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Stimulating teachers' team performance through team-oriented HR practices: the roles of affective team commitment and information processing

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ABSTRACT

Teams of teachers are increasingly held accountable for the quality of education and educational reforms in vocational education and training institutions. However, historically teachers have not been required to engage in deep-level collaboration, thus team-oriented HR practices are being used to promote teamworking in the sector. This paper examines the relationship between team-oriented HR practices and team performance in terms of innovation and efficiency via teachers' affective team commitment and engagement in information processing. To examine these associations, a team-oriented HRM research instrument was developed and validated based on the ability-motivation-opportunity model ($N = 970$, 130 teams) and hypothesised associations were examined using multilevel structural equation modelling ($N = 704$, 70 teams). The results show positive relationships between the team-oriented HR practices of recruitment, team development, team evaluation and teamwork facilitation, and team innovation. Additionally, all practices except team development were positively related to team efficiency. The relationships between team-oriented HR practices and these team performance indicators were often partially or fully mediated by affective team commitment and information processing. Because affective team commitment and information processing sometimes only partially mediated the links between team-oriented HR practices and team performance, other underlying mechanisms await identification.

Introduction

With the rise of new public management in the 1980s, a shift has taken place towards the greater accountability of public sector organisations (Hood, 1995). This implies that these organisations need to account for their actions, policies and

products, which can be challenging for them. Simultaneously, team structures have been widely introduced in the public sector (Rainey, 2014). Teams offer advantages over individuals as more expertise and resources and different perspectives are available in teams. Because of this, teams often outperform individuals when it comes to challenging decision-making and problem-solving tasks (Decuyper, Dochy, & Van den Bossche, 2010; Rainey, 2014).

These developments are also seen in the vocational education and training (VET) sector worldwide, where teacher teams are increasingly held responsible for the development, execution and outcomes of educational programmes (Runhaar & Sanders, 2013). In the Netherlands, where approximately 40% of all students follow education in VET institutions (Ministry of Education, 2017), increased government demands regarding the quality of education have encouraged VET institutions to develop and implement competence based education (CBE) programmes. Teacher teams in these VET institutions do this by strengthening the link between educational programmes and the labour market, which implies that the professional competences necessary to work in a profession are taken as the starting point when developing courses and curricula (Mulder, Weigel, & Collins, 2007; Wesselink, de Jong, & Biemans, 2010). We here present two examples that illustrate how teachers from different disciplines need to collaborate in teams to create this strong link between education and practice. The first example is CBE teachers who need to collaborate to integrate core professional tasks and problems into their courses. For instance, an engineer needs to use both vocational and language skills to write an advisory report about a technical problem. To prepare engineering students for this, vocational teachers and language teachers need to integrate language courses into vocational courses so that students can practice writing a concise advisory report. The second example is an internship coordinator who receives information from the internship company regarding a new business innovation, such as the use of drones. This requires competences from students that are not yet covered by the current curriculum. The internship coordinator then has to discuss with other teachers to what extent and how these competences can be accommodated in their courses. Developments such as these have led to an increased focus on teams and teamwork in VET as teachers of different disciplines collaborate in teams to effectively develop, implement and execute CBE (Truijen, 2012; Wesselink, 2010).

Although teams and teamworking play a central role in many organisations, what is meant by teams remains somewhat ambiguous. Mueller, Procter, and Buchana (2000) for instance define teams as 'a group of employees, normally between three and 15 members, who meet with some regularity in order to work interdependently on fulfilling a specific task' (p. 1398–1399), while Cohen and Bailey (1997) define teams as 'a collection of individuals who are interdependent in their task, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems' (p. 241). A clear difference between these definitions is that Cohen

and Bailey (1997) argue that teams should be a distinguishable social entity in an organisation. Although teams of teachers are distinguishable social entities in schools and teachers engage in collaboration with each other, their collaboration tends to be restricted to discussing practical matters, such as work schedules and existing materials used in classes, while more deep-level collaboration, which for instance contains discussing the didactics of teaching and developing new ideas for innovations, tends to be limited (Vangrieken, Dochy, Raes, & Kyndt, 2015). This appears to be a consequence of teachers' long tradition of focusing on their own work tasks and the relatively recent need for them to interact, share and discuss knowledge and ideas with others (Oude Groote Beverborg, Sleegers, & van Veen, 2015). Moreover, as in many other public and private sector teams, the multi-disciplinary nature of VET teams presents challenges to teamworking (Rainey, 2014). Because of their different roles and expertise, teachers can have different opinions about CBE implementation (Wesselink, 2010). More specifically, given their different backgrounds, team members may have different perspectives on matters, and, consequently, conflicts between team members may arise (Rainey, 2014). Given this context, collaborating in teams is likely to pose a challenge for teachers.

