What motivates transformational leaders? On the relationship between leaders’ satisfaction of basic psychological needs and transformational leadership

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What Motivates Transformational Leaders? On The Relationship Between Leaders’ Satisfaction of Basic Psychological Needs and Transformational Leadership

By

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2023
Approval of the Dissertation Committee

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Haoxiong Li as fulfilling the scope and quality requirements for meriting the degree of Doctor of Philosophy in Psychology.

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Abstract

What Motivates Transformational Leaders? On The Relationship Between Leaders’ Satisfaction of Basic Psychological Needs and Transformational Leadership

By

Haoxiong Li

Claremont Graduate University: 2023

The current research addresses the scarcity of studies exploring the motivational antecedents of transformational leadership, which focuses on developing followers for extraordinary performance. Grounded in the Self-Determination Theory, I propose that leaders' psychological needs satisfaction is associated with transformational leadership. Specifically, leaders' autonomous motivation, mindfulness, and positive affect are outcomes of their satisfaction of basic psychological needs and act as motivating factors for exhibiting transformational leadership behaviors. I conducted two studies to test these hypotheses. Study 1, a correlational study, aimed to establish relationships among the constructs. A sample of 238 leaders with at least two subordinates participated in an online survey. The findings indicated that leaders' autonomous motivation and mindfulness mediated the relationship between leaders’ satisfaction of psychological needs and transformational leadership, while positive affect did not exhibit significant mediation. The direct association between satisfaction of psychological needs and transformational leadership was not established. To further investigate the causal nature of the relationship between satisfaction of psychological needs and transformational leadership, as well as capture the dynamics of state-like constructs, Study 2 was conducted as a longitudinal diary study using cross-lagged panel analysis. Eighty participants completed four consecutive diary surveys over a four-week period, recruited through an online convenience sampling strategy. The
The results of Study 2 demonstrated that leaders' autonomous motivation, but not mindfulness or positive affect, mediated the relationship between their satisfaction of psychological needs and transformational leadership. I also found that transformational leadership predicted leaders' positive affect, mindfulness, and autonomous motivation. The current research offers several contributions. It took an innovative approach exploring the connection between Self-Determination Theory and transformational leadership, through focusing on leaders’ satisfaction of psychological needs and autonomous motivation and examining the influence of these internal experiences and states on their transformational leadership behaviors. Practically, the current research implies that leaders can promote their own transformational leadership behaviors through satisfying their own psychological needs in training programs. In future research, I recommend conducting intervention and experimental studies with longitudinal designs and collecting data from multiple sources.
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# Limitations and Future Research

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Chapter 1: Introduction

Leadership is a social influence process and plays a vital role in organizations (Antonakis & Day, 2017). One notable leadership style, transformational leadership, positively influences followers and contributes to the substantial development of these followers and the entire team (Bass, 1985). Transformational leadership focuses on cultivating extraordinary performers by transforming followers' emotional, motivational, and intellectual aspects (Bass, 1985). Research findings indicate that transformational leadership has been associated with various outcomes, encompassing followers' commitment to the organization (Conger & Kanungo, 1988), their satisfaction with their leaders (Dumdum et al., 2013; Lowe et al., 1996), and their performance, which has been observed across cultures (Elenkov, 2002; Jung & Sosik, 2002; Seltzer & Bass, 1990) and industries (Bass et al., 2003; Hater & Bass, 1998; Riggio et al., 2004).

Various stable individual characteristics of leaders, such as extraversion (Judge & Bono, 2000), openness to experience (Judge & Bono, 2000), leader self-efficacy (Ross & Offerman, 1997), and emotional intelligence (Gardner & Stough, 2002), have been identified as the antecedents of transformational leadership. However, research on discovering the motivational antecedents of transformational leadership remains limited. Motivation explains why an individual initiates and continues specific actions in a particular situation (Kazdin, 2000). Exploring motivational factors that drive leaders toward exhibiting a transformational leadership style over others represents a promising avenue for further inquiry. Therefore, the current research aims to investigate the motivational antecedents of transformational leadership.

To achieve this goal in the current research, as mentioned earlier, I used a theoretical framework explaining why leaders adopt certain leadership styles or practices after assuming leadership positions. I chose to use Self-Determination Theory (Deci & Ryan, 1985) as the
theoretical framework for the current research. This theory explains why individuals engage in certain activities or display certain behaviors. It suggests that motivation to engage in an action comes from satisfying basic psychological needs, including needs for autonomy (the need to act based on one's own volition and willingness), competence (the need to be competent in challenging tasks), and relatedness (the need to form relationships with others) (Deci & Ryan, 2000; Van Den Broeck et al., 2016). When individuals experience the satisfaction of their psychological needs while engaging in an activity, they are more likely to approach it with genuine interests, willingness, and volition (Deci & Ryan, 2000). By using Self-Determination Theory as the theoretical framework, I aimed to investigate why individuals in leadership positions display transformational leadership practices instead of other styles.

By employing the Self-Determination Theory to examine the motivational antecedents of transformational leadership, the current research suggests a potential positive and indirect association between leaders' satisfaction of psychological needs and transformational leadership. The Self-Determination Theory suggests that basic psychological needs, which are essential for individuals’ well-being and functioning, can lead to multiple positive individual outcomes, such as autonomous motivation (Ryan & Deci, 2000), subjective well-being (Diener & Emmons, 1984; Huta & Ryan, 2010), psychological well-being (Ryff & Singer, 1998), and mindfulness (Brown & Ryan, 2003). These positive individual outcomes might in turn motivate and create conditions for leaders to exhibit transformational leadership. Previous empirical research also indicates that leaders' positive states and characteristics, such as autonomous motivation (Gilbert et al., 2016; Gilbert & Kelloway, 2018; Trépanier et al., 2012), mindfulness (Olafsen, 2016; Pinck & Sonnentag, 2018), and positive affect (Huta & Ryan, 2010; Jin et al., 2016), are
positively associated with transformational leadership. I further investigated these probable theoretical connections through empirical studies in the current research.

Overall, I attempt to answer two research questions: 1) whether leaders' satisfaction of psychological needs serves as a precursor to the manifestation of transformational leadership, and 2) whether autonomous motivation, mindfulness, and positive affect mediate the positive relationship between leaders' satisfaction of basic psychological needs and transformational leadership. I propose a theoretical model with three hypotheses, shown in Figure 1.

The current research should significantly contribute to the theoretical development of organizational studies, highlighting its importance. Firstly, I investigate the connection between Self-Determination Theory and transformational leadership from a new perspective. Previous research has examined whether leaders' autonomous motivation at work is an antecedent of transformational leadership (Gilbert et al., 2016; Gilbert & Kelloway, 2018; Trepanier et al., 2012). In the current research, I test the probability that leaders' satisfaction of psychological needs is an antecedent of transformational leadership, which may add new knowledge and perspectives to the understanding of transformational leadership.

Secondly, in contrast to previous studies that mainly examined the effects of transformational leadership on followers' satisfaction of psychological needs and autonomous motivation (e.g., Gözükara & Şimşek, 2015; Kovjanic et al., 2012), the current research focuses on the potential influence of leaders' own satisfaction of basic psychological needs and autonomous motivation on leaders' transformational leadership style instead of the influence of leaders’ transformational leadership style on followers’ satisfaction of psychological needs and autonomous motivation.
Lastly, I examine the motivational antecedents of transformational leadership, which differs from the traditional focus on stable individual characteristics, such as personality (Judge & Bono, 2000) and emotional intelligence (Gardner & Stough, 2002). By investigating the connection between Self-Determination Theory and transformational leadership, this study may expand our understanding of the factors contributing to transformational leadership, highlighting the importance of considering organizational leaders' satisfaction of psychological needs.

In addition to the academic contributions, the current research has contributed to human resources and organizational development practices. The findings of this study suggest that leadership is a malleable quality one can develop over time rather than an inherent and unchanging trait. Should the research results align with the hypotheses, it could suggest that leaders’ satisfaction of psychological needs may improve the capacity of transformational leadership. Consequently, human resources and organizational development practitioners may consider allocating resources toward developing employees’ leadership capacities instead of solely focusing on selecting effective leaders. Organizations may prioritize fulfilling their leaders’ satisfaction of basic psychological needs and promoting their psychological states, enabling them to exhibit transformational leadership.

In the following sections, I review the literature regarding transformational leadership and Self-Determination Theory, as well as provide rationales for each of the three hypotheses.

**Literature review**

*Transformational Leadership*

Transformational leadership is a working relationship in which a leader fosters the development, motivation, empowerment, and inspiration of team members to achieve extraordinary performance (Burns, 1978). Bass (1985) described transformational leadership as
the endeavor to “engage the full person of the follower” (p. 14). This leadership style encompasses four key constructs: idealized influence, inspirational motivation, individualized consideration, and intellectual stimulation (Bass, 1985). Idealized influence involves leaders behaving in ways prompting followers perceive them as exemplary role models, earning their admiration, respect, and trust. Inspirational motivation refers to leaders' ability to motivate and inspire followers, instilling a sense of passion, commitment, meaning, and challenge in their work (Bass, 1985). Leaders envision a desirable future in collaboration with followers and boost team morale. Individualized consideration entails leaders' willingness and capacity to act as coaches, attentively addressing followers' needs and concerns (Bass, 1985). Through intellectual stimulation, leaders encourage followers to think creatively and innovatively by helping them reframe problems and challenge existing assumptions (Bass, 1985).

Transformational leadership has been associated with several positive outcomes for followers in their professional development. Notably, followers of transformational leaders exhibit a strong affective connection with both their leaders and the organization they belong to. They demonstrate unwavering commitment to the organization, displaying a continuous willingness to engage with its mission and values (Avolio et al., 2004). Another significant positive outcome for followers is the cultivation of positive states at work. For instance, transformational leadership is linked to followers experiencing positive affect, such as positive emotions and enthusiasm (Zineldin, 2017). Transformational leaders foster followers' self-efficacy and optimism through inspiration and coaching (Kirkpatrick & Locke, 1996; McColl-Kennedy & Anderson, 2002). By encouraging followers to explore unconventional perspectives, these leaders stimulate creativity among their followers (Jung et al., 2003). In addition to affective connections and positive states, transformational leadership improves followers'
performance. As mentioned earlier, transformational leadership is associated with high
time in various cultures and industries (Riggio, Bass, & Orr, 2004; Bass, Avolio, Jung, & Berson, 2003; Elenkov, 2002; Jung & Sosik, 2002; Hater & Bass, 1998; Seltzer & Bass, 1990). Wang et al. (2011) conducted a meta-analysis and found that
transformational leadership predicted both individual and team performance.

