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The role of basic psychological needs satisfaction in the relationship between transformational leadership and innovative work behavior

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Abstract

The aim of this contribution was to investigate predictors of innovative work behavior (IWB) in nonprofit organizations. For instance, in schools, innovative solutions are crucial as the quality of education and therefore the schools' competitiveness depends on their ability to keep pace with technological, economic, and societal transformations. We addressed this issue in a quantitative study with 130 teachers in Dutch secondary schools employing a time-lag design. In accordance with self-determination theory, we investigated the role of transformational leadership for enhancing IWB and the role of basic psychological needs satisfaction in mediating this relationship. By employing structural equation modeling, we found that transformational leadership was positively related to the satisfaction of the teachers' needs for autonomy and competence. Furthermore, the satisfaction of the need for competence positively predicted teachers' IWB. In addition, perceived competence fully mediated the relationship between transformational leadership and teachers' IWB. Accordingly, persons with leadership responsibilities should adopt a transformational leadership style and motivate their employees by providing individual attention, intellectual stimulation, and encouragement for goal striving. Specifically, leaders may provide feedback on employees' innovative ideas and their strategies for realizing innovative solutions, thus helping them to become increasingly confident about what

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they can achieve and improve concerning their contributions to innovation development. For human resource development (HRD) professionals, our findings imply that efforts toward leadership training and development (e.g., training, coaching, and mentoring) should incorporate knowledge and practical experiences about transformational leadership as well as its role for employees' IWB and their contributions to organizational and professional development.

KEYWORDS

basic psychological needs satisfaction, innovative work behavior, time-lag design, transformational leadership

1 | INTRODUCTION

Innovative solutions in the workplace have become a key element for coping with dynamics in the world of work and, thus, for securing the internal functioning and success of organizations (Anderson et al., 2014). This applies not only to profit organizations but also to nonprofit organizations. For instance, schools need innovative solutions as they are affected by transformations in the world of work and, thus, need to respond to these transformations to secure the quality of their education. Only if schools keep track with technological, economic, and societal transformations, they will be able to adequately prepare youngsters for higher education and future jobs (Messmann et al., 2018). As a consequence, organizations need employees who seek innovative approaches for problems and challenges at work. Individual contributions to the development of innovations are referred to as innovative work behavior (IWB). IWB is associated with various benefits for employees such as improved work processes and outcomes (De Jong & Den Hartog, 2005; Janssen, 2000; Scott & Bruce, 1994). In addition, it stimulates employees' professional development in the sense that they gain cumulative knowledge about the content and logic of the innovative solution they help develop and about the process of innovation development and corresponding strategies for managing the uncertainty of this process (Bowers & Khorakian, 2014; Janssen, 2003; Messmann et al., 2018). Accordingly, as employees' proactive contributions to the development of innovations are related to change and development in organizations as well as to employees' professional development, empirical insight into possibilities for fostering IWB is an important topic for human resource development (HRD).

Self-determination theory (SDT; Deci & Ryan, 2000; Ryan & Deci, 2000) and its notion of basic psychological needs satisfaction (BPNS) represent a powerful theoretical account for explaining how work environments may facilitate employees' IWB. In accordance with SDT, work environments enhance proactive behaviors, such as IWB, if they support the satisfaction of employees' basic psychological needs for autonomy, competence, and relatedness and thus provide employees with the necessary motivational energy for such behaviors. More specifically, SDT posits that successful BPNS enables humans' organismic tendency to internalize externally prompted values and norms, such as the value of innovative solutions for work processes and outcomes and, thus, to become more self-determined in their motivation to perform corresponding behaviors such as IWB (Gagné & Deci, 2005; Rigby & Ryan, 2018).

Social factors play a key role as resources for BPNS (Deci et al., 1989) and as facilitators of proactive behaviors. Regarding the latter, research on IWB showed that social factors, such as the support of employees' immediate supervisor, are crucial for facilitating IWB (Hammond et al., 2011; Scott & Bruce, 1994). Especially if superiors seek to encourage their employees to strive for goals beyond their self-interests this was found to facilitate IWB (Aryee

et al., 2012; Nederveen Pieterse et al., 2010). By enacting such transformational leadership behavior (Bass, 1999; Yukl, 1999), employees are provided precisely with the support they need when they aim to proactively challenge work-related routines or problems.

While the role of transformational leadership as a facilitator of favorable work outcomes, such as IWB, is backed up by an ample amount of empirical evidence (Sheldon et al., 2003), the investigation of mechanisms through which transformational leadership exerts its influence on such work outcomes is still evolving. For instance, while a major focus of theorizing and research was on mediating motivational factors, such as creative self-efficacy, psychological empowerment, and intrinsic motivation (Koh et al., 2019), only few studies investigated the closely related construct of BPNS as an intervening mechanism (Hetland et al., 2015; Klaeijsen, 2015; Kovjanic et al., 2012). Extending this insight would add to our understanding of how transformational leadership contributes to employees' motivation for proactive behaviors such as IWB. Specifically, the notion of BPNS implies that by providing employees with responsibility and choice in relation to meaningful work tasks, transformational leaders can support the satisfaction of employees' need for autonomy; by showing consideration for employees' ideas, perspectives, solutions as well as challenges, transformational leaders can enhance employees' sense of competence; and by signaling their employees that they are trusted with responsible tasks and that it is safe to make errors and express challenging views, transformational leaders can convey feelings of relatedness.

