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ONE PERCEPTION, TWO PERSPECTIVES: MEASURING PSYCHOLOGICAL CONTRACT DIMENSIONALITY THROUGH THE PSYCHOLOGICAL CONTRACT CONTENT QUESTIONNAIRE

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The present study aims to contribute to the validity strengthening of a psychological contract measure, assessing the dimensionality of the item structure of the Psychological Contract Content Questionnaire (PCCQ). According to the authors (De Vos, Buyens, & Schalk, 2003), the scale consists of two theoretical dimensions, one to measure perceived employer inducement (PEI) and the other to measure perceived employee contributions (PEC), both from the employee's perception, each divided into five content areas. Different structure models were tested in newcomers (police officers working in the Penitentiary Administration attending a one-year training) in two different stages of their entry: at their early entrance (three weeks, T1; 436 respondents) and after their encounter with the operative environment (eight months, T2; 519 respondents). Analyses were carried out using nonparametric item response theory (IRT) approach and multidimensional IRT approach. Results showed that psychological contract is a single latent construct that describes the general perception that the employee has about his/her relationship with the organization and reciprocal obligations fulfilment.

Key words: Psychological contract; Scale validation; Dimensionality; Item response models; Bifactor; Newcomers; Correctional officers.

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After more than fifty years there is a considerable body of literature on psychological contract. In recent years the construct has showed a renewed interest due to the globalized labor market, where flexibility and mobility have become *conditio sine qua non* to be competitive, both

for companies and workers. Among the many consequences of this changed scenario, one of the most important is the redefinition of the informal employee-organization relationship which, from the first moment individuals enter a workplace, is constantly updated in the role and context changes which often characterize work life (Barbieri, Dal Corso, Di Sipio, De Carlo, & Benevene, 2016; Cullinane & Dundon, 2006; Dal Corso, Floretta, Falco, Benevene, & De Carlo, 2013; Guest, 2004).

Psychological contract is a topic investigated for some decades now (Levinson, Price, Munden, Mandl, & Solley, 1962), mostly focusing on the entry stage of newcomers who have to make sense of new environments and negotiate reciprocal obligations with the employer (Louis, 1980; Sutton & Griffin, 2004; Thomas & Anderson, 1998; Tomprou & Nikolaou, 2011). Researches on newcomers' psychological contract have demonstrated that the first months after organizational entry are critical for the development of a positively perceived employment relationship (e.g., De Vos, Buyens, & Schalk, 2003, 2005; Farnese, Livi, Barbieri, & Schalk, 2018; Rousseau, 2001; Thomas & Anderson, 1998). During this time, newcomers' motivation, commitment, and intended length of stay in the organization will be affected by their perceptions regarding the terms of their employment relationship and the perceived fulfilment of these terms (De Vos, 2002; Farnese, Barbieri, Bellò, & Bartone, 2017; Farnese, Bellò, Livi, Barbieri, & Gubbiotti, 2016; Robinson, Kraatz, & Rousseau, 1994). Anyhow, both organizations and workers acknowledge that job uncertainty is a feature of the new labor market, and role or organization transitions often happen (Noe, Hollenbeck, Gerhart, & Wright, 2006). In a permanently turbulent economic system, promises and deals made in good faith one day may be broken the next due to factors such as a change in the market, a new product, a change in management, or a reorganization, compromising the relationship between employee and employer (Morrison & Robinson, 1997). Also in light of the significant changes that make the work environment more uncertain (e.g., the forms of employment contract, the different patterns of working hours, and the growing subcontracting of non-core activities) (Guest, 2004). Thus, understanding and monitoring the dynamic of the interplays between the employee's obligations and promises toward the organization and vice versa, has become progressively more important to define the contemporary employment relationship. This is why the psychological contract can be considered a possible conceptual framework helpful to explore a "new" employment relation (Coyle-Shapiro & Parzefall, 2008; Guest, 2004; Persson & Wasieleski, 2015; Rousseau, 2001; Schalk & Roe, 2007).

Despite the renewed interest toward this construct, instruments to measure it are still spare and respond to different development and evaluation criteria that make some of them not reliable or partial, being addressed to specific aspects of psychological contract (Freese & Schalk, 2008). The present study aims to contribute to the validation of a psychological contract measure, assessing the dimensionality of the item structure of the questionnaire proposed by De Vos et al. (2003), henceforth called Psychological Contract Content Questionnaire (PCCQ). This is one of the most comprehensive measures based on a *content-oriented* approach. PCCQ measures the employee's perception about both his/her contribution and employer's inducements, thus allowing to analyze whether the reciprocal obligations fulfilment are perceived as fair and how each party contributes to keeping a balanced contract or to breaching it. Besides, it allows to obtain specific information on the reasons why different employees (or groups) may have different perceptions about the degree to which promises have been kept (Freese & Schalk, 2008). Although authors suggest two theoretical subdimensions (the employee perception about his/her fulfilment and about the organization's fulfilment) and 10 content areas, and use the 10 PCCQ dimensions

for studies on psychological contract (De Vos, 2002; De Vos et al., 2003), they have never validated its structure.

For this reason, in the present study we aim to assess the measurement instrument properties and the dimensionality of the item structure of PCCQ. Specifically, we tested it in the Italian framework by using item response theory (IRT) analysis. To this aim several IRT models with different characteristics in terms of the underlying dimensionality of the items composing the scale were assessed. Assuming that the socialization period is crucial to shape the employees' psychological contract (Coyle-Shapiro & Parzefall, 2008), we tested the models in newcomers (correctional police officers working in the Penitentiary Administration attending a one-year training) in two different stages of their entry: at their early entrance (three weeks), and after their encounter with the operative environment (eight months). To the best of our knowledge, to date, a reliable Italian measure for psychological contract construct is lacking, thus a further purpose of this study is to provide a consistent Italian version of the PCCQ.

THEORETICAL FRAMEWORK

Adopting the social exchange theoretical frame (Blau, 1964), psychological contract can be seen as a process of social negotiation through which both parties adjust their expectations to achieve a workable level of congruence (Cooper-Thomas, Van Vianen, & Anderson, 2004) and develop a mutually understood psychological contract (De Vos, 2002). More specifically, within this theoretical framework, reciprocity and balance are essential elements in the conceptualization of the psychological contract's construct. Thus, employees tend to reciprocate the organization's fulfilment of the psychological contract by adjusting (reducing or increasing) their own contributions to the organization, in order to maintain the balance in the employment relationship (De Vos et al., 2003; Lance, Vandenberg, & Self, 2000; Schalk & Roe, 2007). When employees perceive mutuality in promises and in the fulfilment of obligations of the two parties (employee and employer), this leads to positive attitudes and behavior, such as commitment, work engagement, job satisfaction, organizational citizenship behavior, intention to stay, and attitude toward organizational change (Alcover, Martinez-Inigo, & Chambel, 2012; Bal, de Lange, Jansen, & Van der Velde, 2008; Barbieri, Amato, Passafaro, Dal Corso, & Picciau, 2014; de Jong, Schalk, & de Cuyper, 2009; De Vos & Meganck, 2008; Delobbe, Cooper-Thomas, & De Hoe, 2016; Farnese et al., 2018; Magnano, Platania, Ramaci, Santisi, & Di Nuovo, 2017; Turnley, Bolino, Lester, & Bloogood, 2003; Van den Heuvel, Schalk, & van Assen, 2015). In the case of mismatch and consequent psychological contract breach, this could lead to negative outcomes such as: reduced employees' commitment, satisfaction, and performance (Knights & Kennedy, 2005; Tsui, Lin, & Yu, 2013); lower organizational trust (Pugh, Skarlicki, & Passell, 2003; Robinson, 1996; Robinson & Rousseau, 1994); and higher turnover intention and absenteeism (Addae, Parboteeah, & Davis, 2006; De Vos & Meganck, 2008; Johnson & O'Leary-Kelly, 2003).