The research on the antecedents of transformational leadership has primarily focused on
examining the relationships between stable individual characteristics and this leadership style.
One category of characteristics associated with a transformational leader pertains to personality
traits. For example, extraversion is strongly linked to transformational leadership (e.g., Judge &
Bono, 2000). Individuals who are talkative, outgoing, and enjoy interacting with others are more
likely to be perceived as inspiring role models, making them suitable for transformational
leadership roles (Bono & Judge, 2004). Another category of characteristics relates to
intelligence. Certain forms of intelligence, such as emotional intelligence and practical
intelligence, enable leaders to develop followers in a transformational manner (Gardner &
Stough, 2002; Sternberg, 2002). Overall, these research findings suggest that individuals with
stable characteristics, including personality traits and intelligence, are more likely to exhibit
transformational leadership behaviors.

**Self-Determination Theory**

The Self-Determination Theory posits that individuals are active organisms who seek
growth, embrace challenges, and integrate new experiences to develop a coherent sense of self
(Deci & Ryan, 1985; Ryan & Deci, 2017). Central to this theory are three basic psychological
needs—autonomy, competence, and relatedness—which are essential for individuals' growth,
well-being, and optimal functioning (Deci & Ryan, 2000; Ryan, 1995). Autonomy represents the
need to experience one's authentic self, where behavior is self-regulated based on personal volition rather than external or internal negative influences. Competence refers to the need for successful interactions with the environment and mastering challenging tasks. Relatedness reflects the need to seek meaningful and warm relationships with others, desiring to be liked, cared for, valued, and supported by close others.

Through the process of internalization, individuals continuously integrate external experiences into their self-concept, shaping a coherent sense of self (Deci & Ryan, 1985; Ryan & Connell, 1989). The degree of internalization varies across actions, with sufficient satisfaction of psychological needs leading to a higher degree of internalization of external experiences into the self-concept. Varied extents of internalization give rise to various types of motivation (Deci & Ryan, 2000; Ryan & Deci, 2017). Intrinsic motivation represents the highest degree of internalization, where individuals are driven by a genuine interest in the activity itself, autonomously regulate their behavior, and successfully internalize their experiences. Conversely, extrinsic motivation entails aiming for outcomes beyond the activity itself and feeling coerced to internalize external experiences. Extrinsic motivation can be further categorized into four subtypes based on the degree of internalization: external regulation (being controlled or forced to act), introjected regulation (acting to eliminate negative affective states like fear and guilt), identified regulation (recognizing the importance and value of an action for one's functioning and well-being), and integrated regulation (pursuing external values that are successfully integrated into the self-concept).

Integrated regulation and identified regulation reflect relatively high degrees of internalization despite their extrinsic nature (Deci & Ryan, 2000). Identified regulation occurs when individuals consciously acknowledge the importance and value of engaging in an action
for their functioning and well-being. Integrated regulation refers to the integration of external values inherited by an action into the self-concept, representing the most internalized form of extrinsic motivation. Intrinsic motivation, integrated regulation, and identified regulation are collectively categorized as autonomous motivation—a universal construct encompassing motivation driven by a full sense of choice and willingness to engage in an activity (Deci & Ryan, 2000).

The Self-Determination Theory has been applied to organizational studies (Deci et al., 2017). For instance, a meta-analysis by Van Den Broeck and colleagues (2016) revealed positive associations between the satisfaction of the basic psychological needs and employees' autonomous motivation, positive affect, engagement, well-being, and job satisfaction. Conversely, employees' satisfaction of psychological needs was negatively linked to job burnout and turnover intentions. In addition, previous research has explored the motivational antecedents of transformational leadership. Trépanier and colleagues (2012) proposed autonomous motivation as a precursor to transformational leadership, while Gilbert et al. (2016) and Gilbert and Kelloway (2018) found associations between leaders' autonomous motivation and transformational leadership.

In the following sections, I present the rationales for the three hypotheses in the current research.

Hypotheses

**Psychological Needs, Autonomous Motivation, and Transformational Leadership**

When individuals’ basic psychological needs are satisfied, individuals autonomously engage in activities that they are interested in, prefer, and find meaning in (Deci & Ryan, 2000). Employees are autonomously motivated at work to engage in tasks when their basic
psychological needs are satisfied (Gagné & Deci, 2005; Slemp et al., 2018). For example, Gagné (2003) posited that when employees can freely engage in an activity where they feel competent or deeply connected to others, they are more likely to be autonomously motivated. Supporting this proposition, Slemp et al. (2018) conducted a meta-analysis and found that satisfaction of basic psychological needs was moderately correlated with autonomous motivation at work. Accordingly, I hypothesize that a positive association exists for leaders in organizations between psychological needs and autonomous motivation.

Hypothesis 1a: Leaders’ satisfaction of the basic psychological needs is positively associated with leaders’ autonomous motivation.

I propose that leaders’ autonomous motivation is positively associated with transformational leadership. Individuals who are autonomously motivated to engage in an activity might demonstrate intrinsic interest, enjoyment, and a sense of importance and personal value in that activity (Deci & Ryan, 2000; Gagne and Deci, 2005). Such individuals focus on the present moment during the activity and strive for excellence in the activity itself, rather than being solely driven by external rewards (Deci & Ryan, 2000). In other words, autonomously motivated individuals strive for the sake of intrinsic satisfaction, namely “do things well”, rather than seeking external benefits. In organizational settings, leaders who exhibit autonomous motivation are likely to have a genuine interest in the act of leading and perceive it as personally meaningful (Deci et al., 2017). These leaders tend to prioritize engaging in and excelling at the leadership process itself, aiming to “lead well”, rather than solely pursuing external benefits.

The characteristics of autonomously motivated leaders may facilitate their engagement in transformational leadership practices, which distinguish them from traditional transactional leadership approaches that rely on rewards and punishments to achieve compliance (Bass, 1985).
Transactional leaders might be only involved in activities that are seemingly “directly” related to followers’ and their performance (Bass & Riggio, 2006). In contrast, transformational leaders aim to engage followers holistically, fostering their professional, intellectual, and psychological growth and demonstrating a commitment to excellence (Bass, 1985). Consequently, transformational leaders are inclined to employ leadership practices that might not appear “directly” related to followers’ tangible performance outcomes. These leadership practices might include being the role model that followers admire, considering followers’ individualized needs, challenging followers to be more creative, and inspiring them (Bass, 1985). One of the reasons leaders choose to employ transformational leadership practices is that they might be autonomously motivated to lead. They might have a genuine interest in leading or recognize its inherent value, focusing on the pursuit of excellence, namely “leading well”, rather than external benefits.

Another perspective supporting the proposition that autonomously motivated leaders are likely to engage in transformational leadership practices comes from research by Cerasoli et al. (2014). They discovered that performers driven by autonomous motivation achieved higher-quality performance compared to those motivated by extrinsic or introjected regulation. Achieving high-quality performance necessitates the use of various skills and a high level of task engagement due to the complex nature of the tasks (Bakker, Schaufeli, Leiter, & Taris, 2008). Autonomously motivated performers willingly choose and endorse tasks, investing significant effort and displaying high levels of intensity and persistence (Cerasoli et al., 2014). Similarly, transformational leadership practices require leaders to process complex skills and invest personal energy and time. They need to actively and intensively engage in a range of practices to foster the professional and psychological growth of their followers, with a focus on the quality of
leadership rather than quantity. Leaders who are autonomously motivated are more inclined to prioritize the quality of their leadership and actively choose to engage in transformational leadership practices, in contrast to those who lack autonomous motivation. Based on these rationales, the following hypothesis is proposed:

**Hypothesis 1b:** Leaders’ autonomous motivation is positively associated with transformational leadership.

Combining the theoretical links between satisfaction of psychological needs and autonomous motivation and between autonomous motivation and transformational leadership, I hypothesize that autonomous motivation will mediate the positive effect of leaders’ satisfaction of basic psychological needs on transformational leadership.

**Hypothesis 1:** Leaders’ autonomous motivation mediates the positive relationship between leaders’ satisfaction of psychological needs and transformational leadership, such that leaders’ satisfaction of psychological needs is positively associated with autonomous motivation, and autonomous motivation is positively associated with transformational leadership.

**Psychological Needs, Mindfulness, and Transformational Leadership**

Researchers found that mindfulness was associated with satisfaction of psychological needs (Olafsen, 2016; Shultz et al., 2015). Mindfulness is a form of cognitive state in which “one is being attentive and aware of what is taking place in the present” (Brown & Ryan, 2003, p. 882). Mindful individuals are aware of what is happening in the current moment and focus on a narrow range of experiences. Olafsen (2016) found that employees’ satisfaction of psychological needs predicted their mindfulness a few months later. If people’s psychological needs are satisfied, their minds may stay focused on the present moment and tasks without distraction
Accordingly, I hypothesize that leaders with satisfied psychological needs are also mindful.

**Hypothesis 2a:** Leaders’ satisfaction of psychological needs is positively associated with leaders’ mindfulness.

I propose that leaders’ mindfulness is closely linked to the four dimensions of transformational leadership. Mindful leaders are more inclined to embrace pleasant and unpleasant experiences (Bergomi et al., 2014), allowing them to tolerate imperfection and failure while facing challenging situations. Their followers can readily observe such behavior and might perceive these mindful leaders as role models and adopt their approach when handling challenges (Pinck & Sonnentag, 2018). Therefore, mindful leaders are likely to influence followers through idealized influence. Brown and Ryan (2003) found that mindful leaders aligned their actions with their values and goals because they knew what they truly wanted and valued. These leaders can translate their thoughts into a vivid picture of the future and communicate this to their followers (Pinck & Sonnentag, 2018). Therefore, mindful leaders use inspirational motivation to influence followers. Mindful leaders can attune themselves to accurate information about others (Dane, 2010), enabling them to know their followers’ concerns and needs (Rafferty & Griffin, 2004). Accordingly, mindful leaders are likely to be involved in individualized consideration. Mindful leaders are aware of the current situation and open to experiences (Bergomi et al., 2014; Brown et al., 2007), so they can recognize alternative possibilities within challenging situations. Mindfulness allows leaders to challenge followers and ask them to be creative in solving complex problems, known as intellectual stimulation.

**Hypothesis 2b:** Leaders’ mindfulness is positively associated with transformational leadership.
Combining the theoretical links between satisfaction of psychological needs and mindfulness and between mindfulness and transformational leadership, I hypothesize that leaders’ mindfulness will mediate the positive effect of leaders’ satisfaction of basic psychological needs on transformational leadership.

