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When emotional intelligence predicts team performance: Further validation of the short version of the Workgroup Emotional Intelligence Profile

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Abstract
The purpose of this research was to extend the validation of the short version of the Workgroup Emotional Intelligence Profile (WEIP-S), notably by examining its predictive validity for team performance. Six studies were conducted ($N = 1810$) to achieve this objective. In Study 1, the WEIP-S was translated into French and examined with respect to its factor structure and reliability ($N = 311$). In Study 2, the factor structure was validated in a sample of French employees in various occupations ($N = 1141$). Studies 3 and 4 ($N = 106$) examined the test-retest reliability and assessed the convergent validity. The predictive validity of the WEIP-S was examined in Study 5 ($N = 80$, 40 dyads) and in Study 6 ($N = 172$, 57 teams). The results indicate that the WEIP-S has a four-factor structure and can be reliably measured with 16 items. Moreover, it can be used as a predictive measure of team performance: groups with higher average levels of emotional intelligence performed better than those with lower levels. This research establishes the suitability of the WEIP-S for various occupations and offers researchers a short, validated measure to predict team performance.

Keywords Team performance · Workgroup emotional intelligence · Emotion regulation · Scale validation

After being ignored for many years, the influence of emotions in work settings is now widely studied in applied and organizational psychology (Ashkanasy and Dorris 2017; Barsade et al. 2003; Côté 2014; Troth et al. 2017). According to the five-level model of emotions (Ashkanasy 2003; Ashkanasy and Dorris 2017; Ashkanasy and Humphrey 2011), emotions could affect individual workers and organizations in various ways, including: (a) within-person effects (e.g. affective reactions, mood, state affectivity), (b) between-person factors (e.g. individual differences, emotional intelligence), (c) interpersonal behaviors (e.g. perception and communication of emotions, emotional labor), (d) at group level (e.g. leadership behavior, emotional climate), and (e) at organizational level (e.g. culture and climate). Most studies have focused on the role of emotions at the individual level in employees' or managers' attitudes and behaviors. Less research has investigated the role of emotions at the group level, and it is the objective of the present study to contribute to the literature of emotional intelligence (EI) and team performance. EI is generally defined as the "ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" (Salovey and Mayer 1990, p. 189). Although the impact of EI has been demonstrated in various aspects of work and organizational outcomes, there is ongoing debate about whether it is related to team performance. Meta-analyses have revealed mixed results about the relationships between EI and several work criteria at the team level (e.g. Côté 2014; Harms and Credé 2010; Joseph and Newman 2010; Joseph et al. 2015). These mixed results between EI and team performance can be explained by two major difficulties: (1) the conceptualization of EI and the different measures used, and (2) the development of appropriate measures for studies in the workplace. In the EI literature, three categories of EI measures exist: (1) performance-based measures or ability tests; (2) trait-based measures using self-report and peer measures of EI; and (3)

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mixed measures based on a mixture of personality and behavioral items. Recent studies have provided evidence of a strong relationship between job performance and self-reported EI, trait or mixed measures (Joseph and Newman 2010b; O'Boyle Jr. et al. 2011). The advantage of mixed measures of EI is that they provide "a practical, shorthand alternative to a lengthy battery of several more traditional KSAOs [Knowledge, Skills, Abilities and Other characteristics]" (Joseph et al. 2015, p. 318). The second issue concerns the use of specific or generic tools of EI. Because EI is not invariant across situations, it requires tools in which respondents are asked for responses based on a reflection of their behaviors while working in their team, and not only their behavioral preferences. Many researchers have developed specific measures for the teamwork context (e.g., Côté 2014; Jordan et al. 2003; Jordan and Troth 2004; Miners et al. 2018).

The aims of this study are (1) to assess the psychometric properties of the short version of the Workgroup Emotional Intelligence Profile (WEIP-S, Jordan and Lawrence 2009) in samples of French adults in various work contexts, and (2) to examine how EI measured with this self-report scale can predict team performance. As far as we know, the predictive validity of the WEIP-S scale on 'objective' measures of team performance has not been tested either in the laboratory or in the field.

Emotional Intelligence and Workgroup Performance

Two of the core components of EI models are awareness and management of emotions (e.g., Goleman 1995; Mayer and Salovey 1997). In the workplace, these abilities facilitate employees' interactions with others. High-EI employees are thought to get ahead by treating their own and others' emotions as valuable data in workplace situations (Barsade and Gibson 2007), thus helping them to maintain good interpersonal relationships at work and enhance their performance.

Researchers have suggested several ways whereby EI, as an individual ability, could influence emotion management in the workplace, and more specifically in teamwork (Côté 2014; Joseph et al. 2015). To date, numerous studies have shown that EI is negatively related to stress and turnover (Harvey and Dasborough 2006), and positively related to aspects including job satisfaction (Sy et al. 2006), negotiation outcomes (Schlegel et al. 2018), and team performance (Jordan and Troth 2004; Offermann et al. 2004). However, a meta-analysis suggests that the effect sizes of EI on team performance are relatively small and that they are affected by various moderating factors (Joseph et al. 2015).

