Supporting intrinsic motivation of knowledge workers in teams

*Distributed leadership and a climate for informal learning as social conditions for facilitating autonomy, competence and relatedness satisfaction*

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1. Abstract

The importance of knowledge creation and its continuous application to work keeps rising. Intrinsic motivation is an important contributor to this process, but studies exploring effects of team level social conditions that may contribute to satisfaction of the basic motivational needs of autonomy, competence and relatedness are limited. The purpose of this study is to explore effects of team level social conditions that support workers’ intrinsic motivation. We conducted an explorative cross-sectional study using data from 21 teams of an organization for child and youth support in the Netherlands. The basic psychological needs are measured with the W-BNS survey. Leadership distribution is operationalized using a novel social network approach and an 8-item scale measuring climate for informal learning is developed. Data were analyzed using multilevel analysis. The main findings show that a learning climate for informal learning is significantly tied to the satisfaction of the needs for autonomy and relatedness. Leadership distribution shows no significant relationships. Due to a low between-group variance the team level effects on competence could not be assessed. High explained variance at the team level indicates that a multilevel approach should be considered when studying satisfaction of the motivational needs.

2. Introduction

In a knowledge economy, long term economic success requires the ability to create new knowledge and to apply that new knowledge to the improvement of products, services, and working processes (Drucker, 1993; Kessels, 1996). Research on the Self-Determination Theory (SDT) shows that intrinsic motivation contributes strongly to workers’ productivity, especially when considering complex cognitive tasks and creativity (Deci and Ryan, 2000). According to the SDT, intrinsic motivation is supported by the satisfaction of three basic human needs: the need for autonomy, competence and relatedness. The social context is the most important factor in either Supporting or diminishing the satisfaction of these needs (Deci and Ryan, 2008). This implies that focusing on social conditions in which the basic psychological needs are satisfied are most likely to yield the positive results intrinsic motivation is associated with like better learning, performance, and well-being, (Deci and Ryan, 2000).

Research on factors supporting intrinsic motivation (and also the internalization of external motivators) has mainly focused upon the psychology of the individual and personal (dyadic) relationships between e.g. a manager and employee (Deci and Ryan, 2008). A trend carrying implications for the social context of employees has been the increasing prevalence of working in teams (Kozlowski and Ilgen, 2006). Therefore, exploring effects of social conditions on the team level might help to build better environments for working and learning of knowledge workers. In this research, we focus on two contextual variables that are argued to be important to support knowledge workers: leadership and a climate for informal learning.

Several studies relate the role of leaders to the effectiveness of teams and workers in terms of knowledge creation and learning (Egan, 2008; Hoon Song et al., 2012; Joo, 2010). Although relevant, this only focuses on leadership as a formal role and personal attribute. Theory on distributed leadership views leadership as the interaction between leaders, followers and the situation (Spillane, 2006), where the leadership role is not restricted to the formal leadership position. It refers to the leadership practice in specific situations where team members claim influence on the basis of their expertise and experience. Other team members acknowledge the importance of this temporary leading role, grant leadership to their team member and follow. In a new situation different expertise may be required and the leadership role switches to a colleague. (Gronn, 2000; Spillane, 2006). We assume that this dynamic process of leading and following will support intrinsic motivation of knowledge workers due to creating room for personal initiative (supporting autonomy), opportunities for feedback on competence and stronger relationships, benefiting feelings of relatedness.

The increasing emphasis on application of knowledge in the workplace calls for an integrated approach to learning and working (Kessels and Poell, 2011). In this light, Eraut (2004) emphasizes the importance of a work climate that promotes informal learning. Teams operate best in an open climate, where relationships are based on trust, mutual protection and support (Bennet et al., 2003). This means that a favorable climate for informal learning can be an important social condition for the satisfaction of the basic psychological needs.
In conclusion, in order to support workers’ intrinsic motivation, scientific knowledge is needed to find out which social conditions at the team level support the satisfaction of the basic psychological needs. In this study, we aim to explore the relations of distributed leadership and a climate for informal learning with the three basic psychological needs as described by the SDT.