Moreover, regarding different organizational contexts in which IWB and processes of innovation development were investigated, there is still a strong focus on profit companies while nonprofit organizations, such as public schools, received comparably little attention (S. Choi & Choi, 2014; Messmann et al., 2017). Furthermore, regarding research on IWB in schools, too little attention was paid to the investigation of intervening mechanisms such as BPNS (Thurlings et al., 2015). And finally, a major limitation of many existing studies on IWB, and particularly of studies in nonprofit organizations such as public schools, is their cross-sectional methodological approach (*ibid.*). In order to take into account the causal order of the constructs under investigation and reduce problems with common method variance (Podsakoff et al., 2003), the current contribution thus employed a time-lag design. In conclusion, our central research question is:

RQ1. *What is the role of BPNS in the relationship between transformational leadership and IWB?*

In the following, we first develop a theoretical framework explaining how transformational leadership may be linked to IWB via BPNS as an intervening mechanism. We then present a quantitative study investigating this topic in the work context of secondary education teachers. Finally, we answer our research question based on our findings, take a close look at implications for HRD practice regarding the workplace context and the context of training and development, and critically discuss limitations and implications for future research.

2 | CONCEPTUALIZATION OF IWB

Innovations are products or processes (e.g., tools, devices, or procedures) that are new, adequate, applicable, and beneficial for accomplishing tasks or facilitating processes in a particular work context (Messmann et al., 2017; West & Farr, 1989). Individual contributions to the development of innovative solutions are referred to as IWB, which encompasses all physical and cognitive activities employees carry out alone or together with others to generate innovative ideas, explore corresponding opportunities, activate support, and produce a prototype of the innovation. As IWB incorporates both creative and implementation-related contributions, it conceptually integrates creative behavior (Amabile, 1988; Kanter, 1988; Messmann et al., 2017; West & Farr, 1989). IWB comprises four closely related behavioral dimensions (De Jong & Den Hartog, 2005; Janssen, 2000; Scott & Bruce, 1994). Idea generation refers to the creation of ideas for solving a problem or accomplishing a task differently or more accurately. Through opportunity exploration, value for ideas is created by linking them to existing needs in the work context.

Through idea promotion, the support of a group of collaborators and sociopolitical sponsors is assembled. Idea realization involves the production of a material or conceptual prototype that allows others to experience the innovation's potential. A key characteristic of IWB is that it involves dealing with uncertainty concerning consequences of decisions, attainment of goals, likelihood of success, and potentially adverse reactions of the social work environment (Bowers & Khorakian, 2014; Janssen, 2003; Kanter, 1988; Messmann et al., 2018).

3 | BPNS AND IWB

According to SDT, humans have three basic psychological needs that must be satisfied in order to enable effective functioning, development, and well-being (Deci & Ryan, 2000; Ryan & Deci, 2000), that is, the needs for autonomy, competence, and relatedness. The satisfaction of these needs results in perceptions of autonomy, competence, and relatedness at work, which are captured by the construct of BPNS. Perceived autonomy is the feeling to be in control of one's actions and to consider one's actions as an expression of the self. Perceived competence means the feeling to be capable of effectively accomplishing work tasks and attaining valued goals. And perceived relatedness is the sense of belonging to and being securely connected to other people. If employees feel autonomous, competent, and related at work, this creates the necessary motivational energy that activates their organismic tendency to internalize external values and norms and, thus, develop a self-determined motivation for corresponding behaviors (Gagné & Deci, 2005; Rigby & Ryan, 2018). With respect to IWB, this means that when in a work context the development of innovative solutions is valued and expected, employees who feel autonomous, competent, and related will more likely internalize this externally prompted expectation and develop a self-determined motivation for IWB. And that is because the satisfaction of these basic psychological needs enables employees to explore and act on creative ideas and cope with the challenges and demands that are immanent to processes of innovation development (Bowers & Khorakian, 2014; Janssen, 2003; Kanter, 1988; Messmann et al., 2018).

First, the introduction of innovative ideas into one's work context is a process that cannot be planned entirely, involves numerous decisions about how this introduction should take place, and requires the possibility to experiment with the envisioned innovation. Accordingly, feeling autonomous is crucial as it enables employees to proactively make decisions, plan their own course of action, and independently try out different approaches during the innovation process. Second, introducing and experimenting with innovative ideas is heavily based on knowledge about the content and logic of the envisioned innovation and may not come without frustrations and setbacks along the way. Therefore, feeling competent is essential for acting confidently in a complex innovation process, for continuously improving one's knowledge and creative insights about the envisioned innovation, and for staying motivated during challenging episodes of the innovation process. Third, as innovation processes are knowledge-intensive and strongly affected by the social work environment, having supporters and allies who provide insight, feedback, and sociopolitical backing is crucial. Hence, the perception of relatedness is an important motivational requirement for employees' decision to participate in a process that will likely involve challenges, setbacks, and adverse social reactions. These considerations about the association between BPNS and IWB are also supported by empirical evidence. For instance, Devloo et al. (2015) found a longitudinal, reciprocal relationship between BPNS and IWB in a student sample. Likewise, Klaijsen (2015) found supportive evidence in the context of teachers' work. Accordingly, we formulated the hypothesis:

Hypothesis 1. *Perceived autonomy, competence, and relatedness will be positively related to IWB.*

