The influence of leadership on creativity: A systematic review of experimental studies

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Abstract

Various studies argue that leaders can stimulate the creativity of their followers. However, many of these studies rely on survey or case studies methods, which generally suffer from endogeneity threats, such as reverse causality or omitted variables. In order to provide robust evidence on the cause-and-effect relationship of leadership on creativity, this paper systematically reviews the published experimental studies available on this topic. Findings show that – contrary to expectation – we did not an unequivocal positive influence of general leadership styles such as transformational leadership. On the other hand, leadership strategies such as letting followers participate (related to empowering leadership) and increasing self-efficacy of followers (related to authentic leadership) did increase creativity across various studies. Furthermore, when leaders set creativity goals, this can positively influence creativity. Based upon the review, future research directions are suggested.

Keywords: Leadership, creativity, experiments, systematic review

1 Introduction

Creativity is an intellectual thought process of generating ideas that are new and potentially useful (Shalley, Zhou & Oldham, 2004; Simon, 1985). As Amabile, Conti, Coon, and Herron (1996:1154) noted: "All innovation begins with creative ideas. Successful implementation of new programs, new product introductions, or new services depends on a person or a team having a good idea-and developing that idea beyond its initial state." For organizations in the public, nonprofit and the private sector, it is therefore important to foster creativity of their employees. For private organizations, creative employees can help organizations stay competitive, such as by proposing new market areas to explore and new business partnerships to initiate (Nystrom, 1990; Woodman, Sawyer, & Griffin, 1993). Also for public and nonprofit organizations, creative employees can be beneficial. They can envision new ways to work together with citizens, how to deal with media pressures and how to give citizens 'more bang for their buck' in a dwindling economy (Neuhoff & Searle, 2008; Voorberg, Bekkers, & Tummers, 2014). Although creativity is not without its costs—stimulating creativity can for instance result in more dishonesty (Gino & Ariely, 2012)—it is generally argued that organizations need employees who are creative and employ this in their work (Shalley & Perry-Smith, 2001).

When creativity is deemed important, it becomes interesting to analyze how organizations are able to stimulate the creativity of their participants. Although the 'solitary artist' is an important stereotype among some scholars and practitioners (Howe, 1982), it is argued that organizational environments are able to positively influence the creativity of their participants (Amabile et al., 1996; Martins & Terblanche, 2003). More specifically, various studies argue that leadership is particularly influential in stimulating the creativity of their subordinates (De Jong & Den Hartog, 2007; Oldham & Cunnings, 1996; Shin & Zhou, 2003). For instance, Shin and Zhou (2003) found a positive and significant relationship between

transformational leadership (providing participants with intellectual stimulation, inspirational motivation and individual consideration) and various creativity measures of employees. Furthermore, Zhang and Bartol (2010) found that when leaders empower their employees, this led to more intrinsic motivation and creative process management. In turn, these variables were positively related to creativity.

There have been various valuable literature reviews on leadership and creativity (e.g., Mumford, Scott, Gaddis, & Strange 2002; Reiter-Palmon & Illies, 2004; Shalley & Gilson, 2004; Anderson, Potočnik & Zhou, 2014). For example, Reiter-Palmon and llies (2004) concluded, among else, that leaders play an important role in increasing creative problem solving of subordinates by providing them information and encouraging the sharing of information. Furthermore, Shalley and Gilson (2004) argue that leadership plays a key role in providing a context where creative performance can be stimulated, and among else suggest that leaders should be supportive to participants (and not controlling) in order to facilitate creativity.

In this article, we aim to contribute to the body of knowledge on the influence of leadership on creativity of participants by systematically reviewing the experimental studies which focus on this topic. In this way, we contribute to the literature in two main ways.