Many different psychological contract measures have been developed to assess the feature, content, and evaluation of the psychological contract (for a review of inventories and generation criteria, see Freese & Schalk, 2008). Most of them adopted a *feature-oriented* approach, that is the description and comparison of some contract attribute or characteristic, such as the well-known distinction among transactional-balanced-transitional-relational contracts proposed by Rousseau (Rousseau, 2001; Rousseau & McLean Parks, 1993; Rousseau & Wade Benzoni,

1994) with respect to: focus of the contract, time frame, stability, scope, and tangibility. Anyhow, this feature approach describes general characteristics, without providing an explanation about why different employees perceive different obligations or inducements (Freese & Schalk, 2008). Further, it is not clear whether features are independent factors or if they are different with respect to some specific dimensions, or even opposite ends of a continuum. Inventories based on the *content-oriented* approach refer to the explicit and implicit topics about which both parties made promises in their exchange agreement. Researches have described the psychological contract terms referring to the different contexts' specific features and, for this reason, produced hundreds of items pursuing consistency with each explored organization. Among them, the PCCQ by De Vos and colleagues (2003) considers contents related on the one hand to the employer inducements (such as opportunities for promotions, good atmosphere at work, opportunities for flexible working) and on the other to the employee contributions (such as work fast, do volunteer tasks, follow organizational policies). The *evaluation-oriented* approach aims to provide a measurement of the perceived degree to which the promises were kept. Moreover, content and evaluation approach take into account both the employee and the employer perspective, thus allowing to analyze the specific contribution of each party to the balance (or unbalance) of the relationship.

Initial studies adopted a *bilateral view* on psychological contract, comparing employees' and employer's actual perceptions. This view is useful to clarify differences in perspectives, however in real organizational contexts many actors could be identified as employers, and it is difficult to understand how each of them could affect employees' beliefs and behavior (e.g., Herriot & Pemberton, 1995; Levinson et al., 1962; Schein, 1965). Conversely, other scholars adopted a *unilateral view*, that is, the intraindividual perception about the employee and the employer obligations (Coyle-Shapiro & Kessler, 2000; Tekleab & Taylor, 2003). In agreement with Freese and Schalk (2008), this view is preferable because the psychological contract is literally psychological, that is to say it is, by definition, an individual perception. Essentially, the psychological contract can be considered as a mental model with which employees assess events happening at work. It is a main influencer of employee's attitudes and behavior and can explain how and why employees adjust their attitudes and behavior in response to changes at work (Farnese et al., 2018). In a review, Freese and Schalk (2008) evaluated 14 psychological contract measures, highlighting that many of them overlap items, and that the psychometric properties of the instruments and subscales should be provided when reporting the results. Overall, based on different methodological criteria, six measures are not recommended, two of the remaining are about a specific topic (breaches, changes), and one is related only to the employer's view.

Given the paucity of reliable measures for psychological contract, the main objective of this study is to contribute to the exploration of the psychometric properties of PCCQ by De Vos et al. (2003) and to its dimensionality validation. Below we describe the questionnaire, its generative criteria, and the tested models.

The Psychological Contract Content Questionnaire

The PCCQ is an instrument developed to measure employee's perception of reciprocal obligations in the employer-employee relationship, specifically to monitor changes in newcom-

ers' psychological contract perceptions during the socialization process (De Vos et al., 2003). It consists of two theoretical dimensions, related respectively to the perceived employer inducement (PEI) and to the perceived employee contributions (PEC), both from the employee's perception. Each dimension is divided into five content areas, respectively career development, job content, social atmosphere, financial rewards, and work-life balance for the employer inducements, and in- and extra-role behavior, flexibility, ethical behavior, loyalty, and employability for the employee's contributions. Thus, the PCCQ measures an overall perception about the psychological contract, divided into two dimensions and 10 specific facets. De Vos and colleagues (2003) used the single 10 subdimensions in a longitudinal study, not testing the structure of the whole questionnaire. To verify its structure, we explored and compared the validity of several models, which differ in the number of dimensions specified and in the relationship among them. Specifically, the first model considers the double perspective: the psychological contract depicted from the employer and from the employee point of view. Assuming that the two parts can differently contribute to the psychological contract's development, we suppose that a model taking into account the two theoretical dimensions (i.e., employees' perceptions of both their own and the organization's obligations fulfilment) is a faithful measurement for the psychological contract construct. This two-factor model (M2) is the most used also in studies adopting similar instruments (e.g., Coyle-Shapiro & Kessler, 2002; Guest & Conway, 2002; Kickul, Lester, & Finkl, 2002; Schalk & Freese, 1997).

In line with Freese and Schalk's (2008) conceptualization of psychological contract as the individual perception of his/her relationship with their organization and of the overall balance of their inducements/contributions, an alternative model assumes that psychological contract is a holistic construct. The PCCQ being generated adopting a unilateral view, we can suppose that all dimensions refer to a single factor, expressing the employee's perception of the degree of obligations fulfilment. Thus, this unidimensional model (M1) assumes that all items refer to a unique dimension.

The third model, following the authors' empirical use of PCCQ, focuses on the specific contract contents analyzed. The ten-dimensional model (M3) assumes that the single facets can provide specific information to define the psychological contract construct.

We can further conceptualize psychological contract measurement as composed by a single latent construct (describing the general perception that the employee has about his/her relationship with the organization and their reciprocal obligations) as well as by the specificity due to the dimensions composing it. For this purpose, two last alternative models investigated a possible bifactor model structure of the scale (DeMars, 2006, 2013), considering the general latent trait and specificity due to the two dimensions related to the employee and the employer perspectives (M4); or the general latent trait and specificity due to the 10 subdimensions related to specific psychological contract contents (M5). In other words, these models simultaneously represent one perception and two perspectives, or one perception and various content areas.

The early socialization period is a sensitive stage for psychological contract (Bauer, Bodner, Erdogan, Truxillo, & Tucker, 2007; Bauer & Erdogan 2012; Louis, 1980; Saks & Gruman 2012; Van Maanen & Schein, 1979), thus we decided to test the models depicted above in a sample of newcomers, correctional police officers newly hired by the Penitentiary Administration who were following a one-year mandatory training. We administered questionnaires when they were attending the eighth months of training, after a stage experience in the workplace, since the observed responses at this stage of socialization reflect an adequate awareness of employees about the organization's inducements and their contributions. We carried out a full investigation

of the scale properties and dimensionality on data collected at this time (T2). Anyhow, since psychological contract is a dynamic construct that changes during work life (De Vos, 2002; Farnese et al., 2018), to verify the tenability of the PCCQ's properties and dimensionalities we replicated them on data collected at the newcomers' early entrance in the organization (three weeks, T1).