3. Theoretical Framework

3.1. Self-determination theory

The SDT suggests that humans have a natural tendency towards integration and adaptation, a focus on engaging in interesting and social activities, being part of a larger group and exercising their capabilities (Deci and Ryan, 2000). Central to the theory is the concept of intrinsic motivation. Intrinsic motivation is the motivation to engage in a task for its own sake, out of interest and enjoyment, and not as a means to another reward (Deci and Ryan, 2008). Research by Deci and Ryan (1985) shows that extrinsic motivators like tangible rewards, threats, deadlines, directives, pressured evaluations, and imposed goals diminish intrinsic motivation because people feel as if their behavior is determined by others. On the other hand, choice, acknowledgment of feelings, and opportunities for self-direction support intrinsic motivation because people feel that their behavior is self-determined.

To support intrinsic motivation three basic psychological needs have to be satisfied: autonomy, competence and relatedness. Autonomy describes the need to feel volitional and to experience a sense of choice and psychological freedom when you engage in an activity (DeCharms, 1968). The need for competence is to feel effective in interacting with your environment (White, 1959). It is the urge to explore and to seek challenging tasks to test and extend your skills. Satisfying the need for competence allows you to adapt to complex and changing environments, whereas dissatisfaction results in helplessness (Deci and Ryan, 2000). The need for relatedness is to feel connected to others, to be a member of a group, and develop close relationships with others (Baumeister and Leary, 1995). Employees can experience relatedness when they are part of a close-knit team or group, and when they have the ability to support others and feel supported by others (Deci and Ryan, 2000).

The satisfaction of each of the basic psychological needs correlates positively with workers’ optimal functioning. It is related to enhanced performance, persistence, creativity (Deci and Ryan, 2000; Sheldon et al., 1997; Van den Broeck et al., 2010), self-esteem (Deci and Ryan, 1995), less burnout (Fernet et al., 2004), and higher job satisfaction (Millette and Gagné, 2008). According to Deci and Ryan (2000), the social context plays a key role in either supporting or hindering the satisfaction of the basic psychological needs. Research focusing on supportive social conditions can provide insights in how organizations can foster the positive results intrinsic motivation is associated with. As the majority of SDT research focuses on the level of the individual, and empirical studies on the conditions at the team level are scarce, our exploration will concentrate on the influence of distributed leadership and the informal learning climate as conditions for intrinsic motivation.

3.2. Leadership

One social condition that has enjoyed undying attention during the past decades, from academics as well as in the popular literature, is leadership (Avolio et al., 2009; Storey, 2004). It has been suggested that leadership is crucial for enabling team effectiveness (Cohen and Bailey, 1997) and some researchers have even argued that it is the most critical component (Zaccaro et al., 2001).

Historically, the concept of leadership has been associated with individuals who are seen as agents of great change and who act unilaterally (Gronn, 2000; Spillane, 2006). However, we know that leaders do not exist without followers and that sometimes, as situations require, different leaders or even groups of leaders are needed (Van Vugt et al., 2008). In combination with the current shifts in organizational structures the field of leadership has moved beyond emphasizing the individualist and psychological traits conceptions onto a more integrated approach centered around (social) interactions (Gronn, 2000; Spillane, 2006; Uhl-Bien et al., 2007), such as the notion of distributed leadership. Distributed leadership theory connects social interplay with individual agency (Gronn, 2000, 2002; Spillane, 2006). Gronn (2000) asserts that, while existing social structures as well as individual agency are indeed important, neither can be usefully studied as an isolated construct. In this research we look at leadership from the distributed leadership perspective to account for both agency and social interplay. At the core of the distributed leadership process is the claiming and granting of this social
influence by organizational members (DeRue and Ashford, 2010). Such a process allows for influence to be located at those individuals and groups who have relevant expertise, competencies and motivation for the job at hand (Kessels, 2012). Allowing professionals to take responsibility for their own actions (thus, self-determined) may in turn contribute significantly to the satisfaction of the basic psychological needs for motivation. For example, a dynamic leadership practice may support feelings of autonomy due to increased opportunity for individuals to take action within the team, or wilfully allow actions of others. The need for competence may be supported when granted social influence is perceived as feedback and relatedness may be supported through e.g. mutual decision-making processes.