First, to date no review of experimental studies on leadership and creativity has been conducted. Experiments are still relatively rare in leadership and creativity research. In line with leadership studies in general (Brown & Lord, 2000; Antonakis et al., 2004) the bulk of studies uses cross-sectional survey or case study approaches. Such studies are beneficial, for instance because they grasp the complexities of the working life in organizations. On the other hand, the conclusions that can be drawn from such research are also limited in terms of being able to verify and validate the cause and effect relationships proposed (Avolio, Walumbwa, & Weber, 2009). They often suffer from endogeneity threats, such as reverse causality or omitted

variables. Furthermore, Antonakis et al. (2004:56, based on Following Kerlinger, 1986:347) notes that one of the most dangerous fallacy in science is the "post-hoc, ergo propter hoc [fallacy]: after this, therefore caused by this." Experiments are one of the only ways to really test for causal effects, as the researcher can fully control the independent variables. Furthermore, Brown & Lord (2000) argue that as experimental settings allow researchers to control the levels of their independent variables also unique combinations can be developed, such as highly extraverted leaders with proactive followers (Grant, Gino, & Hofmann, 2011). Hence, experimental studies have a number of advantages over non-experimental studies, and it is therefore interesting whether the impact of (various styles and strategies) leadership on creativity is also found in such settings.

Second, we explicitly chose for a systematic review method. Note that we have not conducted a meta-analysis given the (often limited) number of relationships (as noted above, there are not many experiment in leadership research). To our knowledge, systematic reviews on the impact of leadership on creativity have not yet been conducted. Systematic reviews differ from traditional literature reviews as they are replicable and transparent. They comprise several explicit steps, such as: identifying all likely relevant publications in a standardized way; extracting data from eligible studies; and, synthesizing the results. During the systematic review, we adhere as much as possible to the widely used 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (The PRISMA Statement, referred to as PRISMA from here on), which ensures transparent and complete reporting (Liberati, Terzlaff, Altmann & The PRISMA Group, 2009).

This brings us to the outline of this paper. In the section 'Method', we will describe the methodology used to conduct the review. The section 'Results' will present the results of our review. We end the article with a conclusion and a future research agenda on studying the impact of leadership on creativity of subordinates.

2 Method

2.1 Eligibility criteria

Systematic reviews are based on replicable and transparent steps. The checklist for each step is presented in Appendix 1. PRISMA distinguishes study eligibility and report eligibility criteria (Liberati et al., 2009).

Study eligibility criteria

- *Type of studies* - Records should deal with the *impact* of leadership on creativity of participants. Hence, experimental studies on for instance creativity of leaders themselves were not included (see for such studies for instance Mumford, Connelly, & Gaddis, 2003).

- *Topic* - Records should contain the words 'leadership', 'creativity' and 'experiment' in their title, abstract or body text. We are aware that choosing for particular keywords can influence the results. Therefore, we also searched using relating words such as leading, management, innovation, control and treatment. However, we chose to focus on studies which explicitly refer to leadership, as we aim to contribute to the leadership and creativity literature. This means that we have not selected studies which did not refer to leadership but analyzed actions which could be indirectly linked to leadership (examples are Oppezzo and Schwartz, 2014 and Lichtenfeld, Elliot, Maier, & Pekrun, 2012).

- *Study design* - Only (lab and field) experimental studies are eligible.