4 | TRANSFORMATIONAL LEADERSHIP AND BPNS

Transformational leadership represents a type of leadership behavior through which leaders seek to stimulate their employees to strive for goals beyond their self-interests (Bass, 1999; Yukl, 1999). Transformational leaders provide their employees with individual attention and intellectual stimulation and encourage them to set ambitious goals and develop a professional vision (de Hoogh et al., 2004). In accordance with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), we argue that transformational leadership represents a major source for the satisfaction of employees' basic psychological needs. In this regard, the construct of BPNS allows distinguishing between different ways in which transformational leaders may motivate their employees. First, transformational leaders may stimulate employees' perceived autonomy by creating facilitative work conditions, for instance by giving employees responsibility and choice in relation to meaningful tasks and decisions. Second, transformational leaders may enhance employees' perceived competence by showing appreciation for their ideas, perspectives, and solutions, by emphasizing accomplishments rather than errors, and by being responsive to perceived challenges and uncertainties. Third, transformational leaders may bolster employees' perceived relatedness by signaling them that they are trusted with meaningful tasks and that it is safe to make errors and express challenging views. Although motivational effects of transformational leadership were studied extensively (Koh et al., 2019), comparably few studies investigated how transformational leadership contributes to BPNS. Nevertheless, these studies showed a positive relationship between transformational leadership and BPNS (Hetland et al., 2015; Kovjanic et al., 2012; Stenling & Tafvelin, 2014). Jensen and Bro (2018) and Klaijnsen (2015) also reported evidence for this positive relationship in the domain of teaching. Accordingly, we hypothesized:

Hypothesis 2. *Transformational leadership will be positively related to perceived autonomy, competence, and relatedness.*

5 | TRANSFORMATIONAL LEADERSHIP, BPNS, AND IWB

In accordance with the literature on transformational leadership (Bass, 1999; Yukl, 1999), employees are assumed to show favorable work behaviors, such as IWB, if their leader encourages them to strive for challenging goals that reach beyond their self-interests. This effectiveness may be explained by transformational leaders' ability to motivate their employees (Koh et al., 2019). Among different motivational constructs, BPNS (Deci & Ryan, 2000; Ryan & Deci, 2000) offers a broad view on different ways in which transformational leaders may contribute to favorable motivational perceptions of employees, which, in turn, provide them with the necessary motivational energy for getting actively involved in an uncertain process such as innovation development. While transformational leaders' support of employees' BPNS, as outlined above, may occur in any work situation, leaders' contributions to the satisfaction of basic psychological needs in immediate relation to innovation processes may be particularly facilitative of employees' IWB. For instance, transformational leaders may support perceived autonomy by encouraging employees to think out of the box and experiment with ideas as well as by letting them plan a corresponding innovation strategy. Likewise, transformational leaders may promote perceived competence by showing appreciation for employees' ideas, even if they challenge established routines. In addition, by providing constructive, yet supportive feedback, they may bolster employees' confidence even in situations where the innovation process is stuck or errors have occurred. Furthermore, transformational leaders may support feelings of relatedness by signaling their employees that they are trusted to experiment with new ideas as well as by providing room for errors and backing for conflicting situations (Kanter, 1988). Accordingly, we argue that transformational leadership facilitates IWB through BPNS as an intervening motivational factor. Concerning empirical evidence, several studies found a positive relationship between transformational leadership and IWB (Aryee et al., 2012; S. B. Choi et al., 2016; Nederveen Pieterse et al., 2010; Reuvers et al., 2008). Surprisingly, the role of BPNS in this relationship was only investigated in

one study in the context of teachers' work (Klaeijssen, 2015), which provided support for the assumption that transformational leadership facilitates IWB because it is a source of BPNS. However, while BPNS captures or at least relates to a broad range of motivational aspects, other factors, which are not motivational, might additionally play a role in the relationship between transformational leadership and IWB. For instance, studies suggested that transformational leaders may be effective by facilitating favorable cognitive processes (Carmeli et al., 2014) or social processes (S. B. Choi et al., 2016). Accordingly, BPNS may only partially explain the association between transformational leadership and IWB. Thus, we hypothesized:

Hypothesis 3. *There will be a positive relationship between transformational leadership and IWB that is partially mediated by perceived autonomy, competence, and relatedness.*

6 | METHOD

6.1 | Sample and data collection procedures

We addressed our research question in a study among teachers in secondary education in the Netherlands. Initially, 779 teachers who worked for an association of 10 public, nonprofit schools were invited to participate in the study and take part in three consecutive data collections by completing online questionnaires that could be accessed via unique hyperlinks. At the time of the study, all participating schools had established a policy that aimed at stimulating their teachers to innovate their teaching. In accordance with our research question, we implemented a time-lag design to investigate predictive effects of transformational leadership and BPNS on IWB. Therefore, we temporally separated the measurement of transformational leadership and BPNS from the measurement of IWB. That is, data on transformational leadership and BPNS were collected at the first point of measurement (i.e., T1) while data on IWB were collected at two subsequent points of measurement that however needed to be combined to account for missing data (thus referred to as T2, see below). The three data collections took place in July 2014, November 2015, and February 2017. This time lag of slightly over 1 year was chosen because the school year is a crucial structural element in teachers' work and because the process of innovation development requires sufficient time to take place. We therefore considered the time lag suitable for investigating predictive effects of transformational leadership and BPNS on IWB. In addition, by implementing a time-lag design, we accounted for the causal order of the investigated constructs and reduced potential problems with common method variance (Podsakoff et al., 2003).