To operationalize the construct of distributed leadership we draw on the definition provided by Spillane:

> Leadership refers to activities tied to the core work of the organization that are designed by organizational members to influence the motivation, knowledge, affect, and practices of other organizational members or that are understood by organizational members as intended to influence their motivation, knowledge, affect, and practices. (Spillane, 2006, p. 11)

In Spillane’s definition leadership is conceptualized as exerting social influence. By using a social network approach (Mehra et al., 2006) we attempt to measure how much social influence teammates attribute to each other on the core leadership functions of the team. By looking at the dispersion of the amount of influence that each team member exerts we can then determine if a team exhibits a distributed or more hierarchical form of leadership. In this paper we refer to this as the leadership distribution within a team.

### 3.3. Climate for informal learning

A second contextual factor that seems relevant in supporting employees’ intrinsic motivation is the climate for informal learning in teams. Increasingly, the field of HRD has sought to accommodate workers to learn on-the-job and the importance of informal learning in the workplace is being stressed (Eraut, 2004; Marsick and Volpe, 1999). Marsick and Volpe define informal learning as “learning that is predominantly experiential and non-institutional” (1999, p. 11). In the context of teams working in knowledge intensive organizations, learning together is one of the key activities helping employees to overcome obstacles in their work and engage in reflective activity (Marsick and Volpe, 1999). A climate that promotes informal learning provides a basic trust for workers, so they know that asking a question or making a mistake will not be punished or misunderstood (Marsick and Volpe, 1999). It also encompasses easy accessibility of colleagues through willingness to act as sounding boards for ideas and to provide feedback on each other's work. This conveys a feeling of being interested in and of valuing each other (Van der Heijden, 2003). Research by Liao et al. (2004) indicates that when relationships between employees are perceived as good, sharing knowledge and experiences with these colleagues is perceived as unconditional and voluntary. On the other hand, when the relationship between employees is perceived as not good, the employees are hesitant to share knowledge and experiences (Liao et al., 2004). Egan et al. (2004) found in their study that a learning organizational culture relates positively with job satisfaction and motivation to transfer learning and negatively with turnover intention.

Informal learning is not determined by the organization, but by the individual (Marsick and Volpe, 1999). Pahor et al. (2008) describe that in learning in networks, the individual is the primary source and destination of learning and that learning takes place primarily in social interaction. This emphasizes the importance of intrinsic motivation, to engage in networks for solving personal questions and challenges. A positive climate for informal learning can encourage the establishment of relationships so members feel free to address their personal questions. This provides a sense of self-initiation and trust, which relates to the basic psychological needs.
4. Present study
Considering the literature, we expect that both distributed leadership and a climate for informal learning are positive social conditions within teams that support knowledge workers' intrinsic motivation (see conceptual model, figure 1). However, the empirical links between these concepts and the satisfaction of the basic psychological needs have not yet been established. We conducted an explorative cross-sectional study in 21 teams of an organization for child and youth support in the Netherlands. Regarding the explorative nature of this study, we formulate the following research question:

*How do distributed leadership and a climate for informal learning within a team of knowledge workers relate to the satisfaction of the basic psychological needs?*

In addition to theory building, exploring these conceptual relationships may yield clues on how to provide a supportive work environment for knowledge workers. In practice, the increase in teamwork (Kozlowski and Ilgen, 2006) and trend towards trust based organizational systems (Adler, 2001) has led to a demand for new HRD strategies. The very same processes that speed up the demand for organizational change, also put the clock on the field of HRD to change its practice. This study may provide insight for theorists, HRD practitioners and organizations in how social conditions, specifically at the team level, can be measured and related to the support of intrinsic motivation and knowledge work.

![Figure 1. Conceptual model showing the hierarchical relationship between the team level independent and the individual level dependent variables](image)

5. Method
5.1. Context
The study was conducted in an organization for child and youth support in the Netherlands. The organization is medium sized (400 employees) and has around 30 teams. The data used in this research were gathered as part of a one-year consultancy project focused on supporting teams to become increasingly self-organizing. 14 of the 21 participating teams took part in the entire consultancy project, the remaining 7 teams participated only in the survey for this research.