**Hypothesis 2:** Leaders’ mindfulness positively mediates the relationship between satisfaction of psychological needs and transformational leadership, such that leaders’ satisfaction of psychological needs is positively associated with mindfulness, and mindfulness is positively associated with transformational leadership.

**Psychological Needs, Positive Affect, and Transformational Leadership**

Subjective well-being (Diener & Emmons, 1984) refers to an individual’s perceived sense of pleasure and satisfaction in life. Ryan et al. (2008) argued that one of the contributing factors to subjective well-being is the satisfaction of psychological needs. Supporting this perspective, Van Den Broeck and colleagues (2016) conducted a meta-analysis and found that employees’ psychological needs satisfaction was positively associated with positive affect. I propose that this finding also applies to leaders. Leaders often involved in activities satisfying their psychological needs might have a highly positive effect.

**Hypothesis 3a:** Leaders’ satisfaction of psychological needs is positively associated with leaders’ positive affect.

I propose that leaders’ positive affect is associated with the three dimensions of transformational leadership: inspirational motivation, individualized consideration, and intellectual stimulation. Leaders with a positive affect are inclined to recall the positive characteristics of their followers and the organization. Therefore, these leaders have positive expectations from their followers and the organization (Erber, 1991; Johnson & Tversky, 1983;
Mayer et al., 1990; Mayer et al., 1992; Wright & Bower, 1992). Accordingly, these leaders are likely to communicate the visions about followers’ development and the organization in positive and inspirational ways, which aligns with inspirational motivation (Bass, 1985). Additionally, leaders who experience positive affect are likely to be prosocial (George, 1990, 1991). They will likely take care of followers’ needs and resolve their concerns, demonstrating individualized consideration. While experiencing positive affect, individuals tend to broaden their momentary thought-action repertoires (Frederickson, 1998). Thus, they are likely to think and act with more possibilities (Frederickson, 2001; Fredrickson & Branigan, 2001), be creative (Csikszentmihalyi, 1990; Fredrickson, 1998; Fredrickson & Branigan, 2001), and focus on positive aspects of information (Bower, 1991; Forgas & Bower, 1987). These characteristics enable leaders to challenge conventional perspectives held by their followers and help followers solve problems innovatively. Therefore, leaders’ positive affect is positively associated with intellectual stimulation.

**Hypothesis 3b:** Leaders’ positive affect is positively associated with transformational leadership.

Combining the theoretical links between satisfaction of psychological needs and positive affect and between positive affect and transformational leadership, I hypothesize that leaders’ positive affect will mediate the positive effect of leaders’ satisfaction of basic psychological needs on transformational leadership.

**Hypothesis 3:** Leaders’ positive affect positively mediates the relationship between satisfaction of psychological needs and transformational leadership, such that leaders’ satisfaction of psychological needs is positively related to positive affect, and positive affect is positively related to transformational leadership.
Research Plan

I conducted two empirical studies to test the three hypotheses of the current research. The first study aimed to examine the correlations among leaders' satisfaction of psychological needs, transformational leadership, and the three mediators to test the hypotheses. In the second study, I employed a longitudinal design to enhance the internal validity of the research, allowing for the examination of changes in satisfaction of psychological needs preceding changes in transformational leadership. To test the hypothesized causal relationships statistically, I utilized cross-lagged panel analysis. It is important to note that certain constructs involved in the current research were state-like, such as mindfulness and positive affect. The second study employed a diary approach to capture rapid changes in these state-like constructs, collecting data at the daily level. In the following sections, I will provide further details on both studies.

Chapter 2: Study 1

In Study 1, I tested whether the relationships among leaders’ satisfaction of psychological needs, transformational leadership, autonomous motivation, mindfulness, and positive affect existed in general. The study employed a cross-sectional design, collecting data from a single wave of data collection.

Method

Procedures and Participants

In the current study, I recruited participants through the online platform Amazon Mechanical Turk (MTurk). Previous research by Buhrmester et al. (2011) demonstrated that responses collected via MTurk were reliable and exhibited high retest reliability. Participants were considered as leaders if they held a formal role in an organization with at least two
subordinates. Individuals who were not leaders were excluded from the study. Each participant received compensation of $1.50 upon survey completion.

I recruited 284 participants for the study, with 247 of them completing the survey. Nine participants were excluded from data analysis. Their response patterns suggested that they selected identical options for all survey items, indicating their responses did not genuinely reflect their own experiences or leadership behaviors. The final sample size for data analysis was 238. Post-hoc power analysis was conducted to estimate the statistical power for detecting effects in the mediation analysis, and the power was found to be higher than .99.

All 238 participants were either full-time or part-time employees who held formal leadership roles, with at least two subordinates reporting to them. The average age of the participants was 39.1 ($SD = 10.8$). Of these participants, 136 were male, and 102 were female. The average duration of working in the current organization was 7.46 years ($SD = 5.71$), and the average duration of being a leader was 4.59 years ($SD = 3.25$).

**Measures**

**Psychological Needs.** I used the 16-item Work-Related Basic Need Satisfaction Scale (W-BNS; Van Den Broeck et al., 2010) to measure leaders' three psychological needs (Deci & Ryan, 2000). W-BNS asked respondents to rate to what degree they agreed with the statement in each item using a 5-point scale (1 = "totally disagree," 5 = "totally agree"). The sample items were "I felt free to do my job the way I thought it could best be done" (autonomy), "I felt competent at my job" (competence), and "At work, I felt part of a group" (relatedness). W-BNS's discriminant, nomological, and criterion validity were strong, and the scale's reliability was moderate (Van Den Broeck et al., 2010). The average of all the items represented the leaders' satisfaction with psychological needs. A high average score indicated a higher degree of
satisfaction of psychological needs. The Cronbach's α for the measure in the current study was .90.

**Autonomous Motivation.** I used the Multidimensional Work Motivation Scale (MWMS; Gagné et al., 2015) to measure autonomous motivation. The MWMS contains five subscales that assess intrinsic motivation, identified regulation, introjected regulation, external (social and material) regulation, and amotivation using a 7-point scale (1 = Does not correspond at all, 7 = Corresponds exactly). Six items in the MWMS measure autonomous motivation, which was used in the current study. The respondents were asked to what degree they believed the items represented why they put effort into their current job. The "intrinsic motivation" and "identified regulation" subscales were included in the analysis to represent autonomous motivation. The sample items were "Because the work I did was interesting" (intrinsic motivation) and "Because I personally considered it important to put efforts into this job" (identified regulation). The average of the items in the two subscales (six items in total) represented the level of autonomous motivation. A high average score indicated a higher degree of autonomous motivation. The Cronbach's α for the six items of the MWMS in the current study was .92.

**Mindfulness.** Mindfulness was assessed with the Mindful Attention Awareness Scale (MAAS; Brown & Ryan, 2003). MAAS is a 15-item scale that asked respondents to rate how frequently they had experiences described in each item using a 6-point Likert scale (1 = "almost always," 5 = "almost never") during the past four weeks. The sample items included "I found it difficult to stay focused on what was happening in the present" and "I forgot a person's name almost as soon as I had been told it for the first time." The average of all the items represented the level of mindfulness. A higher average score indicated a higher level of mindfulness. The Cronbach's α for the measure was .87 in the current study.
**Positive Affect.** Positive affect was assessed with the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010). SPANE contains 12 items that describe feelings with one word and asked respondents to rate how frequently they had each of their feelings using a 5-point Likert scale (1 = "Very rarely or never," 5 = "Very often or always") during the past four weeks. The items that assessed positive affect included "positive," "good," "pleasant," "happy," "joyful," and "contented." The items that assessed negative affect included "negative," "bad," "unpleasant," "sad," "afraid," and "angry." The average of the six items assessing positive affect represented the level of positive affect. A higher average score indicated a higher level of positive affect. The Cronbach's α for the six items that measured positive affect was .92 in the current study.

**Transformational Leadership.** The Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1990) was used to measure transformational leadership. The MLQ is a 36-item inventory (including self-form and other-form) assessing multiple leadership styles, such as transformational and transactional leadership. In the current study, only 20 items that assessed the four subscales of transformational leadership were used. The self-form MLQ asked respondents to indicate the frequency of displaying leadership behaviors described in each item using a 5-point scale (1 = "not at all," 5 = "frequently, if not always"). The sample items included "I talked optimistically about the future" and "I spent time teaching and coaching." The composite scores for each subscale were calculated by averaging the scores of the items in each subscale. The total score for transformational leadership was calculated by averaging the scores for each subscale. A higher total score indicated a higher level of transformational leadership. The Cronbach's α for this measure was .94 in the current study.
Demographics and Control Variables. Leaders who are older (Bartling & Barlett, 2005), female (Eagly et al., 2003), have more leadership skills, and have longer job tenure (McCall et al., 1988; Yukl, 2012) exhibit higher levels of transformational leadership than those who are younger, male, have fewer leadership skills and have shorter job tenure. Therefore, participants' age, gender, tenure in the current organizations, and tenure of being a leader in the current organization were measured and used as control variables in Study 1.

Results

In Study 1, I conducted several main steps to test the hypotheses and obtain results through data analysis, comprising examining the reliability and structural validity of the measures used in the current study, obtaining descriptive statistics for all variables used in the analysis (including manifest variables representing constructs involved in the research and control variables), and conducting the mediation analysis to test the three hypotheses.

Reliability and Structural Validity of The Measures

To test the measures’ reliability, I obtained Cronbach's alphas of the measures of the five constructs involved in the current research. These Cronbach's alphas range from .87 to .94, indicating good internal consistency and reliability of the measures.

Also, I conducted a confirmatory factor analysis to test the measures’ structural validity to ensure that these measures were distinct from each other. A measurement model was created, with items loading on the factors they were intended to measure. The fit indices of this measurement model were as follows: CFI = 0.78, TLI = 0.77, SRMR = 0.07, and RMSEA = 0.07. These indices indicated an acceptable level of goodness of fit for the measurement model.
Evaluating Common Method Variance

Since all data in Study 1 relied on self-reports, there was a possibility of common method variance influencing the relationships among constructs. (Podsakoff et al., 2013). To evaluate the extent to which common method variance might impact analysis, I employed the unmeasured latent method factor technique (Podsakoff et al., 2013). Specifically, I constructed a common method factor model, with all items loaded on a single factor (the method factor) in addition to the factors they were intended to measure. The results showed that the common method factor model fit significantly better than the measurement model (see Table 1 for specific comparisons), indicating that the variance of the items involved in the data analysis was explained not only by the hypothetical constructs but also by the common method factor (Widaman, 1985). However, the common method factor only accounted for a small proportion of the total variance (3.27%), suggesting that the common method variance had a minor impact on the study's results (Williams et al., 1989). It is unlikely that the results of the current study were influenced by common method variance.