At T1, 219 teachers participated (response rate: 28.1%). Of these original participants, 100 teachers participated in a second data collection (response rate: 45.7%) and 87 teachers participated in a third data collection (response rate: 39.7%). However, only 57 teachers participated in all three data collections while 73 teachers missed either the second or third point of measurement. To account for these missing data, T2-data were composed by selectively combining the data of these two subsequent data collections. That is, we used the data collected at the second point of measurement if these were available and did not contain more missing values than the respective data collected at the third point of measurement (which applied to 87 teachers). In all other cases, we used the data collected at the third point of measurement (which applied to 43 teachers). Both subsets of our T2-data contained teachers from all participating schools and t-tests did not show any significant differences between the two subsets. This combination procedure resulted in a final sample size of $N = 130$ teachers from eight different school contexts (two schools had dropped out after T1).

Regarding background variables, the 130 teachers in our study sample had an average age of 43.51 years ($SD = 11.49$ years) and 50.8% were female. In terms of education, 1.5% of the teachers had a secondary education, another 1.5% had a vocational education, 75.4% had a higher education from a

practice-oriented university of applied sciences, and 21.5% had a higher education from a research university focused on theory and knowledge creation. Furthermore, on average, the teachers' working time equaled 89.6% ($SD = 16.3\%$) of a full-time employment. And finally, the teachers' average work experience was 16.18 years ($SD = 10.21$ years).

6.2 | Measures

6.2.1 | Innovative work behavior

For the measurement of IWB, seven items were taken from a scale developed by De Jong and Den Hartog (2005). The scale taps individual contributions to the development of innovations (e.g., "In my work I often come up with ideas", $\alpha = 0.93$).

6.2.2 | Basic psychological needs satisfaction

This construct was measured with an instrument that was developed by Kreijns et al. (2019) in accordance with SDT (Ryan & Deci, 2000) and the findings of Klaeijsen (2015) who did not find a three-factor structure using the original scale for measuring BPNS in a work context (Kasser et al., 1992). The instrument contains three subscales for assessing perceived autonomy, perceived competence, and perceived relatedness. Exploratory factor analysis (principal axis factoring, promax rotation) yielded three distinct, theoretically consistent factors (i.e., no problematic cross-loadings exceeding $\lambda > 0.30$), which explained 66.0% of the variance in the items. The three extracted factors and the corresponding item loadings were consistent with the theoretical conceptualization of BPNS, that is, they represented perceived autonomy (4 items, e.g., "In my work I can do the things that I really want or that interest me", $\alpha = 0.85$), perceived competence (4 items, e.g., "In my work my knowledge and skills are quite up to date", $\alpha = 0.73$), and perceived relatedness (4 items, e.g., "In my work my colleagues show genuine interest in me", $\alpha = 0.82$).

6.2.3 | Transformational leadership

For the measurement of transformational leadership, an 11-item scale developed by De Hoogh et al. (2004) was used. The scale measures whether employees perceive that their superior leads by considering individual perspectives and values, showing commitment for beliefs and values, creating enthusiasm for plans, expressing a vision, creating team spirit, encouraging divergent and independent thinking, modeling an innovative work approach, involving employees in decision-making, encouraging goal striving, and giving responsibility for challenging tasks (e.g., "Encourages employees to think independently", $\alpha = 0.95$).

All scales were originally in Dutch and employed a seven-point Likert-type response format. The response options ranged from 1 = "does not apply at all" to 7 = "fully applies" for IWB and BPNS and from 1 = "completely disagree" to 7 = "completely agree" for transformational leadership.

6.3 | Analyses

In order to address our research question, we first carried out a descriptive analysis (i.e., means and standard deviations). As part of this, we employed the Mahalanobis distance to check for outliers. Next, we carried out correlation analyses (Pearson's r) including our study variables. Furthermore, we employed group comparisons (i.e., t -tests and

analyses of variance) and correlation analyses to check for bivariate effects of background variables (i.e., age, gender, education, working time, work experience, and school context) on endogenous variables (i.e., BPNS and IWB). Regarding education and school context, we used dummy variables to examine effects of the single categories.

In order to test our hypothesized direct and indirect effects simultaneously, composite indicator structural equation modeling (CISEM) in Mplus 8 (Muthén & Muthén, 1998–2017) was employed. In CISEM, the observed variables of constructs (i.e., the item-based measurements) are totally aggregated and then used as single indicators of corresponding latent variables. In addition, estimates of the unique variances of the latent variables are specified as fixed parameters. These are calculated based on Cronbach's α and the variance of the corresponding measurement scales as $(1-\alpha)*\sigma^2$ (Coffman & MacCallum, 2005; Williams & O'Boyle Jr., 2008). In accordance with empirical findings (McDonald et al., 2005; Savalei, 2019), CISEM can be recommended as a technique that avoids estimation variability in small samples ($N < 200$) and that allows converting path models into latent variable models by correcting for measurement error. For building our composite indicator structural equation model, we specified directed paths among our study variables in accordance with our hypotheses. In addition, we controlled for effects of background variables on endogenous variables if the preliminary group comparisons or the correlation analyses had shown a significant effect and if the background variables significantly contributed to the model. Furthermore, we employed the Mardia-test to check for multivariate non-normality of our data. Model fit was evaluated based on recommended fit indices (Hu & Bentler, 1999; Schermelleh-Engel et al., 2003). These included the χ^2 -test statistic, the χ^2/df -ratio, the comparative fit index (CFI), the non-normed fit index (NNFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR).