5.2. Sample and procedure
To collect the data for the present study an open invitation was sent via e-mail directly to all of the 30 teams in the organization. Participation was entirely voluntarily. The data collection resulted in 163 participating individuals (level 1 N = 163, response rate = 96%) in 21 teams (level 2 n = 21, response rate = 70%). Data was collected with a paper survey during regular team meetings. When a member
was absent a team member was asked to give the survey to him or her and mail it to the researchers. The questionnaire took about 20 minutes to fill in, participants were asked not to interact with each other during this time. Level 1 non-response was caused by the absence of individuals during the data collection. Level 2 non-response was caused mainly by time constraints. Teams consisted of approximately 4 to 20 employees, with an average of 9.37 (SD = 4.10). Of the 163 respondents, 141 were female (86%, 3 missing). Age ranged from 20 to 64 years, averaging 40.48 (SD = 12.20, 8 missing). The education level was divided in three categories, low (primary school up to vocational education, 26%), middle (higher vocational education, 59%) and high (undergraduate degree and higher, 13%), with 4 missing (3%). See Table 1 for an overview of the descriptive statistics.

Table 1
Means, Standard Deviations, Cronbach’s alpha’s, and Intercorrelations for all variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>( \mu )</th>
<th>( \sigma )</th>
<th>( \alpha )</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1 variables</td>
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<tr>
<td>1. Gender</td>
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<tr>
<td>2. Age</td>
<td>40.84</td>
<td>12.2</td>
<td>-1.69*</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
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<tr>
<td>3. Education</td>
<td>-</td>
<td>-</td>
<td>.047</td>
<td>-.069</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. Autonomy</td>
<td>3.76</td>
<td>.56</td>
<td>.76</td>
<td>-.193*</td>
<td>-.137</td>
<td>-.019</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5. Competence</td>
<td>4.03</td>
<td>.45</td>
<td>.74</td>
<td>-.127</td>
<td>.233**</td>
<td>-.030</td>
<td>.266**</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6. Relatedness</td>
<td>3.81</td>
<td>.55</td>
<td>.79</td>
<td>-.062</td>
<td>-.169*</td>
<td>-.052</td>
<td>.557**</td>
<td>.336**</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Level 2 variables</td>
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<tr>
<td>7. Teamsize</td>
<td>7.76</td>
<td>3.62</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8. Climate for informal learning</td>
<td>3.85</td>
<td>.53</td>
<td>.80</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9. Leadership distribution</td>
<td>.34</td>
<td>.14</td>
<td>.87</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
</tbody>
</table>

Note. \( N = 163 \) at the individual level; \( n = 21 \) at the team level. Significance (two-tailed): * \( p < .05 \); ** \( p < .01 \).

5.3. Measures

All the variables were measured with an on paper survey. To test the practicality of the survey we ran a pilot online survey with four randomly selected teams, showing positive results on the practicality of the questionnaire and clarity of the questions. Because the pilot showed low response rates, we decided to conduct the final data collection on paper. All 89 items were posed in Dutch, the native language of the target group.

The demographic section measured gender (female = 0, male = 1), age (years), and education (highest finished, ranging from 1 = primary school to 8 = graduate school).