First, it has been suggested that the impact of EI on work outcomes depends on contextual factors such as the nature of the job (e.g., Côté 2014; Fahr et al. 2012; Joseph and Newman 2010). For example, the relationship between EI and work performance is much stronger in jobs that require high emotional labor (Joseph and Newman 2010) and in tasks with managerial complexity. Second, the effect sizes of EI on team performance depend on the conceptualization of EI at the team level and the type of measures used (Jordan et al. 2002; Joseph et al. 2015; Schlegel and Mortillaro 2019). Indeed, EI at the team level can be conceptualized in different ways (e.g. Druskat and Wolff 2001; Elfenbein 2006). It can be defined as a norm or climate in the group that determines members' interpretations of and responses to emotional issues (Druskat and Wolff 2001). It can also be viewed as a personal resource that members bring to their teams and that they can use when carrying out their work (e.g. Chang et al. 2012; Elfenbein 2006). Taking the latter approach, measures of EI at the team level have been developed, consisting of aggregating each team member's emotional intelligence (e.g., Jordan and Troth 2004; Jordan et al. 2002; Jordan et al. 2010). Taking this line, Jordan and Lawrence (2009) claimed that "individuals who have better emotional awareness and emotional management abilities will be more effective contributions to their teams, through their improved ability to communicate with their fellow team members and their ability to ensure an effective emotional tone appropriate to the work that needs to be completed" (p. 456). Based on this conception of EI, they developed a scale to assess individual emotional intelligence in teams: the "Workgroup Emotional Intelligence Profile" (WEIP) (Jordan and Lawrence 2009; Jordan et al. 2002; Jordan and Troth 2004). The WEIP asks individuals to evaluate the extent to which they can do things in their team to regulate their emotions, such as "explain the emotions they feel to team members", "respect the opinion of team members even if they think they are wrong", "read team members' true feelings even if they try to hide them", "transmit enthusiasm to other members of the team", etc. Emotional regulation in teams involves focusing both on one's own emotions (awareness and management of own emotions) and on others' emotions (awareness and management of others' emotions).

The Workgroup Emotional Intelligence Profile (WEIP)

Since the initial publication of the WEIP (Jordan and Lawrence 2009; Jordan et al. 2002), different scales measuring EI at the team level have been developed (WEIP-3, WEIP-6, Jordan and Troth 2004). All these scales are relatively long to administer, with 27 to 30 items. The latest version is a short form: the "Workgroup Emotional Intelligence Profile Short-scale" (WEIP-S; Jordan and Lawrence 2009). With only 16 items, it is easier to use in field studies involving professionals than previous versions and can be used to measure EI in work teams. The WEIP-S has four subscales, each comprising four

items: (1) awareness of own emotions, i.e. the ability to discuss and disclose one's emotions, (2) management of own emotions, i.e. the ability to control one's emotional responses, (3) awareness of others' emotions, i.e. the ability to recognize others' feelings, to read faces and body language, and (4) management of others' emotions, i.e. the ability to positively influence others' emotional states. The construct validity, internal and test-retest validity of the original scale have been demonstrated in an Australian sample (Jordan and Lawrence 2009). The convergent validity of a Spanish version has also been demonstrated with an employee sample (Lopez-Zafra et al. 2012), and a Portuguese version in a sample of football players (Brito-Costa et al. 2015). However, to date the predictive validity of the WEIP-S has not been tested with employees in different occupations, or with groups performing a collaborative laboratory task. Due to the mixed results in the literature concerning the influence of EI at the team level, it seems important to test the predictive validity of the WEIP-S. As claimed by Jordan and Lawrence (2009, p. 466), the "WEIP-S requires extensive testing on its predictive validity in applied settings". Furthermore, as the regulation of emotions in work contexts depends on cultural norms, it seems important to extend the validation of the WEIP-S to different cultural contexts in a variety of samples. In the present research, we aimed to validate not only the psychometric properties of the WEIP-S in different samples of French people, but we also examined the predictive validity of the WEIP-S on team performance.

Study 1: Factor Structure and Internal Consistency

Method

In study 1, the factor structure of the WEIP-S (Jordan and Lawrence 2009) was examined. In line with the literature, we hypothesized that the WEIP-S would have a four-factor structure (awareness of own emotions, management of own emotions, awareness of others' emotions, management of others' emotions).

Participants and Procedure

Data were obtained from a convenience sample of French psychology students who were invited to participate in the study. To recruit participants, a link to a web-questionnaire was posted on a social media site of the University, and a paper-pencil questionnaire was handed out to students in class. Participation was voluntary and anonymous, and participants gave their informed consent. The results of the study could be obtained by addressing an email to the authors.

Three hundred and eleven students participated in the study, including 234 women (75.2%). The mean age was 21.57 years ($SD = 4.35$), and the majority of participants were in their second or third year of studies. All the students reported that they had regularly done group work during their studies (reports, oral presentations, etc.). Participants responded to the questionnaire in relation to group work during the current year.

Measures

The Work Group Emotional Intelligence Scale short version (WEIP-S, Jordan and Lawrence 2009) was used. The WEIP-S was translated into French by two native French speakers who were psychology experts. It was then back-translated by a professional translator, and modifications were made in order to ensure that the meaning of the original items remained similar to the translated version. The French version of the WEIP-S comprised 16 items divided into four dimensions (see Appendix 1). The order of items and the response scale were the same as in the original version, with a Likert format ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), scores for each dimension ranging from 4 to 28.

Results and Discussion

Confirmatory Factor Analysis

Table 1 presents the means, standard deviations, internal consistency (alphas), and correlations of the WEIP-S dimensions.

The Confirmatory Factor Analysis (CFA) was used to determine whether a four-factor solution fitted the data set better than other alternative models, using Lavaan Package for R. The validity of the models was examined with different indices: Comparative Fit Index (CFI), Tucker-Lewis index (TLI), Root Mean Squared Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). The fit indices were interpreted using Hu and Bentler's (1999) values, which should be close to 0.95 for CFI and TLI, close to 0.06 for RMSEA, and close to 0.08 for SRMR.

The examination of the descriptive data revealed no problem for univariate skewness and kurtosis coefficients for items related to awareness and management of one's own emotions, and awareness and management of others' emotions. The results of the confirmatory factor analysis are presented in Table 2. The CFI and TLI indices of the four-factor model were .96 and .93 respectively, and the RMSEA and SRMR were 0.05 and 0.04 respectively, which indicates that this model showed an acceptable fit to the data. The fit indices of the alternative models (one-factor and two-factor models) were not acceptable.

