceived as a socially undesirable motivation. Perhaps ER facilitates coaching behavior in the competitive environment and an internal controlling motivation is less influential. Alternatively, the social environment surrounding coaches may be more suited to the development of ER or IDT over ITJ.

Other work (e.g., Lonsdale et al., 2008; Mullan et al., 1997) has suggested the possibility of multiple dimensions in this construct. They found aspects of ITJ loaded onto two factors (guilt and shame vs. ego enhancement) when examined
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Empirically. Both studies chose to include items related to guilt and shame in their measures because these are regarded as the strongest features of the latent construct (Deci & Ryan, 1985, 2000; Lonsdale et al., 2008). Findings from the current study suggest the possibility that measuring ITJ in coaches may have a further layer of complexity. Examination of coaches’ responses to this scale suggested that internal pressure seemed to be stronger when relating to athletes than it was when connected to their own involvement in coaching. For example, while an athlete might feel guilty about missing training, a coaches’ guilt appears tied to his/her responsibility to the athletes rather than the coaching process itself. Alternatively, further examination of the ego-enhancing elements of ITJ may be worth exploring with sports coaches as these may be more relevant. These issues regarding the understanding and subsequent measurement of ITJ in this specialized population need further examination to improve the validity and reliability of this subscale.

The omission of INT from previous measures of motivation has hampered researchers in assessing its relationship with other forms of motivation empirically; therefore, the inclusion of this factor in the CMQ is a strength of the scale. In addition, although the INT and IDT factors were statistically distinct entities, with INT more closely related to IM, discrepancies in their loadings occurred elsewhere. Given that limited measurement tools have included INT, these findings are important. Similar to the current study, Baker (2004) found IDT was more related to ER than ITJ using the Academic Motivation Scale. In addition, research with Australian athletes has produced a similar pattern of relationships related to IDT. Specifically, in their development of the SMS-6, Mallett and colleagues (2007) reported a higher correlation between IDT and ER than ITJ. The replication of this pattern with Australian coaches is interesting and may suggest a cultural bias in the sample. Accordingly, further research with more diverse samples is required.

While model fit was very good and internal consistencies were high, the inclusion of only three items for each of INT and IDT is not ideal. This is particularly the case for IDT, where the three included items represent a narrow description of the factor and therefore questionable content validity. IDT refers to the conscious valuing of a behavioral goal or regulation, such that it is owned as being personally important (Ryan & Deci, 2000b). The items retained for the CMQ, however, are only concerned with coaching as a means of obtaining a personal goal. When tested, items concerning coaching-related outcomes (e.g., because I value the outcomes of my coaching) cross-loaded highly with IM and were therefore removed during model respecification. As this contributes to a loss of meaning from the IDT factor, further examination and amendments are necessary.

These issues may have contributed to the lack of a clear simplex pattern among the motivation scales. Nevertheless, closer examination of previous motivational tools suggests that this criterion has not been rigorously adhered to. For example, using the SMS, Raedeke and Smith (2001) found both ER and ITJ to be positively related to IM and IDT, and AM was more strongly related to ITJ than ER. Despite the theoretical negative relationship between self-determined motivation and ER, other work has found positive relationship between these factors (e.g., Mallett et al., 2007; Martens & Webber, 2002; Pelletier et al., 1995). Moreover, the majority of studies that have demonstrated a clear simplex pattern in sport have not included all six factors stipulated in SDT (e.g., Pelletier et al., 1995). Even among those that claim to have demonstrated the simplex pattern, deviations are often evident. For
example, the SIMS (Guay, Vallerand, & Blanchard, 2000) only measures IM, IDT, ER, and AM. Yet, in conflict with the existence of a clear simplex pattern, IM had a stronger negative relationship with ER than AM. Furthermore, scales that have included INT have often found it to behave out of order in relation to IDT (e.g., Lonsdale et al., 2008 [Study 2]; Mallett et al., 2007).

Thus many highly rated measurement tools have failed to produce a faithful representation of the theory. These consistent findings highlight the difficulty in demonstrating a clear pattern among interrelated constructs, especially those as complex as the facets of EM. In the current study, evidence for the motivational continuum was illustrated in the pattern of relationships with related constructs. Collapsing constructs into autonomous and controlled factors (as done in many other measures), rather than measuring the unique contributions of INT or ITJ, may encourage the expected pattern to emerge. Such grouping, however, results in a loss of information, and sensitivity, which may limit the interpretation of knowledge gained from the data. Hence, further testing in other coaching populations is necessary.

**Study 3**

Test–retest analysis was conducted to assess the stability of the subscales. Correlations were considered to be stable when values greater than 0.70 were noted (Mitchell & Jolley, 2001).