The second section measured climate for informal learning (CIL), which consisted of items from a questionnaire about the corporate curriculum (Stam, 2007) based on the corporate curriculum theory (Kessels, 1996). Items were based on a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree and 6 = not applicable). The whole 63-item survey was administered, but for this study only items on the CIL were used. After checking the normality of the items, the internal structure of the questionnaire was tested by means of an Exploratory Factor Analysis (EFA) using Principal Axis Factoring and an Oblique rotation (in SPSS v21: Direct Oblimin) (Field, 2009). For this analysis the data were combined with a second data set of an accountancy software developer in the center of The Netherlands (\( N = 47, \) response rate = 37%). The Kaiser-Meyer-Olkin measure (KMO = .87) and Bartlett’s test of Sphericity (\( p < .01 \)) confirmed that the sample is adequate for factor analysis. The scree plot suggested between three and five factors. Subsequent parallel analysis in combination with item-content analysis (Hayton et al., 2004) supported a three factor solution, because four and five factors solutions yielded difficult to interpret results and factors with too few items (< 3). After removing items following the criteria of Worthington and Whittaker (2006), and a reliability analysis, the final questionnaire consisted of three scales, from which one scale measured the perception of the individual worker of the climate for informal learning within his or her team (8 items, Cronbach’s alpha = .80, example “In our team everyone is comfortable to share knowledge”). The other two scales that measured self-directed innovation and stress were excluded from the rest of the analysis. For detailed information about the development of this questionnaire we refer to Hirschler (2013) and Van Langevelde (2013).
the need for autonomy (example: “I feel like I can be myself at work”), competence (example: “I am good at the things I do in my job”) and relatedness (example: “I feel like I can be myself at work”) is satisfied at work. Items were based on a 5-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree). Each scale consisted of six items and the final score is the average score on these items. A higher score indicates greater need satisfaction. The Cronbach’s alpha’s of the scales were .76 for autonomy, .74 for competence and .79 for relatedness (see Table 1).

Distributed leadership was measured through four social network questions (Tichy et al., 1979). We developed one question for each of the four leadership functions of Derksen et al. (2011): organizing, creating future, reflecting and dialoguing. Each item consists of a short explanation of one of the functions and the question who in the team incites the respondent to do so. Respondents were allowed to indicate their own name and an option was included to indicate ‘no one’. These social network questions captured the influence that individual team members have with regard to each specific leadership function, in terms of the amount of received nominations. The resulting matrix of answers reflects the leadership network of that particular leadership function. The scores on the four social network questions correlated strongly (r = .52 - .80, p < .05). Therefore we averaged the scores resulting in a single score for each team member on leadership distribution (Cronbach’s alpha = .87).

5.4. Data analysis

Preparation of the data. To prepare the social network data for analysis we removed all missing data and deleted all self-nominations from the team's leadership matrices. When a person had responded ‘no one’ to a leadership question, we filled in a zero for all relationships. A team member was removed from the network data entirely when we could confirm an extended period of absence (e.g. sick leave). A total of 5 persons in 4 teams were removed from their team's network this way.

We then calculated the team’s leadership distribution score, by using an adapted version of Freeman’s (1978) formula for team centrality. Because we operationalized leadership based on influence relationships only the in-degree counts are relevant (Pastor and Mayo, 2002). We adapted the denominator of Freeman’s formula to reflect only the in-degree counts, resulting in the following formula:

$$\text{Team centrality} = \frac{\sum_{i=1}^{n}(C_{P}(P_i) - C_{D}(P_i))}{(n - 1)^2}$$

This score represents the relative amount of hierarchy within the team, with a 0 indicating that all team members received an equal number of nominations and a maximum value of 1, indicating maximum hierarchy. To improve the interpretability of this measure we reversed the score by subtracting it from 1 to give the leadership distribution.

Climate for informal learning is measured at the individual level, while this variable is conceptualized at the team level. In order to calculate the team score, the individual scores were aggregated to the team level by using the group mean. Statistical analysis showed that the data were suited for aggregation (ICC1 = .55, p < .01; ICC2 = .92).

Multilevel analysis. Since variables were measured both at the level of individuals (level 1) and at the team level (level 2), multilevel analysis is needed to study the relation between the social conditions and the BSNS. The basic psychological needs, age, gender and education are properties of the individual worker and are therefore measured on the individual level (level 1). Leadership distribution, team size and climate for informal learning are properties of a team and are therefore measured on a higher level, the team level (level 2). Hierarchical Linear Modeling (HLM) is an appropriate method for examining cross-level main effects where the dependent variable is measured at the lowest level (Hofmann et al., 2000). Grand mean centering was used on all level 1 and 2 variables to reduce potential collinearity (Hofmann et al., 2000). First ICC’s were calculated by running the null model (model 0, see Table 2 and 3) to see whether the three BSNS variables had a significant variance on team level. The ICC for autonomy and relatedness (ICC = .34, p = .02; ICC= .39, p = .01), indicate that a significant amount of the variance (34% and 39%) occurs at the team level. This
justifies the use of HLM for data analysis and gives the indication that there is some variance to explain by team-level predictors. The ICC for competence showed that a non-significant amount of variance is accounted for at the team level (ICC = .04, p = .41). This means that in this study there is no variance to be explained by the level 2 variables for competence satisfaction. Therefore competence was excluded from further data analysis.