To promote teamworking amongst teachers working in the educational sector, Dutch VET institutions have developed and implemented team-oriented HR practices (Runhaar & Sanders, 2013). However, whether these team-oriented HR practices promote teachers to act accordingly has yet to be empirically investigated. Specifically, the aim of this study is to examine associations between team-oriented HR practices and team performance. Given teachers' duty to implement the new curriculum we consider team innovation as one key performance outcome along with team efficiency. We use teachers' perceptions of team-oriented HR practices, and assess their responses to them in terms of affective commitment to the team and engagement in information processing. We also assess whether their responses are associated with higher levels of team performance. Our approach is consistent to that proposed by Bowen and Ostroff (2004) and Nishii and Wright (2008) in which perceptions of HR practices are used in assessing employees' (teachers') attitudinal and behavioural responses (Purcell and Hutchinson 2007). This study considers affective team commitment or teachers' emotional bond to the team as the attitudinal response to team-oriented HR practices (Van der Vegt & Bunderson, 2005), and information processing or teachers' engagement in sharing information and constructing shared interpretations of this information in their team as the behavioural outcome (Van Woerkom & Croon, 2009). We believe these two process measures are important in determining the performance of the team.

Hence, we aim to answer the following research question: *To what extent is the relationship between team-oriented HR practices and team performance, in terms of team innovation and team efficiency, mediated by teachers' affective team commitment and their engagement in information processing?*

In answering this question, we aim to make the following contributions to the literature. First, we aim to provide new insight into the potential effects of team-oriented HR practices in the educational context. This is needed because, although HR practices are increasingly implemented in schools (Runhaar & Sanders, 2013), research on HRM in this context is still relatively limited, which has as a consequence that insight into the effectivity of HRM in schools is largely missing (DeArmond, Gross, & Goldhaber, 2010). Second, we aim to identify the mechanisms that link team-oriented HR practices with team innovation and team efficiency. In this way, we can begin to understand the processes involved in linking HR practices with team performance (Chuang, Jackson, & Jiang, 2013; Jiang, Takeuchi, & Lepak, 2013). This is an important contribution as even though previous studies have shown that both affective team commitment and engagement in information processing are positively related to the performance of multidisciplinary teams (Park, Henkin, & Egley, 2005; Van der Vegt & Bunderson, 2005; Van Woerkom & Croon, 2009), it remains largely unexplored whether and how they are affected by team-oriented HR practices.

Theory

In this section, we first describe why we studied team innovation and team efficiency as indicators of teacher team performance. We then explain the hypothesised associations between team-oriented HR practices, affective team commitment, information processing and team performance indicators.

Team performance: innovation and efficiency

In order to achieve high performance, organisations have to perform well in both innovation and efficiency (Sanders Jones & Linderman, 2014). This is also true for VET institutions that need to be both innovative in the implementation of new CBE programmes and efficient in the execution of existing educational programmes. Because the responsibility for these innovative new programmes and efficient execution of existing programmes lies with teams of teachers (Association of VET Colleges, 2009), team innovation and team efficiency are important indicators of teacher team performance.

Team innovation refers to intentionally introducing and applying new ideas, materials, procedures and products that are designed to improve team performance (Anderson & West, 1998). To achieve team innovation, team members need to engage in activities together that foster creativity, flexibility and experimentation (Sanders Jones & Linderman, 2014).

Team efficiency refers to the team's input-output ratio and to the extent in which teams avoid wasting effort and time and meet schedules during teamworking (Van Woerkom and Croon (2009)). Team efficiency requires deep-level teacher collaboration so that teachers engage in discussing solutions for problems they

meet in daily practice, which they then can implement in their work (Vangrieken et al. 2015).

Because both team innovation and team efficiency require deep-level collaboration, we expect that these performance indicators can be increased if teachers are stimulated to engage in teamworking through the mechanisms that we explain below.

Team-oriented HR practices

We used the ability-motivation-opportunity (AMO) model to identify specific team-oriented HR practices. The AMO model states that by increasing employees' abilities (A), along with offering them motivational incentives (M) and opportunities to perform (O), organisations can increase performance (Appelbaum, Bailey, Berg, & Kalleberg, 2001; Jiang, Lepak, Hu, & Baer, 2012). This implies that, to increase team performance, *team-oriented* ability-, motivation- and opportunity-enhancing HR practices are needed. Here, we elaborate on the content of these team-oriented HR practices.

The goal of *ability-enhancing team-oriented HR practices* is to create teams that consist of members who have and constantly improve their teamwork abilities, so that team performance can be stimulated (Chuang et al., 2013). This means that through *recruitment* HR practices teachers should be selected on the basis of their expertise, interpersonal skills and willingness to collaborate with colleagues. Also, schools should invest in the further professional development of their teamworking abilities through *team development* HR practices.

Motivation-enhancing team-oriented HR practices aim to increase teachers' focus on the team and discretionary effort (Chuang et al., 2013). When teams are evaluated and rewarded through *team evaluation* HR practices on the basis of their collective performance, the importance of acting as a team is communicated clearly to team members. It then becomes apparent to individual teachers how they should perform their role (Gardner, Wright, & Moynihan, 2011), and this can stimulate their involvement in the team and team performance.