7 | RESULTS

7.1 | Descriptives and correlations

To begin with, an inspection of the Mahalanobis distance yielded no outliers in our data. Descriptive statistics (Table 1) indicated that most of the teachers carried out the work activities encompassed in IWB ($M = 5.31$, $SD = 1.09$). They also felt related in their social work environment ($M = 5.24$, $SD = 0.98$). Slightly weaker scores were determined for teachers' perceptions of autonomy ($M = 4.73$, $SD = 1.09$) and competence ($M = 4.83$, $SD = 0.93$) as well as for experiencing their leader as transformational ($M = 4.94$, $SD = 1.15$).

Correlations (Table 1) showed that perceived autonomy and perceived competence were both positively related to IWB. Conversely, perceived relatedness was not related to IWB. In addition, among the three basic psychological needs, only perceived autonomy and perceived competence were substantially related to each other. Moreover, transformational leadership was positively related to perceived autonomy, competence, and relatedness, as well as to IWB.

TABLE 1 Descriptives and correlations

	M	SD	1.	2.	3.	4.	
1. Transformational leadership T1	4.94	1.15	(0.95)				
2. Perceived autonomy T1	4.73	1.09	0.41**	(0.85)			
3. Perceived competence T1	4.83	0.93	0.23**	0.22*	(0.73)		
4. Perceived relatedness T1	5.24	0.98	0.22*	0.13	0.13	(0.82)	
5. Innovative work behavior T2	5.31	1.09	0.19*	0.18*	0.38**	0.08	(0.93)

Note: $N = 130$. Values for Cronbach's α are presented in parentheses in the diagonal of the correlation matrix.

* $p < 0.05$.

** $p < 0.01$.

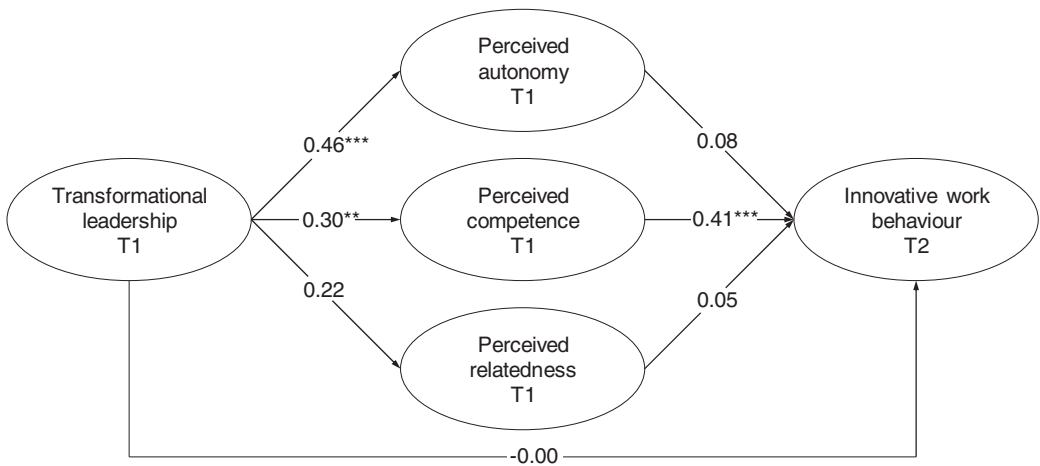


FIGURE 1 Standardized estimates for effects on IWB. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. $N = 130$. Model fit: $\chi^2 = 22.56$, $p = 0.43$; $\chi^2/df = 1.03$; comparative fit index = 0.99; non-normed fit index = 0.99; root mean square error of approximation = 0.01; standardized root mean square residual = 0.05. Effects of background variables are omitted. Indirect effects of transformational leadership (TL) on innovative work behavior (IWB) mediated by perceived autonomy (PA), perceived competence (PC), and perceived relatedness (PR): TL \rightarrow PA \rightarrow IWB, $\beta = 0.04$, ns ; TL \rightarrow PC \rightarrow IWB, $\beta = 0.12^*$, and TL \rightarrow PR \rightarrow IWB, $\beta = 0.01$, ns

Concerning effects of background variables, preliminary group comparisons showed higher perceptions of autonomy in two school contexts ($t_{\text{context}7} = 2.15$, $p < 0.05$; $t_{\text{context}8} = 2.76$, $p < 0.01$). In one of these two school contexts, we also found higher perceptions of competence ($t_{\text{context}8} = 2.62$, $p < 0.05$). And in a third school context we found higher perceptions of relatedness ($t_{\text{context}3} = 2.57$, $p < 0.05$). We furthermore found a lower perception of autonomy for female teachers ($t = -2.11$, $p < 0.05$). And concerning education, we determined a higher perception of autonomy for teachers with a vocational education ($t_{\text{education}} = 2.20$, $p < 0.05$). Moreover, correlation analyses showed that age and work experience were negatively related to IWB ($r_{\text{age}} = -0.19$, $p < 0.05$; $r_{\text{experience}} = -0.31$, $p < 0.01$).

7.2 | Hypothesis testing

As the Mardia-test indicated multivariate non-normality of our data, we used robust maximum likelihood estimation. For our composite indicator structural equation model (Figure 1), in which we had specified our hypothesized direct and indirect effects while controlling for effects of relevant background variables, a good fit was determined (i.e., $\chi^2 = 22.56$, $p = 0.43$; $\chi^2/df = 1.03$; CFI = 0.99; NNFI = 0.99; RMSEA = 0.01; SRMR = 0.05). Specifically, we tested whether the dimensions of BPNS (i.e., perceived autonomy, perceived competence, and perceived relatedness) predicted IWB (Hypothesis 1); whether transformational leadership predicted the dimensions of BPNS (Hypothesis 2); and whether transformational leadership predicted IWB indirectly through the dimensions of BPNS as well as directly as a consequence of potential intervening factors not investigated in our study (Hypothesis 3). Regarding background variables, education, work experience, and school context were included as predictors (see below).