To summarize, we aim to test the PCCQ dimensionality verifying whether the two-factor model (employer inducements vs. employee contributions, both from employee's perspective) better represents its factorial structure compared to the alternative models depicted above. We further aim to assess its concurrent validity through the examination of the convergent and discriminant validity. Basing on literature, we will test the correlation between psychological contract and some of its main outcomes: organizational commitment, satisfaction (considered a proxy for met expectations; Coyle-Shapiro & Kessler, 2000), and turnover. Specifically, convergent validity is assessed by testing the correlation between psychological contract and the affective and normative components of organizational commitment, and satisfaction with training (McInnis, Meyer, & Feldman, 2009; Topa, Morales, & Depolo, 2008; Zhao, Wayne, Glibkowski, & Bravo, 2007). We expect to find a significant positive relationship between these variables. Discriminant validity is assessed by testing the correlations between psychological contract and the continuance component of organizational commitment (Ng & Feldman, 2008) and turnover intention (Blomme, Van Rheede, & Tromp, 2010; Flood, Turner, Ramamoorthy, & Pearson, 2001; Zhao et al., 2007). In this case we expect to find a significant negative relationship between these variables.

METHOD

Participants and Procedure

Data were collected as part of a wider research intervention on correctional police officers' socialization process, jointly undertaken by the Training Office of the Italian Ministry of Justice and the Department of Psychology – Sapienza University of Rome, to support newcomers' entry process and to counteract withdrawal phenomena. Participants were police officer cadets, hired with a permanent employment contract by the Ministry of Justice (Penitentiary Administration) and following a 12-month mandatory training, in order to work in prisons. The Justice Administration manages the training of new cadets in several schools located throughout Italy. Subjects participating in the study (T1-T2) are all those who attended the training course in the schools which took part in the research project from the beginning. Cadets were asked to take part to the research when they were attending the third week (T1) and the eighth month (T2) of their training course, which included a two-month stage in prisons.

The number of respondents was 436 in survey T1 and 519 in survey T2. The difference in the number of participants between T1 and T2 is due to the fact that some cadets who attended the training course at other schools were later added to the research project, thus forming the remaining part of the sample (T2). The composition of respondents is fairly balanced with respect to gender (T1: 213 females, 212 males, 11 missing; T2: 222 females, 288 males, 9 missing). Most of the sample are young (T1: M_{age} = 23.23, SD = 2.0; T2: M_{age} = 23.91, SD = 2.04, range = 19-29) and had completed high school (T1: 80%; T2: 81%). Each participant received, during the training sessions, a paper-and-pencil questionnaire and a presentation letter by the Administration,

containing a brief description of the research and of its main objectives, and guaranteeing the confidentiality of their responses.

Measures

Psychological Contract Content Questionnaire. The PCCQ (De Vos et al., 2003) consists of two dimensions, one to measure the perceived employer inducement (PEI) and the other to measure the perceived employee contribution (PEC). The 19 items related to PEI tap on five content subdimensions of the psychological construct, namely: career development (three items; e.g., "Opportunities to grow"), job content (four items; e.g., "Opportunities to show what you can do"), social atmosphere (four items; e.g., "Positive relationships between colleagues"), financial rewards (four items; e.g., "Wage increased based on your performance"), work-life balance (four items; e.g., "Respect for your personal situation"). The 19 items related to PEC tap on five subdimensions of the psychological construct, namely: in- and extra-role behavior (six items; e.g., "Assist your colleagues in their work"), flexibility (four items; e.g., "Work extra hours to get your job done"), ethical behavior (four items; e.g., "Use the organization's properties honestly"), loyalty (three items; e.g., "Not immediately look for work elsewhere"), and employability (two items; e.g., "Participate in training courses outside your working hours") (see Table 1). Since psychological contract contents need to be consistent with the context characteristics, we excluded from the questionnaire three items considered by the Penitentiary Administration not applicable to correctional police officers: Item 15 from the financial rewards subdimension: "Regular benefits and extras"; Item 27 from the flexibility subdimension: "Take work home regularly"; and Item 34 from the loyalty subdimension: "Accept no job offers you receive from other organization." Thus, we administered a 35-item scale rather than the 38 overall items, anyhow preserving the 10 subdimensions composing it. Respondents had to indicate to what extent they agree with each of the items, each describing the fulfilment of an inducement or contribution, using a 5-point Likert scale ranging from 1 (*completely disagree*) to 5 (*completely agree*). All items have a positive direction.

Organizational Commitment was assessed using the 18-item scale developed by Allen and Meyer (1990). It includes three dimensions, affective, normative, and continuance. They refer, respectively, to attachment to the organization and the desire to remain in the organization (example item: "[This Administration] has a great deal of personal meaning for me"); the obligation to stay for loyalty and moral obligation to remain (example item: "If l got another offer for a better job elsewhere, I would not feel it was right to leave [this Administration]"); and the need to remain in the organization because the cost of leaving is too high or lack of alternatives (example item: "It would be very hard for me to leave [this Administration] right now, even if I wanted to"). Participants were asked to rate their agreement/disagreement on 7-point scales, from 1 (*completely disagree*) to 7 (*completely agree*).

Turnover intent captured intention to quit the Penitentiary Administration within the past month. It was measured by a 4-item scale adapted from Sager, Griffeth, and Hom (1998) (example item: "I frequently think about quitting my job"). Response choices ranged from 1 (*completely disagree*) to 5 (*completely agree*).

Satisfaction for training captured the degree of satisfaction with the training experience. It was measured adapting the job satisfaction scale from the Job Diagnostic Survey (Hackman & Oldham, 1975) (example item: "Generally speaking, I'm very satisfied with this training"). Response choices ranged from 1 (*totally disagree*) to 5 (*completely agree*).

The Measurement Approach for Data Analyses: Unidimensional, Multidimensional, and Bifactor Models

To verify the dimensionality of the PCCQ we first assessed the psychometric properties of the items and dimensions on dataset T2. The main findings from T2 in terms of dimensionality structure were validated on dataset T1.

Basing on the hypothesized model and alternative models, we tested a unidimensional model (M1), with all items loaded on the same dimension; a two-dimensional model (M2), which explicitly models differences in the content dimensions between PEI and PEC items and allows covariance between these two dimensions; and a ten-dimensional model (M3) which considers the items tapping on the 10 content subdimensions and allows covariance between them. We further tested a bifactor model structure (DeMars, 2006, 2013) of the scale, hypothesizing that there could be a non-trivial residual association between parts of the construct defined by items sharing similar contents that is explained by the specific facets composing it. While the multidimensional model produces a score of the respondents on each dimension/subdimension on which the items have been operationalized, the bifactor model produces, for each respondent, a score on the *general* latent trait (which is defined by all items) and a score for each *specific* latent trait (respectively, M4: the two PEI and PEC dimensions; M5: the 10 content facets). The bifactor modelling structure allows to adjust the general latent trait score for the presence of specific aspects (subdimensions) which drive the probability of responding to each of the five categories of an item conditional upon the general latent trait values. This is useful for two main purposes: a) to remove the effect of nuisance factors (which are captured in the specific latent traits) in the estimation of a main latent trait of interest and/or b) to investigate differences in the specific latent traits for respondents with similar values on the general latent trait (or vice versa). Specific latent traits are investigated as they are able to catch relevant secondary aspects which influence the probability of response to an item (e.g., a relevant amount of variability in the response is explained by the specific latent trait).

Analyses were carried out using nonparametric IRT approach and multidimensional IRT (MIRT) approach. The Mokken scale analysis package (Van der Ark, 2012) and the MIRT package (Chalmers, 2012) from R CRAN were adopted in the following analyses.