Suitable environments for teamwork can be created through the *opportunity-enhancing team-oriented HR practices* (Chuang et al., 2013). Designing and scheduling work through *teamwork facilitation* HR practices, so that team members who have the ability and motivation to engage in teamwork activities meet each other, can stimulate social interactions and team members' engagement in knowledge sharing activities (Chuang et al. 2013; Kaše, Paauwe, & Zupan, 2009).

Team-oriented HR practices, teachers' responses and team performance

Consistent with the generic HRM literature, we anticipate that team-oriented HR practices will influence teachers' affective team commitment and information processing This occurs as HR practices have been found to 'signal' employers'

intentions to invest in employees, with employees (teachers) responding in ways they believe are appropriate (Bowen and Ostroff 2004). In terms of team-oriented HR practices, this implies that the ability-, motivation- and opportunity-enhancing practices all signal the importance of teams, teamworking and investment in team performance. Teachers will see that their commitment to the team and engagement in intensive collaboration, such as information processing, is valued by their VET institution who have invested in these HR practices, and respond accordingly by displaying higher levels of affective team commitment and more engagement in information processing. This leads to the first hypothesis:

> *Hypothesis 1:* Team-oriented HR practices are positively associated with affective team commitment and information processing.

Moreover, we theoretically propose that affective team commitment precedes information processing. An affective attachment to the team is likely to result in a willingness to share information with other team members. Affective team commitment implies that individuals identify with the team, form an emotional attachment to it and value their team membership (Van der Vegt & Bunderson, 2005). Affective team commitment is particularly important for multidisciplinary teams, such as teacher teams in the VET sector, because the degree of team members' identification with their team affects the extent to which teams put their diversity to good use (Edmondson, Dillon, & Roloff, 2007). Team members who identify with the team are more committed to team goals and more willing to participate in collective learning processes to achieve these goals (Van der Vegt & Bunderson, 2005). This is confirmed by previous research in schools that shows that more committed teachers with multidisciplinary backgrounds engage more in team learning activities such as information processing (Wijnia, Kunst, Van Woerkom, & Poell, 2016). This leads to our second hypothesis:

> *Hypothesis 2:* Affective team commitment is positively associated with information processing.

In turn, we expect that when team members engage in information processing, that is, when they share information with each other, collectively construct shared interpretations of this information, and constructively discuss different perspectives to reach agreement (Decuyper et al., 2010; Van Woerkom & Croon, 2009; Wijnia et al., 2016), the team's overall performance will increase.

Previous research within the VET context shows that information processing is associated with the successful implementation of CBE programmes (Wijnia et al., 2016). Moreover, research outside the educational context shows that information processing contributes to team innovation and efficiency (Van Woerkom & Croon, 2009; Widmann, Messmann, & Mulder, 2016). These findings indicate that information processing facilitates the sharing of team members' ideas, experimentation and alternative ways of doing things, and, as such, contributes to team innovation (Van Woerkom & Croon, 2009). Additionally,
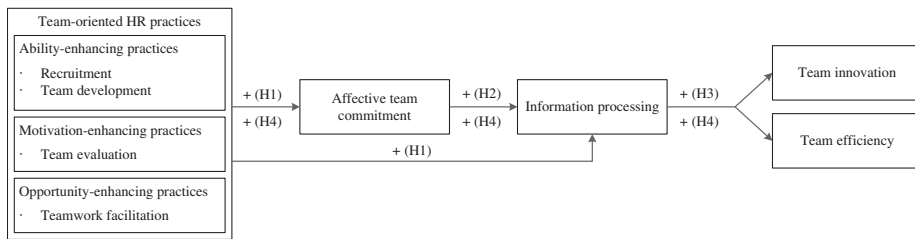
Figure 1. Conceptual model.
Notes: + indicates a positive association.

these findings also indicate that engagement in information processing ensures that team members transfer their knowledge and skills to each other, and, as such, increase their efficiency in their work (Van Woerkom & Croon, 2009). For instance teachers can share their knowledge on preparing lessons, so that other teachers' efficiency in preparing lessons increases (Egodawatte, McDougall, & Stoilescu, 2011). On this basis we anticipate that information processing will be positively associated with teacher team innovation and efficiency. This leads to the third hypothesis:

> *Hypothesis 3:* Information processing is positively associated with teacher team inno-
> vation and efficiency.

Combining these three hypotheses, we expect the positive associations between team-oriented HR practices and team innovation and efficiency to be mediated by teachers' affective commitment to the team and their engagement in information processing with other team members. This reasoning is consistent with findings presented in the generic HRM literature in which scholars have found employees' attitudes and behaviours mediate the relationship between HR practice and performance (e.g. Messersmith, Patel, Lepak, & Gould-Williams, 2011; Nishii, Lepak, & Schneider, 2008). Further, there is emerging context specific evidence which also suggests that teachers' attachment to the team and engagement in information processing leads to improved team performance (Vangrieken, Dochy, & Raes, 2016). This leads to the fourth hypothesis which, together with the other hypotheses, is depicted in the conceptual model of Figure 1:

> *Hypothesis 4:* Team-oriented HR practices are positively associated with team innova-
> tion and efficiency via their positive associations with affective team commitment and
> information processing.