To test for main effects of the independent variables on autonomy and relatedness, we built HLM models by adding variables step by step. In each step we retained the newly added variable(s) only if the model improved significantly, as measured by the $X^2_{\text{change}}$. Model 0 is the null model described above. In model 1 the level 1 control variables (gender, age and education) were added. In model 2 the level 2 control variable team size was added. In model 3 the level 2 independent variables (climate for informal learning and leadership distribution) were added.

6. Results

6.1. Main effects on autonomy satisfaction

Table 2 shows that the addition of level 1 control variables in model 1 provided a significantly better model ($X^2_{\text{change}} (4) = 14.242, p < .01$) than model 0. Model 2, the addition of team size, did not provide a significant better model than model 1 ($X^2_{\text{change}} (1) = .014, p > .05$). Model 3 was accepted as the final model, because it provided a better fit than model 1 ($X^2_{\text{change}} (3) = 15.206, p < .01$). No significant relationship between leadership distribution and autonomy satisfaction was found (Est. = .26, p > .05). A significant positive relationship between climate for informal learning and autonomy satisfaction was identified (Est. = .48, p < .01). None of the control variables showed a significant relationship (see Table 2).

Table 2. HLM Results: The Cross-Level Main Effects of leadership distribution and climate for informal learning on the satisfaction of the need for autonomy.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 0</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Est.</td>
<td>S.E.</td>
<td>Est.</td>
<td>S.E.</td>
</tr>
<tr>
<td>Intercept</td>
<td>.11</td>
<td>.05</td>
<td>-1.2</td>
<td>.20</td>
</tr>
<tr>
<td>Level 1 control variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender (0 = Female)</td>
<td>.21</td>
<td>.13</td>
<td>.21</td>
<td>.13</td>
</tr>
<tr>
<td>Age</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>Education (1=Low)</td>
<td>.09</td>
<td>.21</td>
<td>.08</td>
<td>.22</td>
</tr>
<tr>
<td>Education (2=Middle)</td>
<td>.12</td>
<td>.20</td>
<td>.11</td>
<td>.22</td>
</tr>
<tr>
<td>Level 2 control variable</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Team size</td>
<td>-.00</td>
<td>.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level 2 independent variables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Climate for informal learning</td>
<td></td>
<td></td>
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<tr>
<td>Leadership distribution</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Model summary</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>-$2\log$ likelihood</td>
<td>242.233</td>
<td>227.991</td>
<td>227.977</td>
<td>212.785</td>
</tr>
<tr>
<td>$X^2_{\text{change}} (df)$</td>
<td>-</td>
<td>14.242** (4)</td>
<td>.014 (1)</td>
<td>15.206** (2)</td>
</tr>
<tr>
<td>Number of parameters</td>
<td>3</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Explained variance (Total variance)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Team ($R^2$)</td>
<td>(34%)</td>
<td>16.7%</td>
<td>16.7%</td>
<td>79%</td>
</tr>
<tr>
<td>Individual ($R^2$)</td>
<td>(66%)</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>6.3%</td>
<td>6.3%</td>
<td>6.3%</td>
<td>26.9%</td>
</tr>
</tbody>
</table>

Note. Est. = Estimate, S.E. = Standard Error, df = Degrees of freedom for $X^2_{\text{change}}$
Significance (two-tailed): *p < .05. **p < .01.
6.2. **Main effects on relatedness**

The results for relatedness are displayed in Table 3. Model 1, which included the level 1 control variables, fitted the data significantly better than model 0 ($X^2_{\text{change}} (4) = 11.310, p < .01$). Model 2 included the level two control variable and did not fit the data better ($X^2_{\text{change}} (1) = 1.288, p > .05$). Finally, model 3 including the level 2 independent variables, was accepted as the best fitting model over model 1 ($X^2_{\text{change}} (4) = 24.258, p < .01$). Results from model 3 in Table 3 suggest that no significant relationship exists between leadership distribution and relatedness (Est. = -.21, $p > .05$). A significant positive relationship between climate for informal learning and relatedness was found (Est. = .62, $p < .01$). None of the control variables have a significant relationship with relatedness (see Table 3).