IRT allows to inspect items and respondents' characteristics. The class of IRT model assumes that responses to a set of items are explained by one (unidimensional model) or more latent traits (multidimensional models), and that there is no pair association in item responses within a group of individuals who have the same latent trait values (local independence assumption). The presence of local dependence (LD) is usually a signal that the dimensionality structure of the items is not correctly specified by the model (De Ayala, 2009; Toland, 2014).

The most flexible model for ordinal data is the graded response model (GRM; Samejima, 1969) which models the probability of respondent (i, for $i = 1, \ldots, N$) to provide a response in

each of the five categories (indexed with *k*, for $k = 1, \ldots, 5$). Specifically three parameters (which represent item or individual characteristics) influence the probability of response in each of the five categories: the respondent' s value of the latent trait (called ability or person parameters — θ_i); the item location parameters (namely each item *j*, for $j = 1, \ldots, 35$) which is characterized by a number of item-category — parameters b_{jk} — equal to the number of categories (minus 1); and an item loading (a_j). The person parameter represents the latent trait value for a given respondent, the item-category threshold informs on how easy it is to endorse a category of an item, whereas the slope informs on the item power to discriminate across respondents with different values of the latent trait (i.e., it is the slope of the logistic function).

In addition to the unidimensionality and LD assumptions, the GRM assumes that the probability to exceed a response category (described by the item step response function) is a non-decreasing function of the latent trait values (latent monotonicity assumption, LM) (De Ayala, 2009; Toland, 2014). Lastly, like any parametric model, the GRM model assumes that the functional form of the model has to fit the data adequately (i.e., the item step response functions follow a logistic distribution). Violations of LD and LM can be both signals that the structure of the data is not unidimensional and that a more complicated internal structure of the data needs to be tested. Ignoring the violation of these assumptions may lead to biased estimates of the item slopes and of the respondents' latent trait values.

Multidimensional item response theory models allow to deal with violations of the unidimensional assumption by specifying the probability of endorsing a response category as function of more than one latent trait (for $m = 1, \ldots, M$), specifically $\theta_{i1}, \ldots, \theta_{IM}$ (DeMars, 2006, 2013). In the multidimensional GRM model each of the *M* latent traits is defined by a subscale of the items; a set of slopes for each latent trait describes the relationship between the latent trait values and the probability of endorsing a response category of an item (the functions which describe this relationship for any items are known as item-category characteristic curves). If we suppose that the items 1-18 define the PEI latent trait θ_{PEI} and the items 19-35 define θ_{PEC} latent trait, then a set of slopes $a_{1PEI}, \ldots, a_{18PEI}$ describes the relationship of the items with the first latent trait θ_{PEI}, whereas the set of slopes $a_{1PEC}, \ldots, a_{17PEC}$ describes the relationships of the items with the second latent trait θ_{PEC}.

In the bifactor model, each item is allowed to load on a main general latent trait and a specific latent trait (Rodriguez, Reise, & Haviland, 2016), thus a multidimensional data structure is specified (De Boeck & Wilson, 2004). The specific latent trait captures the residual association shared by subsets of items which has not been explained by the general latent trait. The number of specific latent traits is equal to the number of clusters which are sources of dependency across responses (e.g., the number of relevant content subdimensions).

In addition, the model assumes that general and specific latent traits are uncorrelated, making the values on the general latent trait independent and conditional upon the values on the specific latent trait. Thus, for each item two slopes are estimated, one related to the general latent trait and one to the specific latent trait. The number of specific latent traits is equal to the sources of residual association across items. If in the PCCQ is observed residual association between the items loading on the same subscale (PEI and PEC) after conditioning on the value of the general latent trait, then a bifactor structure may help to improve the fitting of the model.

To summarize, to assess the dimensionality of the PCCQ the tenability of the unidimensional model (M1) is tested against the multidimensional (M2 and M3) and the bifactor (M4, M5)

solutions. IRT analysis will be used to investigate the properties of the measurement instrument and to explore its internal structure, carrying out a comparison between several IRT models with different characteristics in terms of dimensionality (unidimensional, multidimensional, and bifactor models). Subsequently, MIRT models will be used for the inspection of item dimensionality, IRT assumptions, item fit, and model fit.

RESULTS

Preliminary Data Inspection

Table 1 presents the PCCQ organized according to the two main dimensions related to employee and employer perspectives (PEI and PEC), the 10 content subdimensions, and descriptive statistics for each item. The main evidence which arises comparing the change of the mean of each item over time is that there is a decrease in the rate of respondents in the higher categories of the scale. The average difference between the mean of the items between T1 and T2 is 0.38 (in T1 the range is 3.14-4.69; and in T2 the range is 2.80-4.60). These findings should highlight that on average there are lower expectations in T2. Probably this decrease is due to the phenomenon that happens to newcomers and that some scholars call "honeymoon and hangover" (Boswell, Shipp, Payne, & Culbertson, 2009), which leads to a change in newcomers' perception of the organization, that is, the transition from an idealization phase to a more realistic knowledge of the context.

Given the low number of missing values in each item, we carried out a multivariate imputation based on multivariate normal distribution (Wu, Jia, & Enders, 2015) rounding the imputed values to the first unit and constraining the range of variation of the variable in 1-5 using the Amelia package form R CRAN (Honaker, King, & Blackwell, 2011).

From here on, the analysis focuses on the inspection of scale properties using data T2. The main findings emerging from this analysis in terms of item dimensionality and tenability of the IRT assumption will be validated on T1. We boundaried the analysis, in this step, to dataset T2, in order to focus only on comparisons addressed to detect the dimensionality of the item structure and to limit the objects under comparison. Dataset T2 was preferred to T1 because we can assume that newcomers have a greater awareness of their organization and job after eight months. Besides, a greater number of police officer cadets answered to T2.

Table 2 shows for dataset T2 several indicators of reliability of the PCCQ, namely the Cronbach's (1951) alpha, the lambda-2 (Sijtsma, 2009), and the latent class reliability coefficient (LCRC; Chalmers, 2012; Van der Ark, Van der Palm, & Sijstma, 2011). These three indicators of reliability were calculated for the PCCQ items considering the instrument as a unidimensional scale (M1), for each of the two subscales PEI and PEC (M2), and for each of the 10 subscales (M3). A comparison of the indexes indicates as favorite the unidimensional solution, followed by the bidimensional solution. In both cases the three reliability indexes agree in indicating a coefficient greater than .90. However, the reliability coefficients can be larger in M1 and M2 than in M3 just because the number of items is larger in the scales evaluated in M1 and M2 than in those evaluated in M3 (Tavakol & Dennick, 2011).