Data and methods

In this section, we describe the sample, measurements and data analysis. Because we have developed a new research instrument to measure team-oriented HR practice, the validation of this instrument is also explained.

Sample and respondents

Two data-sets are used for this study. Data-set 1, which was used to validate the team-oriented HRM research instrument, was collected from April to December 2014. An online survey was sent to 1,650 teachers in 104 teams from 23 VET institutions in the Netherlands. Data on the HRM instrument were collected from 970 teachers (59%) in 103 teams from 23 VET institutions. Data-set 2, which was used for hypothesis testing, was collected from April to December 2015. An online survey was sent to 1,376 teachers in 84 teams from 20 VET institutions. To obtain a good representation of each team, only those respondents were included in the analysis who answered all the relevant questions in the survey and who were members of a team with a minimum response rate of 33%. This resulted in a sample of 704 (51%) teachers in 70 teams from 19 VET institutions. Of these teachers, 46% were male with an average age of 48 years ($SD = 11.01$), which is representative of the Dutch VET teacher population (approximately 49% male, average age 49 years; Lubberman, Van Rens, Hovius, & Wester, 2013). On average, teachers had worked for 15.57 years in education ($SD = 10.42$). Most teachers had a bachelor's degree (74%), 11% had completed secondary vocational education, 9% had a master's degree, and 6% had completed other secondary education or post-higher education.

Measurements

All measurements were assessed using a five-point Likert scale, with 1 (*never*) to 5 (*always*) for team-oriented HR practices and information processing and 1 (*completely disagree*) to 5 (*completely agree*) for team innovation, team efficiency and affective team commitment. See Appendix A for all scales.

Although the scales for team innovation, team efficiency and information processing focus on team-level processes, they are here measured through individual teachers' perceptions of these team-level processes. *Team innovation* was measured using the four-item scale developed by Van Woerkom and Croon (2009), although the formulation of the items was adjusted to fit the school context (Cronbach's alpha = .89). *Team efficiency* was measured using the three-item scale developed by Van Woerkom and Croon (2009) (Cronbach's alpha = .84). *Information processing* was measured using an adaptation of the team learning instrument of Van Offenbeek (2001) (Cronbach's alpha = .89). Based on Van Woerkom and Van Engen (2009), nine original Dutch items from this instrument were selected and combined into one scale for information processing. This scale was pilot tested among 128 teachers from one Dutch VET institution who did not participate in the final data collection. Principal component analysis (PCA) on the pilot data showed a clear one-component structure. *Affective team commitment* was measured using the collective team identification scale developed by Van der Vegt and Bunderson (2005) (Cronbach's alpha = .81).

To measure *team-oriented HR practices* in Dutch VET institutions, a new instrument was developed, as previously mentioned. Our research instrument consisted of four, five-item scales that were developed based on team-oriented HR practices distinguished in previous studies (Chuang et al., 2013; Jackson, Chuang, Harden & Jiang, 2006). These HR practices were made context-specific based on knowledge of and information about HRM in Dutch education (e.g. MBO Raad, 2009). Although Chuang et al. (2013) and Flinchbaugh, Li, Luth, and Chadwick (2016) also measured team-oriented HR practices, their instruments were not suitable for the goal of this study and a new instrument was therefore required. First, like most HRM research (Knies, Boselie, Gould-Williams, & Vandenabeele, 2014), the study of Chuang et al. (2013) was conducted in the private sector, which made their instrument unsuitable for the specific VET context of this study. For instance, multiple motivation-enhancing practices in their instrument focus on financial rewards, while VET institutions usually have little resources for such rewards. Second, although the study of Flinchbaugh et al. (2016) was conducted in the public sector, namely the health sector, their instrument does not focus on distinct AMO practices as we aimed to do here.

Our instrument was developed to measure the practices of recruitment, team development, team evaluation and teamwork facilitation. These practices are similar to HR practices measured in other studies (for an overview see Jiang et al., 2012), except that previous studies usually measured *individual* employee-oriented HR practices, while our instrument measured *team*-oriented HR practices. The research instrument was discussed with researchers in the field of HRM and team learning for readability and clarity, resulting in the reformulation or deletion of items and the creation of new ones. The instrument was also pilot tested among 123 respondents working in different organisations such as schools, municipalities and health-care institutes, to test initial construct validity. Specifically, 47% of the respondents worked in an educational context. Construct validity was explored by PCA, which resulted in a four-component solution with four items per scale. This instrument was further tested for construct validity in the VET context using data-set 1 of this study (see the data analysis and results sections).

