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# A Multifoci Person-Centered Perspective on Workplace Affective Commitment: A Latent Profile/Factor Mixture Analysis

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## Abstract

The current study aims to explore the usefulness of a person-centered perspective to the study of workplace affective commitment (WAC). Five distinct profiles of employees were hypothesized based on their levels of WAC directed toward seven foci (organization, workgroup, supervisor, customers, job, work, and career). This study applied latent profile analyses and factor mixture analyses to a sample of 404 Canadian workers. The construct validity of the extracted latent profiles was verified by their associations with multiple predictors (gender, age, tenure, social relationships at work, workplace satisfaction, and organizational justice perceptions) and outcomes (in-role performance, organizational citizenship behaviors, and intent to quit). The analyses confirmed that a model with five latent profiles adequately represented the data: (a) highly committed toward all foci; (b) weakly committed toward all foci; (c) committed to their supervisor and moderately committed to the other foci; and (d) committed to their career and moderately uncommitted to the other foci; (e) committed mostly to their proximal work environment. These latent profiles present theoretically coherent patterns of associations with the predictors and outcomes, which suggests their adequate construct validity.

## Keywords

workplace affective commitment, multifoci, mixture modeling, latent profile analysis, factor mixture analysis, person-centered

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Since Porter, Steers, Mowday, and Boulian (1974) defined workplace affective commitment (WAC), many refinements have been incorporated into this concept. The study of WAC was initially limited to employees' commitment to their organization as an undifferentiated entity, and Reichers (1985) was the first to suggest that, given the coalitional nature of organizations, employees may be differentially committed to different work-related entities (or foci). She proposed that WAC reflects a "process of identification with the goals of an organization's multiple constituencies" (Reichers, 1985, p. 465), such as supervisors or colleagues. She noted that the advantage of this concept was that it provided a more realistic perspective, taking into account the possibility that an employee could face conflictual commitments to multiple foci. Building in part on this concept, Morrow (1993) noted that some of the proposed foci were redundant and insufficiently distinguishable, whereas others were not relevant to the majority of employees. She proposed to focus on four "universal/generic" foci of WAC (organizational commitment, career commitment, job involvement, and work ethic endorsement).

Within the scientific literature, eight generic foci of WAC could be consistently identified: organization, supervisor, workgroup, customers, work (i.e., work ethic endorsement), tasks, career, and profession (Cohen, 2003; Morrow, 1993; Randall & Cote, 1991; Stinglhamber, Bentein, & Vandenberghe, 2002).<sup>1</sup> However, a recent study (Morin, Madore, Morizot, Boudrias, & Tremblay, 2009) revealed that two of those foci (tasks and profession) can hardly be distinguished empirically but rather formed a single construct: employees' WAC to their job. Numerous studies supported the differential predictive validity of those foci and showed that considering them simultaneously improved the prediction of work outcomes, such as in-role performance (i.e., work efficiency: employees efforts to reliably perform the tasks that are required from them), organizational citizenship behaviors (OCBs)<sup>2</sup> and lower turnover intent (Becker, 1992; Becker, Billings, Eveleth, & Gilbert, 1996; Bentein, Stinglhamber, & Vandenberghe, 2002; Cohen, 2003; Somers & Birnbaum, 1998; Stinglhamber et al., 2002). Many variables were also found to predict WAC (Meyer, Stanley, Herscovitch, Topolnytsky, 2002), such as workplace satisfaction (Clugston, 2000; Fullagar & Barling, 1991), employees' workplace relationships (Bishop & Scott, 2000; Vandenberghe, Bentein, & Stinglhamber, 2004), age and tenure (Beck & Wilson, 2000; Meyer, Allen, & Smith, 1993), and organizational justice perceptions (Aryee, Budhwar, & Chen, 2002; Kacmar, Carlson, & Brymer, 1999). Unfortunately, few studies included more than two or three foci at a time (Cohen, 2000; Stinglhamber et al., 2002) or verified whether the relations changed according to specific foci (Cohen, 1993; Vandenberghe et al., 2004).

Although recent studies shed some light on these relationships through increasingly sophisticated statistical procedures (Bentein, Vandenberg, Vandenberghe, & Stinglhamber, 2005; Bishop & Scott, 2000; Eby, Freeman, Rush, & Lance, 1999), many unknowns remain. For instance, the fact that most studies relied on *variable-centered* analyses (e.g., multiple regression or structural equation modeling) means that their results represent a synthesis (or averaged estimate) of the relationships observed in every individual from the sample under study, without systematically considering the possibility that these relationships may meaningfully differ in subgroups of participants. Results from variable-centered analyses are obviously very important in their own right, but they simply ignore the fact that the participants may come from different subpopulations in which the observed relations between variables may differ, quantitatively and qualitatively. Conversely, *person-centered analyses* strive to identify distinct profiles of employees (i.e., a typology; see Bailey, 1994; Bergman, 2000; Magnusson, 1998). Typologies, or taxonomies, represent classification systems designed to help categorize individuals more accurately into qualitatively and quantitatively distinct profiles (Bailey, 1994; Bergman, 2000; Magnusson, 1998). A WAC typology would thus consist in the classification of employees into groups so that those within a group have a similar configuration on a set of WAC foci, while displaying a profile that is qualitatively and quantitatively distinct from other groups' profiles. Although this desire to classify has long existed in psychology

(e.g., Allport, 1937), it is fairly recent in the field of WAC (Becker, 1992; Meyer & Herscovitch, 2001; Meyer, Stanley, et al., 2002; Reichers, 1985). Interestingly, person-centered analyses are potentially the most effective way of verifying Reichers' (1985; see also Gouldner, 1958) hypothesis that employees could face conflictual commitments to multiple foci. Recently, the development of more accessible statistical methods for clustering multivariate data has facilitated the search for profiles of WAC.

Reichers' (1985) propositions received indirect support from variable-centered analyses testing interactions among bases or foci of commitment (Jaros, 1997; Meyer, Paunonen, Gellatly, Goffin, & Jackson, 1989; Randall, Fedor, & Longenecker, 1990; Snape & Redman, 2003; Somers, 1995) or from those comparing subgroups of employees identified according to midpoint splits on commitment variables (Baugh & Roberts, 1994; Carson, Carson, Roe, Birkenmeier, & Philips, 1999; Cohen, 2003; Fullagar & Barling, 1991; Herscovitch & Meyer, 2002; Lipponen, Helkama, Olkkonen, & Juslin, 2005; Magenau, Martin, & Peterson, 1988; Somers & Birnbaum, 2000). These studies show that WAC foci interacted in the prediction of workplace behaviors and attitudes and thus should not be studied in isolation. Indeed, these studies show that the effects of employees' WAC to a specific focus changed according their levels of WAC to other foci in a manner that could not be anticipated from analyses in which single focus of WAC were considered. However, those studies present some limitations, the main one arguably being their reliance on artificially or theoretically created subgroups, which may not exist naturally or may conceal other potentially important subgroups, such as moderately committed employees (Sinclair, Tucker, Cullen, & Wright, 2005).

The few studies that attempted to study workplace commitment through person-centered analyses found that meaningful profiles, distinct from those created on the basis of midpoints splits, could be identified (Becker & Billings, 1993; Sinclair et al., 2005; Swailes, 2004; Wasti, 2005). Another advantage of person-centered analyses is that they can more easily reveal complex interactions among multiple foci of WAC than standard analyses (multiple regressions, analysis of variance [ANOVA], etc.), for which interaction effects among more than three variables are very seldom analyzed. In their pioneering work, Becker and Billings (1993) identified four profiles of employees through cluster analyses applied to four foci of WAC: (a) uncommitted employees, who were committed toward none of the foci (18.7%); (b) committed employees, who were committed toward the four foci (25.1%); (c) locally committed employees, who were highly committed to their supervisors and workgroups (10.1%); and (d) globally committed employees, who were highly committed to their organization and to top management (46.1%). Those profiles could also be differentiated on the basis of multiple additional variables not used in the clustering process, such as job satisfaction, OCB, tenure, age, intent to quit, and so on. Ten years later, Swailes (2004) attempted to replicate those results within two samples of accountants and succeeded in doing so in the first sample. However, he failed to replicate the local and global profiles in the second sample and found two new profiles: one with employees committed to their supervisor only and one with employees committed to their workgroups only.

Although cluster analyses are an interesting tool for the study of employees' profiles, they present a number of limitations (Milligan & Cooper, 1987; Speece, 1994): (a) they provide no clear guideline to help in identifying the correct number of clusters in the data; (b) their results may vary according to the retained clustering algorithm and are sensitive to measurement scales and distributions, and even to the ordering of cases in the data; and (c) they rely on rather rigid assumptions (i.e., conditional independence, class-invariant variances, etc.) that often prove unrealistic with real-life data. Recent developments in mixture modeling (e.g., Muthén, 2002; Muthén & Shedden, 1999; Vermunt & Magidson, 2002) offer interesting ways of circumventing those limits while remaining in line with the fundamental goal of cluster analyses. For instance, latent profile analysis (LPA; the continuous indicators version of latent class analysis) represents a model-based approach to clustering that offers advantages over cluster analyses (Magidson & Vermunt, 2004; Vermunt &

Madgidson, 2002). For instance, LPA allows for the direct specification of alternative models that can be compared with various fit statistics. Moreover, those models need not rely on the rigid assumptions of cluster analyses. Rather, they allow for the evaluation of the relative fit of models in which these assumptions are progressively relaxed. Mixture models also allow for the simultaneous inclusion of continuous, ordinal, and categorical measurement scales in the same model (McLachlan & Peel, 2000; Muthén & Muthén, 2008). Finally, LPA allows for the direct inclusion of covariates (or predictors) in the models. Although these covariates should not define or qualitatively change the profiles per se (Marsh, Lüdtke, Trautwein, & Morin, 2009), this helps to limit Type I errors by combining analyses (the profiles and all of the relationships are estimated in a single step) and have been shown to systematically reduce biases in the estimation of the model parameters, especially those describing the relationships between the predictors and the latent profiles (which otherwise tended to be underestimated; Bolck, Croon, & Hagenars, 2004; Clark & Muthén, 2009; Lubke & Muthén, 2007). For a detailed comparison of cluster analyses and LPA or related models, the interested reader is referred to Magidson and Vermunt (2002).