Descriptive Statistics and Correlations

Descriptive statistics, including mean scores, median, standard deviation, skewness, and kurtosis, were calculated for all variables and control variables and presented in Table 2. Correlations among all variables were also calculated and presented in Table 3. All data were standardized for further analysis.

Analysis of The Mediation and Hypothesis Testing

To test the mediation and the three hypotheses, I constructed structural equation path models with the jAMM module (Galluci, 2020) in the statistics software Jamovi (The jamovi project, 2022). The jAMM module allowed for analyzing mediation effects using structural
equation modeling (Galluci, 2020). In the mediation analysis, leaders’ psychological needs satisfaction was the predictor, autonomous motivation, mindfulness, and positive affect were the three parallel mediators, and transformational leadership was the outcome. Additionally, all control variables predicted transformational leadership. Table 4 presents the direct and indirect effects of the three mediators, the total effect, and all the specific effects among the predictor, the three mediators, and the outcome. The total effect, the direct effect, and the indirect effects were obtained through 1000-time bootstrapping. The model with the paths and the path estimates is provided in Figure 2.

Based on the mediation analysis results, I found that the total effect of satisfaction of psychological needs on transformational leadership was positive and statistically significant ($\beta = .62, p < .01$), indicating that leaders' satisfaction of psychological needs was positively associated with transformational leadership. However, the direct effect of satisfaction of psychological needs on transformational leadership was not statistically significant ($\beta = .07, p = .41$), suggesting that leaders’ psychological needs satisfaction was not directly associated with transformational leadership.

The results of specific hypotheses testing are provided below:

Hypothesis 1 states that leaders’ autonomous motivation mediates the positive relationship between leaders’ satisfaction of psychological needs and transformational leadership. Hypothesis 1 was tested by examining the indirect effect of satisfaction of psychological needs on transformational leadership through autonomous motivation, which was statistically significant ($\beta = .27, p < .01$). Hypothesis 1 was supported.

Hypothesis 1a states that leaders' satisfaction of psychological needs is positively associated with leaders' autonomous motivation. Hypothesis 1a was tested by examining the
effect of satisfaction of psychological needs on autonomous motivation, which was statistically significant ($\beta = .71, p < .01$). Hypothesis 1a was supported.

Hypothesis 1b states that leaders' autonomous motivation is positively associated with transformational leadership. Hypothesis 1b was tested by examining the effect of autonomous motivation on transformational leadership, which was statistically significant ($\beta = .38, p < .01$). Hypothesis 1b was supported.

Hypothesis 2 states that leaders' mindfulness mediates the positive relationship between satisfaction of psychological needs and transformational leadership. Hypothesis 2 was tested by examining the indirect effect of satisfaction of psychological needs on transformational leadership through mindfulness, which was statistically significant ($\beta = .19, p < .01$). Hypothesis 2 was supported.

Hypothesis 2a states that leaders' satisfaction of psychological needs is positively associated with leaders' mindfulness. Hypothesis 2a was tested by examining the effect of satisfaction of psychological needs on mindfulness, which was statistically significant ($\beta = .55, p < .01$). Hypothesis 2a was supported.

Hypothesis 2b states that leaders' mindfulness is positively associated with transformational leadership. Hypothesis 2b was tested by examining the effect of mindfulness on transformational leadership, which was statistically significant ($\beta = .35, p < .01$). Hypothesis 2b was supported.

Hypothesis 3 states that leaders' positive affect mediates the positive relationship between satisfaction of psychological needs and transformational leadership. Hypothesis 3 was tested by examining the indirect effect of satisfaction of psychological needs on transformational
leadership through positive affect, which was not statistically significant ($\beta = .09, p = .13$). Hypothesis 3 was not supported.

Hypothesis 3a states that leaders' satisfaction of psychological needs is positively associated with leaders' positive affect. Hypothesis 3a was tested by examining the effect of satisfaction of psychological needs on positive affect, which was statistically significant ($\beta = .71, p < .01$). Hypothesis 3a was supported.

Hypothesis 3b states that leaders' positive affect is positively associated with transformational leadership. Hypothesis 2b was tested by examining the effect of positive affect on transformational leadership, which was not statistically significant ($\beta = .12, p = .12$). Hypothesis 3b was not supported.

In summary, Hypothesis 1, 1a, 1b, 2, 2a, 2b, and 3a were supported, and Hypothesis 3 and 3b were not. Table 4 presents the summary of all these tests. These results suggest that leaders' satisfaction of psychological needs satisfaction is positively associated with transformational leadership in an indirect way through autonomous motivation and mindfulness, but not positive affect.

**Discussion**

The current study aimed to examine the relationships among the constructs and test specific hypotheses regarding leaders' satisfaction of psychological needs satisfaction, transformational leadership, and the mediating roles of autonomous motivation, mindfulness, and positive affect. The findings of Study 1 indicate that autonomous motivation and mindfulness mediate the relationship between satisfaction of psychological needs and transformational leadership, while positive affect does not.
The results of Study 1 indicated that the indirect effect of autonomous motivation was the strongest among the three mediators in the relationship between satisfaction of psychological needs and transformational leadership. This finding supports my proposition that leaders who are autonomously motivated are more inclined to embrace leadership practices that foster the development of exceptional performers, a fundamental characteristic of transformational leadership. When leaders' satisfaction of psychological needs for autonomy, competence, and relatedness are fulfilled, they are likely to exhibit a genuine interest in assuming leadership roles and recognize the significance and value of being a leader. Consequently, they are more inclined to focus on the process of leading rather than impatiently pursuing the outcomes associated with leadership. In such circumstances, autonomously motivated leaders are more likely to engage in transformational leadership practices.

The indirect effect of mindfulness between satisfaction of psychological needs and transformational leadership was significant, although weaker than the indirect effect of autonomous motivation. This finding aligns with previous research by Olafsen (2016), which also found a connection between satisfaction of psychological needs and mindfulness.

I did not find evidence supporting that the indirect effect of positive affect between satisfaction of psychological needs and transformational leadership. One possible explanation is that the relationship between leaders' positive affect and transformational leadership may not exist at the trait level, even though state-like positive affect might show a positive association. For example, Jin et al. (2016) measured state-like positive affect and found a positive relationship with transformational leadership. Another explanation for the non-significant result could be the challenge of accurately recalling affective experiences over a three-month period. An individual's affect might change drastically and frequently within a short period, making it
challenging and unrealistic for individuals to estimate their overall level of positive affect accurately.

It is important to consider the limitations of Study 1. The data collected reflected the overall levels of the constructs studied over a three-month period, relying on participants' recollection of their experiences. However, constructs such as mindfulness and positive affect are relatively state-like and subject to fluctuations within shorter time frames. To capture these fluctuations and obtain more accurate measurements, a diary study with multiple waves of data collection may be a more suitable approach. For example, Jin et al. (2016) employed a 27-day diary study to measure leaders' positive affect on a daily basis.

Furthermore, it is crucial to acknowledge that Study 1 did not establish a causal relationship between leaders' satisfaction of psychological needs and transformational leadership. The directionality of this relationship and its causality remain uncertain. To strengthen the internal validity of the research and address these limitations, I will conduct an additional study.

In conclusion, the findings of Study 1 indicate that autonomous motivation and mindfulness mediate the relationship between leaders' psychological needs satisfaction and transformational leadership. The results emphasize the significance of autonomously motivated leaders who prioritize the process of leading and focus on developing their followers. However, further research is needed to establish causality and delve deeper into the dynamics of these relationships.

Chapter 3: Study 2

In Study 2, I aimed to expand the investigation by examining the state-like constructs over a short period and testing the causal nature of the relationship between leaders’ satisfaction of psychological needs and their manifestations of transformational leadership. I conducted a
diary study with a longitudinal design, employing a cross-lagged panel analysis to achieve this goal. The study involved collecting daily data every week over four consecutive weeks.

Method

Participants and Procedure

Participants. To recruit participants for Study 2, I used a convenience sampling strategy by inviting people I knew and individuals on the professional networking platform LinkedIn. Eighty-six participants agreed to participate in the four-week diary study, and 80 completed all four diary surveys and their data was included in the analyses. All the participants were full-time or part-time employees holding formal leadership roles in organizations and had at least two subordinates reporting to them. The average age of the participants was 36.00 (SD = 7.10). Among these participants, 40 were male, and the remaining 40 were female. The average duration of their current employment was 6.91 years (SD = 6.61). The average duration of their experience as a leader was 4.39 years (SD = 4.25).

Procedure. The data collection procedure in Study 2 spanned four consecutive weeks. Every Wednesday at 6 p.m., when participants were likely to have rich experiences during the day, an email containing the link to the online survey on Qualtrics was sent to each participant. Each weekly survey included day-level measurements of leaders' satisfaction of psychological needs, autonomous motivation, mindfulness, positive affect, and transformational leadership. Participants were informed that the survey questions pertained to their psychological states and behaviors throughout the day. The first week's survey also included measurements of control variables, such as age, gender, tenure in the current organization, and tenure as a leader in the current organization. Participants who completed all four diary surveys received $5 compensation through Venmo or other preferred methods.
Measures

Daily Leaders’ Psychological Needs. Van Hooff & Guerts (2015) measured leaders’ day-level satisfaction of psychological needs of leaders using the nine items from the Work-Related Basic Need Satisfaction scale (Van Den Broeck et al., 2010). I used these nine items to measure daily satisfaction of psychological needs. The wording of the items was slightly modified to fit the daily situation. Example items are “Today, I felt I had to do what other people ordered me to do at my work” (autonomy; reversed coded), “Today, I felt part of a group at work” (relatedness), and “Today, I felt competent in my job” (competence). Items were answered on a 5-point Likert scale (1 = completely disagree, 5 = completely agree). The Cronbach’s α of this measure in the current study was .81.

Daily Autonomous Motivation. The day-level autonomous motivation of leaders will be measured by all six items from the Multidimensional Work Motivation Scale (Gagné et al., 2015), identical to the items used in Study 1. The respondents were asked to what degree they believe the items represent why they put effort into their current job. Participants answered on a 7-point Likert scale (1 = not at all, 7 = completely). The Cronbach’s α of this measure in the current study was .91.