Data analysis

Instrument validation

To validate the team-oriented HR practices research instrument, data-set 1 was randomly split into two subsamples. We used subsample 1 ($N = 240$) to explore the component structure of the instrument using PCA with oblique rotation in SPSS 21. Subsample 2 ($N = 730$) was used for cross-validation of the instrument using confirmatory factor analysis (CFA) in Mplus 7.4. Model fits were assessed using the following multiple fit indices: chi-square, the root-mean-square error

of approximation (RMSEA), the Tucker-Lewis index (TLI), the comparative fit index (CFI) and the standardised root-mean-square residual (SRMR). A model fit is good when RMSEA ≤ .05, TLI > .95, CFI > .95 and SRMR ≤ .08 (Hu & Bentler, 1999), although RMSEA ≤ .08, TLI > .90 and CFI > .90 are considered acceptable (Byrne, 2012). The average variance extracted (AVE) and the square root of the AVE were calculated as indicators for discriminant validity. Discriminant validity is good when all AVE values are above .50 and when the square root of the AVE value of each factor is larger than correlations of that factor with other factors (Zait & Bertea, 2011).

Hypothesis testing

Data-set 2 was used for hypothesis testing. Because teachers are nested in teams, intra-class correlations (ICC(1) and ICC(2)) and average within-group agreement ($r_{WG(J)}$) were calculated for all constructs. In education, ICC(1) values of .10 are considered to be medium and values of .15 or higher to be large (Hox, 2010). In general, ICC(2) values and $r_{WG(J)}$ values should be .70 or higher to justify data aggregation to the team level (LeBreton & Senter, 2007). All constructs of the conceptual model had ICC(1) values above .10, with three above .15, and one construct (information processing) had an ICC(2) value above .70. Four constructs had $r_{WG(J)}$ values above .70 (see Table 2). These results imply that aggregation of all constructs to the team level was not permitted, but that team membership affected the data and that the multilevel structure of the data needed to be taken into account.

Multilevel structural equation modelling (MSEM) with complex structure analysis in Mplus was used for hypothesis testing. MSEM with complex structure analysis takes into account the multilevel structure of the data, by assessing the conceptual model at the individual team member level while correcting the model for their team membership. As it includes the non-independence of the data by correctly computing standard errors and the chi-square test of the model fit (Muthén & Muthén, 1998–2012), complex structure analysis reduces the chance of reporting type I errors (false positive results in the measurement model) (Oude Groote Beverborg et al., 2015).

The measurement model fit was assessed by the RMSEA, TLI, CFI and SRMR fit indices. The control variables gender, age and team size were included in the analyses by adding their regression coefficients on all mediating and dependent variables of the model.

Results

In this section, we first discuss the results of the validation of the team-oriented HR practices research instrument then the results of the hypothesis testing.

Table 1. Results of the team-oriented HRM research instrument validation on data-set 1 from PCA (subsample 1; $N = 240$) and CFA (subsample 2; $N = 730$).

HR practice	Item	PCA component loadings				CFA standardised factor loadings			
		1	2	3	4	1	2	3	4
Recruitment	1	−.94				.88			
	2	−.90				.88			
	3	−.87				.96			
	4	−.77				.92			
Team development	5		−.97				.91		
	6		−.95				.91		
	7		−.93				.91		
	8		−.88				.93		
Team evaluation	9			.96				.89	
	10			.91				.93	
	11			.91				.94	
	12			.83				.85	
Teamwork facilitation	13				−.95				.80
	14				−.86				.85
	15				−.82				.93
	16				−.78				.84

Notes: Only loadings over .32 are shown for PCA. For CFA, all factor loadings $p < .001$.

Instrument validation

PCA on subsample 1 of data-set 1 showed a clear four-component structure corresponding to the proposed scales. CFA was used to further test the PCA structure on subsample 2 of data-set 1, as well as two alternative models: a one-factor model that regarded all practices as an interdependent HRM system, and a three-factor model that only distinguished between ability-, motivation- and opportunity-enhancing practices. Analysis showed poor model fits for the one-factor structure ($\chi^2(104) = 6749.765$, $p < .001$, TLI = .365, CFI = .450, RMSEA = .296, SRMR = .157) and the three-factor structure ($\chi^2(101) = 2991.758$, $p < .001$, TLI = .716, CFI = .761, RMSEA = .198, SRMR = .127). The four-factor structure showed a satisfactory model fit ($\chi^2(98) = 530.967$, $p < .001$, TLI = .956, CFI = .964, RMSEA = .078, SRMR = .026) and good discriminant validity because AVE values were greater than .50 and square roots of AVE values were larger than correlations between CFA factors (see Table 1 for PCA and CFA results). The four-factor model was therefore used for hypothesis testing.

Additionally, a CFA on data-set 2 with all nine scales of the conceptual model showed an acceptable fit to the data, with $\chi^2(566) = 1621.141$, $p < .001$, TLI = .942, CFI = .948, RMSEA = .051 and SRMR = .038.