Unfortunately, to our knowledge, mixture models have still not been applied to the study of WAC. Only one study applied a similar procedure to the study of WAC (Scarborough & Somers, 2006). However, this study incorporated multiple covariates directly in the clustering algorithm, thus yielding results that are difficult to transpose directly to the study of WAC (e.g., at least two profiles are differentiated mostly by withdrawal cognitions rather than by foci of WAC). Clearly, the identification of WAC profiles would be an important improvement in the field of human resources management and organizational psychology. Indeed, results regarding employee profiles are easier to communicate to managers and make cognitively more sense than abstract results from variable-centered multivariate analyses. Additionally, identifying WAC profiles may serve as a first step in the development of differential strategies targeting specific profiles of employees.

## The Current Study

The main objective of the current study is to identify distinct profiles of employees based on their levels of WAC directed toward seven foci (organization, supervisor, workgroup, work, customers, job, and career). To this end, LPA will be used. However, the advantages of LPA do not offset the need to assess the construct validity of the classification (e.g., Bauer & Curran, 2004; Muthén, 2004). This is usually accomplished by verifying whether the identified profiles are related to theoretically meaningful variables not directly used in the classification process. To this end, the associations between the profiles and some of the most commonly cited predictors of WAC (for a review see Meyer et al., 2002) will be verified: gender, age and tenure (e.g., Beck & Wilson, 2000; Meyer et al., 1993), workplace satisfaction (e.g., Clugston, 2000; Fullagar & Barling, 1991), quality of social relationships at work (e.g., Bishop & Scott, 2000; Vandenberghe et al., 2004), and perceived organizational justice (e.g., Aryee et al., 2002; Kacmar et al., 1999). These covariates will be directly included as predictors of latent class membership in the model through a multinomial logistic regression, although they will not be directly included in the classification algorithm.<sup>3</sup>

As a further verification of the construct validity of the profiles, their association with a series of outcomes often related to WAC will also be assessed (for reviews see Cohen, 2003; Meyer, et al., 2002): in-role performance, OCB, and intent to quit (e.g., Becker 1992; Becker et al., 1996; Bentein et al., 2002; Somers & Birnbaum, 1998; Stinglhamber et al., 2002).

This study sets out to investigate a relatively new domain (a person-centered approach to modeling relationships between multiple foci of WAC) and, as such, is essentially exploratory. However, our review of the few previous studies still suggested that some general hypotheses can be proposed with respect to the nature of the anticipated profiles. For instance, the results of Becker and Billings (1993), as well as Swailes' (2004, study 1), suggested that at least three distinct profiles should be

identified: (a) one in which employees will be committed toward a majority of WAC foci; (b) one in which employees will be committed toward “global” WAC foci (organization, work, and career); and (c) one in which employees will be committed toward “local”/“proximal” WAC foci (workgroup, supervisor, customers, and job). Although previous studies did not provide theoretical explanations for the last two profiles, they can be related to the traditional distinction between affiliation and achievement motivations from McClelland’s (1987) theory. This theory, as well as others (e.g., Cross & Madson, 1997; Helgeson, 1994), proposes that individuals may present two very distinct orientations toward life: one in which they strive to affiliate with others and to develop/maintain positive relationships and one in which they strive to achieve as much as they can and to overcome personal limits. More precisely, the “global” profile should comprise achievement-oriented employees, whereas the local profile should comprise affiliation-oriented employees.

However, additional results suggest that both the “local” and the “global” profiles may be subdivided and recombined differently. Indeed, previous studies suggest that careerists (employees with a high level of career-related WAC) are committed mostly to themselves and to their personal advancement and will remain in an organization only to the extent that it allows them advancement opportunities (Bolino, 1999; Feldman & Weitz, 1991; Penner, Midili, & Kegelmeyer, 1997; Zellars & Tepper, 2003). Thus, in addition to a more traditional “global” profile of employees (organization and work), a career-advancement profile may also be identified. In fact, it is this profile that will group together the employees with the highest levels of achievement motivation. The other profile (the global–traditional) would comprise employees similar to those described in classical works on protestant work ethic and work centrality (see Morrow, 1993). In support of this proposition, Morin et al. (2009) found very low correlations between career-related WAC and the other foci of WAC.

The results from Swailes’ (2004) second study suggest that the “local” profile may also be subdivided into two distinct profiles, one including employees committed mostly to their supervisors and another with those committed mostly to their workgroups, customers, and job. However, most of the previous work proposing an “opposition” between supervisors and workgroups underlined the role of the supervisors as representatives of the organization, stating that workgroups represent cohesive entities whose goals and values may conflict with those of the organizations or supervisors and who may sometimes have to compete with them to fulfill their needs at work (Cohen, 2003; Roethlisberger & Dickson, 1939/1967; Tajfel & Turner, 1985). It is thus possible that the global–traditional profile includes employees highly committed to work, to their organization, and to their supervisor (as the representatives of the organization). Although this proposition appears to contradict the results of Becker and Billings (1993), it may be that the association they observed between workgroup- and supervisor-directed WAC was made possible only through their simultaneous measurement of WAC directed toward top management, which may have forced employees to artificially dissociate their supervisors from the organization’s decision makers.

Finally, in accordance with Sinclair et al.’s (2005) hypothesis stating that fully uncommitted employees would soon select themselves out the organization, no such profile is proposed. However, because WAC is not the sole reason employees remain in an organization (Meyer, Stanley, et al., 2002), it is possible to propose an additional profile of employees moderately committed toward a variety of foci in an undifferentiated manner. In summary, five profiles are anticipated: those comprising employees (a) highly committed toward a majority of foci; (b) moderately committed toward a majority of foci; (c) committed mostly toward their careers (careerists); (d) with a global–traditional profile (organization, supervisor, and work); and (e) with a local–proximal profile (workgroup, customers, and job).

Given that this study is only the third to apply a person-centered perspective to the study of WAC and the first to do so with more than four foci of WAC, these hypotheses remain preliminary.

Consequently, it would be unrealistic to provide specific hypotheses regarding the relationships that will be obtained between the profiles and covariates.

## Method

### *Participants and Procedure*

Employees (analysts, research specialists, insurance agents, account managers, technicians, call center, and customer services) from three service organizations ( $N = 270$  [insurance company], 170 [pharmaceutical company], and 120 [communications company]) located in Canada were solicited to participate in this study between August and December 2003. The project relied on a Web-based questionnaire and the response rates were quite high (90%, 82%, and 76%). Because the companies wanted to obtain a portrait of their employees' commitment, higher level managers were also given the opportunity to complete the questionnaire. Still, to ensure a minimal level of homogeneity in the samples, and as there were fewer of them ( $n = 55$ ), they were excluded from the analyses. Additionally, 14 participants were excluded due to presenting over 50% of missing data on the WAC questionnaire, leaving a final sample of 404. Most of them were women (65.6%), between 26 and 45 years of age (72.3%) with a postsecondary education (76%), who had tenure of 5 years or less (57.6%) and occupied full-time positions (92.2%).

### *Measures*

**Demographics.** Participants were asked to indicate their gender (coded 0 = *male* and 1 = *female*), their age (1 = *under 25*; 2 = *between 26 and 35*; 3 = *between 36 and 45*; 4 = *between 46 and 55*; 5 = *between 56 and 65*; 6 = *Over 65*), and their tenure in the organization (1 = *less than 1 year*; 2 = *between 1 and 2 years*; 3 = *between 2 and 5 years*; 4 = *between 5 and 10 years*; 5 = *between 10 and 15 years*; 6 = *between 15 and 20 years*; 7 = *more than 20 years*).

**WAC.** The Workplace Affective Commitment Multidimensional Questionnaire (WACMQ; Madore, 2004; Morin et al., 2009) was used to evaluate employees' WAC, defined as employees' emotional attachment to a specific work-related focus and as the importance they attribute to this focus in their daily lives, to seven foci (five items per foci): (a) organization (e.g., "I am proud to say that I work for this organization"); (b) supervisor (e.g., "I feel privileged to work with someone like my supervisor"); (c) workgroup (e.g., "My coworkers make me feel like going to work"); (d) customers (e.g., "In my opinion, the satisfaction of [the organization's] customers is a priority"); (e) job (e.g., "I find the tasks I perform in my current position stimulating"); (f) career advancement (e.g., "It is important for me to move up through the ranks or obtain promotions"); and (g) work in general (e.g., "Work is a priority in my life"). The 35 items are rated on a 7-point Likert scale.

**In-role performance and OCB.** The Behavioral Empowerment Questionnaire (BEQ; Boudrias & Savoie, 2006) was used to evaluate employees' self-determined behaviors aimed at ensuring work effectiveness (in-role performance) or at improving work efficiency within the organization. Two types of behavioral dimensions are measured with this questionnaire. The first one covers in-role performance (the execution of prescribed work behaviors: six items; e.g., "Adequately carry out the tasks related to my job"). The second one comprises 5 subscales and covers the improvement of work efficiency through self-determined behaviors (OCB) targeting: (a) tasks (five items; e.g., "Try to find better ways to achieve my objectives"); (b) workgroup (nine items; e.g., "Help my coworkers do their work"); (c) organization (nine items; e.g., "Propose changes that will have an impact outside my workgroup"); (d) supervisors (five items; e.g., "Keep my immediate supervisor informed of important events which concern him/her"); and (e) customers (five items; e.g., "Project a positive

image of the organization to customers”). The items are rated on a 5-point frequency scale indicating how often the employees exhibited the behaviors in the last 6 months.

*Intent to quit.* Employees’ intent to leave their current job was evaluated with three items (“I will probably look actively for another job soon,” “I often think about resigning,” and “It would not take much to make me resign”) inspired by the scale used by Becker and Billings (1993). These items are rated on a 7-point Likert scale.

*Workplace satisfaction.* Workplace satisfaction was assessed with the Personal Need Non-fulfillment Questionnaire (Cook & Wall, 1980). This questionnaire asks employees whether their work environment fulfills their basic needs in four areas: (a) social (four items; e.g., “The opportunity to talk with others”); (b) recognition (four items; e.g., “Recognition received for your achievements”); (c) autonomy (four items; e.g., “To be able to work without constant supervision”); and (d) self-actualization (four items; e.g., “The chance to learn new things”). These items are rated on a 5-point scale (1 = *I have more now than I really want*; 2 = *It’s just about right*; 3 = *I would like a little bit more*; 4 = *I would like considerably more*; 5 = *I would like very much more*), which was reversed (to represent employees’ satisfaction) and recoded (the first choice was recoded as equivalent to the third because both reflect a slight dissatisfaction). Given the high correlations ( $r = .49-.71$ ; mean = .61 with all subscales presenting at least one correlation over .60 with another subscale) between the four subscales, the scores were combined into a composite workplace satisfaction index.