Daily Mindfulness. Following the practices in the research by Brown and Ryan (2003), the day-level mindfulness was measured by five items from the Mindful Attention Awareness Scale (Brown & Ryan, 2003). Example items are “I find it difficult to stay focused on what’s happening in the present,” “I rush through activities without being really attentive to them,” and “I do jobs or tasks automatically, without being aware of what I’m doing.” Items will be answered on a 7-point Likert scale (1 = not at all, 7 = very much). The Cronbach’s α of the measure in the current study was .79.
**Daily Positive Affect.** The day-level positive affect was measured by all six positive affect items from the Scale of Positive and Negative Experience (Diener et al., 2010). The scale asks respondents to rate how frequently they have each of the feelings using a 5-point Likert scale (1 = “Very rarely or never,” 5 = “Very often or always”). The items that assess positive affect include “positive,” “good,” “pleasant,” “happy,” “joyful,” and “contented.” The Cronbach’s α of the positive affect component of the measure in the current study was .95.

**Daily Transformational Leadership.** Breevaart et al. (2014) studied daily transformational leadership and adapted five items from the Multifactor Leadership Questionnaire for measurement (Bass & Avolio, 1990). I used these five items in the current study to measure daily transformational leadership. Example items are “Today, I talked enthusiastically about what needed to be accomplished,” “Today, I got my followers to look at problems from different angles,” and “Today, I emphasized the importance of having a collective sense of mission.” Items were answered on a 5-point Likert scale (1 = totally disagree, 5 = totally agree). The Cronbach’s α of the measure in the current study was .84.

**Demographics and Control Variables.** Similar to Study 1, some variables were assessed in the first diary survey to control the factors that might change the level of transformational leadership. These variables are participants’ age, gender, tenure in the current organizations, and tenure as a leader in the current organization.

**Results**

In Study 2, I followed several main steps to analyze the data and obtain results:

1. Examining the reliability and structural validity of the measures used in the study.
2. Obtaining descriptive statistics for all variables used in the analysis, including manifest variables representing all constructs involved in the research and control variables.

3. Conducting analyses to test the hypotheses mentioned above.

**Reliability and Structural Validity of The Measures**

To test reliability of the measures, I calculated Cronbach’s alpha scores for the measures of the five constructs involved in the study. The alpha scores ranged from .79 to .95, indicating that the measures were internally consistent and reliable.

I conducted the confirmatory factor analysis to test the structural validity of the measures used in the analysis. I created the measurement model in which the items loaded on the factors they were intended to measure. For example, all five items that measured daily transformational leadership loaded on the same factor. The fit indices of this measurement model were within an acceptable range, with CFI = 0.85, TLI = 0.83, SRMR = 0.06, and RMSEA = 0.08.

**Descriptive Statistics and Correlations**

I calculated the mean scores (I used ‘variables’ to stand for these mean scores in the following text) of all the items that measured each construct respectively. The data of these variables was further divided into four parts by the time points when they were collected. All the data were standardized for further analysis.

Table 5 presents the mean, median, standard deviation, skewness, and kurtosis of the variables. These statistics provide an overview of the distribution and variability of the variables. Table 6 presents the correlations among each variable at each time point. Most of the correlations between variables were positive and significant. However, there were a few exceptions. For
instance, mindfulness at the first time point was not significantly correlated with mindfulness at the second and fourth time points, as well as transformational leadership at the second and fourth time points.

**Cross-lagged Analysis and Hypothesis Testing**

Following the suggestions by Cole and Maxwell (2003), I conducted a cross-lagged panel analysis with four distinct stages to examine mediation and test the hypotheses.

**Stage 1, Building the Stability Model.** In Stage 1, I constructed a stability model assuming that the constructs' relationships did not exist. This model included autoregressive paths, which captured the influence of each variable at a given time point on the same variable at the subsequent time point and the covariations among variables at each time point. This stage aimed to establish a stability model for further model comparisons. The stability model for the current study is presented in Figure 3.

**Stage 2, Building the Causation Model and Testing the Hypotheses.** In Stage 2, I constructed a causation model comprising paths from leaders' satisfaction of psychological needs (the predictor) at each time point to the three mediators (autonomous motivation, mindfulness, and positive affect) and transformational leadership (the outcome) at lagged time points. The mediators at each time point also predicted the outcome at lagged time points. Following the suggestions of Cole and Maxwell (2003), I created the most parsimonious version of the causation model through iterative model comparisons. In each iteration, I ran the model, deleted all insignificant paths based on the model's output, and ran the updated model in the next iteration. All control variables were retained in the model for each round. In each iteration, the total effect, direct effect, and indirect effects of the causation model were obtained through 1000-time bootstrapping. The power of this resulting most parsimonious causation model was higher
than .99. Figure 4 provides the most parsimonious causation model. Throughout the following text, the term "causation model" refers to this most parsimonious causation model.

I tested the hypotheses through a three-step approach to evaluate the causation model, as Cole and Maxwell (2003) and Barron and Kenny (1986) recommended. In the first step, I compared the overall model fit of the causation model with the stability model. I found that the causation model had a significantly better fit than the stability model, indicating a causal relationship between satisfaction of psychological needs and transformational leadership (see Table 7 for specific comparisons of fit indices between the two models).

Given that the overall causal relationship existed, in the second step, I estimated the total effect of the predictor (satisfaction of psychological needs) on the outcome (transformational leadership), which was the sum of several existing time-specific effects. These time-specific effects represented the effects of the predictor at each time point on the outcome at all lagged time points. The total effect was .64 ($p < .00$), indicating statistical significance. The specific effects were provided in Table 8.

In the third step, I estimated each of the three mediators’ overall indirect effect. The overall indirect effect of a mediator was the sum of time-specific effects that start with the predictor, passed through the mediator, and ended with the outcome. I found that the indirect effect between satisfaction of psychological needs and transformational leadership mediated by autonomous motivation was statistically significant at .09 ($p = .01$). However, the indirect effects mediated by mindfulness or positive affect were not significant. The results of these indirect effects are provided in Table 8.

Overall, the cross-lagged mediation analysis results indicate that the direct effect of satisfaction of psychological needs on transformational leadership is approaching significance.
The indirect effect between satisfaction of psychological needs and transformational leadership through autonomous motivation was significant.

Specific hypotheses testing yielded the following results:

Hypothesis 1 states that leaders' autonomous motivation mediates the positive relationship between leaders' satisfaction of psychological needs and transformational leadership. The estimate of the indirect effect of satisfaction of psychological needs on transformational leadership mediated by autonomous motivation was .09 ($p = .01$), supporting Hypothesis 1.

Hypothesis 1a states that leaders' satisfaction of psychological needs is positively associated with leaders' autonomous motivation. The estimate of the summarized time-specific effects from satisfaction of psychological needs to autonomous motivation was .31 ($p < .00$), supporting Hypothesis 1a.

Hypothesis 1b states that leaders' autonomous motivation is positively associated with transformational leadership. The estimate of the summarized time-specific effects of autonomous motivation on transformational leadership was .28 ($p < .00$), supporting Hypothesis 1b.

Hypothesis 2 states that leaders' mindfulness mediates the positive relationship between leaders' satisfaction of psychological needs and transformational leadership. The indirect effect of satisfaction of psychological needs on transformational leadership through mindfulness was insignificant, as all paths from mindfulness to transformational leadership were excluded from the causation model. Therefore, Hypothesis 2 was not supported.

Hypothesis 2a states that leaders' satisfaction of psychological needs is positively associated with leaders' mindfulness. The estimate of the summarized time-specific effects from satisfaction of psychological needs to mindfulness was .22 ($p = .03$), supporting Hypothesis 2a.
Hypothesis 2b states that leaders' mindfulness is positively associated with transformational leadership. All paths from mindfulness to transformational leadership were excluded from the causation model, indicating that Hypothesis 2b was not supported.

Hypothesis 3 states that leaders' positive affect mediates the positive relationship between leaders' satisfaction of psychological needs and transformational leadership. The indirect effect from satisfaction of psychological needs to transformational leadership mediated by positive affect was not significant, as all paths from positive affect to transformational leadership were excluded from the causation model. Therefore, Hypothesis 3 was not supported.

Hypothesis 3a states that leaders' satisfaction of psychological needs is positively associated with leaders' positive affect. The estimate of the summarized time-specific effects from satisfaction of psychological needs to positive affect was 0.18 ($p = .07$), indicating a positive but non-significant relationship. Therefore, Hypothesis 3a was not supported.

Hypothesis 3b states that leaders' positive affect is positively associated with transformational leadership. All paths from positive affect to transformational leadership were excluded from the most parsimonious causation model, indicating that Hypothesis 3b was not supported.

In summary, Hypothesis 1a, 1b, 1, 2a, and 3a were supported, and Hypothesis 2, 2b, 3, and 3b were not supported. Table 8 provides the summary of these tests. Through examining the findings in Stage 3, I found that satisfaction of psychological needs predicted the three mediators, and autonomous motivation fully mediated the relationship between satisfaction of psychological needs and transformational leadership.

**Stage 3, Building the Reversed Causation Model.** In Stage 3, I constructed the reversed causation model in which transformational leadership at each time point predicted the three
mediators and leaders' satisfaction of psychological needs at lagged time points. This stage aimed to examine the existence of the reversed causation relationship between satisfaction of psychological needs and transformational leadership. Following the suggestions of Cole and Maxwell (2003), I created the most parsimonious reversed causation model through iterative model comparisons. In each iteration, I ran the model, deleted all insignificant paths based on the model's output, and ran the updated model in the next iteration. All the control variables were retained in the model for each round. The most parsimonious reversed causation model is provided in Figure 5. The power of this model was higher than .99. The retained paths in this reversed causation model are between transformational leadership at the first time point and intrinsic motivation at the third and fourth time points, transformational leadership at the first time point and mindfulness at the third time point, and transformational leadership at the first time point and positive affect at the second and third time points. Overall, the results indicate that transformational leadership at the first time point predicted the three mediators at later time points, but transformational leadership did not predict satisfaction of psychological needs.

**Stage 4, Building the Reciprocal Model and Comparing Several Models.** In Stage 4, I constructed a reciprocal model by combining the most parsimonious causation and the most parsimonious reversed causation model into a single model. By comparing multiple fit indices between the most parsimonious causation model and the reciprocal model (see Table 9 for specific comparisons), I found that the most parsimonious causation model had a slightly better fit than the reciprocal model did when considering the chi-square/degree of freedom ratio and the TLI. However, the reciprocal model fitted slightly better than the most parsimonious causation model when comparing the chi-square, CFI, and SRMR. Overall, the reciprocal model had a better fit than the most parsimonious causation model, suggesting that the causal relationship
between satisfaction of psychological needs and transformational leadership is bidirectional, and that this causal direction from satisfaction of psychological needs to transformational leadership is not dominant.