With respect to our hypothesized effects, we found that of the three dimensions of BPNS only perceived competence positively predicted IWB ($\beta = 0.41$, $p < 0.001$). On the contrary, we found no such effect for perceived autonomy ($\beta = 0.08$, ns) and perceived relatedness ($\beta = 0.05$, ns). Thus, Hypothesis 1 was partly supported.

Concerning the hypothesized relationship between transformational leadership and BPNS, we found that transformational leadership positively predicted perceived autonomy ($\beta = 0.46, p < 0.001$) and perceived competence ($\beta = 0.30, p < 0.01$). Conversely, for perceived relatedness, the predictive effect of transformational leadership was less substantial ($\beta = 0.22, ns$), herewith partly supporting Hypothesis 2. Regarding the hypothesized link between transformational leadership and IWB, we found an indirect predictive effect of transformational leadership on IWB via perceived competence ($\beta = 0.12, p < 0.05$). On the contrary, the relationship between transformational leadership and IWB was not mediated by perceived autonomy or perceived relatedness ($\beta = 0.04/0.01, ns$). Likewise, transformational leadership did not predict IWB directly ($\beta = -0.00, ns$). Accordingly, our results showed in contradiction to Hypothesis 3 that the predictive effect of transformational leadership on IWB was not partially but fully mediated by only one dimension of BPNS (i.e., perceived competence).

Moreover, concerning effects of background variables (omitted in Figure 1), we found that some school contexts positively predicted the amounts of perceived autonomy ($\beta_{\text{context7}} = 0.18, p < 0.01$ and $\beta_{\text{context8}} = 0.32, p < 0.01$), perceived competence ($\beta_{\text{context8}} = 0.28, p < 0.01$), and perceived relatedness ($\beta_{\text{context3}} = 0.22, p < 0.01$). Furthermore, having a vocational education positively predicted perceived autonomy ($\beta_{\text{education}} = 0.15, p < 0.01$). Moreover, work experience negatively predicted IWB ($\beta = -0.31, p < 0.001$).

8 | DISCUSSION

The aim of this contribution was to investigate the role of BPNS in the relationship between transformational leadership and IWB, thus providing insight into the facilitation of innovation development in organizations. This topic is important as innovative solutions and accordingly employees' IWB are crucial for securing the success and survival of profit organizations and nonprofit organizations (e.g., public schools) alike (Anderson et al., 2014). We addressed this issue in a study with secondary education teachers, thereby responding to the neglect of studies on IWB in nonprofit organizations (Thurlings et al., 2015). In accordance with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000) and existing empirical insights, we tested several hypotheses related to the role of BPNS in the relationship between transformational leadership and IWB.

8.1 | The role of BPNS in the relationship between transformational leadership and IWB

First, in accordance with supportive evidence for a positive relationship between BPNS and IWB (Devloo et al., 2015; Klaijnsen, 2015), our study shows that if employees perceive themselves as competent at work they are more likely to contribute to the development of innovative solutions. This finding implies that dealing with the uncertainty associated with IWB requires a strong perception of work-related competence. This is in line with Bowers and Khorakian (2014) and Janssen (2003) who stated that coping with the challenges and demands of innovation processes requires a strong motivational basis. In accordance with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), it can be concluded that employees who feel competent at work will perceive innovation processes as positively challenging and sustain their efforts despite the experience of uncertainty about consequences of decisions, goal attainment, or adverse social reactions.

However, in contradiction to SDT and previous studies (Devloo et al., 2015; Klaijnsen, 2015), we did not find evidence for such a positive association with IWB for perceived autonomy and perceived relatedness. Concerning perceived autonomy, we would have expected in accordance with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000) that if employees feel to have freedom and choice at work they are more encouraged to challenge the status quo, strive for necessary changes, and initiate a rather chaotic innovation process. However, it may be that for teachers the

feeling of freedom and choice, which is something they are used to in relation to their teaching, is less crucial when it comes to initiating innovation processes than it is the feeling of being competent enough for such a complex and uncertain process. Likewise, concerning perceived relatedness, we would have expected from an SDT perspective (Deci & Ryan, 2000; Ryan & Deci, 2000) that if employees feel safely connected at work they will also sense that support and sociopolitical backing will be available if they participated in a knowledge-intensive and challenging innovation process in which errors, setbacks, and social resistance are likely. However, it may be that in the culture of teachers' work, which largely consists of teachers performing in the classroom and apart from their colleagues, social relatedness is less important for deciding to enter or initiate an innovation process (Messmann et al., 2017; Wermke et al., 2019). Based on these findings, we may conclude that although SDT would have proposed that the satisfaction of all three basic psychological needs is necessary for internalizing the value of developing innovative solutions at work and, thus, for developing a self-determined motivation for IWB (Gagné & Deci, 2005; Rigby & Ryan, 2018), there may be work contexts, such as teachers' work, in which the importance of one or more of these needs is reduced.