Table 1 Items, means, standard deviations, internal consistency, and correlations of the WEIP-S dimensions in Studies 1 and 2

	Study	*M*	*SD*	1	2	3	4	5
1. Awareness of own emotions	1	4.15	1.23	(0.87)				
	2	4.47	1.35	(0.90)				
2. Management of own emotions	1	5.01	0.98	0.41**	(0.76)			
	2	5.49	0.90	0.30**	(0.72)			
3. Awareness of others' emotions	1	4.20	1.08	0.42**	0.42**	(0.85)		
	2	4.48	1.13	0.31**	0.27**	(0.86)		
4. Management of others' emotions	1	4.51	1.11	0.50**	0.50**	0.55**	(0.86)	
	2	5.11	1.06	0.51**	0.37**	0.44**	(0.88)	
5. Total WEIP score	1	4.47	0.85	0.77**	0.73**	0.76**	0.82**	(0.90)
	2	4.89	0.81	0.78**	0.61**	0.70**	0.79**	(0.88)

Internal consistencies are presented in parentheses. Study 1 involved a sample of students ($N = 311$). Study 2 involved a sample of workers ($N = 1141$). ** $p < .01$

The results of this first study confirmed the four-dimension model of the WEIP-S. The internal consistency of each dimension was good, suggesting that the four subscales capture the different EI dimensions (Awareness of own emotions, Management of own emotions, Awareness of others' emotions, Management of others' emotions).

Study 2: Cross-Validation

To examine whether the structure of the WEIP-S depended on the student sample, a cross-validation study was developed using a sample of employees working in various occupational sectors. The objective of this second study was to test the four-factor structure of the WEIP-S with French employees in various occupations, as some results in the literature suggest that emotion regulation could be affected by the work context.

Table 2 Fit indices for each of the models tested in the sample of students (Study 1) and the sample of professionals (Study 2)

Models	χ^2	*df*	CFI	TLI	RMSEA	SRMR
Study 1 ($n = 311$)						
One-factor	1209.18	104	0.56	0.49	0.18	0.13
Two-factor	842.01	103	0.71	0.61	0.15	0.11
Four-factor	244.88	98	0.96	0.93	0.05	0.04
Study 2 ($n = 1141$)						
One-factor	4169.27	104	0.56	0.49	0.19	0.13
Two-factor	2725.38	103	0.72	0.67	0.15	0.12
Four-factor	495.66	98	0.96	0.95	0.06	0.03

One-factor model: The 16 items are included in the same factor. Two-factor model: 8 items related to own emotions and 8 items related to others' emotions. Four-factor model: 4 items related to awareness of own emotions, 4 items related to management of own emotions, 4 items related to awareness of others' emotions, and 4 items related to management of others' emotions. CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual

Method

Participants and Procedure

French employees were invited to participate in the study by email and a link to a web-questionnaire, or by a paper-and-pencil questionnaire distributed in organizations by the assistant researchers. The sample comprised 1141 participants, with 472 men (41.4%) and 664 women (58.2%) (five participants did not indicate their gender). Mean age was 28.80 years (SD = 9.08), ranging from 18 to 59 years. Participants came from different activity sectors (i.e. security: 37.6%; social work: 19.1%; healthcare and emergency services: 24.1%; large retail: 19%), in which teams are often exposed to emotional labor and conflict resolution: 320 police officers (28%), 62 prison guards (5.4%), 48 bus controllers (4.2%), 217 retail workers (19%), 218 social workers (19.1%), 127 student nurses (11.1%), emergency service personnel including 61 firefighters (5.3%), 88 medical residents (7.7%). All participants worked full time (>35 h a week). Participation in the survey was voluntary and anonymous, and was based on convenience sampling.

Measures

The survey contained the 16 items of the WEIP-S adapted to the working sample and included some socio-demographic variables (age, gender, activity sector, job status, work time).

Results and Discussion

The means, standard deviations, internal consistency (alphas) and correlations of the WEIP-S dimensions are shown in

Table 1. As in study 1, the data revealed some evidence of univariate skewness and kurtosis for items related to awareness and management of one's own emotions, and awareness and management of others' emotions.

The results of the confirmatory factor analysis are shown in Table 2. The CFA revealed comparable results to Study 1. The CFI and TLI indices of the four-factor model were .96 and .95 respectively, and the RMSEA and SRMR were 0.06 and 0.03 respectively, which indicates that this model showed an acceptable fit to the data. The fit indices of the alternative models (one-factor and two-factor models) were not acceptable. Accordingly, a four-factor structure of the WEIP-S scale was deemed suitable in a sample of employees in various work sectors.

Study 3: Test-Retest Reliability

The purpose of Study 3 was to examine whether the four emotional intelligence components in the WEIP-S are stable over time.

Method

Participants and Procedure

One hundred and six French psychology students participated at Time 1. The sample comprised 11 men and 95 women, aged 19 to 44 years, with a mean age of 21.43 years ($SD = 2.85$). Students were in their third year and worked regularly in groups ($M = 4.08$ on a 6-point scale). The test-retest method required a double intervention of the investigator. At Time 2 (6 weeks later), 67 students (63.20%) completed the survey.

At each intervention, participants answered the 16 items of the WEIP-S and provided some socio-demographic information (age, gender, academic level, familiarity with group work at the university). The survey was presented as a study on the "impressions about group work among students". Participation in the survey was voluntary and anonymous. Participants were asked to enter the same anonymous and personal code on both questionnaires.

Results and Discussion

Table 3 shows the consistency of the WEIP-S between the two time periods.

The mean difference for a particular component ranged from .02 to .20. None of the means for a component of the WEIP-S were significantly different from one another. The bivariate correlations between time 1 and time 2 for the four components of the WEIP-S were satisfactory (from .67 to .76).

Test-rest reliability indicates good levels of stability across time for the WEIP-S scale. These results provide evidence of the reliability of the scale in a French sample.