*Quality of social relationships.* Two subscales were used to evaluate employees’ relations with their supervisor and coworkers (Roy, 1989). On both subscales, employees were asked to qualify, on a 6-point bipolar rating scale, whether their relationships were “distrustful or trustful,” “disdainful or respectful,” and “hostile or friendly.” A fourth item is included in the coworkers’ subscale (“competitive or cooperative”).

*Organizational justice.* Organizational justice was assessed with a composite from two correlated scales ( $r = .64$ ). Procedural justice (PJ) was measured with nine items, adapted from Moorman’s (1991) questionnaire, which assessed whether employees perceive the decision-making processes as fair and transparent, that all parties affected by decisions are involved in the decision-making process and that decisions are applied uniformly to all parties concerned. Distributive justice (DJ) was measured with eight items, among which six were taken from the Distributive Justice Index by Price and Muller (1986). These items assessed whether various forms of rewards are awarded to employees based on merit, objective criteria, efforts, and so on. All items are rated on a 6-point agreement scale. A previous study revealed that both scales possessed satisfactory psychometric properties (Duval, Ménard, Brunet, & Savoie, 2003).<sup>4</sup>

### Analytical Strategy

To determine whether meaningful latent profiles of employees could be identified on the basis of their levels of WAC directed toward seven foci, latent profile analyses (LPA: Bartholomew, 1987; Gibson, 1959; Lazarsfeld & Henry, 1968; Muthén, 2002) and factor mixture analyses (FMA: Lubke & Muthén, 2005) were used. LPA postulates that the correlations between the indicators (foci) may be explained by the presence of a categorical latent variable representing qualitatively and quantitatively distinct latent profiles of employees within the population. By default, traditional LPA assumes conditional independence: conditional on class membership, the residual correlations between the observed variables should be zero (Gibson, 1959; Vermunt & Magidson, 2002). In other words, the latent profiles suffice to explain the correlations between the indicators. However, this

assumption is often too stringent with real-life data, especially when the research question does not necessarily assume the conditional independence of the observations (Vermunt & Magidson, 2002; Uebersax, 1999). In such cases, spurious latent classes may emerge as a way to reconcile the data with these assumptions (Bauer & Curran, 2003). In the current study, this may represent a potentially serious problem given the fact that all of the WAC foci represent interrelated dimensions of a generic WAC construct (e.g., Clugston, Howell, & Dorfman, 2000; Morin et al., 2009; Vandenberghe, Stinglhamber, Bentein, & Delhaise, 2001). Thus, the LPA models were also reproduced within the more flexible FMA framework. FMAs represent a cost-efficient way of including correlations between the indicators by allowing them to be simultaneously related to a categorical latent variable (the LPA model) and to a continuous latent variable (as in the common factor model; Lubke & Muthén, 2005). This method allows for conditional dependence among the indicators in a more parsimonious way (fewer parameters are estimated) than the alternative of directly specifying correlations among the indicators' residuals (e.g., Uebersax, 1999). As mentioned by Marsh et al. (2009), it should be noted that the relaxation of the conditional independence assumption of LPA should only be done in special cases and on the basis of strong theoretical assumption to avoid converging on a model that would reflect capitalization on chance based on atheoretical *ex post facto* modifications. Because the current study aims to identify employee profiles rather than to verify the invariance of the WAC measurement across profiles, all FMA models were specified with a class-invariant factor model in which only the indicators' intercepts were allowed to vary across classes (Lubke & Muthén, 2005). For consistency, LPA models were also specified with class-invariant residuals: the residuals of the WAC foci were allowed to differ from one another within classes but were kept equal between classes.<sup>5</sup>

In the current study, models from 1 to 9 latent profiles were specified. The analyses reported in this study were performed using Mplus 5.1 (Muthén & Muthén, 2008), which relies on the expectation-maximization algorithm of the robust maximum likelihood estimator (MLR) to estimate mixture model parameters (Muthén & Shedden, 1999). An important challenge in mixture modeling consists in avoiding converging on a local solution (i.e., false maximum likelihood). This problem often stems from inadequate start values. It is recommended to estimate the model with multiple random sets of start values (Hipp & Bauer, 2006; McLachlan & Peel, 2000). In this study, 800 random sets of start values were *a priori* requested for each model, with the 40 best retained for the final optimization. All of the reported models converged on a replicated solution and can thus confidently be assumed to reflect a "real" maximum likelihood. To ensure that it did not rely on a local maximum, the final retained model was replicated with 2,000 random sets of start values.

Another important challenge in mixture modeling is determining the number of latent profiles in the data. Clearly, one set of criteria used to guide this decision has to do with the substantive meaning and theoretical conformity of the extracted classes (Marsh et al., 2009; Muthén, 2003). The characteristics of the extracted solution also need to be inspected for statistical adequacy (e.g., absence of negative variance, etc.; Bauer & Curran, 2003). A number of statistical tests and indices are available to help in this decision process (McLachlan & Peel, 2000). First, various distribution-free information criteria based on the model log likelihood may be examined: the Akaike Information Criterion (AIC; Akaike, 1987), the Consistent AIC (i.e., adjusted for sample size and number of parameters; CAIC: Bozdogan, 1987), the Bayesian Information Criterion (BIC: Schwartz, 1978), and the sample-size adjusted BIC (ABIC: Sclove, 1987). A lower value on these indices suggests a better fitting model. The Bayes factor approximation suggests that a BIC difference of 10 points indicates that a given model is 150 times more likely to fit the data than the comparison model (Raftery, 1995). Additional indices include the entropy, which indicates the precision with which the cases are classified into the various extracted latent profiles (Ramswamy, DeSarbo, Reibstein, & Robinson, 1993). The entropy should not in itself be used to determine the model with the optimal number of classes, but it is nevertheless important because it summarizes the extent to which a



model generates classification errors (Henson, Reise, & Kim, 2007; McLachlan & Peel, 2000). There is no consensus regarding a cutoff value for the entropy, but the larger the value and closer to 1, the less classification errors in the model. Conversely, the ICL-BIC (Integrated Classification Likelihood-BIC), a BIC adjusted for the entropy of the model (McLachlan & Peel, 2000), might be used as another guideline in the choice of the optimal model and is interpreted as the previously presented information criteria. Finally, although classical likelihood ratio tests are inappropriate in the context of mixture models, two approximations of these tests were proposed: the Likelihood Ratio Test (LRT) by Lo, Mendel, and Rubin (2001; LMR), which compares a  $k$ -class model with a  $k-1$ -class model,<sup>6</sup> and the Bootstrap Likelihood Ratio Test (BLRT; McLachlan & Peel, 2000), a parametric LRT test obtained through resampling methods (in this study, 100 bootstrap samples were drawn for each model). Significant  $p$  values for both the LMR and BLRT indicate that the  $k-1$ -class model should be rejected in favor of a  $k$ -class model.

Recent simulation studies indicate that the ABIC, CAIC, BIC, and BLRT appeared particularly effective in choosing the model which best recovers the sample's true parameters in LPA and FMA, especially those relying on smaller samples to estimate complex models, as is the case in this study (Nylund, Asparouhov, & Muthén, 2007; Yang, 2006). Recent additional simulation studies conducted on different types of mixture models support those results and add that the ICL-BIC may also be effective (Henson et al., 2007; McLachlan & Peel, 2000; Tofighi & Enders, 2008). It should be noted that those studies also show that, when the indicators fail to retain the optimal model, the AIC, ABIC, LMR, and BLRT tend to overestimate the number of classes, whereas the BIC and CAIC tend to underestimate it.

Once the final model with adequate number of classes was chosen, predictors were incorporated directly into this model to predict class membership through a multinomial logistic regression. This method presents two advantages. First, including the covariates after selecting the best fitting model allows for the verification of the stability of the model following the inclusion of the covariates (Marsh et al., 2009; Tofighi & Enders, 2008). Indeed, the failure to include covariates should not result in a misspecified model, as the covariates are assumed to affect only the class probabilities (also see Marsh et al., 2009). Thus, even though classifications that include covariates should be more accurate (Lubke & Muthén, 2007), the substantive interpretation of the latent profiles should remain unbiased by omission of the class predictors. Indeed, observing such a change would indicate that the assumption that the covariates affect only the latent class probabilities are violated (Marsh et al., 2009). More substantively, the inclusion of covariates in a latent profile model should not change the nature or shape of the observed profiles because such a change would mean that the profiles are dependent on the choice of the predictors, which are in the current case only supposed to validate them. Second, contrary to traditional methods of testing covariates effect after the classification has taken place, directly including covariates into an LPA signifies that covariates effect takes into account the model-estimated posterior probabilities (the estimated probability that each individual has of belonging to each profile). Contrasting with the traditional methods of assigning individuals to a single profile by modal posterior probabilities (group *dichotomies*), the current method avoids the biases associated with the dichotomization of continuous variables (MacCallum, Zhang, Preacher, & Rucker, 2002; Marsh et al., 2009). This method has been shown to systematically reduce biases in the estimation of the model parameters, especially those describing the relationships between the predictors and the latent profiles (Bolck et al., 2004; Clark & Muthén, 2009).

Conversely, outcomes were not incorporated directly into the model, because doing so would involve including them as mixture indicators and would thus allow them to influence the nature of the observed profiles (Petras & Masyn, 2010). Because as many outcomes as WAC foci were considered and since the objective was to use these outcomes to validate the profiles rather than to define them, an alternate method was preferred. Mplus recently implemented the AUXILIARY (*e*) function to compare *probabilities*-based profiles on covariates without including them in the

model and without having to rely on a biased three-step approach (e.g., Bolck et al., 2004). Note that auxiliary variables were also named inactive covariates by Magidson and Vermunt (2001). The AUXILIARY function relies on a Wald chi-square test of statistical significance based on pseudo-class draws and tests the equality of outcome means across the various profiles (for more technical introductions, see Asparouhov & Muthén, 2007; Wang, Brown, & Bandeen-Roche, 2005).

As Mplus does not allow for missing data on the covariates, they were imputed with ML estimates using the EM algorithm (Little & Rubin, 2002) of Statistical Package for the Social Sciences (SPSS) 15.0 “missing values” module. Imputed estimates were conditional on all predictors and outcomes used in the study. Given the low levels of missing data, multiple imputation was not warranted: 0%–6.9% (mean = 2.95%,  $SD = 2.54\%$ ) and 0.25%–3.96% (mean = 2.51%,  $SD = 1.10\%$ ) of the participants had missing values on, respectively, the predictors and the outcomes.