**Method**

**Participants, Measures and Procedures**

Fifty-seven coaches (40 male; $M_{age} = 38.98$ years, $SD = 11.98$ years) participated in the retest and were required to complete a modified demographics questionnaire and the CMQ. Participants were asked whether they had experienced any changes to their coaching situation since they last completed the questionnaire. If they responded in the affirmative, they were asked to specify what had changed. Finally, they were asked what sport they coached and when, to the closest date, they had last completed the questionnaire. Due to delays in data collection, a large and variable amount of time elapsed between the first and second rounds. Participation in the retest was voluntary and coaches who chose to be involved in this aspect of the study completed their second test 2–8 months after their data were initially collected.

**Results and Discussion**

Data were successfully matched and compared for 38 coaches. Overall, the factors were moderately stable across time, with correlations ranging from .61 to .78. Nevertheless, differences emerged when looking at potential influencing factors (see Table 7). Acceptable stability was displayed among coaches who had not experienced changes in their situation ($n = 31$). Given that most test–retest examination occurs within days or weeks rather than months (e.g., Guay et al., 2000; Raedeke &
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Smith, 2001), the current correlations are encouraging and show that the measure is relatively consistent over long periods of time. However, this data also highlights that coaching operates in a dynamic environment, and changes to personnel, job titles, time commitments, and seasonal pressures mean that motivation is likely to be influenced by such situational factors. Hence, any long-term monitoring of motivation needs to be accompanied by detailed demographic information to highlight any potential influencing changes.

**Study 4**

The aim of the final study was to confirm the factor structure of the CMQ with an independent sample.

**Method**

**Participants**

Two hundred and fifty-four coaches (215 male, $M_{age} = 41.59$ years, $SD = 11.17$ years) participated in the study. Coaches had spent an average of 10.13 ($SD = 9.19$) years coaching (range: 1–52 years), predominantly within the developmental context ($M = 5.63$ years, $SD = 6.78$ years, range: 0–45 years). Again a wide range of sports were covered (e.g., cricket, basketball), with 193 (76.0%) coaches indicating that their coaching was predominantly with teams. The majority of participants coached in clubs (46.9%), schools (22.8%), and privately (20.9%), with 49.2% in voluntary positions and full-time or part-time coaches constituting 41.3% of the sample. Almost all coaches (95.3%) held some form of coaching accreditation, with 76.4% indicating that they would like to attain higher levels of accreditation than they currently held, and 4.3% had reached the highest level available in their sport.

**Measures and Procedure**

Coaches were targeted through their governing body and invited to participate in the study online. Demographic data were collected along with the 22-item CMQ, and similar analysis to Study 2 was undertaken to determine the fit of the model with the current sample.
Results and Discussion

The S–B $\chi^2$ correction was used because of significant skewness on the items. Examination of multivariate outliers using Mahalanobis distance resulted in the removal of nine cases ($p < .001$). Data from five coaches not currently coaching were also removed from the sample.

Once again, participants appeared to be motivated by largely self-determined forces. Specifically, mean scores on the subscales intended to represent self-determined motivation were above the midpoint on each scale, IM = 5.99 ($SD = 0.84$), INT = 5.43 ($SD = 1.23$), IDT = 5.13 ($SD = 1.43$), and mean scores for the three non-self-determined motivation subscales were lower, ITJ = 4.00 ($SD = 1.26$), ER = 3.17 ($SD = 1.48$), AM = 2.19 ($SD = 1.03$). There was a significant linear trend for the participants to report increasingly greater levels of self-determined motivation, $F(1, 239) = 1405.22$, $p < .001$. Moreover, a simplex pattern was displayed with factors conceptually closer to each other on the motivational continuum being more closely related than factors conceptually distant (see Table 8).

All factor loadings were significant (range: 0.61–0.95, $Mdn = 0.73$), providing evidence that all items loaded onto their proposed factors. Moreover, the model provided good fit to the data, RMSEA = 0.067 (90% CI = 0.058–0.076), NNFI = 0.96, CFI = 0.97, SRMR = 0.09. The internal consistencies of the factors of the CMQ were assessed using Cronbach alpha and were considered satisfactory, ranging from .61 to .85 ($Mdn = .77$). Overall, this provides further evidence for the validity and factor structure of the CMQ.