Report eligibility criteria

- *Language* – Only studies written in English were taken into account. This is common for systematic reviews, given the practical difficulties of translation and the replicability of the review (Wilson, Lipsey, & Derzon, 2003).
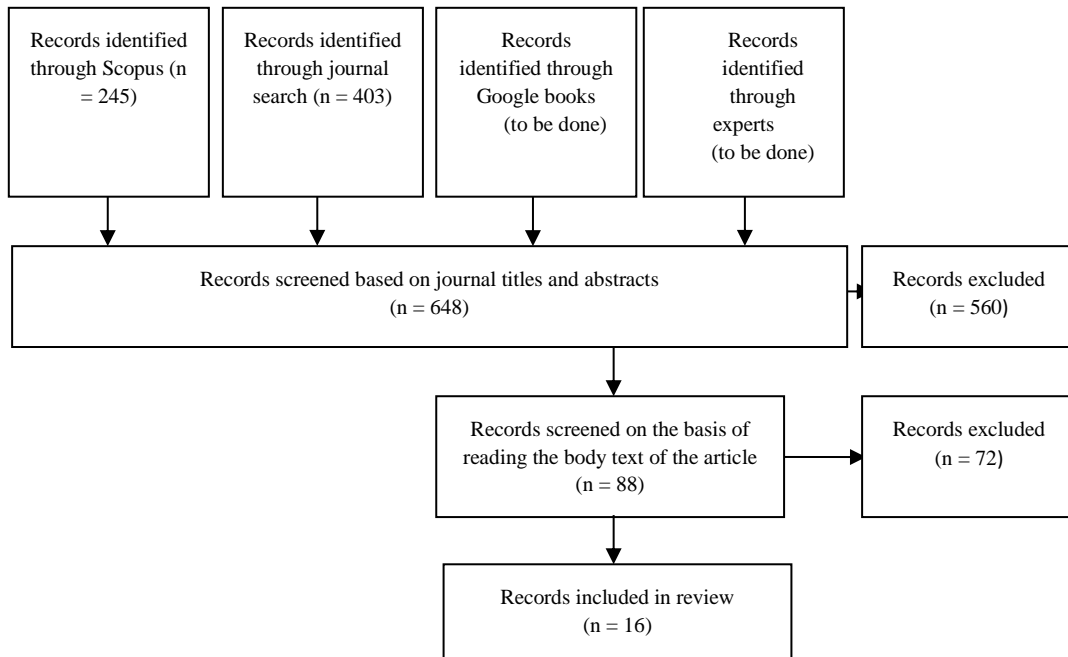
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- *Publication status* - Only international peer-reviewed journal articles were included, in order to have an indication of quality. However, we do acknowledge that a publication bias might exist.

- *Year of publication* - Studies were retrieved that were published in the period from 1990-2014. We selected the period from 1990 to 2014 given that is quite a large range and some of our pilot searches showed that almost no experimental studies on leadership and creativity have been published before 1990.

2.2   Search strategies

Two complementary searching strategies were used to find relevant studies for our systematic review. First, the Scopus databases (1990-2014) was searched for experimental studies on leadership and creativity. This search was applied to Scopus in the period August 2014 till October 2014. After searching for the studies, the records were assessed based on their eligibility by reading abstracts and full texts. Secondly, we searched for journal articles published between 1990 and 2014 in five top leadership and management journals, namely *Academy of Management Journal*, *Journal of Applied Psychology*, *The Leadership Quarterly*, *Organzational Behavior and Human Decision Processes*, and *Journal of Management*. Later on in the process (after the PAR-conference), we will also search for references within relevant books on the topic and contact relevant experts of experimental studies in leadership and creativity in order to make sure that no eligible publications were left out.

2.3   Study selection

Based on the eligibility criteria, we included 16 studies in our analysis. Our selection process is presented in Figure 1.

Records identified through Scopus (n = 245)

Records identified through journal search (n = 403)

Records identified through Google books (to be done)

Records identified through experts (to be done)

Records screened based on journal titles and abstracts (n = 648)

Records excluded (n = 560)

Records screened on the basis of reading the body text of the article (n = 88)

Records excluded (n = 72)

Records included in review (n = 16)