Since those have already been presented elsewhere, we do not report all of the relevant equations for the mixture models used in this study. The readers are referred to McLachlan and Peel (2000; also see Muthén & Shedden, 1999) for an extensive review of the relevant equations regarding model estimation and specification for mixture models in general, and LPA in particular, and to Lubke and Muthén (2005) for a presentation of factor mixture models. The Mplus input codes used to estimate this study’s main models are reported in the Appendix. It should be noted that all of the models estimated in the current study could also have been estimated (totally or in part) within other statistical packages such as LatentGOLD, R, Mx, MCLUST, GLIMMIX, EMMIX, or GLLAMM.

## Results

The descriptive statistics (means and  $SD$ s, correlations, and internal consistency coefficients) of the study variables are reported in Table 1, and the fit indices of the LPA and FMA models are reported in Table 2. According to most indicators, the FMAs consistently present a better fit to the data than the LPAs. In fact, only the ICL-BIC suggests that for models with more than six classes, the LPA might be slightly superior to the FMA (the entropy also suggests that the classification quality might be slightly better for the four-class LPM than for the four-class FMA). Solutions from both types of models tend to be substantively similar, although the FMAs’ results were clearer and easier to interpret. In Table 2, most indices suggest the superiority of the five- (CAIC, BIC) or six-class (ABIC, BLRT) FMA, with the exception of the LMR (supporting the three-class model) and the ICL-BIC (supporting the four-class model, but this index is almost identical for the four- and five-class models). Even the AIC that has been consistently shown to result in the overextraction of latent classes (Henson et al., 2007; McLachlan & Peel, 2000; Nylund et al., 2007; Tofighi & Enders, 2008; Yang, 2006) are almost identical for the models comprising six to nine classes (in such cases, the parsimony principle support the six-class model). It should be noted that the entropy values are also higher and almost identical in models comprising six to eight classes. Among the recommended indices (e.g., Nylund et al., 2007; Yang, 2006), two converge on the five-class model (BIC and CAIC: previous simulations show that both tend to underestimate the number of classes when they are wrong) and two converge on the six-class model (ABIC and BLRT: previous simulations show that both tend to overestimate the number of classes when they are wrong). These two models are substantively interpretable according to the hypotheses and yield adequate classifications (i.e., highly distinct latent profiles), with entropy values of 0.886 for the five-class model and of 0.917 for the six-class model, and average posterior probabilities of class membership in the dominant profile varying from .87 to .97 for the five-class model and from .89 to .99 for the six-class model, with very low cross-probabilities (varying from 0 to 0.110 in the five-class model and from 0 to 0.072 in the six class-model). Finally, the maximum likelihood of the five-class FMA model was replicated with 10% of the start values retained for final optimisation, in comparison with only 5% for the

Table 1. Descriptive Statistics, Reliability, and Correlations

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1. WAC Organization	1.00																				
2. WAC supervisor	0.42*	1.00																			
3. WAC group	0.46*	0.45*	1.00																		
4. WAC job	0.50*	0.35*	0.32*	1.00																	
5. WAC career	0.26*	0.17*	0.12*	0.19*	1.00																
6. WAC work	0.41*	0.21*	0.23*	0.40*	0.45*	1.00															
7. WAC customers	0.46*	0.22*	0.32*	0.38*	0.25*	0.35*	1.00														
8. Age	0.13*	-0.04	0.05	0.20*	-0.27*	-0.03	0.21*	1.00													
9. Tenure	0.01	-0.20*	0.01	0.13*	-0.23*	-0.09	0.03	0.42*	1.00												
10. Rel. colleagues	0.25*	0.30*	0.56*	0.18*	0.08	0.12*	0.12*	0.03	-0.22	1.00											
11. Rel. supervisor	0.32*	0.73*	0.39*	0.27*	0.14*	0.20*	0.13*	-0.05	-0.10*	0.48*	1.00										
12. Justice	0.45*	0.54*	0.36*	0.34*	0.21*	0.31*	0.24*	0.02	-0.22*	0.35*	0.47*	1.00									
13. Satisfaction	0.17*	0.19*	0.22*	0.22*	-0.26*	-0.13*	0.02	0.10*	0.13*	0.19*	0.19*	0.23*	1.00								
14. In-role perf.	0.28*	0.25*	0.25*	0.19*	0.21*	0.18*	0.31*	0.15*	0.05	0.16*	0.78*	0.11*	0.02	1.00							
15. OCB tasks	0.24*	0.10	0.15*	0.20*	0.29*	0.20*	0.29*	0.04	0.02	0.10	0.10	0.09	-0.09	0.55*	1.00						
16. OCB group	0.17*	0.05	0.11*	0.21*	0.33*	0.19*	0.15*	-0.01	0.07	0.07	0.10*	0.13*	-0.13*	0.22*	0.47*	1.00					
17. OCB organization	0.12*	0.01	-0.02	0.12*	0.28*	0.20*	0.17*	-0.04	0.10	0.04	0.04	0.06	-0.20*	0.05	0.27*	0.54*	1.00				
18. OCB Supervisor	0.09	0.15*	-0.02	0.14*	0.21*	0.11*	0.11*	0.01	0.01	-0.02	0.18*	0.15*	-0.13*	0.12*	0.26*	0.53*	0.55*	1.00			
19. OCB customers	0.21*	0.15*	0.14*	0.24*	0.25*	0.25*	0.38*	0.01	-0.06	0.14*	0.12*	0.15*	-0.70	0.30*	0.38*	0.41*	0.40*	.039*	1.00		
20. Intent to quit	-0.60*	-0.36*	-0.39*	-0.49*	-0.06	-0.23*	-0.49*	-0.10	-0.28*	-0.10	-0.25*	-0.30*	-0.43*	-0.35*	-0.15*	-0.09	-0.02	0.07	0.05	-0.08	1.00
21. Gender	0.10*	0.01	0.02	0.01	-0.21*	-0.02	0.12*	0.18*	0.21*	-0.10	-0.08	0.02	0.10	0.06	-0.05	-0.23*	-0.20*	-0.16*	-0.15*	-0.07	
Mean	4.61	4.30	4.43	3.04	4.20	3.02	5.10	2.75	3.41	4.98	5.08	3.87	3.28	4.73	4.33	3.61	2.24	2.94	3.81	2.40	
Standard deviation	1.76	2.09	1.63	1.59	1.78	1.54	1.65	0.91	1.55	0.93	0.96	0.92	0.60	0.41	0.63	0.80	0.99	0.89	0.85	1.58	
Skewness	-0.43	-0.27	-0.03	0.55	-0.08	0.55	-0.58	0.28	0.54	-1.20	-1.03	-0.40	-1.10	-1.78	-0.93	-0.29	0.85	0.06	-0.75	1.08	
Kurtosis	-0.63	-1.26	-0.49	-0.24	-0.92	-0.32	-0.45	-0.29	0.01	1.58	0.81	0.38	0.98	2.90	0.46	-0.23	0.13	-0.17	0.33	0.31	
Reliability ( $\alpha$ )	0.87	0.91	0.82	0.86	0.85	0.77	0.88	-	-	0.89	0.90	0.94	0.92	0.88	0.85	0.91	0.93	0.81	0.82	0.87	

Note. OCB = organizational citizenship behaviors; WAC = workplace affective commitment.

\*  $p \leq .05$ .

**Table 2.** Fit Indices From Alternative LPA and FMA Models

Model	LL	# parameters	AIC	CAIC	BIC	ABIC	Entropy	ICL-BIC	LMR (p)	BLRT (p)
<b>LPA models</b>										
One class	-2420.990	14	4870	4940	4926	4882	Na	Na	Na	Na
Two classes	-2190.208	22	4424	4534	4512	4443	0.731	4362	< 0.001	< 0.001
Three classes	-2116.336	30	4293	4443	4413	4318	0.779	4217	0.004	< 0.001
Four classes	-2061.962	38	4200	4390	4352	4231	0.828	4159	0.010	< 0.001
Five classes	-2039.039	46	4170	4400	4354	4208	0.829	4132	0.271	< 0.001
Six classes	-2012.128	54	4132	4402	4348	4177	0.809	4072	0.262	< 0.001
Seven classes	-1981.866	62	4088	4398	4336	4139	0.879	4146	0.035	< 0.001
Eight classes	-1964.848	70	4070	4420	4350	4128	0.872	4135	1.000	< 0.001
Nine classes	-1955.532	78	4067	4457	4379	4132	0.821	4061	0.374	0.437
<b>FMA models</b>										
One class	-2130.300	21	4303	4408	4387	4320	Na	Na	Na	Na
Two classes	-2058.818	29	4176	4321	4292	4200	0.847	4206	< 0.001	< 0.001
Three classes	-2030.305	37	4135	4320	4283	4165	0.816	4119	0.017	< 0.001
Four classes	-2004.194	45	4098	4323	4278	4136	0.820	4077	0.133	< 0.001
Five classes	-1959.363	53	4025	4290	4237	4069	0.886	4089	0.199	< 0.001
Six classes	-1936.886	61	3996	4301	4240	4046	0.917	4120	0.083	< 0.001
Seven classes	-1927.924	69	3994	4339	4270	4051	0.921	4146	0.920	0.568
Eight classes	-1918.373	77	3991	4376	4299	4055	0.926	4175	0.710	1.000
Nine classes	-1912.731	85	3995	4421	4336	4066	0.864	4094	0.667	0.221
<b>FMA models with predictors</b>										
Five classes	-1754.248	81	3670	4076	3995	3738	0.912	3880	0.163	< 0.001
Six classes	-1730.715	96	3653	4134	4038	3733	0.914	3913	0.845	< 0.001

Note. ABIC = Adjusted BIC; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = Bootstrap LRT; CAIC = Consistent AIC; FMA = Factor Mixture Analysis; ICL-BIC = Integrated Classification Likelihood-BIC; LL = Log Likelihood; LMR = Log Likelihood; LMR = Lo, Mendel, & Rubin LRT test; LPA = Latent Profile Analysis; LRT = Likelihood Ratio Test.