In summary, the findings from Stage 2 and Stage 3 indicate that both satisfaction of psychological needs and transformational leadership predicted intrinsic motivation, mindfulness, and positive affect. However, there is no direct relationship between satisfaction of psychological needs and transformational leadership. The results indicate that autonomous motivation fully mediates the relationship from satisfaction of psychological needs to transformational leadership. Additionally, the reciprocal model provides support for a bidirectional causal relationship between satisfaction of psychological needs and transformational leadership, suggesting that the influence between these two constructs is not unilateral.

Discussion

Study 2 aimed to test the hypotheses, capture fluctuations of state-like constructs over a short period, and examine the causal relationship between leaders' satisfaction of psychological needs and transformational leadership. Longitudinal data was analyzed using cross-lagged panel analysis. The study yielded two primary findings. Firstly, leaders' autonomous motivation was found to mediate the relationship between their satisfaction of psychological needs and transformational leadership, while mindfulness and positive affect did not significantly mediate this relationship. Secondly, the study observed both causal and reversed causal relationships between leaders' satisfaction of psychological needs and transformational leadership.

The most valuable finding of the current study is that autonomous motivation served as a mediator between satisfaction of psychological needs and transformational leadership. However, leaders’ satisfaction of psychological needs does not directly impact transformational leadership.
These findings indicate individuals who are interested in or perceive the meanings and importance of leadership are more likely to exhibit the transformational leadership style. His could be attributed to their previous experiences of autonomy, competence, and relatedness in leadership roles.

In contrast to the results of the first study, the results of the second study did not suggest that mindfulness mediates the relationship between satisfaction of psychological needs and transformational leadership. This finding contradicts the findings by Pinck and Sonnentag (2018). However, it is worth noting that Pinck and Sonnentag (2018) used a measure of mindfulness that was intended to assess the relatively trait-like nature of mindfulness, rather than its state-like fluctuations. Trait-like mindfulness might be associated with transformational leadership, whereas state-like mindfulness might not necessarily be linked to it.

Consistent with the findings of Study 1, the current study’s results did not support the hypothesis that positive affect mediates the relationship between satisfaction of psychological needs and transformational leadership. This finding contradicts the results of Jin et al. (2016). However, it is important to note that Jin et al.'s study had a much larger sample size than the current study. The nature of inferential statistics indicates that the significance of an estimate is a function of both the sample size in the analysis and the effect sizes of the estimate (Hoenig & Heisey, 2001; Sullivan & Feinn, 2012). The larger the sample size is, the more likely an estimate is to be statistically significant in a study, controlling for the effect size of the estimate. In Jin et al.'s (2016) study, the effect of positive affect on transformational leadership was relatively small but significant, given the sample size of over 1300. However, in real work settings, the actual influence of positive affect on transformational leadership may not be substantial with such a small effect size.
Regarding the reversed causal relationship, I found that transformational leadership predicted leaders' autonomous motivation at the third and fourth time points, mindfulness at the third time point, and positive affect at the second and third time points. The effects of transformational leadership on positive affect were stronger than those on autonomous motivation and mindfulness. These findings were not hypothesized in the current research but are intriguing. One plausible explanation for these findings is that certain stable antecedents of transformational leadership might be related to mindfulness, and autonomous motivation, and particularly positive affect. As discussed in the introduction, traits and characteristics such as extraversion (Judge & Bono, 2000), openness to experience (Judge & Bono, 2000), leader self-efficacy (Ross & Offerman, 1997), and emotional intelligence (Gardner & Stough, 2002) are associated with transformational leadership. These antecedents of transformational leadership might predict the three mediators in the current study. For instance, individuals' extraversion (Smillie et al., 2015) and self-efficacy (Bakker & Demerouti, 2007; Bandura et al., 2003) are positively associated with positive affect. Emotional intelligence is an antecedent of mindfulness (Miao et al., 2018). Furthermore, it is worth noting that the construct of autonomous motivation is partially derived from and conceptually overlaps with intrinsic motivation (Deci et al., 2017). The two antecedents of intrinsic motivation, individuals' self-efficacy (Bandura, 1997) and interests in a specific domain (Hidi & Renninger, 2006), might be positively associated with autonomous motivation. Overall, it is plausible that transformational leadership mediates the relationship between some stable characteristics, such as extraversion and self-efficacy, and the three mediators in the current research, namely positive affect, mindfulness, and autonomous motivation.
Another possible explanation for finding the reversed causal relationship is that leading with a transformational leadership style predicts leaders' positive affect, mindfulness, and autonomous motivation. The current research assumes that individuals' experiences influence their own motivational, cognitive, and emotional states, which, in turn, influence their behaviors. However, the discovery of the reversed causal relationship in Study 2 might suggest the converse: leaders' behaviors might impact their states, including emotional, cognitive, and motivational states. This possibility is worth further investigation.

Overall, the findings of the second study provide insights into the complex relationships between leaders' satisfaction of psychological needs, transformational leadership, and the mediating constructs. The study highlights the importance of autonomous motivation as a mediator in the relationship between satisfaction of psychological needs and transformational leadership, while also shedding light on the potential reversed causal relationship. These findings contribute to our understanding of the dynamics of leadership and the factors that influence transformational leadership behaviors.

Chapter 4: General Discussion

In the current research, I aimed to address two main research questions. The first question aimed to investigate whether leaders' satisfaction of basic psychological needs in the workplace was positively associated with transformational leadership. The second question sought to explore whether the three positive states of leaders, namely autonomous motivation, mindfulness, and positive affect, mediated the relationship between leaders' satisfaction of basic psychological needs and transformational leadership. I hypothesized that autonomous motivation, mindfulness, and positive affect mediated the positive relationship between satisfaction of psychological needs and transformational leadership.
In Study 1, I conducted a correlational study with the cross-sectional design to investigate the hypothesized relationships among the constructs. The findings indicate that leaders' satisfaction of psychological needs indirectly influenced transformational leadership through leaders' autonomous motivation and mindfulness, but not positive affect. In Study 2, I conducted a longitudinal diary study with a crossed-lagged panel analysis to examine the fluctuating dynamics of state-like constructs and test the causal relationship between satisfaction of psychological needs and transformational leadership. The results revealed that leaders' autonomous motivation, but not leaders' mindfulness and positive affect, mediated the indirect relationship between leaders' satisfaction of psychological needs and transformational leadership.

Interestingly, in neither Study 1 nor Study 2, I found a direct association between leaders' satisfaction of psychological needs satisfaction and transformational leadership. Individuals' satisfaction of basic psychological needs are individuals' internal experiences (Deci & Ryan, 2000), while transformational leadership is characterized by a collection of leadership behaviors that promote followers' professional development (Bass, 1985). The finding suggests that leaders' internal experiences while in a leadership role may not directly influence their leadership style at work. However, I found that leaders' satisfaction of psychological needs was positively associated with transformational leadership through leaders' autonomous motivation in both studies. This finding indicates that those leaders who experience being autonomous, competent, and related to others in their leader positions have an interest in being a leader or perceive the meanings and the importance of being a leader, and these leaders are likely to exhibit a transformational leadership style.

Regarding mindfulness, I observed inconsistent results between Study 1 and 2. Both studies found a positive association between leaders' satisfaction of psychological needs and
mindfulness. However, the association between mindfulness and transformational leadership was present in Study 1 but not in Study 2. As discussed in Study 2, it is possible that trait-like mindfulness, which is stable over a long period, is associated with transformational leadership. In contrast, state-like mindfulness, which fluctuates frequently over time, might not necessarily be associated with transformational leadership. Transformational leadership is a relatively stable leadership style characterized by a set of principles that are followed over a long period. It might not be directly influenced by leaders' state-like mindfulness levels but could be positively influenced by mindfulness over a more extended period. Therefore, it is plausible that trait-like mindfulness, but not state-like mindfulness, is associated with transformational leadership.

The results of the current research did not support the hypothesis that leaders' positive affect mediates the relationship between satisfaction of psychological needs and transformational leadership. Specifically, leaders’ psychological needs satisfaction was found to be positively associated with positive affect, consistent with the theoretical elaboration of Self-Determination Theory and related empirical findings (Ryan et al., 2016; Van Den Broeck et al., 2016). However, the evidence from this study did not support the hypothesis that leaders' positive affect was positively associated with transformational leadership. The effect of positive affect on transformational leadership might exist, but the size of this effect is small and statistically non-significant. Leaders' positive affect might have a minor effect on their manifestation of transformational leadership behaviors, but this effect might not be noticeable in real workplace situations.

Interestingly, in study 2, I found that earlier episodes of transformational leadership were associated with leaders' autonomous motivation, mindfulness, and positive affect. One possible explanation for this finding is that certain stable predictors of transformational leadership, such
as extraversion, self-efficacy, and emotional intelligence, might predict leaders' autonomous motivation, mindfulness, and positive affect. Another possible explanation for this finding is that leading with a transformational leadership style itself predicts leaders' positive affect, mindfulness, and autonomous motivation. The phenomenon of leaders' behaviors potentially influencing their internal states warrants further investigation in future research.

**Theoretical Implications**

The current research theoretically connected the Self-Determination Theory and transformational leadership through a new perspective. Numerous research findings provide substantial support for the argument that the satisfaction of psychological needs and autonomous motivation of employees are strongly associated with various positive workplace outcomes, including performance, health, and well-being (Deci et al., 2017). However, further research is needed to explore the effects of satisfaction of psychological needs and autonomous motivation on specific employee groups, particularly leaders. Leaders hold a critical position in organizational functioning and significantly impact employee performance (Day & Lord, 1988; Kaiser et al., 2008). The current research focused on leaders’ internal experiences and behaviors through the lens of the Self-Determination Theory.

While previous research has examined the application of Self-Determination Theory in organizational settings and identified positive influences of transformational leadership on followers' satisfaction of psychological needs (e.g., Hetland et al., 2011) and autonomous motivation (e.g., Conchie, 2013), the current research took an innovative approach by investigating the relationship between leaders' own satisfaction of basic psychological needs and their specific behavioral pattern, specifically transformational leadership. Instead of focusing solely on the influence of the transformational leadership style on followers, the current research
examined the potential impact of leaders' satisfaction of basic psychological needs on the leaders themselves. This approach provides a unique perspective on the role of leaders' internal experiences in shaping their leadership behaviors. By exploring the mediating role of autonomous motivation, mindfulness, and positive affect, the current research sheds light on how leaders' satisfaction of basic psychological needs may influence their demonstration of transformational leadership behaviors.