Hypothesis testing

Descriptive statistics

Table 2 shows the descriptive statistics. All constructs of the conceptual model were positively correlated to one another. Correlations varied from small (e.g.

Table 2. Descriptive statistics of data-set 2 (N = 704).

Measure	M	SD	ICC(1)	ICC(2)	$r_{WG(J)}$ M	SD	1	2	3	4	5	6	7	8	9	10
1. Team innovation	3.81	.66	.182	.687	.84	.16	(.89)									
2. Team efficiency	3.28	.73	.193	.694	.76	.18	.47**	(.84)								
3. Information processing	3.13	.65	.220	.727	.87	.11	.52**	.56**	(.89)							
4. Affective team commitment	3.50	.78	.110	.566	.61	.26	.33**	.33**	.46**	(.81)						
5. Recruitment	3.17	.98	.138	.613	.53	.32	.34**	.26**	.45**	.29**	(.95)					
6. Team development	2.94	.86	.140	.629	.72	.22	.37**	.28**	.40**	.23**	.40**	(.95)				
7. Team evaluation	3.08	.91	.113	.555	.65	.29	.37**	.31**	.49**	.30**	.55**	.55**	(.96)			
8. Teamwork facilitation	3.01	.83	.102	.537	.69	.24	.41**	.40**	.51**	.27**	.41**	.59**	.50**	(.93)		
9. Gender (female)							.07	.01	−.06	.02	−.01	.06	.08*	.04		
10. Age	47.86	11.02					−.01	.08*	.00	−.03	−.03	−.05	−.08*	.04	−.05	
11. Team size	21.12	10.83					.04	−.11*	−.06	.02	−.03	−.01	.03	−.05	.12*	.07

Notes: Cronbach's alphas are in parentheses on the diagonal.

$r_{WG(J)}$ calculations were adjusted for a slight skew in the expected variance.

*$p < .05$; **$p < .001$.
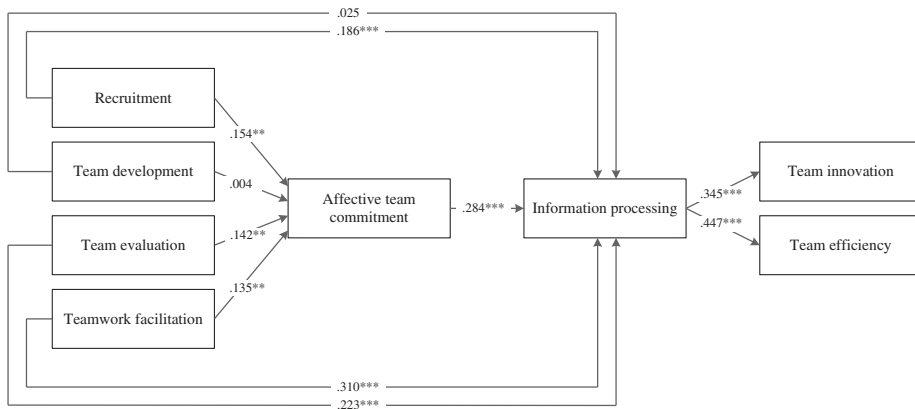
Figure 2. Results of the measurement model.
Notes: * *p* < .05, ** *p* < .01, *** *p* < .001. Standardised coefficients of total results are reported, only hypothesised paths are depicted. Control variables are not included for display reasons. Non-hypothesised direct associations, indirect associations and associations of control variables with dependent variables are included in Table 3.

between team development and affective team commitment; r = .23) to large (e.g. between information processing and team efficiency; r = .56).

Model results

The fit of the measurement model to the data was good, with $\chi^2(13) = 21.941$, $p = .056$, TLI = .972, CFI = .989, RMSEA = .031 and SRMR = .021. The model was therefore used for hypothesis testing. Figure 2 presents the hypothesised total results of this model, and Table 3 presents all direct, indirect and total results.

The results show that Hypothesis 1, which expected that team-oriented HR practices had positive associations with affective team commitment and information processing, was partially confirmed because different results for the separate HR practices were found. Recruitment, team evaluation and teamwork facilitation were positively associated with affective team commitment and information processing, while team development had no significant associations with affective team commitment and information processing. Results showed that Hypothesis 2, which expected that affective team commitment was positively associated with information processing, was confirmed. Hypothesis 3, which expected a direct positive association between information processing and team innovation and efficiency, was also confirmed. This implies that teachers who reported more information processing also reported higher levels of team innovation and efficiency. Hypothesis 4, which expected that team-oriented HR practices were indirectly and positively associated with team innovation and efficiency through affective team commitment and information processing, was partially confirmed. Recruitment, team evaluation and teamwork facilitation were indirectly associated with team innovation and efficiency, while team development had no significant indirect associations.

Table 3. Direct, indirect and total effects of the measurement model (data-set 2, $N = 704$).