**Table 3.** Average Latent Class Probabilities (SD) for Most Likely Latent Profile Membership (Row) by Latent Profile (Column)

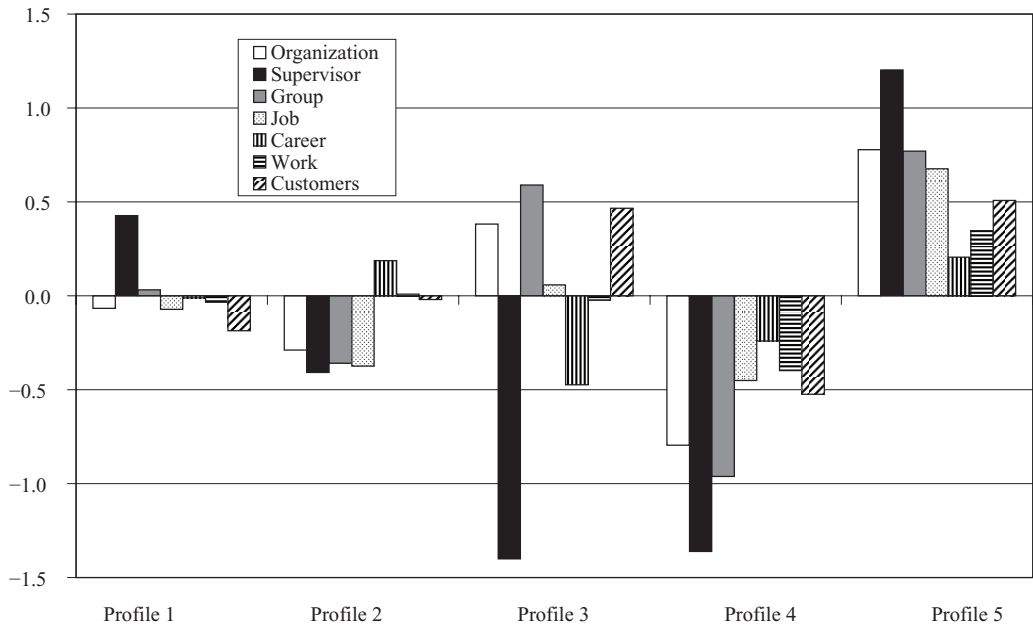
	Latent profile 1	Latent profile 2	Latent profile 3	Latent profile 4	Latent profile 5
Latent Profile 1	0.946 (0.009)	0.026 (0.006)	0.000 (0.000)	0.000 (0.000)	0.029 (0.007)
Latent Profile 2	0.046 (0.011)	0.939 (0.012)	0.002 (0.001)	0.014 (0.006)	0.000 (0.000)
Latent Profile 3	0.000 (0.000)	0.013 (0.011)	0.903 (0.025)	0.084 (0.024)	0.000 (0.000)
Latent Profile 4	0.000 (0.000)	0.026 (0.007)	0.034 (0.009)	0.940 (0.012)	0.000 (0.000)
Latent Profile 5	0.028 (0.007)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.972 (0.007)

six-class model. Although both final models were replicated with an increasing number of start values, this suggests that the five-class model is less likely to have converged on a local maximum.

To help in the final model selection, predictors were added directly to both models (see the bottom of Table 2). This inclusion did not change the characteristics of the profiles, thus confirming their stability (Marsh et al., 2009). However, the various indices from the FMA now tended to show the superiority of the five-class model (CAIC, BIC, ICL-BIC) or were nearly equivalent for both models (ABIC, entropy, LMR, BLRT). In fact, only the AIC, an indicator with a known tendency for overestimation (e.g., Henson et al., 2007; Nylund et al., 2007; Tofighi & Enders, 2008; Yang, 2006), now favors the six-class model. In the five-class model, the entropy value (0.912) again indicates highly distinct profiles, with elevated posterior probabilities of class membership and very low cross-probabilities (see Table 3). Membership in these profiles was not related to the specific organization the employees were working for, either at the level of modal class assignment ( $\chi^2 = 12.586$ ,  $df = 8$ , ns), or at the level of the posterior class probabilities ( $F = 0.281$  to  $2.134$ ,  $df = 2$ , 401; ns).

The level of focus-specific WAC in the five latent profiles of this final model is illustrated in Figure 1. The first latent profile is characterized by employees presenting moderate levels of WAC directed toward the majority of foci and a moderately elevated level of WAC directed toward the supervisor. This “supervisor-committed” profile describes 31% of the employees, 64% of whom are women. The second latent profile is characterized by employees presenting moderately low levels of WAC directed toward the majority of foci, but a moderately high level of WAC directed toward their careers. This “career-committed” profile describes 17% of the employees, 67% of whom are women. The third latent profile is characterized by employees presenting a highly divergent pattern of WAC. This profile describes 7% of the employees, 93% of whom are women. Those employees present very low levels of WAC directed toward their supervisors, low levels of WAC directed toward their careers, average/moderate levels of WAC directed toward their job and work in general, and high levels of WAC directed toward the organization, the workgroup, and the customers. This latent profile will hereafter be referred to as “workplace-committed,” because those employees appear mostly committed to their daily work environment, rather than to their job itself, supervisors, work in general, or career. The fourth latent profile is characterized by employees presenting low (job, career, work, and customers) to very low (organization, supervisor, and workgroup) levels of WAC directed toward all foci. This “uncommitted” profile describes 19% of the employees, 56% of whom are women. Finally, the fifth latent profile is characterized by employees presenting high (career, work, and customers) to very high (organization, supervisor, workgroup, and job) levels of WAC directed toward all foci. This “committed” profile describes 25% of the employees, 70% of whom are women.

The relationships between the various predictors and the five latent profiles, taking the “uncommitted” profile as referent, are reported in Table 4 and illustrated in Figure 2. Most of the covariates (with the exception of age) contribute to the prediction of at least one latent profile. The fact that the pattern of prediction varies in a coherent manner from one latent profile to another suggests adequate



**Figure 1.** Characteristics of the latent profiles on the mixture indicators workplace affective commitment (WAC). *Note.* The results were standardized to help in the interpretation of this histogram.

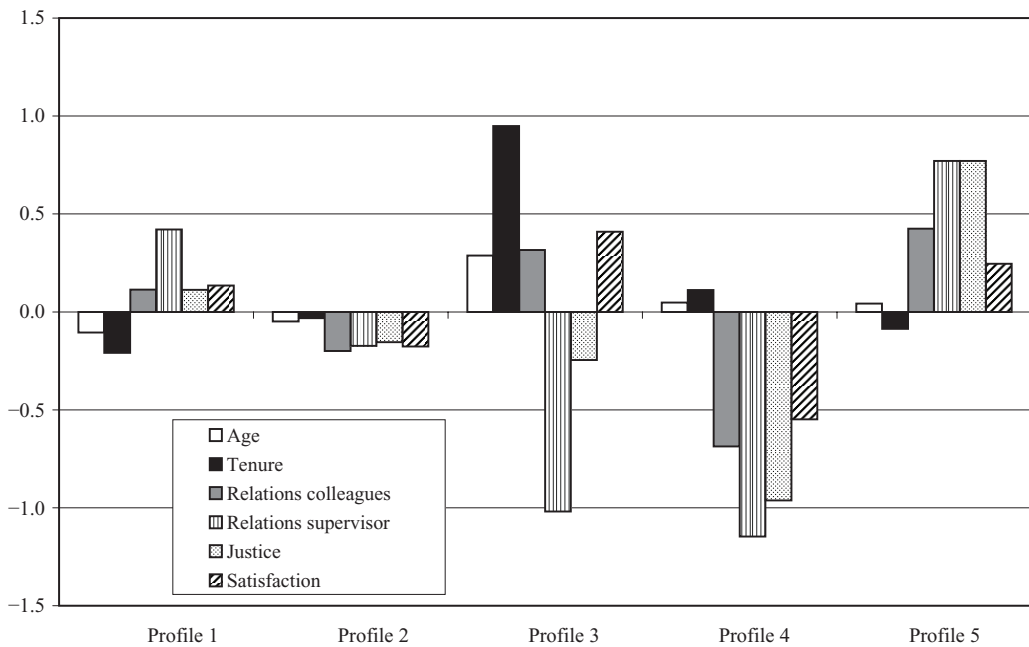
construct validity for the extracted solution. More precisely, the results show that being a woman is associated with a higher probability (significant or marginally significant) of belonging to the first (“supervisor-committed”), second (“career-committed”), third (“workplace-committed”), and fifth (“committed”) latent profiles. This observation reflects the choice of the “uncommitted” latent profile as referent, because the proportion of women in the other profiles is very close to the proportion observed in the overall sample (65.6%). Indeed, additional results in which different referent classes were used (provided by default in Mplus) showed that these four latent profiles (first, second, third, and fifth) presented similar (non-significantly different) proportion of women. Overall, this shows that women are globally more committed than men in general. It should still be noted that the third latent profile remains the one which includes the highest proportion of women. The results also show that tenure, workplace satisfaction, and quality of social relationships with colleagues are associated with a greater probability of belonging to the “workplace-committed” latent profile. Indeed, 47% of the employees from the third latent profile have 5 years or more of tenure (compared to 9%–15% for the other profiles). Those results are consistent with the fact that those employees appear to be committed mostly toward their workplace, which they have occupied for more than 5 years, in which they share fulfilling relationships with their colleagues, and which provide them with a marginally higher level of satisfaction. It should be noted that, although the quality of the relationships that employees from the fifth (“committed”) latent profile share with their colleagues is visually as high as in the “workplace-committed” latent profile, this result did not emerge as significant within the multivariate analyses, suggesting that the differentiation between the fifth latent profile and the others relies mostly on other predictors. Indeed, the results show that the quality of the relationships that employees share with their supervisors, as well as their perception of organizational justice, predict a greater probability of belonging to the first (“supervisor-committed”), second (“career-committed”), and fifth (“committed”) profiles. Those latent profiles are characterized

**Table 4.** Results From the Multinomial Logistic Regression Evaluating the Effects of Predictors on Latent Profile Membership

Predictor	Latent Profile 1			Latent Profile 2			Latent Profile 3			Latent profile 5		
	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Intercept	-20.25 (3.25)**	—	—	-11.07 (2.73)**	—	—	-21.02 (7.38)**	—	—	-34.28 (5.64)**	—	—
Gender	1.24 (0.53)**	3.45	1.22-9.72	1.09 (0.56)*	2.98	0.99-8.93	2.07 (1.19)*	7.90	0.77-81.38	1.58 (0.60)**	4.85	1.50-15.67
Age	-0.15 (0.33)	0.86	0.45-1.65	-0.13 (0.32)	0.88	0.47-1.63	-0.60 (0.69)	0.55	0.14-2.13	-0.09 (0.35)	0.92	0.46-1.82
Tenure	-0.15 (0.24)	0.86	0.54-1.37	0.02 (0.25)	1.02	0.62-1.67	0.65 (0.32)**	1.92	1.03-3.55	-0.02 (0.26)	0.98	0.59-1.64
Rel. colleagues	-0.41 (0.40)	0.67	0.31-1.46	-0.16 (0.36)	0.85	0.42-1.73	2.19 (0.62)**	8.93	2.68-29.79	-0.50 (0.42)	0.61	0.27-1.39
Rel. supervisor	3.32 (0.47)**	27.60	10.95-69.56	1.74 (0.40)**	5.70	2.62-12.38	-0.60 (0.72)	0.55	0.13-2.27	4.74 (0.71)**	114.24	28.61-456.18
Justice	1.21 (0.33)**	3.35	1.77-6.34	0.92 (0.32)**	2.52	1.36-4.68	0.81 (0.80)	2.25	0.29-10.73	2.39 (0.42)**	10.91	4.83-24.65
Satisfaction	0.76 (0.48)	2.14	0.83-5.50	0.15 (0.43)	1.16	0.50-2.72	2.19 (1.13)*	8.97	0.48-82.80	0.90 (0.61)	2.45	0.75-8.05

Note. CI = confidence interval for the odds ratio; OR = odds ratio; SE = standard error of the coefficient.