Previous research has proposed and tested various individual differences as antecedents or predictors of transformational leadership (Bass, 1985; Bass & Riggio, 2006). These antecedents can be broadly categorized into two groups. The first group includes personality traits and related stable individual characteristics, such as extraversion (Judge & Bono, 2000), self-efficacy (Ross & Offerman, 1997), and locus of control (Howell & Avolio, 1993). The second group encompasses multiple intelligences, such as social intelligence (Berson, 1999), emotional intelligence (Gardner & Stough, 2002), and cognitive intelligence (Hater & Bass, 1988). On the other hand, research has emerged focusing on individual states as antecedents of transformational leadership (e.g., Barbuto, 2005; Jin et al., 2016; Pinck & Sonnentag, 2018; Trépanier et al., 2011). The current research builds upon and expands this line of inquiry by finding that leaders' satisfaction of psychological needs serves as a motivational antecedent to transformational leadership.

Practical Implications

The discovery of the association between leaders' satisfaction of psychological needs and transformational leadership in the current research suggests that leadership is malleable and can be promoted. In addition to stable individual characteristics such as personality (Judge & Bono, 2000) and emotional intelligence (Gardner & Stough, 2002), individual internal experiences and
states may also play a role in predicting transformational leadership. The short-term manifestation of transformational leadership is likely to be influenced by fluctuations in leaders’ motivational states. It is probable that leaders exhibit transformational leadership behaviors when their own psychological needs are satisfied. The findings in the current research reinforce the belief that leadership is a quality that can be nurtured through development (Antonakis & Day, 2017).

Satisfaction of psychological needs is influenced by a range of contextual and individual factors, such as a supportive work environment (e.g., Deci et al., 1989; Hadre & Reeve, 2009), positive performance feedback at work (Deci, 1971; Deci et al., 1989), properties of rewards in the workplace (Deci et al., 2017; Deci & Ryan, 1980), and employees' work values (Kasser & Ryan, 1993; Schreurs et al., 2014). Intervention studies (Deci et al., 1989; Hardré & Reeve, 2009) have demonstrated that modifying these individual and contextual factors can enhance employees' psychological needs satisfaction. The findings in the current research suggest that leadership training programs can integrate elements that aid leaders in satisfying their psychological needs, thereby promoting transformational leadership. By addressing these factors, leaders can better equip themselves to exhibit transformational leadership behaviors, ultimately leading to enhanced organizational outcomes.

**Limitations and Future Research**

There exist several limitations in the current research that should be addressed in future research. One limitation is that the current research did not meet some assumptions necessary to test a causal relationship. One of these assumptions is that the change of the predictor temporally preceded the change of the outcome. Study 1 only examined the correlational relationship between leaders' satisfaction of psychological needs and transformational leadership, which did
not establish a temporal precedence of the predictor over the outcome. In study 2, although the lagged effects of the predictor were examined, another assumption, which includes the manipulation of predictor levels and subsequent observation of outcome changes, was not met. Thus, future research should focus on strengthening the internal validity of the research design to establish causal relationships.

To address this limitation, future research can employ intervention studies to test the causal relationship between leaders' satisfaction of psychological needs and transformational leadership. Intervention studies involve manipulating leaders' satisfaction of psychological needs and observing changes in transformational leadership before and after the manipulation. Previous intervention studies have focused on enhancing employees' satisfaction of psychological needs, while future studies can adapt some elements from these interventions to enhance leaders' satisfaction of psychological needs (Deci et al., 1989; Hardré & Reeve, 2009). For instance, training sessions can be designed to assist leaders to become aware of their interests and preferences in the leadership position, explore the meaning and importance of being a leader, and provide supportive practices that nurture motivational resources and offer explanatory rationales (Hardré & Reeve, 2009). Additionally, by dividing participants into intervention and control groups, as well as assessing leaders' satisfaction of psychological needs before and after the training session, researchers can examine the causal nature of the relationship between satisfaction of psychological needs and transformational leadership.

There also exist limitations concerning the non-ideal theoretical model proposed in the current research. The current research only examined three mediators, which were mindfulness, autonomous motivation, and positive affect. Other constructs might also mediate the relationship between leaders' satisfaction of psychological needs and transformational leadership. However,
these constructs were not examined in the current research. Furthermore, the current research solely focused on transformational leadership but could have addressed other related leadership styles, such as transactional and laissez-faire leadership (Bass & Riggio, 2006). Moreover, for practical implications, leaders' satisfaction of psychological needs might not be the optimal antecedent for improving transformational leadership. Instead, focusing on investigating the relationship between the antecedents that support the satisfaction of psychological needs and transformational leadership might be a better approach. In summary, future research should explore alternative theoretical models and directions, including:

1. Examining additional potential mediators between the predictor and outcome variables in the current model.
2. Including alternative leadership styles as outcomes in the current model.
3. Investigating antecedents of leaders' satisfaction of psychological needs as predictors in the current model.

Some measurement issues in the current research also resulted in limitations. All the measures used in both studies in the current research relied on self-reports, which might be related to inherent weaknesses, such as the common method bias (Podsakoff et al., 2003), the social desirability tendency (Edwards, 1957), and respondents' tendency to agree with positively worded statements. Future research should collect data from multiple sources, such as reports from others and objective records in organizations.

In Study 2, I found that transformational leadership at earlier time points was associated with leaders' positive affect, mindfulness, and autonomous motivation. I provided two plausible explanations for these findings. One explanation is that some predictors, such as leaders' extraversion and leader self-efficacy, predict their own positive affect, mindfulness, and
autonomous motivation. If this explanation holds true, transformational leadership mediates the relationship between leaders' stable characteristics and leaders' emotional, cognitive, and motivational states. The other explanation is that the process of leading with a transformational leadership style influences leaders' internal states.

To test these plausible explanations, future research should conduct experiments in laboratories or field settings to examine whether and to what degree transformational leadership behaviors predict changes in leaders' motivational, emotional, and cognitive states. For example, participants in a field experiment can be trained to influence others with transformational leadership skills. Levels of leaders’ positive affect, mindfulness, and autonomous motivation can be assessed before and after the training to examine the effect of leading with a transformational leadership style on leaders' internal states. Longitudinal studies are also needed to examine the relationship between leaders' stable characteristics, such as personality traits, emotional intelligence, and leader self-efficacy, and their transformational leadership behaviors, as well as their emotional, cognitive, and motivational states assessed through questionnaires.

Chapter 5: Conclusion

The current research aimed to explore the theoretical relationship between leaders' satisfaction of psychological needs and transformational leadership. Three theoretical pathways were hypothesized: mindfulness, autonomous motivation, and positive affect serve as mediators between leaders' satisfaction of psychological needs and transformational leadership.

Study 1 utilized a cross-sectional design to examine the proposed relationships. The findings indicated that leaders' autonomous motivation and mindfulness, but not positive affect, mediated the relationship between satisfaction of psychological needs and transformational leadership. However, a direct association between these constructs was not observed.
Study 2 employed a longitudinal design and cross-lagged panel analysis to capture the dynamic nature of state-like constructs and investigate the causal relationship between satisfaction of psychological needs and transformational leadership. Daily assessments of participants' satisfaction of psychological needs, transformational leadership, and the three mediators were conducted over a four-week period. The findings of Study 2 indicated that leaders' autonomous motivation, but not mindfulness or positive affect, mediated the relationship between satisfaction of psychological needs and transformational leadership. Additionally, transformational leadership was found to predict leaders' positive affect, mindfulness, and autonomous motivation.

The current research offers several contributions. It took an innovative approach exploring the connection between Self-Determination Theory and transformational leadership. The current research focused on leaders’ satisfaction of psychological needs and autonomous motivation and examined the influence of these internal experiences and states on their transformational leadership behaviors. Practically, the current research implies that leaders can enhance their own transformational leadership behaviors through satisfying their own psychological needs in training programs.

Some limitations existed in the current research. Some assumptions to test causal relationships were not met. Some relevant constructs that should have been included in the theoretical were not examined in the current research. The current research only employed self-reports as the form of measurement. In future research, I recommend conducting intervention and experimental studies with longitudinal designs and collecting data from multiple sources.
References


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https://doi.org/10.1111/joop.12041


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**Figure 1**

*The Theoretical Model*

![Diagram](image)

*Note.* In this model, leaders’ satisfaction of basic psychological needs are the antecedent of transformational leadership, leaders’ autonomous motivation, mindfulness, and positive affect are the mediators of the relationship between leaders’ psychological needs and transformational leadership.
Figure 2

The Model with the Path Estimates in Study 1

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. The paths with dashed lines are not significant.
Figure 3

The Stability Model in Study 2

![Diagram showing the stability model in Study 2 with variables and correlation coefficients]

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Psych Needs = leaders’ satisfaction of psychological needs, TL = transformational leadership. The covariations among variables and all the control variables are hidden.
Figure 4

The Most Parsimonious Causation Model in Study 2

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Psych Needs = leaders’ satisfaction of psychological needs, TL = transformational leadership. The autoregressive paths, the covariations among variables, and all the control variables are hidden. The path from psychological needs (t1) to transformational leadership (t2) is approaching significance, $p = 0.06$. 
The Most Parsimonious Reversed Causation Model in Study 2

Figure 5

TL (t1)  Autonomous Motivation (t1)  Mindfulness (t1)  Positive Affect (t1)  Psych Needs (t1)

TL (t2)  Autonomous Motivation (t2)  Mindfulness (t2)  Positive Affect (t2)  Psych Needs (t2)

TL (t3)  Autonomous Motivation (t3)  Mindfulness (t3)  Positive Affect (t3)  Psych Needs (t3)

TL (t4)  Autonomous Motivation (t4)  Mindfulness (t4)  Positive Affect (t4)  Psych Needs (t4)
Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Psych Needs = leaders’ satisfaction of psychological needs. TL = transformational leadership. The autoregressive paths, the covariations among variables, and all the control variables are hidden.
Table 1

*The Comparisons of The Model Fit Indices Between the Measurement Model and The Common Method Factor Model in Study 1*