	Affective team commitment	Information processing			Team innovation			Team efficiency		
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect	Total
Recruitment	.154**	.142***	.044**	.186***	.062	.079***	.141**	−.045	.097***	.052
Team development	.004	.024	.001	.025	.111*	.009	.120*	−.007	.012	.005
Team evaluation	.142**	.183***	.040*	.223***	.015	.090***	.106*	.036	.113***	.149***
Teamwork facilitation	.135**	.271***	.038**	.310***	.110**	.120***	.230***	.138**	.151***	.289***
Affective team commitment				.284***	.095*	.098***	.193***	.092*	.127***	.218***
Information processing							.345***			.447***
Gender (female)	−.003			−.078*			.069			.042
Age	−.023			.024			.002			.084*
Team size	.024			−.046			.064			−.090
R-square	.126			.440			.330			.347

Note: Standardised estimates are reported.
*$p < .05$; **$p < .01$; ***$p < .001$.

Additionally, non-hypothesised direct associations were found. Team development, teamwork facilitation and affective team commitment were directly and positively associated with team innovation. Moreover, teamwork facilitation and affective team commitment were directly and positively associated with team efficiency. Lastly, female team members reported less information processing than males, and older team members reported higher levels of team efficiency.

Conclusion and discussion

This study focuses on explaining how team-oriented HR practices are associated with VET teacher team performance in terms of innovation and efficiency. We predicted that team-oriented HR practices would be positively and indirectly associated with team innovation and efficiency, through positive associations with teachers' affective team commitment and engagement in information processing. Our results generally supported this line of reasoning. We found that all team-oriented HR practices, with the exception of team development, were positively associated with teachers' affective team commitment and their engagement in information processing. In turn, affective team commitment and information processing were positively associated with both team innovation and efficiency. Consequently, the team-oriented HR practices of recruitment, team evaluation and teamwork facilitation were indirectly associated with team innovation and efficiency.

As noted above, the team-oriented HR practice of team development was not associated with affective commitment and information processing. However, team development was directly associated with team innovation. A possible explanation for this finding is that team development is more often used to instruct teams on how to implement innovations such as CBE than to improve team-oriented attitudes and behaviours such as affective team commitment and information processing. Furthermore, teamwork facilitation was not only indirectly, but also directly associated with higher levels of team innovation and efficiency, which stresses the importance of offering teachers the opportunity to meet in practice.

Overall, these findings offer several new insights and possibilities for future research. We elaborate on these contributions below by discussing our findings.

HRM research in the educational context

As explained in the introduction, teams of teachers have historically not had to engage in deep-level collaboration. However, VET schools are now promoting teamworking so that teachers can develop new ideas, be more innovative and discuss didactics, all of which are needed to execute CBE. Our study suggests that team-oriented HR practices play a crucial role in stimulating such collaboration

as our results show that these HR practices are positively associated with teachers' affective team commitment and their engagement in information processing. By stimulating teachers to become committed to the team and engage in information processing, the team-oriented HR practices also appear to affect team performance, in terms of innovation and efficiency.

The link between team-oriented HR practices, affective team commitment, information processing and team performance varied by HR practice. For instance, on the one hand, recruitment, team evaluation and teamwork facilitation all seemed important team-oriented HR practices for taking teachers out of their isolation and making them feel part of a team and behave in the interest of the team, and, as such, increase team performance *indirectly*. On the other hand, only team facilitation also *directly* stimulated team performance. Despite these differences, each HR practice was found to make a unique contribution to team performance. To stimulate teacher team performance, therefore, a combination of ability-, motivation- and opportunity-enhancing team-oriented HR practices is needed. Consequently, we propose that it is important to study associations between multiple HR practices and team performance simultaneously instead of examining the impact of single HR practices, as is usually done in studies on HRM in the educational context (DeArmond et al., 2010; Runhaar & Sanders, 2015) and the medical sector (Buljac-Samardzic, Dekker-van Doorn, van Wijngaarden, & van Wijk, 2010). This would enable the distinct effects of HR practices and possible interactions between these practices to be examined, which would help researchers to further understand the complex relationship between team-oriented HR practices and team performance.

Focus on teams in the HRM-performance link

The findings also underline the importance of further examining the link between HR practices and performance at the team level. While many studies have already focused on associations between HR practices, individual employee responses and outcomes such as organisational commitment, job satisfaction, empowerment and organisational citizenship behaviour (e.g. Kehoe & Wright, 2013; Messersmith et al., 2011) and organisational outcomes such as financial outcomes (e.g. Jiang et al., 2012), our results suggest that employee perceptions of HR practices also affect *team* responses and outcomes. This insight is relatively new, because although the need to examine the team level is regularly stressed, there is still very little research on teams in the HRM literature (Chuang et al., 2013; Jiang et al., 2013). Because team structures have been widely introduced in many organisations and teams are better at dealing with changing environments and complex tasks than individuals (Decuyper et al., 2010), we believe future studies on the HRM-performance link should focus on teams so that our understanding of how HR practices can stimulate teamworking increases.