\*  $p \leq .10$ . \*\*  $p \leq .05$ .



**Figure 2.** Characteristics of the latent profiles on the predictors. *Note.* The results were standardized to help in the interpretation of this histogram.

by employees presenting high (first), moderately low (second), or very high (fifth) levels of WAC directed toward their supervisors, whereas the employees from the other latent profiles (“uncommitted” and “workplace-committed”) present very low and comparable levels of WAC directed toward this focus. Clearly, those results are quite consistent; the quality of the relationships that employees share with their supervisors will predict their probability of belonging to latent profiles characterized by high levels of WAC directed toward those supervisors. The same reasoning applies to the perception of organizational justice, because supervisors are often seen as those who embody the fairness of organizational processes or decisions (e.g., Bies & Moag, 1986; Tyler & Bies, 1990).<sup>7</sup>

The relationships between the outcomes and the five latent profiles (i.e., Mplus’ *Auxilliary (e)* analyses) are reported in Table 5 and illustrated in Figure 3. Those results first reveal that the various latent profiles are characterized by equivalent levels of OCB directed toward the organization and the workgroup. This is consistent with the fact that neither the organization nor the workgroup represented very significant foci in the distinction between the WAC latent profiles, with one exception. Indeed, the third (“workplace-committed”) profile was characterized mostly by high levels of WAC directed toward the organization, workgroup, and customers. It should be noted that the employees from this third latent profile were also indistinguishable from the others by their levels of customer-directed OCB. However, this is also consistent with the nature of this latent profile; employees with more tenure who appear to enjoy socializing with their colleagues and who like their work environment without appearing overly motivated by achievement-related factors (such as their job or their career) or by the simple pleasure of working. Indeed, high levels of OCB would involve, by definition, a desire to go beyond the simple requirements of the tasks, no matter their specific foci. This desire to “overperform” or to improve organizational or team effectiveness does not appear to characterize this latent profile. Similarly, the level of task-directed OCB observed in this latent profile also remains moderate and indistinguishable from the level observed in the

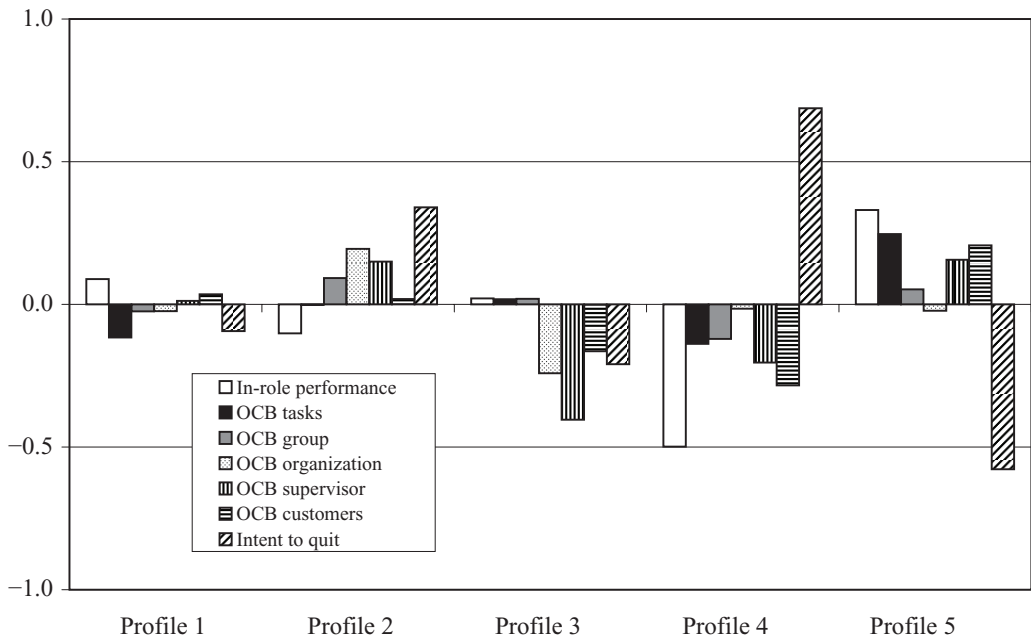


**Table 5.** Results From the Wald Chi-Square ( $\chi^2$ ) Tests of Mean Equality of the Auxiliary Analyses of Work Outcomes\*

	Global $\chi^2$	1 vs. 2	1 vs. 3	1 vs. 4	1 vs. 5	2 vs. 3	2 vs. 4	2 vs. 5	3 vs. 4	3 vs. 5	4 vs. 5	Summary
In-role performance	28.78*	1.48	0.11	0.27	11.73*	3.90*	4.38*	5.48*	8.70*	2.30	26.04*	4 < 2 < 3 = 5; 1 < 5 1 = 3; 1 = 2; 1 = 3 2 = 4 < 5
OCB tasks	6.10	0.55	0.39	0.01	0.02	0.57	0.42	7.23*	0.12	1.06	5.75*	1 = 2 = 3 = 4; 1 = 3 = 5 1 = 2 = 3 = 4 = 5
OCB group	2.12	0.54	0.07	0.15	0.42	1.61	0.56	0.24	0.06	0.03	1.11	1 = 2 = 3 = 4 = 5
OCB organization	4.55	2.02	1.17	3.74	0.00	1.47	1.09	0.00	1.67	1.09	0.00	1 = 2 = 3 = 4 = 5
OCB supervisor	12.58*	0.72	4.39*	5.85*	2.07	3.52	0.85	1.13	0.00	7.47*	5.03*	3 = 4 < 5 = 1 2 = 3 = 4; 2 = 5 = 1
OCB customers	10.86*	0.01	0.73	0.51	4.64*	2.86	0.22	1.70	1.34	2.40	9.77*	1 = 4 < 5 1 = 2 = 3 = 4; 2 = 3 = 5
Intent to quit	113.24*	7.40*	0.37	6.66*	29.96*	3.99*	18.88*	19.79*	40.03*	4.25*	96.52*	5 < 3 = 1 < 2 < 4

Note. OCB = organizational citizenship behaviors.

\*  $p \leq .05$ .



**Figure 3.** Characteristics of the latent profiles on the outcomes. *Note.* The results were standardized to help in the interpretation of this histogram.

other profiles. Conversely, the low level of WAC directed toward their supervisors (and the poor quality of their relationships with them) observed in this third profile appears associated with lower levels of OCB directed toward supervisors. “Workplace-committed” employees also present low levels of intent to quit and levels of in-role performance that are not statistically distinct from the levels of the “committed” latent profile. These results confirm that those employees like their workplace, intend to continue working there, and will do so by maintaining a satisfactory level of performance, although they do not appear to be willing to invest extra efforts on the behalf of the organization.

The results obtained for the “committed” and “uncommitted” latent profiles are also highly consistent with their nature, because they respectively present among the most positive and problematic levels on most of the outcome variables that differed between the latent profiles. Thus, the “committed” employees are characterized by the highest levels of in-role performance and of OCB directed toward their tasks, supervisors and customers, and by the lowest levels of intent to quit. The reverse was observed for the “uncommitted” employees. The last two latent profiles also present a very distinct and consistent pattern of results. Indeed, the “supervisor-committed” latent profile is characterized mostly by an average level on each of the outcomes and by a level of OCB directed toward the supervisor that is moderately higher than the level observed in the third and fourth latent profiles (see Table 3). Finally, the “career-committed” latent profile is characterized by a slightly below average level of in-role performance, by a slightly above average level of intent to quit, by average levels of OCB directed toward their tasks and customers, and by slightly above average levels of OCB directed toward their workgroups, supervisors, and organizations (although these levels are not significantly different from those of the other latent profiles). Again, it is consistent with the nature of a self-centered, careerist profile to be characterized by a tendency to devote higher levels of effort to impression management strategies (i.e., to the most observable forms of OCB) than to

in-role performance (which still remains at acceptable levels as part of an efficient impression management strategy) while being ready to quit the organization, potentially for a higher level position.

It should finally be noted that two of the outcomes, in-role performance and intent to quit, appear to allow particularly clear distinctions between the latent profiles. This is highly interesting because those variables represent outcomes that are mostly under employees' control, whereas to exhibit OCB, employees need not only to desire to do so but also to have the opportunity and the capability to do so (e.g., Zellars & Tepper, 2003).