Figure 1. PRISMA flowchart: process for identifying and retaining studies

Our search terms resulted in 245 initial hits in Scopus and 403 journal articles. We read the titles and abstracts of all these 648 articles. Based on the eligibility criteria, many articles were excluded, for instance, because it was apparent from the abstract that it concerned a conceptual study, a qualitative case study or a survey. Next, we read 88 articles more in detail. Here, some articles were dropped because they studied the impact of leadership on top-down implementation of management ideas (Abrams, Radsley de Moura, Marques, & Hutchison, 2008; Lam & Schaubroeck, 2000). Furthermore, our initial sample included four studies based upon the same Group-Decision-Support-System experiment (i.e., Sosik, 1997; Sosik, Avolio, & Kahai, 1997; Sosik, Avolio, Kahai, & Jung, 1998; Sosik, Kahai , & Avolio, 1999). We removed Sosik (1997), Sosik et al. (1998) and Sosik et al. (1999) given that they were based on the same experiment as Sosik et al. (1997). The final sample included 16 articles in which the relationship between leadership and creativity of participants was studied using an experimental design.

All experiments in these 16 studies were coded independently by both authors. The few coding discrepancies were resolved through discussion. We report main effects of leadership on creativity only. The main reason is that the authors did almost always use unique moderators or mediators, making it impossible to move beyond an individual study. Mediators included variables such as psychological capital (Avey, Richmond, & Nixon., 2012), self-concordance (Bono & Judge, 2003) and task engagement and motivation (Van Kleef, Anastasopoulou, & Nijstad, 2010). Moderators included variables such as anonymity (Kahai, Sosik, &, Avolio , 2003; Sosik et al., 1997), prior experience or choice (Chua & Iyengar, 2011), time (Streicher, Jonas, Maier, Frey, & Spießberger , 2012) and epistemic motivation (Van Kleef et al., 2010).

2.4 Leadership styles/strategies

Based upon a preliminary analysis of the sample, we decided to summarize the results using four different leadership styles: 1) transactional; 2) transformational; 3) empowering and 4) authentic leadership. We recognize that the boundaries are not clear-cut and that there are overlaps (see also Avolio, Walumbwa, & Weber, 2009; Judge & Piccolo, 2004). However, this distinction serves as a helpful analytical tool to distinguish between leadership styles/strategies.

Transformational leaders try to align employees' goals with organizational needs (Judge & Piccolo, 2004) by stimulating participants' intrinsic motivation and self-confidence to perform (Piccolo & Colquitt, 2006). Transformational leadership consists of four dimensions: A leader scoring high on transformational leadership acts as a role model (idealized influence), inspires employees with a compelling vision (inspirational motivation), stimulates employees to be creative and innovative (intellectual stimulation), and mentors his employees (individualized consideration) (Bass, 1999).

Transactional leaders focus on the exchange of resources (Judge & Piccolo, 2004; Howell & Avolio, 1993). Transactional leadership consists of three dimensions: contingent reward, management by exception-active and management by exception-passive. Contingent reward is about setting goals for employees and rewarding them when they meet these goals. Moreover, transactional leaders manage by exception. Some transactional leaders actively monitor participant behavior and take actions before behavior creates serious difficulties. Other transactional leaders manage exceptions passively: they wait until the behavior has caused problems before taking action.

Empowering leadership is about leaders sharing power with employees and increase their sense of belonging and autonomy (Bennis & Townsend, 1995). The roots of empowering leadership include the Ohio State :eadership studies on showing concern for the needs of subordinates (Fleishman, 1953), participative leadership studies (Vroom & Yetton, 1973) and the importance of coaching and delegation in situational leadership (Hershey & Blanchard, 1969) (Srivastava et al., 2006). Following Srivastava et al. (2006:1240), we define empowering leadership as "behaviors of leaders which result in power sharing with subordinates and that raise their level of intrinsic motivation". Ahearne et al. (2005, cf. Arnold et al., 2000) developed a measure for leadership empowerment behavior that consists of four dimensions: 1) enhancing the meaningfulness of work (such as showing how your work relates to the goals of the organization), 2) participation in decision-making (such as making decisions together with employees), 3) expressing confidence in high performance (stating against employees that they are able to handle difficult work) and 4) providing autonomy from bureaucratic constraints (such as letting employees make important decisions).