Study 4: Convergent Validity

In their initial validation study, Jordan and Lawrence (2009) did not test the divergent and convergent validity of the short version of the WEIP-S. The convergent validity of the WEIP-S has been assessed in Spanish (Lopez-Zafra et al. 2012) and Portuguese versions (Brito-Costa et al. 2015). The relationships between the dimensions of the WEIP-S and other constructs with which it has been theoretically related (see Jordan et al. 2002) have been examined. Specifically, the criterion validity of the WEIP-S has been examined with different scales: (1) meta-knowledge of emotional abilities measured with the Trait Meta-Mood Scale (Salovey et al. 1995), (2) empathic tendencies with the Interpersonal Reactivity Index (IRI, Davis 1983), (3) problem-solving strengths and weaknesses with the Social Problem-Solving Inventory-Revised (D'Zurilla and Nezu 1990), and (4) the intention of individuals to manage the impression they make on others, evaluated by the Self-monitoring scale (Snyder 1974). The main results show significant positive or negative relationships between dimensions of the WEIP-S and emotional attention, emotional clarity, emotional repair, perspective taking, empathic involvement, personal distress, orientation to others, problem solving, impulsive style, avoidance style and extraversion.

The aim of Study 4 was to evaluate the relationships between the dimensions of the WEIP-S and the empathic construct. Indeed, the relationship between empathy and emotional intelligence is contentious in the literature (see Jordan et al. 2002); some scholars include empathy in their models of emotional intelligence (Bar-On 1997; Goleman 1995, 1998a, 1998b), while others see it as a related construct but not an essential component of EI (Mayer and Salovey 1997). Based on previous studies (Berrios Martos et al. 2013; Jordan et al. 2002 with the WEIP-3), we expected to find a positive relationship between the components of the WEIP-S scale and the empathy construct. We chose the Interpersonal Reactivity Index (IRI, Davis 1983) to assess empathy, because it measures both cognitive and emotional components. The original IRI scale has 28 items measuring four dimensions: (1) *Perspective Taking* assesses the ability of people to take the perspective or point of view of others; (2) *Fantasy* denotes the tendency of people to identify with fictional characters in books and movies; (3) *Empathic Concern* reflects the tendency to experience feelings of compassion and concern for others; (4) *Personal Distress* examines whether the person experiences feelings of discomfort and anxiety when observing the negative experiences of others. More specifically, we expected that the WEIP-S dimension of the ability to deal with

Table 3 Test-retest reliability calculations for each component of the WEIP-S

	Time	*M (SD)*	Test-retest Times 1 and 2
Awareness of own emotions	1	4.33 (1.34)	.71**
	2	4.35 (1.09)	
Management of own emotions	1	5.40 (0.79)	.67**
	2	5.32 (0.81)	
Awareness of others' emotions	1	4.08 (0.97)	.76**
	2	4.28 (1.06)	
Management of others' emotions	1	4.79 (0.95)	.69**
	2	4.81 (0.87)	

$n = 106$ (Time 1), $n = 67$ (Time 2)

**$p < .001$

the emotions of others would be positively related to the IRI scales of perspective taking and empathic concern, and negatively related to the dimension of personal distress. The fantasy component was not included in our survey because no relationship between the fantasy component and the WEIP-S scale was anticipated from the results of previous studies using another version of the WEIP (WEIP-3, Jordan et al. 2002).

Method

Participants and Procedure

To test the convergent validity, we correlated the WEIP-S dimensions with other constructs with which it has been theoretically related (Jordan et al. 2002). Specifically, the participants in Study 3 ($N = 106$ psychology students, 95 women and 11 men; mean age = 21.43, range 19–44 years) completed the Interpersonal Reactivity Index (IRI, Davis 1983; French version of the IRI, Gilet et al. 2012). As in the French version of the IRI scale (Gilet et al. 2012), we used a 7-point scale ranging from 1 (*does not describe me well*) to 7 (*describes me very well*). Mean scores were computed for each subscale (Perspective Taking, Empathic Concern, and Personal Distress). A high score in each facet indicates a greater empathic tendency.

Results and Discussion

Table 4 presents the means, standard deviations, internal consistency (alphas), and correlations between the WEIP-S total score, the IRI total score and scores for each subscale.

As expected, the results show that the total score of the WEIP-S was positively correlated with the total score of the IRI ($r = .22$, $p < .05$). It was also positively correlated with the dimensions of empathic concern ($r = .25$, $p < .05$) and perspective taking ($r = .44$, $p < .01$), and negatively correlated with the personal distress dimension ($r = -.19$, $p < .05$). On the dimensional level, the dimension related to awareness of one's own emotions was positively correlated with empathic concern ($r = .20$, $p < .05$) and perspective taking ($r = .27$, $p < .01$), and management of one's own emotions was positively correlated with empathic concern ($r = .27$, $p < .01$) and perspective taking ($r = .59$, $p < .01$). Management of others' emotions was correlated positively with perspective taking ($r = .22$, $p < .05$) and negatively with personal distress ($r = -.19$, $p < .05$). Together, these results support the expectation that the WEIP-S is related to the dimensions of empathy.

Study 5: Predictive Validity in the Laboratory

The objective of Study 5 was to examine the influence of the WEIP-S dimensions on team performance. To date, the predictive validity of the WEIP-S has not been tested with 'objective' measures of team performance judged by external evaluators. To this end, we initially investigated the impact of the WEIP-S scores on team performance in a task-solving problem with groups of students. Based on results related to the other versions of the WEIP (Jordan et al. 2002; Jordan and Troth 2004), we expected that groups with high average levels of emotional intelligence would perform a task-solving problem better than groups with low average levels of emotional intelligence. In this study, we also aimed to extend the predictive validity of the WEIP-S to communication processes in work teams that have developed a "*Transactive Memory System*" (TMS, Wegner 1986). Transactive memory can be considered as an *emergent cognitive process* that transforms the inputs (team members' characteristics, nature of the task, context, etc.) into team performance. It is defined as a "shared system of encoding, storing, and retrieving information" from different domains of knowledge, which often develops in close relationships (Wegner et al. 1991) or within groups in which team members have trained together and communicated directly (Liang et al. 1995). The basic idea is that familiar individuals develop an implicit system of dividing up responsibility for information processing in different domains of knowledge based on their shared agreement of the distribution