Second, in accordance with previous studies (Hetland et al., 2015; Jensen & Bro, 2018; Kovjanic et al., 2012), our evidence supports the assumption that transformational leadership is an important factor for employees' BPNS. This finding is consistent with SDT, which proposes that social factors play a key role in satisfying employees' basic psychological needs (Deci et al., 1989). Specifically, our finding of a substantial relationship between transformational leadership and perceived autonomy and competence supports the assumption that transformational leaders may enhance employees' motivational energy through task-related and competence-related channels. That is, by providing task-related resources such as encouragement, responsibility, and choice as well as competence-related resources such as acknowledgment of accomplishments and opportunities for improvement, transformational leaders may strengthen perceptions of autonomy and competence. However, perceived relatedness was less substantially related to transformational leadership. Accordingly, the assumption that giving employees responsibility for meaningful tasks and showing consideration for their individual perspectives and challenges contributes to their feelings of trust and safety and, thus, their sense of relatedness is not supported by our findings.

Third, our evidence suggests in accordance with existing studies (Klaeijnsen, 2015; Kovjanic et al., 2012) that the relationship between transformational leadership and IWB may be explained by transformational leaders' contributions to employees' feelings of competence, which, in turn, facilitate IWB. Conversely, the assumption that transformational leaders' contributions to the satisfaction of the needs for autonomy and relatedness also play a role in the relationship between transformational leadership and IWB is not supported by our findings. These findings thus support the assumption that employees' contributions to innovation development rely on their confidence in the ability to manage the uncertainty associated with innovation processes (Bowers & Khorakian, 2014; Janssen, 2003; Kanter, 1988; Messmann et al., 2018), which, in turn, is more likely if they have a transformational leader who considers their individual ideas, perspectives, solutions, and challenges. Furthermore, in accordance with SDT (Deci & Ryan, 2000; Ryan & Deci, 2000), the findings support the assumption that by contributing to the satisfaction of the need for competence, transformational leaders facilitate employees' tendency to internalize the importance of developing innovative solutions at work and, thus, develop a self-determined motivation for carrying out IWB. Furthermore, the finding that transformational leadership and IWB were not directly connected supports the assumption that there may be work contexts in which this relationship is solely due to transformational leaders' ability to motivate their employees and more specifically their support for employees' feelings of competence. This finding adds to meta-analytic evidence showing that motivational factors play a key role in mediating the effects of transformational leadership on creative behavior (Koh et al., 2019) by providing insight into the role of BPNS as a motivational factor that received comparably little attention in existing research on transformational leadership (Hetland et al., 2015).

8.2 | Implications for HRD practice

Our study offers valuable insight into predictors of employees' IWB in knowledge-intensive work contexts such as secondary schools. This insight holds important implications for HRD practice as employees' proactive contributions to the development of innovative solutions are linked to organizational change and development as well as to employees' professional development. In the following, we will discuss specifically what our findings imply for interactions between leaders and employees at the workplace as well as for systematic efforts toward leadership training and development.

As far as leader–follower interactions at the workplace are concerned, our study provides insight into the role of transformational leadership for fostering IWB through the satisfaction of employees' basic psychological needs. First, the finding of a substantial relationship between perceiving one's leader as transformative and feeling autonomous and competent at work implies that persons in any kind of leadership position (e.g., school leaders) should pay attention to potential motivational effects of their leadership style. Based on our findings, it may thus be suggested that leaders should provide their employees with individual attention, intellectual stimulation, and encouragement for setting ambitious goals. Such transformational leadership behavior may be embedded in any kind of interaction between leaders and employees, for instance, when leaders give informal feedback during a team meeting or a coffee break. Likewise, transformational leadership behavior may take place during appraisal interviews in which leaders stimulate their employees to set ambitious goals for their personal development plan such as defining an aspect of their work they want to innovate. Through such transformative interactions, employees may be enabled to act autonomously and take over responsibility for important tasks and decisions. Furthermore, interactions with transformational leaders may help employees to gain insight into their individual strengths and weaknesses and, thus, develop a sense of competence at work. By this means, transformational leaders may draw employees' attention to the fit of their responsibilities and goals with their current level of knowledge and skills which, in turn, may stimulate future efforts toward professional development.

Second, the finding that there is an indirect positive connection between perceiving one's leader as transformational and performing IWB through the perception of competence at work implies that leaders should be aware of the role they may play in encouraging employees' contributions to complex and uncertain processes such as the development of innovative solutions at work. Specifically, this finding suggests that leaders should bolster employees' feelings of competence through transformative actions, such as providing individual attention or intellectual stimulation, as this may help employees to manage the complexity and uncertainty of an innovation process. For instance, leaders may provide constructive feedback on employees' innovative ideas and the strategies employees pursue to realize innovative solutions, thus helping them to become increasingly confident about what they can achieve as well as improve regarding their contributions to innovation development. In addition, as a precondition, leaders themselves need to have a vision about ideas and needs for innovation in their organization. This in turn may increase employees' self-determined motivation for contributing to the development of innovative solutions at work.