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2$ (Chi-square)</th>
<th>Degree of freedom</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>$\Delta \chi^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>The measurement model</td>
<td>3921.44</td>
<td>1880</td>
<td>.78</td>
<td>.77</td>
<td>.07</td>
<td>.07</td>
<td>557.06</td>
</tr>
<tr>
<td>The common method factor model</td>
<td>3363.38</td>
<td>1812</td>
<td>.83</td>
<td>.82</td>
<td>.06</td>
<td>.06</td>
<td></td>
</tr>
</tbody>
</table>
Table 2

The Descriptive Statistics of The Variables Used in The Analysis in Study 1

<table>
<thead>
<tr>
<th></th>
<th>PN</th>
<th>autonomous motivation</th>
<th>positive affect</th>
<th>mindfulness</th>
<th>TL</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>238</td>
<td>238</td>
<td>238</td>
<td>238</td>
<td>238</td>
</tr>
<tr>
<td>Mean</td>
<td>3.79</td>
<td>5.00</td>
<td>3.76</td>
<td>4.87</td>
<td>4.81</td>
</tr>
<tr>
<td>Median</td>
<td>3.81</td>
<td>5.17</td>
<td>3.83</td>
<td>4.90</td>
<td>4.90</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.627</td>
<td>1.29</td>
<td>0.771</td>
<td>0.664</td>
<td>0.702</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.50</td>
<td>-1.04</td>
<td>-0.92</td>
<td>-0.72</td>
<td>-0.64</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>0.45</td>
<td>1.31</td>
<td>1.38</td>
<td>0.54</td>
<td>0.14</td>
</tr>
</tbody>
</table>

*Note.* PN = satisfaction of psychological needs, TL = transformational leadership.
Table 3

The Correlations Among the Variables Used in The Analysis in Study 1

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PN</td>
<td>—</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>autonomous motivation</td>
<td>0.70***</td>
<td>—</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>positive affect</td>
<td>0.71***</td>
<td>0.69***</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>mindfulness</td>
<td>0.55***</td>
<td>0.50***</td>
<td>0.50***</td>
<td>—</td>
</tr>
<tr>
<td>5.</td>
<td>TL</td>
<td>0.62***</td>
<td>0.69***</td>
<td>0.60***</td>
<td>0.65***</td>
</tr>
</tbody>
</table>

Note. * p < .05, ** p < .01, *** p < .001. PN = satisfaction of psychological needs, TL = transformational leadership.
Table 4

The Estimates and Significance Information of The Effects and The Hypotheses Test Results in The Mediation Analysis in Study 1

<table>
<thead>
<tr>
<th>Hypothesis/Effect</th>
<th>Paths</th>
<th>Coefficient</th>
<th>P value</th>
<th>Testing of hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>The total effect</td>
<td>--</td>
<td>.62***</td>
<td>.00</td>
<td>--</td>
</tr>
<tr>
<td>The direct effect</td>
<td>PN → TL</td>
<td>.09</td>
<td>.29</td>
<td>--</td>
</tr>
<tr>
<td>H1/ the indirect effect of autonomous motivation</td>
<td>PN → autonomous motivation → TL</td>
<td>.26***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H1a</td>
<td>PN → autonomous motivation</td>
<td>.70***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b</td>
<td>autonomous motivation → TL</td>
<td>.38***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H2/ the indirect effect of mindfulness</td>
<td>PN → mindfulness → TL</td>
<td>.20***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H2a</td>
<td>PN → mindfulness</td>
<td>.55***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H2b</td>
<td>mindfulness → TL</td>
<td>.36***</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H3/ the indirect effect of positive affect</td>
<td>PN → positive affect → TL</td>
<td>.07</td>
<td>.21</td>
<td>Not supported</td>
</tr>
<tr>
<td>H3a</td>
<td>PN → positive affect</td>
<td>.71</td>
<td>.00</td>
<td>Supported</td>
</tr>
<tr>
<td>H1b</td>
<td>Positive affect → TL</td>
<td>.10</td>
<td>.20</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

Note. * *p < .05, ** *p < .01, *** *p < .001. PN = satisfaction of psychological needs, TL = transformational leadership.
Table 5a

The Descriptive Statistics of The Variables Used in The Analysis in Study 2

<table>
<thead>
<tr>
<th></th>
<th>autonomous motivation (t1)</th>
<th>positive affect (t1)</th>
<th>mindfulness (t1)</th>
<th>TL (t1)</th>
<th>autonomous motivation (t2)</th>
<th>positive affect (t2)</th>
<th>mindfulness (t2)</th>
<th>TL (t2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Mean</td>
<td>3.61</td>
<td>4.02</td>
<td>3.26</td>
<td>4.77</td>
<td>3.73</td>
<td>3.67</td>
<td>4.16</td>
<td>3.38</td>
</tr>
<tr>
<td>Median</td>
<td>3.56</td>
<td>3.83</td>
<td>3.33</td>
<td>4.80</td>
<td>3.80</td>
<td>3.67</td>
<td>4.17</td>
<td>3.33</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.508</td>
<td>1.16</td>
<td>0.72</td>
<td>0.53</td>
<td>0.59</td>
<td>0.91</td>
<td>1.5</td>
<td>1.07</td>
</tr>
<tr>
<td>Skewness</td>
<td>-0.14</td>
<td>0.51</td>
<td>-0.631</td>
<td>-0.52</td>
<td>-0.31</td>
<td>3.12</td>
<td>1.35</td>
<td>1.64</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>-0.62</td>
<td>-0.16</td>
<td>-0.33</td>
<td>0.40</td>
<td>1.01</td>
<td>15.9</td>
<td>3.99</td>
<td>7.27</td>
</tr>
</tbody>
</table>

Note. PN = psychological needs, TL = transformational leadership.
Table 5b

The Descriptive Statistics of The Variables Used in The Analysis in Study 2 (cont.)

<table>
<thead>
<tr>
<th></th>
<th>PN(t3) mean</th>
<th>autonomous motivation (t3)</th>
<th>positive affect (t3)</th>
<th>mindfulness (t3)</th>
<th>TL (t3)</th>
<th>PN(t4) mean</th>
<th>autonomous motivation (t4)</th>
<th>positive affect (t4)</th>
<th>mindfulness (t4)</th>
<th>TL (t4)</th>
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<td>N</td>
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<td>80</td>
<td>80</td>
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<td>80</td>
<td>80</td>
<td>80</td>
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<td>80</td>
</tr>
<tr>
<td>Mean</td>
<td>3.67</td>
<td>4.10</td>
<td>3.42</td>
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<td>3.74</td>
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<td>3.44</td>
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<td>3.82</td>
</tr>
<tr>
<td>Median</td>
<td>3.72</td>
<td>3.92</td>
<td>3.75</td>
<td>4.9</td>
<td>3.8</td>
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<td>3.83</td>
<td>3.67</td>
<td>5.00</td>
<td>3.80</td>
</tr>
<tr>
<td>Standard deviation</td>
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<td>1.11</td>
<td>1.03</td>
<td>0.747</td>
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<td>1.28</td>
<td>1.22</td>
<td>1.10</td>
</tr>
<tr>
<td>Skewness</td>
<td>2.47</td>
<td>0.55</td>
<td>0.69</td>
<td>2.28</td>
<td>0.22</td>
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<td>2.57</td>
<td>1.35</td>
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<td>1.85</td>
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<tr>
<td>Kurtosis</td>
<td>11.90</td>
<td>0.29</td>
<td>2.14</td>
<td>12.90</td>
<td>4.47</td>
<td>10.3</td>
<td>5.13</td>
<td>8.96</td>
<td>6.90</td>
<td></td>
</tr>
</tbody>
</table>

Note. PN = satisfaction of psychological needs, TL = transformational leadership.
Table 6a

The Correlations Among the Variables Used in The Analysis in Study 2 (The Upper-Left Part)

<table>
<thead>
<tr>
<th></th>
<th>PN(t1)</th>
<th>AM (t1)</th>
<th>positive affect (t1)</th>
<th>Mindfulness (t1)</th>
<th>TL (t1)</th>
<th>PN(t2)</th>
<th>AM (t2)</th>
<th>positive affect (t2)</th>
<th>Mindfulness (t2)</th>
<th>TL (t2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>autonomous motivation</td>
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<td></td>
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<td>0.43***</td>
<td>0.43***</td>
<td>0.35**</td>
</tr>
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</table>

Note. * p < .05, ** p < .01, *** p < .001. PN = satisfaction of psychological needs, TL = transformational leadership, AM = autonomous motivation.
Table 6b

The Correlations Among the Variables Used in The Analysis in Study 2 (The Lower-Left Part)

<table>
<thead>
<tr>
<th></th>
<th>PN(t1)</th>
<th>AM (t1)</th>
<th>positive affect (t1)</th>
<th>Mindfulness (t1)</th>
<th>TL (t1)</th>
<th>PN(t2)</th>
<th>AM (t2)</th>
<th>positive affect (t2)</th>
<th>Mindfulness (t2)</th>
<th>TL (t2)</th>
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<td>0.72***</td>
<td>0.52***</td>
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<td>0.42***</td>
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</table>

*Note. *p < .05, **p < .01, ***p < .001. PN = satisfaction of psychological needs, TL = transformational leadership, AM = autonomous motivation.
Table 6c

*The Correlations Among the Variables Used in The Analysis in Study 2 (The Lower-Right Part)*

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<tr>
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<th>PN(t3)</th>
<th>AM (t1)</th>
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<th>Mindfulness (t1)</th>
<th>TL (t4)</th>
<th>PN(t4)</th>
<th>AM (t4)</th>
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*Note.* *p* < .05, **p** < .01, ***p*** < .001. PN = satisfaction of psychological needs, TL = transformational leadership, AM = autonomous motivation.
Table 7
*The Comparisons of The Model Fit Indices Between The Stability Model And The Most Parsimonious Causation Model In Study 2*

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<th>Model</th>
<th>$\chi^2$ (Chi-square)</th>
<th>Degree of freedom</th>
<th>$\chi^2$/ degree of freedom</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>RMSEA</th>
<th>$\Delta\chi^2$</th>
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Table 8

The Estimates and Significance Information of The Effects and Hypotheses in The Causation Model in Study 2

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<th>P value</th>
<th>Testing of hypotheses</th>
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Note. * $p < .05$, ** $p < .01$, *** $p < .001$. PN = satisfaction of psychological needs, TL = transformational leadership. The first column denotes hypothesis or the effect that the corresponding parameters test. The total effect in the most parsimonious causation model is the sum of the direct effect from PN to TL, the effect from PN to mindfulness, the effect from PN to positive emotion, and the indirect effect from PN to TL through autonomous motivation.
The Comparisons of The Model Fit Indices Between The Causation Model And The Reciprocal Model

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