General Discussion

This paper presents support for the psychometric properties of the CMQ. First, results of factor analysis revealed that the CMQ has a six-factor structure that best reflects the theorized constructs of IM, INT, ITJ, ER, and AM. Second, with

Table 8  Pearson’s Intercorrelations (Lower Diagonal), and Internal Consistencies (Diagonal) for the Six Factors of the CMQ, Study 4

<table>
<thead>
<tr>
<th>Factor</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intrinsic</td>
<td></td>
<td>(0.81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Integrated</td>
<td>0.67**</td>
<td>(0.74)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Identified</td>
<td>0.45**</td>
<td>0.65**</td>
<td>(0.85)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Introjected</td>
<td>0.24**</td>
<td>0.44**</td>
<td>0.45**</td>
<td>(0.69)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. External</td>
<td>0.12</td>
<td>0.34**</td>
<td>0.48**</td>
<td>0.55**</td>
<td>(0.84)</td>
<td></td>
</tr>
<tr>
<td>6. Amotivation</td>
<td>−0.34**</td>
<td>−0.10</td>
<td>−0.06</td>
<td>0.27**</td>
<td>0.23**</td>
<td>(0.69)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01.
the exception of ITJ, the internal consistency of each factor was satisfactory, and the convergent, discriminant, and construct validities of the CMQ were established. Third, the long-term stability of the CMQ was satisfactory for most scales in a reasonable time frame. Finally, the factor structure of the measure was reinforced through CFA with an independent sample. Through these analyses, this study has made methodological and theoretical contributions to the existing literature and shown that the CMQ may be a valuable tool in understanding the motivations of coaches.

A limitation of the study is that although the CMQ aimed to access a general subsample of the population, the demographic data did not allow for the motivation profiles of coaches in professional sports to be accurately evaluated. These high performance environments are the most contested with the greatest overt extrinsic pressure; therefore, this specific sample may be important for the development of strong factors measuring controlling forms of motivation. In addition, the high levels of autonomous motivation that characterized the current samples may have made accurately assessing controlling latent variables difficult. Finally, findings suggested that scores on some types of motivation were more common among certain groups of coaches. Therefore, future coaching research, using the CMQ, should endeavor to examine the motivational profiles of different coaching contexts and to conduct comparative studies. In turn, the possible implications for coach education and practice can be determined.

Coaching has long been about the athlete, with studies concentrating on how coaches can be used to create the most favorable athlete outcomes. The present research provides researchers, practitioners, and coaches alike with the opportunity to broaden that focus to include the needs of coaches, as this will ultimately affect their delivery. By developing the CMQ empirically from first principles, we have endeavored to ensure the theoretical integrity of the items and the empirical validity of the constructs. Research with this measure can inform not only coaching practice, but also the dynamic of the coach–athlete relationship, and coach well-being. In addition, theoretical models that include coach motivation can now be assessed; for example, both the effect of psychological need satisfaction on coach motivation and the effect of coach motivation on coach behavior and subsequent athlete outcomes can be empirically examined.

In conclusion, this is the first study to develop and extensively examine the psychometric properties of a complete measure of coach motivation grounded in SDT. Overall, the factor structure of the final 22-item questionnaire was supported and preliminary evidence for the scale’s validity and reliability has been offered. Nevertheless, the lack of coaching-specific research in motivation means that we cannot assume a “one size fits all” approach. The absence of consistent measurement approaches combined with atypical research findings with this population suggest that further studies examining coaches are required. Conclusive decisions about coach motivation and its absolute fit to the theory are not possible without future research and replication. Questionnaire validation is an ongoing endeavor and the current study represents just the beginning of this process. Future studies need to include invariance testing of various groups (e.g., by gender or coaching experience) and consider what factor structures provide the most meaningful results. Given the
literature regarding coach behavior, the possibility of extending our understanding of its underlying drive has important practical and theoretical implications, and further empirical examination of the relationship between motivation and behavior is extremely important.

**Notes**

1. For further information, please contact the first author.
2. For further information about the model respecification process, please contact the first author.
3. Examination of factor structure invariance was also explored across gender. Results indicated that model fit was adequate for both males (RMSEA = 0.051 [90% CI = 0.043–0.059], CFI = 0.97, SRMR = 0.06) and females (RMSEA = 0.061 [90% CI = 0.048–0.074], CFI = 0.96, SRMR = 0.07). As the ΔCFI was equivalent to 0.01 (Chen, Sousa & West, 2005), it was concluded that no notable difference in factor structure existed between groups. Further tests of factor loading equivalence across groups also provided support for invariance (RMSEA = 0.053 [90% CI = 0.046–0.06], CFI = 0.97, SRMR = 0.06). Further relevant information is available on request from the first author.
4. The factor structure of two different higher order models was also tested. Both a two-factor (autonomous and controlled) higher-order model (RMSEA = 0.053 [90% CI = 0.046–0.59], NNFI = 0.96, CFI = 0.97, SRMR = 0.09), and a four-factor (intrinsic motivation, autonomous extrinsic, controlled extrinsic, and amotivation) model (RMSEA = 0.056 [90% CI = 0.05–0.62], NNFI = 0.96, CFI = 0.97, SRMR = 0.06) displayed acceptable fit, supporting the overarching theoretical composition of the CMQ.

**References**


Manuscript submitted: April 17, 2011
Revision accepted: December 31, 2011