Table 4 Means, standard deviations, internal consistency, and correlations between the WEIP-S dimensions and the IRI components

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Awareness of own emotions	4.33	1.34	(0.89)								
2. Management of own emotions	5.40	0.79	.32**	(0.64)							
3. Awareness of others' emotions	4.08	0.97	.35**	.21*	(0.85)						
4. Management of others' emotions	4.79	0.95	.33**	.25**	.47***	(0.87)					
5. Total WEIP-S score	4.65	0.72	.78***	.58***	.71***	.71***	–				
6. Empathic concern	5.34	0.96	.20*	.27**	.07	.18	.25**	(0.79)			
7. Perspective taking	5.03	0.87	.27**	.59***	.22*	.22*	.44***	.53***	(0.75)		
8. Personal Distress	3.95	1.02	−.13	−.18	−.04	−.19*	−.19*	.24*	−.04	(0.81)	
9. Total IRI score	4.77	0.67	.15	.30**	.11	.09	.22*	.83***	.67***	.61***	–

Internal consistencies are presented in parentheses. $N = 106$ (Study 3). *$p < .05$, **$p < .01$, ***$p < .001$

of knowledge in the group. The transactive memory system has three components (Lewis 2003): specialization, coordination and credibility. Specialization refers to the acknowledgement of distributed expertise within the team ("*Different team members are responsible for expertise in different areas*"), coordination refers to the ability of the team members to work together efficiently with greater cooperation, less confusion and misunderstandings ("*Our team works together in a well-coordinated fashion*"), and credibility refers to the degree to which group members trust one another's task expertise ("*I am comfortable accepting procedural suggestions from other team members*"). We expected that groups with higher average levels of emotional intelligence would have better communication between team members, and consequently would have developed higher transactive memory systems (specialization, coordination and credibility components).

Method

Participants and Procedure

A total of 80 French psychology undergraduates (42 women and 38 men, mean age = 20.40, range 18–48 years) divided into 40 dyads participated in the experiment. They all attended psychology classes at a French University. Participation was voluntary, and no remuneration was given.

First of all, participants were asked to complete an informed consent form and a demographic data survey. Next, they completed the emotional intelligence measure (WEIP-S scale) and other scales of empathy. This first part was presented to the participants as an independent study related to testing personality measures in psychology. In the second phase, participants carried out two problem-solving survival exercises: a 'training task' (NASA moon survival exercise, Johnson and Johnson 1975; Hall and Watson 1970) to enable team members to acquire familiarity with each other, and a structurally similar 'performance task' (Ocean survival exercise) to assess teamwork and group performance.

In both tasks, participants were presented with a life-threatening situation and asked to rank a list of 15 objects in order of importance; the object ranked #1 was the one they considered to be the most important, and object #15 the one they considered the least important. These problem-solving exercises are seen as a novel, complex intellectual task. Participants initially worked individually for 10 min to rank the objects (individual ranking). They then worked in dyads for 15 min to come up with a group ranking (group ranking). After completing the tasks, participants individually completed a post-questionnaire comprising measures of team cognitive processes.

Measures

Team Performance Individual and group rankings for the 'performance task' (Ocean survival exercise) were compared with the "expert" rankings reported in Hall and Watson (1970), and the absolute differences were summed (see Appendix 2 for an example). The sum of absolute differences ranged from 0 to 112 (0 representing no discrepancy with the experts' ranking, and 112 representing the maximum discrepancy). The summed scores were reversed, such that high scores became indicative of high performance on the task, and low values became indicative of low performance.

Based on these individual and group rankings, we calculated a quantitative estimate of how much synergy was created by the group relative to the performance of the individuals within the group. The *synergy score* is a widely used indicator in group problem-solving tasks (e.g., Larson Jr. 2007; Meslec and Curşeu 2013). "Synergy denotes a level of group performance that is above and beyond what could be achieved by the members of the group working independently" (Larson Jr. 2007, p. 415). The *synergy score* was obtained by subtracting the group difference scores from the average individual difference scores. A high positive number indicates greater synergy.

Team cognitive processes were measured in the post-questionnaire with the *Transactive Memory* scale (Lewis

2003; Michinov 2007, for French version). This scale contains 15 items designed to assess three components of transactive memory: specialization, coordination, and credibility. Each item was scored on a 5-point Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Reliability and validity of this scale have been demonstrated with different teams in various contexts in French (Michinov and Michinov 2009; Michinov and Juhel 2018). For this study, internal consistency was satisfactory for the total transactive memory score ($\alpha = .77$), and for each component (*specialization*: $\alpha = .79$; *coordination*: $\alpha = .68$; *credibility*: $\alpha = .71$).

Results and Discussion

Table 5 shows the means, standard deviations, and correlations for the WEIP-S, the *synergy score* and the transactive memory system at the group level.

To investigate the effects of team emotional intelligence on team performance, we divided the dyads into three groups. The first group ($N = 11$) comprised dyads whose combined emotional intelligence score was inferior to the median score (*median* = 4.81), the second group ($N = 14$) comprised dyads whose combined emotional intelligence score was superior to the median score, and the third group ($N = 15$) comprised dyads with one member who had a high emotional intelligence score and one who had a low emotional intelligence score. As expected, planned contrasts (1, −2, 1) show a difference between the three groups on the synergy scores, $t(37) = -2.59$, $p = .014$. The dyads with the highest emotional intelligence had a better synergy score ($M = 8.57$, $SD = 6.88$) than those with the lowest emotional intelligence ($M = 3.27$, $SD = 8.62$) and those with mixed emotional intelligence ($M = 1.33$, $SD = 6.52$). Additional planned contrasts (−1, 0, 1) revealed that the difference between the dyads with the lowest emotional intelligence and the dyads with mixed emotional intelligence was not statistically significant, $t(37) = .67$, $p = .506$.