Unravelling the HRM-performance link: the mediating role of information processing

When examining associations between HR practices and team performance, we argue that relevant team-level mediating variables should also be included. In this study, we did this by researching the mediating effects of affective team commitment and engagement in information processing. The findings regarding the mediating role of information processing in particular shed new light on the associations between team-oriented HR practices and team performance, because so far only a few other studies have addressed associations between team-oriented HR practices and information processing in teams (Chuang et al., 2013; Flinchbaugh et al., 2016). We have contributed to these studies by broadening the concept of information processing by not only focusing on information sharing in teams, but by also including the processes of co-constructing shared interpretations and discussing different perspectives in teams into our conceptualisation of information processing. This conceptualisation of information processing is based on the team learning literature (e.g. Decuyper et al., 2010; Van Woerkom & Van Engen, 2009). As such, we have tried to bridge the gap between HRM literature and team learning literature. This gap could be further bridged by including other team learning processes as possible mediating variables in future studies, to increase our understanding of associations between team-oriented HRM practices and team performance. The team learning literature would also benefit from bridging this gap, because although associations between team learning processes and team performance have been quite thoroughly examined (e.g. Leicher & Mulder, 2016; Van Woerkom & Croon, 2009; Wijnia et al., 2016), the role of HRM is largely underexposed.

Limitations

This study is based on self-report data because attitudes and perceptions can only be measured by self-reports (Chan, 2009). A consequence of this is that the results could be influenced by common method bias. For future research, we therefore suggest combining reports from different sources, such as teachers and team leaders, to obtain more reliable data (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Additionally, this study made use of cross-sectional data. Although it is plausible to assume that organisations implement team-oriented HR practices to stimulate team performance, instead of the reverse causal order (Chuang et al., 2013), the data make it impossible to draw this causal conclusion. Additional longitudinal research should be conducted to make stronger causal claims.

Moreover, when examining team processes such as information processing, analysis at the team level is often recommended (e.g. Van den Bossche, Gijselaers, Segers, & Kirschner, 2006). We used MSEM with complex structure analysis to analyse the research model at the individual teacher level, corrected for the team

level. This was needed because we used a combination of individual-level and team-level variables, and data aggregation was not permitted. Consequently, we could only offer insights into individual teachers' perceptions of the team-level processes of information processing, team innovation and efficiency.

Practical implications

As teams of teachers are responsible for educational improvements and innovations, it is important to invest in HRM practices that encourage teachers to engage in collaboration. Schools can do this through team-oriented HR practices such as selecting new team members based on their interpersonal skills and willingness to collaborate, evaluating teams by recognising and stimulating the attitudes and behaviours needed to reach team goals, and providing teams with the opportunity to collaborate which, according to our research, increases commitment and engagement in information processing. In doing so, teachers' focus shifts from individual tasks to team goals. If this kind of transformation is achieved, then team performance, in terms of innovation and efficiency will improve.

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Appendix A.Measurements

Team innovation

Our team…
1   Continuously improves and develops the educational programme.
2   Develops new ways to meet school, labour market and/or student demands
3   Develops new materials and methods
4   Knows how to constantly find improved ways to carry out teaching tasks

Team efficiency

Our team…
1   Works efficiently
2   Achieves its goals
3   Spends the available time well

Information processing

In my team,…
1   Team members give each other feedback
2   Team members exchange knowledge and information
3   We challenge each other to look at our work in new ways
4   We develop a shared understanding about our work approach
5   We try to achieve a clear consensus
6   We carefully listen to each other's ideas about work
7   We consider whether there are better ways to deal with the work
8   Where possible, we try to form standard procedures
9   Professional information is disseminated across all team members

Affective team commitment

I feel…
1   Emotionally attached to my team.
2   A strong sense of belonging to my team
3   As if the team's problems are my own
4   Like 'part of the family' in my team

Team-oriented HR practices
Ability-enhancing practices
Recruitment
When recruiting new members for my team (from inside or outside the organisation), the following is taken into
   account:
1   The degree to which they are willing to commit themselves to the team interest
2   The degree to which they have the potential to contribute to team performance
3   Their ability to work in a team
4   The degree to which they are team players

Team development
This organisation offers my team development opportunities (inside or outside our organisation), aimed at:
5   The learning needs of my team
6   Topics my team needs for further professionalisation
7   Enhancing the qualities of my team
8   Increasing team results

Motivation-enhancing practices
Team evaluation
During the evaluation of *my team*, the following is taken into account:
9   The performance of my team
10   The initiatives taken by my team
11   How the team works on professionalisation
12   The extent to which the team is functioning properly

Opportunity-enhancing practices

Teamwork facilitation

This organisation makes it possible for my team to:

13   Work together on our team tasks
14   Meet to discuss the team's functioning
15   Think about solutions for problems/challenges together
16   Apply innovations/changes together