Table 3. **HLM results: The cross-level main effects of leadership distribution and climate for informal learning variables on the satisfaction of the need for relatedness.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 0</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.03</td>
<td>0.06</td>
<td>0.36</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>S.E. 0.09</td>
<td>S.E. 0.21</td>
<td>S.E. 0.33</td>
<td>S.E. 0.13</td>
</tr>
</tbody>
</table>

*Level 1 control variables*

- Gender (0 = Female) | .02 | .01 | .01 | .12 |
- Age | -.01* | .00 | -.01* | .00 |
- Education (1=Low) | -.08 | -.15 | .22 | -.20 |
- Education (2=Middle) | -.02 | -.10 | .22 | -.16 |

*Level 2 control variable*

- Team size | -.03 | .02 |

*Level 2 independent variables*

- Climate for informal learning | .62** | .09 |
- Leadership distribution | -.21 | .37 |

**Model summary**

- $-2*\text{log likelihood}$ | 233.985 | 222.675 | 221.387 | 198.417 |
- $X^2_{\text{change}} (df)$ | - | 11.310** (4) | 1.288 (1) | 24.258** (2) |
- Number of parameters | 3 | 7 | 8 | 9 |

**Explained variance**

- Team ($R^2$) | (38.6%) | 4.1% | 10.2% | 93.4% |
- Individual ($R^2$) | (61.4%) | 1% | 10.9% | 0% |
- Total | 2.2% | 10.6% | 36.1% |

**Notes.** Est. = Estimate, SE = Standard Error, df = Degrees of freedom for $X^2_{\text{change}}$. Significance (two-tailed): *$p < .05$. **$p < .01$.**
7. Discussion

The main goal of this study was to determine if team level variables are tied to the satisfaction of the basic psychological needs of autonomy, competence and relatedness. Our results show a relationship between a positive climate for informal learning and the satisfaction of the needs for autonomy and relatedness, indicating that the climate for informal learning may be an important factor in supporting the SDT needs of knowledge professionals. For both autonomy and relatedness a substantial amount of variance is explained at the team level. This indicates that team level variables play a role in the satisfaction of the basic psychological needs. Our research also indicates that multilevel analysis has added value over ordinary least squares methods (Nezlek, 2008). We therefore underline the urge of Chen and Kanfer (2006) to adopt multilevel models in motivational research, in addition to an increased focus on team level variables. We found no effects for the distributed leadership variable on any of the three SDT needs. No relationships of the control variables were found, indicating that age, gender, educational levels and team size did not seem to influence the satisfaction of the SDT needs in our sample.

The results show that a positive learning climate for informal learning contributes significantly to the satisfaction of the needs for autonomy and relatedness, which is in line with our theoretical expectations. Further research can focus on assessing its external validity in other sectors.

No evidence was found for a relationship between leadership distribution and autonomy. This contradicts the theoretical expectation. Deci and Ryan (2000) define autonomy as the personal feeling of volition. This means there is a strong focus on the way the individual perceives his or her social context. It can be perceived as either autonomy supportive or not. The concepts of distributed leadership used in this study only captured the granting of influence by others and the network configuration (dense vs. loose and hierarchical vs. distributed). The lack of evidence for leadership distribution being related to autonomy, might also indicate that our operationalization of leadership in terms of team (de)centrality and the instruments used might not fully fit the intended concept.