## Discussion

The results from this study suggest that a FMA model with five distinct latent profiles of employees, distinguished on the basis of their levels of WAC directed toward seven foci, provided the best fit to the data. It is especially important to note that those latent profiles are qualitatively and quantitatively different from one another and present coherent patterns of associations with multiple predictors and outcomes known to be associated with WAC. Indeed, it has been shown that an identical covariance matrix can be generated from a  $k$ -class LPA model and from a common factor model with  $k-1$  latent factors (e.g., Bartholomew, 1987; Bauer & Curran, 2004). Given this, the extraction of latent profiles presenting only a convergent pattern of WAC on most foci and presenting only mean-level differences (such as the current "committed" and "uncommitted" profiles) would argue in favour of a variable-centered approach. However, the remaining latent profiles differed from one another qualitatively rather than solely quantitatively and were extracted by way of FMA (incorporating both a common factor and a LPA model). This reinforces the idea that those results are meaningful and that person-centered analyses represent a potentially important tool in organizational research. The real added value of this analytical tool should however be placed in perspective. Indeed, following one of the reviewers' suggestions, post hoc multiple regressions analyses were conducted to predict the various covariates (predictors and outcomes) from the WAC foci (variable-centered approach) and the posterior probabilities of class membership (person-centered approach) to verify whether the addition of the class probabilities could significantly improve the prediction. Unfortunately, with a few exceptions (quality of employees' relationships with their supervisor, workplace satisfaction, and organizational justice) in which the addition of the class probability increased the percentage of explained variance in the covariates by very small amounts (1.5%–3.2%; which can still be meaningful in organizational research), this addition did not significantly improve the prediction. However, if one move beyond the statistical underpinning of both models, the real added value of person-centered approaches is heuristic: human beings naturally conceptualize things and persons in terms of categories and a person-centered approach is better suited to these natural mindsets than a variable-centered approach, for an equivalent predictive value (e.g., Magnusson, 1998). Thus, practical guidelines emerging from a person-centered perspective would be more likely to influence management practices.

It is also important to note that Bauer and Curran (2003, 2004; Bauer, 2007) showed that mixture models may inadvertently result in the extraction of multiple latent classes even when none "truly" exist in the population through various forms of model misspecifications. Some steps were taken to diminish this potentially serious limitation. Indeed, multiple parameterizations of the mixture models were compared in addition to those reported here (i.e., FMA and LPA with freely estimated indicators' residual variances and with the addition of correlations between those residual variances were also estimated: see Note 5) to limit the risk of retaining a misspecified model (e.g., Bauer & Curran, 2003, 2004). These models were also estimated with multiple random starts to avoid the risk of converging on a local maximum (e.g., Hipp & Bauer, 2006). However, when attempts were made to verify the measurement invariance assumptions of the common factor that was included to capture the local dependencies among the foci of WAC in the FMA models, none of the alternative models

did converge on a proper and interpretable solution. Although this may suggest that these models may have been over parameterized (e.g., Chen, Bollen, Paxton, Curran, & Kirby, 2001; Tolvanen, 2007) this interpretation does not eliminate the possibility that this over parameterization could be due to the limited sample size used in the current study rather than to the inadequacy of the estimated models (i.e., in the first level of measurement invariance analyses, which involves estimating a five-class FMA model with class-varying intercepts, factor loadings, and uniquenesses would involve 109 parameters—with 404 participants, this gives a ratio of only 3.7 participants per parameter).

In fact, the only solution that has been proposed to verify the adequacy of the extracted latent profiles is to embark on a rigorous process of construct validation (e.g., Bauer & Curran, 2003, 2004; Muthén, 2003). This is the approach that was adopted in this study in which the meaningfulness of the extracted latent profiles was verified through the analyses of their relationships with multiple external predictors and outcomes. Regarding the predictors, it should be noted that a shortcoming of the current study is related to the fact that it was not possible to consider the full spectrum of the organizational justice construct which is known to comprise four well-defined sub dimensions (distributive, procedural, informational, interactional; e.g., Cohen-Charash, & Spector, 2001; Colquitt, Conlon, Wesson, Porter, & Ng, 2001), due to measurement (the measures used in the current study do not allow for the differentiation of these four sub dimensions) and sample size issues (see Note 7). Future studies should attempt to investigate how the separate consideration of these four dimensions could refine or modify the current interpretations.

An important support for the construct validity of the extracted latent profiles comes from their convergence with the theoretical bases outlined in the introduction. Indeed, at least two of the latent profiles are coherent with our expectations. First, a profile characterized by employees highly committed toward all of the foci was observed, as in the previous cluster analytic studies relying on less foci (Becker & Billings, 1993; Swailes, 2004). Those employees are also distinct from the others because of the satisfactory nature of the relationships they share with their supervisors and their positive perceptions of organizational justice. Additionally, these employees are those who exhibit the highest levels of OCB directed toward their tasks, supervisors, and customers and are characterized by the highest levels of in-role performance and the lowest levels of intent to quit the organization. Fortunately, for the organizations, this latent profile comprises 25% of the employees.

Second, a career-oriented latent profile (17%) was also extracted. The employees forming this profile are characterized by slightly below average levels of WAC directed toward most foci with the exception of their career, which is above the average level (although less so than what was anticipated in the hypothesis). Those employees could not be clearly distinguished from the other employees on the basis of the chosen predictors, on which they presented average levels (the significant differences being mostly due to the choice of the uncommitted profile as the referent). This finding is consistent with the nature of careerists as well (Bolino, 1999; Feldman & Weitz, 1991; Penner et al., 1997); they are neither satisfied nor unsatisfied in general, they have neutral social relationships at work, neutral perceptions of organizational justice, and so on. In fact, the only surprise came from the fact that this profile did not comprise a higher proportion of men, given the known gender differences in individuals' motivations to affiliate (also called communion, interdependent self-construals, etc.) and to achieve (also called agency, independent self-construals, etc.), with women attributing more importance to social relationships than men and men attributing more importance to achievement than women (Cross & Madson, 1997; Feingold, 1994; Helgeson, 1994). This may be related to the predominance of women in the participating organizations. Interestingly, the employees from this profile exhibit slightly above-average levels of OCB directed toward their supervisors, workgroups, and organization to the detriment of their in-role performance, which is slightly below average, but still at acceptable levels. They are also those with the second highest level of intent to quit. Again, this is consistent with what is known about careerism: career-oriented employees tend to be committed mostly toward themselves and to their career. As self-interest represents an important

human motive (Cropanzano, Goldman, & Folger, 2005), those employees will devote their highest levels of effort toward impression management strategies designed to help in their progression and will not hesitate to quit their job when a better offer becomes available (Bolino, 1999; Feldman & Weitz, 1991; Penner et al., 1997; Zellars & Tepper, 2003). Clearly, impression management strategies are a key determinant of OCB (e.g., Bolino, 1999; Penner et al., 1997; Zellars & Tepper, 2003), especially those forms of OCB that are observable by key organizational players, such as the supervisor. Hence, careerists may decide to focus on observable OCB.

Two additional profiles proved to be similar to the proposed “global” and “local” profiles. Indeed, a latent profile of employees characterized by a high level of WAC directed toward their supervisors was observed. However, those employees presented an average level of WAC directed toward the other foci and did not differ from the other profiles regarding WAC directed toward the organization and work. In fact, this profile is the most prevalent in the current study (31%), combines the “moderate” and “global” profiles proposed in the hypotheses and may represent the “silent majority” of conformist employees already described in Polsky’s (1978) typology (see also Robinson & O’Leary-Kelly, 1998). Membership in this profile, as in the case of the “committed” one, can be predicted mostly from the positive relationships shared with the supervisor and from organizational justice perceptions. Consistent with this profile, those employees also present moderate levels on all outcomes. However, although their level of supervisor-directed OCB remains moderate, it is significantly higher than in the “workplace-committed” and “uncommitted” profiles.

Similarly, instead of “locally” committed employees, a latent profile of “workplace-committed” employees was obtained. The extraction of this small profile (7%) of employees (mostly women with tenure) highly committed to their workgroup, customers, and organization while also presenting low levels of commitment to their supervisors and career is perhaps the most interesting result from this study. Clearly, the main foci of WAC for those employees are related to what happens daily in their proximal work environment, which they potentially define as “the organization,” rather than to their job itself, to the possibility of advancing their careers and to their supervisors. It is interesting to note that 93% of the employees from this profile are women, given the fact that women are known to attribute a higher level of importance to affiliation-related factors than to achievement-related factors or personal advancement (Cross & Madson, 1997; Feingold, 1994; Helgeson, 1994). This profile is further characterized by employees with more than 5 years of tenure who enjoy working with their colleagues, would like to remain in their position (low turnover intent), and make sure that they do so by maintaining proper levels of performance. However, they present only moderate levels of OCB, which could indicate that they are not overly motivated by achievement-related factors or by their job per se. Conversely, because social relationships are important for them, the poor relationships they share with their supervisors are associated with low levels of WAC and OCB directed toward those.

It is interesting to note that those two profiles (“supervisor-committed” and “workplace-committed”) are highly similar to two of the clusters identified in Swailes’ (2004) second study, which is more recent than the study by Becker and Billings (1993). This suggests that the observed profiles may vary in time and that, as organizations become more complex and undergo constant changes, employees’ referents may become more proximal (supervisors, workgroups, and customers). Organizations may become more abstract entities and may now be defined by employees as their workplace or daily socialization area rather than as a more global employing entity. This hypothesis is interesting, should be verified in the context of additional studies, and clearly reinforces the need to replicate the current results. Those profiles also represent a vivid illustration of Reichers’ (1985) proposition that employees may face conflictual commitments to multiple foci. Interestingly, the most often proposed form of WAC-related conflict opposes workgroups to supervisors (e.g., Cohen, 2003; Roethlisberger & Dickson, 1939/1967; Tajfel & Turner, 1985). The observation that “workplace-committed” employees also present a high level of organizational

commitment confirms the fact that few workers exhibit clearly nonconformist/antisocial attitudes and that most of them share organizational goals and values (e.g., Robinson & O'Leary-Kelly, 1998). Conversely, more workers may oppose supervisors' values and objectives, which are a more proximal object of conflict. Supervisors do indeed represent a determining entity in the latent profile definition. With the exception of careerist employees, none of the other profiles present average/neutral levels of supervisor-directed WAC. Similarly, supervisor-related predictors and outcomes also represent potent differentiators between the latent profiles. In this regard, the results from this study confirm the fact that supervisors are a key element in organizational efficacy and employee motivation (e.g., Arnetz & Blomkvist, 2007; Combs, Liu, Hall, & Ketchen, 2006; Gelade & Ivery, 2003).

The last latent profile, comprising uncommitted employees (19%), was unpredicted. Sinclair et al. (2005) even suggested that such a profile was improbable because fully uncommitted employees would rapidly select themselves out of the organization. The extraction of such a profile that is clearly distinguishable from the others on a majority of covariates reveals the unrealistic character of Sinclair et al.'s (2005) affirmation: employees' motivation to work most likely emerges from multiple factors among which WAC potentially plays a secondary role (e.g., Maslow, 1943; Meyer, Becker, & Vandenberghe, 2004). It should be noted that Sinclair et al. referred to the bases of commitment rather than to their foci, referring to "uncommitted employees" as those presenting low levels of affective, normative, and continuance commitment. Their hypothesis thus covers a larger spectrum of variables. This suggests that this study needs to be replicated with the simultaneous consideration of the bases and the foci of commitment and indicate that the other bases of commitment may play an important role in the prediction of employees' intent to quit, within the affectively uncommitted profile.