TABLE 1
Desciptive statistics at T1 and T2

			T1			T2			*d*
Dimension	Sub dimensions	Items	*Mean*	*SD*	#	*Mean*	*SD*	#	(T1-T2)
PEI	1. Career development	Item 1	3.96	0.87	429	3.69	1.00	516	0.27
		Item 2	4.44	0.68	436	3.93	0.96	517	0.51
		Item 3	4.57	0.67	435	4.12	0.94	513	0.45
	2. Job content	Item 4	3.20	1.13	435	3.26	1.10	514	–0.06
		Item 5	4.15	0.82	436	3.89	1.00	515	0.26
		Item 6	4.70	0.59	435	4.56	0.68	516	0.14
		Item 7	4.31	0.75	434	4.07	0.91	516	0.25
	3. Social atmosphere	Item 8	3.59	0.93	433	3.02	1.06	514	0.56
		Item 9	3.90	0.84	435	3.29	0.98	514	0.61
		Item 10	4.05	0.81	436	3.53	2.43	516	0.52
		Item 11	3.94	0.85	431	3.47	0.99	513	0.48
	4. Financial rewards	Item 12	3.66	1.10	435	3.24	1.14	515	0.42
		Item 13	3.53	1.18	434	3.06	1.19	514	0.47
		Item 14	3.57	0.98	433	3.11	1.05	514	0.46
	5. Work-life balance	Item 16	3.94	0.86	434	3.27	1.00	512	0.67
		Item 17	3.42	1.02	435	2.99	1.12	517	0.42
		Item 18	3.14	1.02	435	2.79	1.07	515	0.36
		Item 19	3.59	1.02	434	3.00	1.10	516	0.59
PEC	6. In- and extra-role behavior	Item 20	3.60	0.83	429	3.53	0.86	516	0.07
		Item 21	4.01	0.81	434	3.56	0.90	517	0.45
		Item 22	4.12	0.80	432	3.63	0.94	516	0.48
		Item 23	4.31	0.80	433	3.81	0.92	514	0.50
		Item 24	3.94	0.87	433	3.66	0.90	516	0.27
		Item 25	4.10	0.84	431	3.52	0.94	515	0.58
	7. Flexibility	Item 26	4.31	0.76	432	4.06	0.89	514	0.25
		Item 28	3.97	0.96	436	3.77	0.94	516	0.21
		Item 29	3.89	1.01	434	3.68	0.97	517	0.20
	8. Ethical behavior	Item 30	4.69	0.72	434	4.31	1.01	512	0.38
		Item 31	4.56	0.80	435	4.17	0.99	512	0.39
		Item 32	4.56	0.77	434	4.22	0.91	517	0.35
		Item 33	4.57	0.70	431	4.17	0.88	516	0.40
	9. Loyalty	Item.35	4.07	1.12	431	3.71	1.22	513	0.36
		Item 36	3.91	1.15	434	3.73	1.12	510	0.17
	10. Employability	Item 37	4.03	0.99	435	3.61	1.12	512	0.42
		Item 38	4.08	0.94	435	3.55	1.08	517	0.54

Note. PEI = perceived employer inducement; PEC = perceived employee contributions.

TABLE 2
Study at T2 – Reliability indexes

Index	One-dimension	Two-dimensions		Ten-dimensions									
Reliability	PCCQ	PEI	PEC	1	2	3	4	5	6	7	8	9	10
Alpha	.936	.906	.903	.857	.678	.891	.848	.816	.878	.819	.873	.548	.813
Lambda-2	.938	.910	.905	.862	.694	.892	.849	.818	.881	.826	.876	.548	.814
LCRC	.941	.918	.912	.749	.683	.843	.773	.798	.879	.762	.866	.274	.406

Note. PCCQ = Psychological Contract Content Questionnaire; PEI = perceived employer inducement; PEC = perceived employee contributions; LCRC = latent class reliability coefficient.

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Graded Response Models Under Comparisons

In the following, IRT and MIRT models will be used to further contribute to the dimensionality validation of the PCCQ. Specifically, several GRM were specified and results compared in terms of itemparameters, tenability of the local independency assumption, goodness-of-fit measures at item and global level.

The unidimensional GRM considers the PCCQ defining a single latent trait (M1: Uni-GRM); the two-dimensional model considers the two subsets of items (PEI and PEC) of the PCCQ to define two latent traits (M2: Multi-Two-GRM); whereas the ten-dimensional model considers the 10 content subdomains to define related latent traits (M3: Multi-Ten-GRM). In the M2 and M3, the dimensions are allowed to covary. Moreover, two bifactor model structures were specified and tested: the first which incorporates in the specific latent trait the dichotomy between items related to employer inducement and those related to employee contribution, by specifying a general latent trait and two specific latent traits corresponding to the two subdomains PEI and PEC (M4: Bifac-Two-GRM, where "Two" in the label refers to the number of specific latent traits); and a second model which incorporates in the specific factors the communalities due to belonging to the same content subscale of the PCCQ, by considering any item to load on a general latent trait and on a specific latent trait which reflects residual association between items belonging to one of the 10 domains of the PCCQ (M5: Bifac-Ten-GRM). Models with a number of latent traits greater than 3 (namely M3 and M5) were estimated using the Metropolis-Hastings Robbins-Monroe (MHRM) algorithm (Cai, 2010), whereas models with a number of latent traits up to 3 (M1, M2, and M4) were estimated using the more accurate marginal maximum likelihood (MML) algorithm (Bock & Aitkin, 1981) and, only to ensure comparability of the goodness-of-fit measure with the former, with the MHMR algorithm (Toland, Sulis, Giambona, Porcu, & Campbell, 2017).

Before carrying on with the IRT analysis, we investigated the structure of the items composing the PCCQ scale, by considering the following structure: the unidimensional solution, the two subscales PEI and PEC, and the 10 subscales. These three data structures were investigated using nonparametric IRT tools (Sijtsma & Hemker, 2000) in terms of scalability of the sets/subsets of items and tenability of LM assumption. In a second step, we estimated for the three structures the five parametric IRT models described above (M1, M2, M3, M4, M5) to check the tenability of the LD assumption and to inspect item-level and global measure of model fits (see De Ayala, 2009).

Once the most competing models had been selected, a comparative analysis between them was carried out in terms of measures of item-level data fit and global model fit in order to select a championed model. Finally, an inspection of the adequacy of IRT parameters was done to remove inadequate items and to assess the improvement of the degree of tenability of the LD assumption and global fit measures related to a refinement of the measurement instrument.

Evaluating Model Assumptions and Testing Competing Models

Investigating Unidimensionality

We adopted a widely used nonparametric IRT approach to investigate the unidimensionality of the measurement instrument and of its subscales (Van der Heijden, Fekkes, Radder, & Verpis, 2003). For each set/subset of items we first used Loevinger's *H* coefficient of scalability

(Mokken, 1971; Sijtsma & Hemker, 2000) to measure the closeness of the observed response pattern to the perfect Guttman scale. The *H* index takes values between 0-1 and provides information on the expected (defined in probabilistic terms)[1] number of Guttman errors observed in each scale or subscale of items H^d and assumes value equal to one. Each item is also characterized by its own scalability coefficient H_j^d. The following scalability criteria were defined (Mokken, 1971): $H^d < .30$ for defining a scale unscalable, $.30 \leq H^d < .40$ for defining a scale weakly scalable, $.40 \leq H^d < .50$ for defining a scale moderately scalable, and $H^d \geq .50$ for defining a scale highly scalable (Sijtsma & Hemker, 2000). Usually it is recommended that items in the same scale have an item scalability coefficient greater than .30. For the application of any IRT models a scale should be at least weakly scalable. The *H*s coefficients were calculated for the whole PCCQ, for each of the two subscales PEI and PEC of the PCCQ, and for each of the 10 domains of the PCCQ. For each solution (M1: unidimensional; M2: two-dimensional; M3: ten-dimensional) the *H* coefficient was calculated in each subscale. The results show that the three structure solutions provide scales that are at least weakly scalable (see Table 3). The M1 has the lowest degree of scalability, whereas all the M3 subdimensions are highly scalable. In the M1, 11 out of 35 items showed values of the item scalability coefficient lower than .30, whereas in the M2 only in two cases the H_j coefficient is lower than .30. For each scale/subscale of items the LM assumption was assessed using a nonparametric procedure which checks for each item if the item step characteristic curves are a monotone nondecreasing function of the latent trait (for details, see Molenaar & Sijtsma, 2000; Sijtsma & Molenaar, 2002; Van der Ark, 2012). For each item category the number of times the assumption is checked in different intervals of the latent trait (# comparisons), the number of times the assumption is violated (# violations), and the number of significant violations is recorded (for details, see Molenaar & Sijtsma, 2000; Van der Ark, 2012).