Moreover, as expected, planned contrasts (1, −2, 1) show a difference between the three groups on the global transactive memory score, $t(37) = -2.12$, $p = .041$, indicating that the dyads with highest emotional intelligence reported a better transactive memory system ($M = 56.29$, $SD = 3.53$) than those with the lowest emotional intelligence ($M = 51.32$, $SD = 4.22$) and those with mixed emotional intelligence ($M = 55.57$, $SD = 3.85$). Additional planned contrasts (−1, 0, 1) demonstrated that the dyads with the lowest emotional intelligence reported a lower transactive memory system than the dyads with mixed emotional intelligence, $t(37) = 2.65$, $p = .012$. Specifically, the effect of workgroup emotional intelligence on each component of the transactive memory system (specialization, coordination and credibility) was only significant for the specialization component, $t(37) = -2.61$, $p = .013$, indicating that the dyads with the highest emotional intelligence were more specialized ($M = 18.25$, $SD = 1.40$) than those with the lowest emotional intelligence ($M = 15.00$, $SD = 2.92$) and those with mixed emotional intelligence ($M = 17.50$, $SD = 2.46$). Additional planned contrasts (−1, 0, 1) demonstrated that the dyads with the lowest emotional intelligence reported lower specialization than the dyads with mixed emotional intelligence, $t(37) = 2.74$, $p = .009$.

The results of Study 5 demonstrate the predictive validity of the WEIP-S showing that dyads composed of individuals with high levels of emotional intelligence perform better on tasks than dyads whose members have low or mixed levels of emotional intelligence. The present data provide the first empirical validation of the predictive validity of the short form of the WEIP-S (Jordan and Lawrence 2009). This study also provides new data by showing that members of dyads with higher emotional intelligence scores are also better able to communicate and to identify the expertise of each member. Team emotional intelligence would therefore have effects on

Table 5 Means, standard deviations and correlations between the WEIP-S dimensions, task performance and transactive memory at the group level

	M	*SD*	1	2	3	4	5	6	7	8	9	10
1. Awareness of own emotions	4.30	1.11	–									
2. Management of own emotions	5.96	0.62	−.09	–								
3. Awareness of others' emotions	4.01	0.77	.56***	−.09	–							
4. Management of others' emotions	4.68	1.02	.62***	.31*	.57***	–						
5. Total WEIP-S score	4.74	0.61	.81***	.35*	.79***	.88***	–					
6. Transactive memory	54.65	4.46	.14	.44**	.22	.44**	.39*	–				
7. Specialization	17.08	2.61	.36*	.33*	.33*	.52***	.52***	.71***	–			
8. Coordination	17.50	1.55	.01	.21	.30†	.22	.22	.59***	.03	–		
9. Credibility	20.08	2.16	−.15	.35*	−.16	.13	.02	.79***	.23	.47**	–	
10. Synergy score	4.40	10.48	−.01	.37*	.15	.01	.14	.07	.07	−.05	.09	–

$N = 40$ dyads (Study 5). † $p < .10$, *$p < .05$, **$p < .01$, *** $p < .001$

team cognitive processes such as transactive memory, and not only on socio-affective processes such as conflict resolution (Jordan and Troth 2004).

Although these results about the predictive validity of EI on team interactions and team performance are encouraging, they have some limitations. First, they were observed with dyads of students, and they should be replicated in larger teams in a 'real' professional context to extend the generalizability of our findings. Moreover, the results could suffer from the 'bias of common method variance' (CMV), because the emotional intelligence measure was assessed in the same session as the group problem-solving tasks. Consequently, we carried out a further study to measure emotional regulation in teams with more than two individuals performing simulation exercises in an occupational context, and we assessed team performance in a different session using external evaluators.

Study 6: Predictive Validity in the Field

To test the predictive validity of the WEIP-S with a sample of workers, we conducted a study among police officers carrying out simulation exercises. To operate effectively, police officers must develop not only tactical and technical skills, but also the capacity to cooperate and coordinate their actions with their colleagues. *Technical skills* include procedures, knowledge, rules, handling firearms and tactical defense. *Non-technical skills* are related to teamwork, coordination, decision-making, emotion/stress regulation, and management of victims and family (Bertram et al. 2015; Owen 2014). The aim of this study was to examine the relationship between high team emotional intelligence and 'objective' measures of performance relative to police officers' *technical* and *non-technical skills* evaluated by experts.

We expected that police teams with high average levels of emotional intelligence at group level would perform better than teams with low average levels of emotional intelligence. We also expected that the influence of the WEIP-S would be related more to police officers' *non-technical skills,* including self-control and interpersonal aspects, than to their *technical skills*.

Method

Participants and Procedure

Participants were 172 police officers on training courses (121 men and 51 women, mean age = 24.49, range 19–38 years). This research complied with the American Psychological Association's Code of Ethics and was approved by the French National Police Research Board. Informed consent was obtained from each participant. The police officers took part in four simulation training sessions (police patrol, traffic control, identity check and questioning) in three-member teams (one woman and two men), except for one team with four members ($N = 57$ teams). In the last evaluation exercise (domestic violence), their skills were assessed by three professional experts (i.e. expert in law, expert in safety technique, and psychologist). The next day, the police officers were given 15 min to complete an anonymous questionnaire before being debriefed by police instructors. This questionnaire comprised biographical information, including age, sex, section, year group, perception of the simulation exercises, team processes, and the workgroup emotional intelligence scale (WEIP-S).