Longitudinal measures using the social network approach may be useful to examine leadership distribution as a temporal phenomenon, whereas our cross-sectional approach may shed light on leadership distribution in terms of different leaders being active on different leadership functions simultaneously. More research is needed to determine which leadership functions can be usefully discerned by team members, while still being generic enough to apply to teams across organizational contexts.

The results do not show a significant relationship between leadership distribution and satisfaction of the need for relatedness. Tichy et al. (1979) distinguish between instrumental networks, in which influence and/or information is exchanged and expressive networks, in which affective interactions take place (e.g. liking and friendship). The leadership measures in this study are based on an instrumental network, measuring social relationships which are tied to leadership functions. As Baumeister and Leary (1995) have shown, the need for relatedness can be satisfied by two processes: (1) frequent and affectively pleasant interactions with others, and (2) an environment in which people feel an affective concern for one another. These two criteria seem to be tied more strongly to expressive networks than to instrumental type networks. Our instruments did not measure affective aspects of the work-related interactions, which might influence the dynamic process of granting and claiming influence. The positive relationship between a climate for informal learning and relatedness corroborates this explanation.

The problem in measuring the relationship between team level variables and competence satisfaction in this study was the low between-group variance (ICC1 = .04). This means that the differences in the satisfaction of the need for competence do not seem in any way related to an individual's membership of a specific team. It is not clear whether this problem originates from the sample, it's size, or if it is inherent to the nature of the competence concept. A replication of this study in other (health care) organizations could shed light on this issue.

7.1. Limitations

The cross-sectional data were not adequate for measuring the emergence of leadership and the dynamic process of claiming and granting influence through time. Bennet et al. (2003) highlight that distributed leadership is an emergent property of a group or network of interacting individuals. In addition, the dynamic process of claiming and granting influence is an important part of distributed leadership.
leadership developing over time (DeRue and Ashford, 2010; Gronn, 2002; Van Vugt et al., 2008). Our operationalization of leadership distribution was intended to measure social influence across different leadership functions, aimed to expose the presence of multiple ‘leaders’ at one point in time as a proxy for the aspect of dynamism while only employing a cross-sectional measure. A true longitudinal study would be much better suited to approach the dynamism aspect of distributed leadership, and could increase the effectiveness of the distributed leadership measure. Furthermore, the power of the sample in this study is low (Maas and Hox, 2005), which means that only large effects can be measured in this study. A larger sample of teams is needed to increase the power of the sample in order to also measure smaller effects. Additionally, only one specific health care organization was studied and therefore the generalizability of the findings of this study is limited.

7.2. Implications

This study encourages further exploration of the relationships between the SDT needs and variables at the team level. We also encourage expanding the range of included variables. By developing a better understanding of how team-level variables are tied to the satisfaction of the SDT needs, we can learn how to facilitate a work environment where knowledge workers feel and remain highly motivated. This study also yielded a short scale measuring team members’ perceptions of the climate for informal learning within the team and an innovative method of measuring team leadership distribution. By using a social network approach the operationalization of leadership distributions allows for capturing individual agency within the context of social interplay. Research on distributed leadership employing this method is still very limited (Mehra et al., 2006) and more social network research using longitudinal measures is needed to investigate the full breadth of the distributed leadership theory.

Although this study has been conducted in only one organization for child and youth support, the practical implications of this study are relevant to other health care organizations in which teams of knowledge workers play an important role. This study provides insight for theorists, HRD practitioners and organizations on how the intrinsic motivation of knowledge workers can be supported. A positive climate for informal learning yields positive results for autonomy and relatedness satisfaction. This emphasizes the importance of social interaction, which enables knowledge workers to create and apply knowledge that is relevant to professional situations and needs in cooperation with their colleagues (De Laat, 2012). In the process toward a learning organization, the informal organization is where most of the learning happens, which is strengthened by positive social relations (Yang et al., 2004). One of the tasks of HRD professionals is to create favorable conditions for intrinsic motivation of knowledge workers so that learning and collaborative knowledge development can emerge in the workplace. This study shows that a climate for informal learning and the sense of autonomy and relatedness are related in a positive way and that teams differ in the way they experience the informal learning climate. These findings offer a rationale for dedicated HRD interventions at team level.

8. References