The results are summarized at item level in Table 3. Eight violations out of 3,786 comparisons were observed in the M1, one out of 3,188 in the M2, and four out 1,504 in the M3. The evaluation of the scalability properties and the tenability of the LM assumption would suggest to further investigate the two-dimensional data structure versus the ten-dimensional one.

Evaluating Conditional Independence and Item-Fit

The LD assumption for the five models was tested using the local dependence pairwise statistics (Chen & Thissen, 1997; Toland, 2014; Toland et al., 2017) between pairs of items implemented in the MIRT package in R (Chalmers, 2012). The LD statistics is based on χ^2 metric. High positive values reflect relevant covariation/association between pairs of items even conditional upon the latent trait values. High values of LD statistics highlight an inflation of slope parameters causing unreliable estimates of person parameters. The LD issues need to be further investigated also in the light of the item-fit indexes and item parameters in order to better define the model structure and/or to remove items which cause concern. On the contrary, the detection of negative LD does not represent an issue in terms of tenability of the model assumptions and usually are ignored in applied research. For each model the presence of LD is inspected for any pairs of items, producing $[(J \times J\text{-}1)/2]$ values of the statistics (namely 595). To improve the readability of the statistics with items with more than two response categories (thus with different degrees of freedom)

TABLE 3
Assessing scalability and latent monotonicity

One-dimension						Two-dimensions						Ten-dimensions					
Item	H_j	H	#ac	#vi	#zsig		H_j^d	H^d	#ac	#vi	#zsig		H_j^d	H^d	#ac	#vi	#zsig
Item 1	.36	.33	123	1	0	PEI	.41	.39	89	2	0	Career development	.77	.75	28	0	0
Item 2	.37		123	2	0	PEI	.42		91	5	0	Career development	.80		23	0	0
Item 3	.36		105	4	0	PEI	.40		77	2	0	Career development	.66		25	1	0
Item 4	.21		131	11	2	PEI	.26		137	8	0	Job content	.31	.40	60	1	0
Item 5	.36		110	2	0	PEI	.41		101	1	0	Job content	.49		52	0	0
Item 6	.25		64	3	1	PEI	.24		58	3	0	Job content	.38		37	0	0
Item 7	.34		84	1	0	PEI	.35		68	2	0	Job content	.43		36	0	0
Item 8	.39		117	4	0	PEI	.44		89	0	0	Social atmosphere	.67	.73	45	1	0
Item 9	.37		96	4	0	PEI	.39		95	5	0	Social atmosphere	.75		55	0	0
Item 10	.41		87	4	0	PEI	.43		78	1	0	Social atmosphere	.75		51	1	0
Item 11	.39		86	3	0	PEI	.42		78	2	0	Social atmosphere	.74		45	0	0
Item 12	.27		136	2	0	PEI	.38		100	4	0	Financial rewards	.67	.68	68	2	0
Item 13	.26		144	9	0	PEI	.36		105	3	0	Financial rewards	.71		52	0	0
Item 14	.29		112	4	0	PEI	.39		100	5	0	Financial rewards	.67		31	0	0
Item 16	.37		104	7	0	PEI	.46		83	0	0	Work-life balance	.56	.57	62	3	0
Item 17	.35		125	6	0	PEI	.42		96	5	0	Work-life balance	.60		60	0	0
Item 18	.29		121	4	0	PEI	.38		93	2	0	Work-life balance	.59		50	1	0
Item 19	.35		114	1	0	PEI	.40		116	3	0	Work-life balance	.53		75	2	1
Item 20	.30		117	7	0	PEC	.35	.40	110	8	0	In- and extra-role behavior	.47	.59	73	2	0
Item 21	.40		88	3	0	PEC	.46		69	1	0	In- and extra-role behavior	.66		26	0	0
Item 22	.39		86	2	0	PEC	.45		69	5	0	In- and extra-role behavior	.65		50	1	0
Item 23	.41		87	3	0	PEC	.47		73	2	0	In- and extra-role behavio	.62		65	1	0

(Table 3 continues)

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Table 3 (continued)

One-dimension						Two-dimensions						Ten- dimensions					
Item	H_j	H	#ac	#vi	#zsig		H_j^d	H^d	#ac	#vi	#zsig		H_j^d	H^d	#ac	#vi	#zsig
Item 24	.35		108	3	0	PEC	.40		83	6	0	In- and extra-role behavior	.55		63	1	0
Item 25	.41		95	0	0	PEC	.44		93	3	0	In- and extra-role behavior	.57		73	4	0
Item 26	.30		88	1	0	PEC	.36		69	3	0	Flexibility	.60	.67	31	2	0
Item 28	.29		108	1	0	PEC	.39		83	0	0	Flexibility	.72		23	0	0
Item 29	.29		134	1	0	PEC	.37		128	4	0	Flexibility	.67		37	0	0
Item 30	.29		121	2	0	PEC	.37		97	2	0	Ethical behavior	.61	.68	38	0	0
Item 31	.32		98	3	0	PEC	.43		76	0	0	Ethical behavior	.73		23	0	0
Item 32	.34		89	3	0	PEC	.45		71	0	0	Ethical behavior	.73		25	0	0
Item 33	.38		73	3	0	PEC	.47		86	2	0	Ethical behavior	.66		28	1	0
Item 35	.29		135	9	2	PEC	.32		112	8	0	Loyalty	.40	.40	24	3	2
Item 36	.28		137	20	3	PEC	.32		112	8	0	Loyalty	.40		24	4	1
Item 37	.32		118	6	0	PEC	.39		91	4	1	Employability	.70	.70	22	0	0
Item 38	.31		122	3	0	PEC	.36		112	4	0	Employability	.70		24	1	0
Total			3786	142	8				3188	113	1				1504	32	4

Note. H(s) = Lovinger's H scalability coefficients for subscales; H_j = item scalability coefficient; H_j^d = scalability coefficient of item j belonging to subscale d; H^d = scalability coefficient of subscale d; #ac = number of comparisons; #vi = the number of times the assumption is violated; #zsig = the number of significant violations; PEI = perceived employer inducement; PEC = perceived employee contributions.

a standardized version of the LD statistics based on Cramer's V is provided by the MIRT package (Chalmers, 2012). A value not greater than .21 is fixed as a threshold for considering an association between pairs of items "nonrelevant."