Measures

Team Performance During the final evaluation exercise, the technical and non-technical skills of each police officer were evaluated by three professional experts (cf. Cotard and Michinov 2018). *General technical skills* were evaluated by an expert in law, with 10 items concerning the distribution of roles, identification of the offense, information sharing, taking witnesses in for questioning, drawing up statements, and ethical rules. *Specific technical skills* were evaluated by an expert in safety techniques on 10 items concerning firearm handling, radio communication, contact with the plaintiff, security of premises, pat-down search, and handcuffing. *Non-technical skills* were evaluated by a police psychologist on 10 items concerning situation awareness, decision making, teamwork, coordination, stress management, assertiveness, self-control, and management of the victim, the offender and the plaintiff. The skills were evaluated on a 5-point scale (0 = *very poor* to 4 = *very good*). Each skills domain was scored on a 40-point scale.

The skills were evaluated at the individual level and aggregated at the team level. To determine whether aggregation of the performance to the group level was reasonable, intraclass correlation coefficients (ICCs, Bliese 2000) were calculated. The ICC(1) value should be higher than .10 (James 1982). As the groups were composed of three members, an ICC(2) value of between .50 and 1 is acceptable (Kenny et al. 2002). The ICCs were calculated and were excellent: ICC(1) = .91 and ICC(2) = .97 for non-technical skills, ICC(1) = .91 and ICC(2) = .97 for specific technical skills, and ICC(1) = .90 and ICC(2) = .97 for general technical skills.

Results and Discussion

Table 6 presents the means, standard deviations and correlations for the WEIP-S components, and the technical and non-technical skills at the team level.

The correlational analyses showed that awareness of one's own emotions was positively correlated with general technical skills ($r = .37$, $p = .005$) and global team performance ($r = .27$,

Table 6 Means, standard deviations, internal consistency, and correlations of the WEIP-S dimensions with skills evaluation at the team level

	M	*SD*	1	2	3	4	5	6	7	8	9
1. Awareness of own emotions	4.67	0.71	(0.85)								
2. Management of own emotions	5.64	0.42	.16	(0.69)							
3. Awareness of others' emotions	4.71	0.60	.55***	.16	(0.86)						
4. Management of others' emotions	5.24	0.52	.45***	.35**	.44***	(0.91)					
5. Total WEIP-S score	5.06	0.41	.81***	.50***	.78***	.76***	–				
6. General Technical skills	30.09	5.66	.37**	.26*	.18	.09	.32*	(0.84)			
7. Specific Technical skills	30.57	6.13	.13	.25†	−.13	−.13	.04	.72***	(0.72)		
8. Non-technical skills	29.19	7.00	.25†	.28*	.06	.01	.21	.77***	.78***	(0.92)	
9. Global performance	29.95	5.73	.27*	.29*	.04	−.01	.20	.89***	.91***	.94***	–

Internal consistencies are presented in parentheses. $N = 57$ teams (Study 6). $^{\dagger}p < .10$, $*p < .05$, $**p < .01$, $***p < .001$

$p = .043$), and marginally correlated with non-technical skills ($r = .25$, $p = .063$). Management of one's own emotions was positively correlated with general technical skills ($r = .26$, $p = .05$), non-technical skills ($r = .28$, $p = .033$) and global performance ($r = .29$, $p = .03$), and marginally with specific technical skills ($r = .25$, $p = .06$). The dimensions related to awareness and management of others' emotions were not correlated with either technical or non-technical skills.

Further multiple regression analyses were conducted to measure the relative importance of each dimension of emotional intelligence in predicting police officers' "objective" performance. For the global performance measure, the results yielded an overall significant effect of level of workgroup emotional intelligence with a significant contribution of awareness of one's own emotions ($\beta = .40$), and management of one's own emotions ($\beta = .33$). Awareness and management of others' emotions did not appear as significant predictors of team performance in police officers (respectively, $\beta = -.13$ and $\beta = -.25$). The same analyses were conducted on measures of general technical skills, specific technical skills and non-technical skills, and the same pattern of results was obtained (see Table 7).

Overall, the results of this study confirm the predictive validity of the WEIP-S by demonstrating that teams with high emotional intelligence obtained better scores for occupational skills as measured by experts. However, the present results partially confirm our expectations by showing that management of one's own emotions, but not the ability to deal with others' emotions, is related to both *technical* and *non-technical skills*.

Several explanations can be proposed to understand these unexpected results. Firstly, concerning the influence of self-awareness and emotional management on *technical* and *non-technical skills*, these skills are highly inter-correlated and can mobilize dimensions related to emotional self-control. Indeed, while one can expect team emotional regulation to be particularly related to *non-technical skills* involving interpersonal and social aspects, one can also assume that police officers' *technical skills* (taking witnesses in for questioning, firearm handling, contact with the plaintiff, handcuffing, tactics of self-defense, etc.) also require emotional self-control (awareness and management of own emotions). Secondly, the non-influence of the dimensions related to the regulation of others' emotions can be explained by the items in the WEIP-S; those related to the management and awareness of others' emotions concern the participants' workgroup colleagues, not those of users, victims, or patients. Our results could thus be explained by the nature of the participants' work; it is probably more important for police officers to be able to control their own emotions than to manage those of their colleagues. To examine whether the management of others' emotions could be related to team performance, our results should be replicated with people working in other sectors performing different tasks (e.g. nurses, educators).

General Discussion

The first goal of the present research was to validate the psychometric properties of the Workgroup Emotional Intelligence Profile Short-scale (WEIP-S) in samples of French people in various sectors. The second goal was to examine the predictive validity of the WEIP-S by demonstrating its influence on team performance. Six studies were conducted to attain this objective, and provided new empirical evidence about the measure and the role of emotional intelligence at the team level.