Finally, the consistent pattern of associations that was obtained between the latent profiles, the predictors and the outcomes also support classical proposals about the relations between workplace attitudes and behaviors. Indeed, classical multifoci perspectives strongly suggest that the relationships should be stronger between similar foci than across different foci. For instance, when Meyer and Herscovitch (2001, p. 301) defined WAC as a "force that binds an individual to a course of action of relevance to one or more targets," they explicitly proposed that employees' commitment toward a specific foci will exert an influence mostly on behaviors directed toward that same foci (see also Meyer et al., 2004). This is coherent with seminal review by Ajzen and Fishbein (1977) on the relationships between attitudes and behaviors in which they conclude that to maximize behavioral predictions, attitudes should be matched in focus to the behaviors they strive to predict. Additional multifoci perspectives also underline the fact that the relationships between organizational practices, attitudes, and outcomes will be stronger when they involve similar foci (e.g., Cropanzano, Prehar, & Chen, 2002; Rupp & Cropanzano, 2002). In fact, with few exceptions involving mostly the third latent profile of "workplace-committed" employees that could be explained by the specific nature of this profile, the observed pattern of associations that was obtained between the latent profiles, the predictors, and the outcomes did provide some support to these classical propositions.

Although this study represents a first attempt to apply LPA/FMA to the study of WAC and great precautions were taken to avoid the problems most commonly associated with mixture modeling, a number of limits remain. In our view, the four most serious ones are related to the methodological design of this study, the size and nature of the sample, and the absence of cross-validation samples. First, this study relied on a cross-sectional design, which precludes conclusions regarding the direction of the observed effects: are the latent profiles really predictive of the outcomes and are they really predicted from the predictors? Are the effects in fact in the reverse direction? Only longitudinal studies may answer those questions. In addition, a complete process of construct validation of the extracted latent profiles would also involve the verification of their stability over time. This could clearly be realized within a longitudinal design relying on latent transition analyses (see Nylund, 2007) but could also be done through the verification of the invariance of the estimated

FMA/LPA model across age or tenure categories (see Geiser, Lehman, & Eid, 2006). Unfortunately, this second alternative could not be pursued in the current study due to insufficient sample size. Second, this study relied on a small convenience sample that is clearly not representative of the general population. Third, a cross-validation sample was not available. Those last two limits underscore the need to replicate the current findings. Pending their replication, the extracted latent profiles remain preliminary. In this context, care should be taken to avoid the reification of these profiles, as they are only heuristics (and should remain as such) that are useful to depict interactive patterns among multiple variables (Bauer, 2005; Bauer & Shanahan, 2007; Kreuter & Muthén, 2008).

## Notes

1. Additional foci of WAC were also defined but are not considered in the current study: union (Gordon, Philpot, Burt, Thompson, & Spiller, 1980), organizational change and programs (Herscovitch & Meyer, 2002; Neubert & Cady, 2001), and external organizations (McElroy, Morrow, & Laczniak, 2001). These targets could not be considered “generic” because many employees are not members of unions, many organizations do not undergo constant change and most employees are not in boundary-spanning positions.
2. OCB represents behaviors that are “discretionary, not directly or explicitly recognized by the formal reward system, and that, in the aggregate, promotes effective functioning of the organization” (Organ, 1988, p.4).
3. The stability of the solution obtained following the inclusion of predictors in the model may even be taken as evidence of the quality and robustness of the model and of the appropriateness of those specific covariates as antecedents of the identified profiles (Marsh et al., 2009).
4. All of the measurement instruments were bilingual (28% completed the French versions of the questionnaires and 72% completed the English versions) and preliminary confirmatory analyses found them to respect strict measurement invariance (e.g., Meredith, 1993) across language versions (for additional details on the WAC questionnaire, see Morin, Madore, Morizot, Boudrias, & Tremblay, 2009).
5. Additional models were also specified. First, alternate LPA and FMA models in which the indicators residual variances were freely estimated in all classes were also estimated, given the demonstration by Magidson and Vermunt (2004) that assuming invariant variances may result in the overextraction of too many latent profiles. Second, LPA and FMA models including correlations between the indicators residual variances were also estimated to verify whether the FMA single latent factor proved sufficient to account for all of the local dependencies between the indicators. Third, alternative FMA models designed to empirically verify the assumption of measurement invariance across latent profiles that were made regarding the single latent factor were also specified. Many of these models converged on improper or degenerate solutions (negative variance estimates, non-positive definite Fisher Information matrix, empty or very small classes, etc.) and on non-replicated log likelihood (even after multiple attempts involving multiple starts, user defined starts, optseed, etc.). This suggests the inadequacy of those models (e.g., Bauer & Curran, 2003; Henson, Reise, & Kim, 2007; Nylund, Asparouhov, & Muthén, 2007), which may have been over parameterized, especially in the context of the relatively low sample size that was available to estimate so many parameters (Chen, Bollen, Paxton, Curran, & Kirby, 2001; Tolvanen, 2007), and the fact that more parsimonious models may be more appropriate (e.g., Bauer & Shanahan, 2007). However, when they did converge on proper or at least interpretable solutions (this was often the case for the five-class models), the results showed that (a) the free estimation of the indicators residual variances did not improve the fit of the models; and (b) the addition of correlations between the indicators residuals resulted in an improvement for the LPA models (but an improvement that was less substantial than the addition of a single latent factor, as in the FMA models) but not for the FMA models. Details regarding all those additional models and syntax examples are available on request from the first author.
6. Lo, Mendel, and Rubin (2001) proposed a standard and adjusted version of this test. However, because both tests provided identical results in the current study, only the adjusted LMR is reported.
7. Following reviewers’ suggestions, post hoc examinations of the associations between the five latent profiles and the subscales of organizational justice (distributive and procedural) and workplace satisfaction (social,

recognition, achievement, and self-actualisation needs) were conducted. Regarding organizational justice, both subscales presented a highly convergent pattern of association with the latent profiles, although the between-profiles differences were more pronounced for the Procedural justice (PJ) subscale than for the distributive justice (DJ) subscale. Regarding workplace satisfaction, the four subscales also presented a very similar pattern of association with the latent profile (which is not surprising given the elevated level of correlations observed between the subscales) and confirm that, like the global scale, none of these subscales allowed for a very clear differentiation between profiles.

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## **Appendix**

### **MPlus Input Files for the Five-Class Models Estimated in the Current Study**

```
TITLE: Latent Profile 5 classes Without Covariates and Outcomes
DATA: FILE IS "WAC_LPM2.dat";
VARIABLE:
NAMES ARE id_e WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
IDVARIABLE = id_e;
MISSING ARE ALL (999);
USEVARIABLES ARE WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
CLASSES = c (5);
ANALYSIS:
TYPE = MIXTURE;
STARTS = 800 40;
STITERATIONS = 40;
LRTBOOTSTRAP = 100;
LRTSTARTS = 10 5 80 20;
MODEL:
%OVERALL%
%c#1%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#2%
```



```

[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#3%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#4%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#5%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
!By default, MPlus fix the indicator variances to equality from one class to
the other.
OUTPUT:
SAMPSTAT CINTERVAL RESIDUAL TECH1 TECH7 TECH11 TECH14;
PLOT:
TYPE = PLOT3;
SERIES = WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli (*);
SAVEDATA:
FILE IS FMA_5_UWV.dat;
FORMAT IS FREE;
SAVE=CPROBABILITIES;
TITLE: Factor Mixture 5 Classes Without Covariates and Outcomes
DATA: FILE IS "WAC_LPM2.dat";
VARIABLE:
NAMES ARE id_e WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
IDVARIABLE = id_e;
MISSING ARE ALL (999);
USEVARIABLES ARE WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
CLASSES = c (5);
ANALYSIS:
TYPE = MIXTURE;
STARTS = 800 40;
STITERATIONS = 40;
LRTBOOTSTRAP = 100;
LRTSTARTS = 10 5 80 20;
MODEL:
%OVERALL%
f by WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
[f@0];
%c#1%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#2%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#3%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#4%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#5%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
!By default, MPlus fix the indicator variances to equality from one class to
the other.

```

```

OUTPUT:
SAMPSTAT CINTERVAL RESIDUAL TECH1 TECH7 TECH11 TECH14;
PLOT:
TYPE = PLOT3;
SERIES = WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli (*);
SAVEDATA:
FILE IS FMA_5_UWV.dat;
FORMAT IS FREE;
SAVE=CPROBABILITIES;
TITLE: Factor Mixture 5 Classes with Covariates Included in the Model and
      Outcomes as Inactive Covariates
DATA: FILE IS "WAC_LPM2.dat";
VARIABLE:
NAMES ARE id_e WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra
WAC_cli Inrole OCB_tac OCB_gro OCB_org OCB_sup OCB_cli int_qui
gender age anc rel_gro rel_sup just satis;
IDVARIABLE = id_e;
MISSING ARE ALL (999);
USEVARIABLES ARE WAC_org WAC_sup
WAC_gro WAC_job WAC_car WAC_tra WAC_cli
gender age anc rel_gro rel_sup just satis;
AUXILIARY = Inrole(e) OCB_tac (e) OCB_gro (e) OCB_org (e)
OCB_sup (e) OCB_cli (e) int_qui (e);
CLASSES = c (5);
ANALYSIS:
TYPE = MIXTURE;
STARTS = 800 40;
STITERATIONS = 40;
LRTBOOTSTRAP = 100;
LRTSTARTS = 10 5 80 20;
MODEL:
%OVERALL%
c#1-c#4 ON gender age anc
rel_gro rel_sup just satis;
f by WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli;
[f@0];
%c#1%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#2%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#3%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#4%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
%c#5%
[WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli];
!By default, Mplus fix the indicator variances to equality from one class to
the other.

```

```

OUTPUT:
SAMPSTAT CINTERVAL RESIDUAL TECH1 TECH7 TECH11 TECH14;
PLOT:
TYPE = PLOT3;
SERIES = WAC_org WAC_sup WAC_gro WAC_job WAC_car WAC_tra WAC_cli (*);
SAVEDATA:
FILE IS FMA_5_final.dat;
FORMAT IS FREE;
SAVE=CPROBABILITIES;

```

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