Table 4 lists for each model how many time Cramer's V statistics assumes an absolute value greater than .21 (number of positive flags) (Stucky & Edelen, 2015; Toland et al., 2017). A first inspection of these results suggests the inadequacy of the Multi-Ten-GRM (M3) and Bifac-Ten-GRM (M5) solutions for modelling PCCQ and identifies the Bifac-Two-GRM (M4) and the Multi-Two-GRM (M2) as the ones which show a better tenability of the local independence assumption. However, the closeness in the number of observed positive flags for the Uni-GRM (M1), Multi-Two-GRM (M2), and Bifac-Two-GRM (M4) would suggest to further investigate the characteristics of these models and the structure of LD violation. Specifically, the inspection of the LD matrices in the three models suggests that positive flags are always observed between pairs of items related to the same domain of the 10 content subscales. Inspecting in detail the structure of the LD matrices it arises that in the Bifac-Two-GRM (M4) in 16 out of 22 of the pairs which show a positive flag the detected association can be considered weak (between $0.21 \leq V \leq .25$) whereas only in six out of 22 pairs — namely 2-1, 10-9, 11-9, 20-24, 26-27, 35-34 — Cramer's V statistics shows a moderate association ($V > .25$; with the highest value equal to .43). An investigation of the LD matrices of the Multi-Two-GRM (M2) and the Uni-GRM (M1) shows that in both cases the number of positive flags which signal moderate association ($V > .25$) is higher than in the Bifac-Two-GR (M4), respectively, 10 out of 23 for the M2, and 15 out of 31 for the M1. These first findings highlight the Bifac-Two-GRM (M4) as the one which guarantees lower issues in terms of tenability of the LD assumption and suggest that refining the scale by removing some items should lead to an improvement of the overall instrument proprieties.

Evaluating Item Fit and Global Model Fit and Selecting the Best Model

The adequacy of the functional form assumed by the five competing models is investigated using goodness-of-fit statistics at item and global level. The fit of each item to the model was examined by assessing the closeness between the model predicted (expected) and observed (empirical) response probabilities using the $S - \chi^2$ statistics for unidimensional and multidimensional models (Orlando & Thissen, 2000, 2003) implemented in the MIRT package (Chalmers, 2012). A significant departure between the two frequencies shows a violation of the assumption.

For each model, Table 3 summarizes the numbers of items in which the assumption holds. Results confirm the bad itemfit of the Ten-GRM (M3) and Bifac-Ten-GRM (M5) and highlight the best performance of the Bifac-Two-GRM (M4). However, 34 out of 35 items adequately fit also under the Uni-GRM (M1) and Multi-Two-GRM solutions (M2). Specifically, the items which are not well represented by the model are Item 6 in the Uni-GRM (M1) and Item 30 in the Two-GRM (M2).

The global fit of the models to the sample data was evaluated using a bunch of goodness-of-fit statistics which allow comparisons in relative and absolute terms. Next to the traditional statistics used for model comparisons in relative terms — Bayesian information criterion (BIC) and the Akaike information criterion (AIC) — specific statistics used in IRT and structural equation modelling framework, such as the Cai & Hansen's (2013) M_2* limited-information statistics and the root

TABLE 4
Results from the tested models' fit to the 35 items estimated using MIRT in R (T2)

Models	M1 Uni-GRM	M2 Multi-Two-GRM		M3 Multi-Ten-GRM	M4 Bifac-Two-GRM		M5 Bifac-Ten-GRM
Estimation Method	MML	MML	MHRM	MHRM	MML	MHRM	MHRM
# Items	PC-35	PC-35	PC-35	PC-35	PC-35	PC-35	PC-35
# of positive LD pairs flagged (Cramer's V > |.21|)	31	23	24	591	22	17	594
# of negative LD pairs flagged (Cramer's V > |.21|)	3	4	4	1	7	9	1
# of items fit by model (S – χ^2)	33 (35*)	34 (35*)	35	0	35	34	0
# of parameters	175	176	176	220	210	210	210
# latent traits	1	2	2	10	3	3	11
M_2*	3279.966	2297.89	2280.877	3597.031	1431.5	1494.09	9097.783
$df(M_2*)$	456	455	455	411	421	421	421
p-value (M_2*)	.000	.000	.000	.000	.000	.000	.000
RMSEA	.110	.089	.088	.123	.068	.070	.200
RMSEA_5	.106	.085	.085	.119	.064	.066	.196
RMSEA_95	.113	.092	.092	.126	.072	.074	.203
SRMSR	.106	.095	.095	.232	.083	.083	.324
AIC	43034.97	42267.69	42281.25	40208.96	41049.57	41033.92	40728.64
BIC	43773.79	43010.76	43024.32	41134.61	41937	41921.36	41616.08

Note. MML = marginal maximum likelihood; MHRM = Metropolis-Hastings Robbins-Monroe algorithm; RMSEA = root mean square error of approximation; SRMSR = standardized root mean square errors; AIC = Akaike information criterion; BIC = Bayesian information criterion.

mean square error approximation (RMSEA) indexes based on M_2*, are computed. RMSEA assumes values between 0-1; lower values indicate a better model fit. In addition to the RMSEA also the standardized root mean square errors (SRMSR) is considered. The following cut-off criteria were adopted: RMSEA < .05 and SRMSR < .06 for good model fit; RMSEA < .06 and SRMSR <.08 for adequate model fit; RMSEA < .08 and SRMSR < .10 for acceptable model fit (Hammer & Toland, 2016; Maydeu-Olivares & Joe, 2006, 2014). Comparisons in terms of AIC and BIC were carried out only across models which show an acceptable tenability of IRT assumptions and items and model statistics.

Table 4 displays a summary of these measures. Limiting the comparisons in terms of global fit to the three competing models which show a satisfactory tenability of the IRT assumptions (M1, M2, and M4), the championed model is, according to the two global-fit indexes, the Bifac-Two-GRM (M4; RMSEA = .068; SRMSR = .083), followed by the Multi-Two-GRM (M2; RMSEA = .088; SRMSR = .095) and the Uni-GRM (M1; RMSEA = .110; SRMSR = .106). The value of the RMSEA and its related 90% confidence interval confirm that the model fits the data more than adequately, whereas the value of the SRMSR signals an acceptable model fit. Also relative differences in model fit show that the PCCQ best conforms to a bifactor structure with one general and two specific latent traits, rather than a two-dimensional (ΔAIC = 1,233.77 and ΔBIC = 1,098.40, between M4 vs. M2), or a unidimensional structure (ΔAIC = 2,001.05 and ΔBIC = 1,852.43, between M4 vs. M1). Convergent and divergent validity of the general latent trait values θ^G obtained using M4 was assessed by looking at the correlations of the general latent trait values of the PCCQ scale with the three components of organizational commitment, satisfaction with training, and turnover intent (see Table 5).

TABLE 5
Correlation coefficients between general and/or specific latent traits
and other external variables (T2 dataset)

	Psychological contract GENERAL	Psychological contract SPECIFIC PEI	Psychological contract SPECIFIC PEC
Affective commitment	.444***	.151***	.181***
Normative commitment	.314***	.093**	.143***
Continuance commitment	–.184***	–.133***	–.018
Satisfaction with training	.518***	.205***	.150***
Turnover intent	–.422***	–.103**	–.118***
Psychological contract (GENERAL)	1.000	.058	–.018
Psychological contract (SPECIFIC PEI)	.058	1.000	.071
Psychological contract (SPECIFIC PEC)	–.018	.071	1.000

Note. PEI = perceived employer inducement; PEC = perceived employee contributions.
*** < .01. ** < .05.

The general and specific latent trait values were estimated using expected a posteriori (EAP) method in MIRT package (Chalmers, 2012; Embretson & Reise, 2000). Coherently with our hypotheses, correlations in Table 5 provide evidence of a significant positive association of

the general latent trait values with the affective and normative components of the organizational commitment and satisfaction with training, thus confirming the convergent validity of the PCCQ; and a significant negative association with the continuance commitment (although weak) and turnover intent, thus confirming the divergent validity of the PCCQ. Moreover, the weak association of the same variables (affective and normative components of the organizational commitment and satisfaction with training) with the specific latent traits confirm that these two latent traits mainly capture nuisance factors.