Study 1 and Study 2 confirmed that the four-factor solution represented the data best in different samples. Indeed, the internal consistency of the WEIP-S was similar to that of the original scale (Jordan and Lawrence 2009) and of other validations in Spanish (Lopez-Zafra et al. 2012) and Portuguese (Brito-Costa et al. 2015). The results demonstrate that the good psychometric qualities of the French version of the 16-item WEIP-S scale were maintained when evaluating four distinct dimensions of emotional intelligence abilities in teams

Table 7 Multiple regression analyses to test the contribution of the different components of the WEIP-S on total score of team performance, general technical skills, specific technical skills and non-technical skills

	β	t	p	R^2	$F(4,56)$	p
1- Team performance				.20	3.27	.018
Awareness of Own Emotions	.40	2.58	.01			
Management of Own Emotions	.33	2.52	.02			
Awareness of Others' Emotions	−.13	−0.84	.41			
Management of Others' Emotions	−.25	−1.66	.10			
				R^2	$F(4,56)$	p
2- General technical skills				.20	3.24	.019
Awareness of Own Emotions	.42	2.70	.01			
Management of Own Emotions	.26	1.92	.06			
Awareness of Others' Emotions	−.02	−.124	.90			
Management of Others' Emotions	−.18	−1.17	.25			
3- Specific technical skills				.20	3.21	.02
Awareness of Own Emotions	.35	2.22	.03			
Management of Own Emotions	.34	2.55	.01			
Awareness of Others' Emotions	−.24	−1.58	.12			
Management of Others' Emotions	−.30	−1.96	.06			
4- Non-technical skills				.17	2.59	.047
Awareness of Own Emotions	.34	2.16	.04			
Management of Own Emotions	.32	2.35	.02			
Awareness of Others' Emotions	−.09	−0.56	.58			
Management of Others' Emotions	−.21	−1.38	.17			

(i.e., awareness and management of own emotions, awareness and management of others' emotions).

Study 3 demonstrated that the scale is stable across time, and Study 4 provided evidence about convergent validity when comparing emotional intelligence scores with dimensions of empathy. The expected positive relationships with the WEIP-S and the empathic and perspective-taking dimensions were observed, and also the negative relationship with personal distress. These findings confirm the findings of previous studies suggesting that the WEIP-S scale has convergent validity with dimensions related to empathy (Berrios Martos et al. 2013; Jordan et al. 2002). Individuals with the ability to manage their own and others' emotions are able to generate feelings of compassion, closeness and tenderness for others. These *socio-emotional skills* are crucial for individuals in work contexts. Indeed, many studies stress the importance of satisfying interpersonal relationships in work teams and the importance of empathy in relationships at work (Berrios Martos et al. 2013). Despite this encouraging result, one limitation of Study 4 concerns the cross-sectional design, leading to the risk of common method variance. In future studies, measures of EI and empathy should be administered at different times.

More importantly, the last two studies extend the validation of the WEIP-S by providing new results concerning its predictive validity with measures of team performance. Indeed, the value of the present studies is that they demonstrate that groups with high EI scores among team members have greater synergy when working together (Study 5) and perform better in simulation exercises as assessed by external evaluators (Study 6). In contrast to the laboratory experiment with dyads, the last study assessed team performance and emotional intelligence at different times (1 day after the training session). Consequently, the results do not suffer from the classic 'bias of common method variance'. The results of the last two studies demonstrate the predictive validity of the WEIP-S with dyads of students working on group-decision tasks (Study 5) and with three-member teams of police officers (Study 6). It confirms that the WEIP-S may influence team performance and team cognitive processes such as transactive memory, and specifically the ability to identify the expertise of each team member. Team emotional intelligence would therefore have an effect on team cognitive processes, and not only on socio-affective processes such as conflict resolution (Jordan and Troth 2004). Finally, the results of Study 6 extend the validation of the WEIP-S in a 'real' occupational context with police teams carrying out simulation exercises. To date, very few studies have measured the relationships between group emotional intelligence and 'objective' team performance. This is one of the major contributions of the present research. In addition to extending the validation of the WEIP-S to another language using French samples, the present studies also provide new empirical evidence about its predictive validity for team performance.

Although this research demonstrated the validity of the WEIP-S in its different forms, the present studies are not without some limitations. First, we did not provide further evidence of the divergent validity of the WEIP-S. It would be interesting in future studies to examine the specific nature of this workgroup emotional profile with other constructs related to personality attributes (e.g., the Big Five dimensions). Indeed, results in the literature have revealed that EI does not improve the effect size related to other personality attributes in the prediction of team performance. Second, future research should also examine whether the predictive validity of the WEIP-S (specifically the relationship between awareness/management of one's own emotions and team performance) is influenced by characteristics of the sample such as profession, group task, or the cultural context. Finally, additional research is needed to examine the role of group emotional intelligence in group outcomes other than team performance (e.g., leadership, cohesion, engagement). One of the main interests of using EI instruments in workplace contexts is their ability to predict employees' attitudes and behaviors, including team performance.

Conclusion and Practical Implications

Several specific measures of EI in workplace settings have been developed. The WEIP-S (Jordan and Lawrence 2009) expands this framework by adapting a previously validated short version of the WEIP (Jordan et al. 2002; Jordan and Troth 2004). The current results support the validity of the WEIP-S in different professional activity sectors, and specifically demonstrate its predictive validity for team performance. Teams with high average levels of emotional intelligence perform better than those with lower levels on task-solving problems and simulation exercises in occupational contexts.

From a practical perspective, the present results provide support for a useful tool that can be used in personnel selection. The relationship between EI measures and team performance has often been shown to be weak or mixed or absent. In this paper, we describe a practical tool that consistently seems to predict team performance. Practitioners could thus use the WEIP-S questionnaire in the personnel selection procedure to assess EI, as an alternative to long test batteries in order to determine the ability to work in teams. In addition, the WEIP-S tool can be used by managers in education and stress-prevention programs because it provides a way of learning how to regulate one's own emotions and those of others when working in teams. Finally, the present research establishes the appropriateness of the WEIP-S for various occupations and provides managers with a short and validated measure to improve team performance.

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Compliance with Ethical Standards

Conflict of Interest The two authors declare that they have no conflict of interest.

Ethical Approval All procedures were in accordance with the ethical standards of institutional and/or national research committees for studies involving human participants, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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