Moreover, our findings concerning the association of transformational leadership with perceived autonomy and competence and with IWB hold implications for HRD professionals' systematic efforts toward transformational leadership training and development in organizations. For instance, leadership training may emphasize the importance of transformational aspects of leadership behavior such as individual attention, intellectual stimulation, and encouragement for goal striving. In this regard, a recent study (Tafvelin et al., 2019) showed that training may indeed be an effective strategy for improving transformational leadership. Based on such knowledge about transformational leadership, leadership coaching may complement training efforts by providing leaders with opportunities to question their current leadership style as well as to reflect on experiences with applying transformative aspects of leadership in their interactions with employees during informal as well as formal encounters. Regarding the latter, coaching activities should draw attention to how the individual attention, intellectual stimulation, and encouragement for goal striving that leaders have provided their employees has affected these employees' feelings

of autonomy and competence. Furthermore, mentoring may provide a viable means for prospective leaders to prepare themselves for future leadership responsibilities by learning from an experienced transformational leader. Concerning the school context, such mentoring efforts may already be integrated into teacher education and for instance take place during internships of prospective school leaders (Jamison et al., 2020). In accordance with our findings, all these efforts toward supporting leaders in developing their knowledge and skills about transformational leadership behavior may positively affect employees. That is, transformational leadership training, coaching, and mentoring may enable leaders to bolster their employees' sense of autonomy and competence, to stimulate employees to innovate aspects of their work, and to guide those employees who are already involved in the generation, exploration, promotion, and realization of innovative ideas. In addition, as a study by Akdere and Egan (2020) shows, transformational leaders may also have a positive effect on an organization's HRD culture and practices. Investing into transformational leadership training and development may thus facilitate change and development of organizations and of professionals alike.

8.3 | Limitations and future research

Regarding our findings about the role of BPNS in the relationship between transformational leadership and IWB, some points have to be considered in future studies. First, the small sample sizes of the second and third data collection, which led to the implementation of a time-lag design with only two points of measurement, are a critical issue. Although there were no significant differences between the two subsets of data taken from either the second or the third data collection, one might ask why some participants' may have skipped one of these data collections. As a consequence, our findings should be corroborated on basis of a larger sample, which would, for instance, enable multiple indicator structural equation modeling. While CISEM can be recommended in studies with small samples as a technique that allows converting path models into latent variable models by correcting for measurement error (McDonald et al., 2005; Savalei, 2019), obtaining estimates of unique variance based on Cronbach's α does not account for specific variance. Thus, the unique variance of latent variables may be underestimated (Coffman & MacCallum, 2005; Williams & O'Boyle Jr., 2008). Accordingly, future studies should employ multiple indicator structural equation modeling in which unique variance is estimated as part of the statistical model. Closely connected to this issue, collecting data in a larger number of work contexts, such as different schools, would allow accounting for the nested nature of data collected across different work contexts by means of a multilevel analysis.

Second, although we partially took into account the causal order of our study variables by implementing a time-lag design, causal interpretations are constrained by the nature of our data. We employed a time-lag design as we were merely interested in the prediction of IWB at a later point in time rather than on the prediction of changes in IWB. Nevertheless, a panel design with three points of measurement, which include transformational leadership, BPNS, and IWB, would have allowed us to optimally reflect the causal order of effects, investigate reciprocal effects, and examine the stability of effects.

Third, while the current study focused solely on the role of BPNS in the relationship between transformational leadership and IWB, our findings need to be complemented by studies that additionally investigate other potential intervening factors in the relationship between transformational leadership and IWB. In this regard, the role of transformational leaders in facilitating cognitive or social processes (Carmeli et al., 2014; S. B. Choi et al., 2016) could be included. In addition, their contributions to a supportive human resource development culture (Akdere & Egan, 2020) may be investigated. Furthermore, it would be promising to complement the perspective of SDT with other theoretical accounts such as action regulation theory according to which employees regulate their behavior by searching the social work environment for action-relevant information or signals such as encouragement by one's supervisor to introduce and apply innovative ideas (Zacher & Frese, 2018). Likewise, in accordance with models of creativity and innovation in organizations (Amabile, 1988; Woodman et al., 1993), future studies should include job characteristics, such as job complexity, and individual traits, such as creative personality, to broaden the perspective

on the facilitation of IWB (Hammond et al., 2011). Moreover, future research may take into account the multidimensionality of transformational leadership. While we focused on associations between transformational leadership and the dimensions of BPNS and, thus, employed an overall measure of transformational leadership, it should also be investigated whether different dimensions of transformational leadership, such as intellectual stimulation or individualized consideration (Bass, 1999), relate differently to perceived autonomy, competence, and relatedness.

Fourth, concerning the generalization of our findings, our study context needs to be considered. To begin with, the fact that all participating schools had established a policy that aimed at stimulating teachers to innovate their teaching represents a critical issue. While we accounted for the possibility that this policy may have affected the single schools differently by controlling for differences between schools, the potential impact of this policy on teachers' IWB and the investigated predictors needs to be considered when generalizing our findings. Likewise, the current study context and the culture of teachers' work, which to a large part is characterized by autonomous classroom work apart from colleagues (Messmann et al., 2017), need to be considered when generalizing our relational patterns (e.g., the subordinate role of perceived autonomy and relatedness as predictors of IWB).

Finally, by studying public school teachers' IWB, we addressed the shortcoming of too little research on IWB in nonprofit organizations. Future research should broaden this insight by investigating the role of IWB in primary, vocational, and higher education. Such studies are important for improving our understanding of how IWB of employees working in nonprofit contexts can be fostered. In this regard, our study suggests that although the reasons for an organization's need for innovation may differ between profit and nonprofit contexts, the needs of individual employees who contribute to innovation development may be similar. That is, for realizing innovative ideas and for managing the uncertainty inherent to innovation development (Bowers & Khorakian, 2014; Janssen, 2003), resources such as BPNS and transformational leadership matter for employees in any kind of work context (Kanter, 1988; Messmann et al., 2017).

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