Validating Main Findings on T1

Once the dimensionality of the PCCQ had been assessed on T2, we adopted dataset T1 only to confirm the findings arose from T2 in terms of item dimensionality structure and thus to inspect the possibility of generalizing the tenability of observed results over time. For this reason, the analyses were constrained only to comparisons between the results of the main competing models, namely M1, M2, and M4, whereas M3 and M5 were not further considered because unsuitable to describe the factor structure in T2. Table 6 replicates for dataset T1 the results listed in Table 4. Findings emerging from the analysis of T1 are completely in line with the main findings of T2 and confirm that the championed model, in terms of global model fit statistics and tenability of the IRT assumption, is M4. No differences are detected in the three models in terms of item-fit statistics. The value of the RMSEA and its related 90% confidence interval showed that the bifactor model ensures a good model fit which is also confirmed by the improvement of the SRMSR with respect to the two competing models. Moreover, also relative comparisons in model fit (see differences in AIC and BIC) show that the PCCQ scale best conforms to a bifactor structure with one general and two specific latent traits, rather than a two-dimensional or a unidimensional structure.

DISCUSSION

The psychometric analyses presented here show that psychological contract is a single latent construct, able to describe the general perception that employees have about their relationship with the organization and reciprocal obligations. Analysis results regarding the psychometric properties of the scale showed that the PCCQ can investigate the two dimensions of the psychological contract, although the two dimensions are the result of individual perceptions, that is to say that the scale can capture through one perception two perspectives, thus allowing to analyze how employees perceive both their contribution to the organization and the contribution of their employer toward them. The bifactor model structure confirms that the psychological contract is a holistic construct, that is, with one general and two specific latent traits, rather than a two-dimensional or a unidimensional structure in which the two dimensions (employer inducements and employee contributions) are perceived by subjects as referring to one perspective. Basically the structure of the bifactor model emphasizes the subjective perspective, taking into account the employees' perception of the obligations of both parties (Freese & Schalk, 2008; Rousseau, 1990), seizing the importance of the balance between mutual obligations as a central process of the psychological contract.

TABLE 6
Results from the tested models' fit to the 35 items estimated using MIRT in R (T1)

Models	M1 Uni-GRM	M2 Multi-Two-GRM	M4 Bifac-Two-GRM
Estimation Method	MML	MML	MML
# Items	PC-35	PC-35	PC-35
# of positive LD pairs flagged (Cramer's V > |.21|)	14	14	11
# of negative LD pairs flagged (Cramer's V > |.21|)	0	0	1
# of items fit by model (S – χ^2)	35	35	35
# of parameters	175	176	210
# latent traits	1	2	3
M_2*	2174.819	1750.045	1003.365
$df(M_2*)$	458	457	423
p-value (M_2*)	.000	.000	.000
RMSEA	.093	.081	.056
RMSEA_5	.089	.077	.052
RMSEA_95	.097	.085	.061
SRMSR	.097	.183	.071
AIC	32443	32137.45	31376.27
BIC	33144.36	32842.88	32220.34

Note. MML = marginal maximum likelihood; RMSEA = root mean square error of approximation; SRMSR = standardized root mean square errors; AIC = Akaike information criterion; BIC = Bayesian information criterion.

Having both perspectives in mind allows employees to constantly adjust their attitudes and behaviors in response to possible changes at work. In addition, the model highlights that, although the specific content areas of the subdimensions are important, all in all, they acquire a sense of unity with respect to the "psychological contract" that employees feel to have with their organization. This result seems to support the possibility (and necessity) of adapting the content areas to the specific work contexts to be analyzed in order to provide a better fit with main obligations, at the same time grasping the basic feature of the psychological contract construct, and thus allowing the generalizability of results among contexts.

Further, the main findings of the analyses repeated on the two surveys (T1 and T2) confirm that the PCCQ scale best conforms to a bifactor structure rather than a two-dimensional or a unidimensional structure both in early socialization stage and in subsequent months. The stability of the scale that emerged from our data is important above all considering that psychological contract is a dynamic construct that changes during work life, as PCCQ allows to track contract changes over time. However, the assessment of the PCCQ characteristics in terms of items (intercept and slope) and persons parameters and the invariance of the results over time is beyond the scope of this paper.

Limitation and Future Research

Of course, the present study has limitations. First of all, choosing only one organization resulted in having a very homogeneous sample. This approach helped us keep social, demographic, and professional variables consistent, but it did not allow more general findings regarding the target population (i.e., employees) also limiting the external validity of the scale. As we were interested in the assessment of individual factors affecting newcomers' psychological contracts and in the subjective mechanisms affecting changes in psychological contracts, we exclusively focused on the individual level of analysis, while ignoring possible influences of the organizational context. Considering the fact that our sample consisted of employees of a single and a specific organization (i.e., public organization, permanent employment contract, military context), it would be appropriate to test the scale in other organizational contexts. For the reason above, we believe that future researches should include additional Italian samples of employees working in different types of organization (Lo Presti & Nonnis, 2014), or with different forms of employment contract (Falco, Dal Corso, De Carlo, & Di Sipio, 2008) or conduct cross-cultural studies between different organizational contexts.

The second important limitation of this study is that the scale we administered was with 35 items instead of the original 38 items. Although this was a necessary adaptation to the specific context, as literature suggests (Freese & Schalk, 2008), and albeit we preserved the 10 subdimensions composing the questionnaire, further studies should confirm the structure of the scale also including the three missing items. Finally, using a cross-sectional and self-report assessment methodology might have had negative effects on the assessment quality of the dimension under scrutiny, though we were primarily interested in employees' perceptions and subjective evaluations of their employment relationship, so the use of self-report data is justified. However, this justification does not eliminate the potential problems of common method variance due to single-source bias and of socially desirable responding (Crampton & Wagner, 1994). To conclude, assessing the nature of psychological contract by examining its underlying dimensions offers the potential to study employment relationships across persons and settings. Certainly, further studies should check the invariance over times and the persistence of this stability in more time, taking into account not only the entry phase in the work context but also the subsequent ones. Further investigations are recommended in order to assess the explicative contribution of both general and specific factor scores in depicting differences among respondents (see DeMars, 2006; Stucky & Edelen, 2015) and if these differences are stable over time.

Practical Implications

Understanding newcomers' beliefs about the terms of their employment relationship is important from a managerial viewpoint since this will allow organizations, and especially human resource professionals responsible for recruitment and selection, to take into account and to actively manage the factors affecting employees' perceptions of the terms of their psychological contract (De Vos, 2002). In line with social exchange theory (Blau, 1964), activating a good psychological contract affects the way the employment relationship develops. According to Rousseau and Greller (1994), human resource processes and practices within organizations determine,

to a large extent, the relationship between employer and employee. As a matter of fact, during the encounter phase newcomers experience the real demands at work, in exchange for rewards such as salary, promotions, and recognition (De Vos, 2002). This is the stage in which the psychological contract is formed and reliability is actively being tested (Nelson, Quick, & Joplin, 1991). Especially during the early stage of entry, psychological contract could serve as a protective function for the new employees, facilitating the development of positive attitudes (i.e., organizational commitment).

NOTES

1. If for a respondent to overcome category *k* of item *Yj* is expected to be easier than to overcome category *k'* of item *Yj'* than it is expected that $P(Yj > k) > P(Yj' > k')$ for any latent trait value**.**

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