The fourth leadership style we distinguish is the emerging style of 'authentic leadership' (Luthans & Avolio, 2003; Avolio et al., 2009). This leadership style developed

among else because of the distinction between 'pseudo' and 'authentic' transformational leadership: some leaders pretend that they are transformational, while others are genuinely transformation (Bass & Steidlmeier, 1999). Secondly, the concept of authentic leadership was introduced to connect leadership studies with the upcoming field of 'positive psychology' and 'positive organizational behavior'. Luthans and Avolio (2003) argue that theories in positive psychology like Frederickson's broaden-and-build theory could be fruitfully connected to leadership. Furthermore, the positive psychological concept of 'positive psychological capital' has also been connected to authentic leadership (Clapp-Smith et al., 2009). Based on the initial definition of Luthans and Avolio (2003:243), Walumbwa et al. (2008:94) proposed a refined definition, stating that authentic leadership is "a pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, an internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development." Walumbwa et al. (2008) argues that authentic leadership consists of four main dimensions: self-awareness (understanding among else one's own capabilities), relational transparency (presenting who you really are to others, instead of 'faking'), balanced processing (taking into account information of others) and internalized moral perspective (making decision consistent with own values).

Hence, authentic leaders try to foster positive employees' self-awareness and self-realization. In order to achieve these goals, they focus on stimulating positive employee behavior such as hope, self-efficacy, and employee well-being. Similar to a transformational leader, an authentic leader functions as a role model. However, in contrast to a transformational leader, an authentic leader is not primarily interested in aligning employee's goals with organizational needs. Furthermore, authentic leadership has overlap with the concept of ethical leadership, among else its moral dimension and taking into account the

view of others when making decisions (compare 'balanced processing' for authentic leadership and 'power sharing' for ethical leadership).

2.5   Creativity: divergent and convergent thinking

Next to the different styles/strategies of leadership, we also found that creativity was operationalized in various ways. The main difference was between divergent and convergent thinking. Indeed, a successful creative process consists of both these phases (Cropley, 2006). In the divergent-thinking phase, a person is challenged to come up with as many different ideas as possible. People can be classified as less or more creative than others depending on their scores on the following four dimensions (Torrance, 1972): number of ideas generated (fluency); the details added to each idea (elaboration); the diversity of the ideas presented (flexibility); and the uniqueness of the ideas generated (originality). In the convergent-thinking phase, that person needs to be able to select one's best (most useful) idea. Hence, we coded whether researchers investigated the impact of leadership on divergent thinking, convergent thinking, or both.

3   Results

3.1   Background: Journals, design and samples

The articles in our final sample appeared from 1991 to 2014 in ten different journals. The most prevalent were the *Leadership Quarterly* (five) and the *Journal of Applied Psychology* (three). Twelve articles investigated the impact of leadership on creativity of individual participants (such as Avey et al., 2012; Redmond, Mumford & Teach, 1993); three articles studied the effects of leadership at the team level (Anderson & Balzer, 1991; Kahai et al., 2003; Sosik et al., 1997); and one article investigated the consequences of leadership on creativity on both the individual level and team level (Jaussi & Dionne, 2003).

Twelve articles used US citizens as main research subjects and four articles used Europeans participants. Hence, there were no experiments found which used non-Western participants.

Thirteen articles in our sample reported findings from a single experiment; three articles consisted of two eligible experiments. Hence, our results are based on the conclusions of 19 experiments.

3.2 The impact of leadership on creativity

Transformational and transactional leadership styles.

Transformational and transactional leadership styles are often contrasted. Results of employee surveys suggest often that a transformational leadership style has more beneficial effects on employee creativity than a transactional style (see for instance Gong, Huang & Farh, 2009; Shin & Zhou, 2003, but confer Basu & Green, 1997). In fact, leadership scholars consider stimulating employee creativity as one of the core strategies a transformational leader can use to align individual needs with organizational goals (Piccolo & Colquitt, 2006). Five experiments tested the effects of transformational leadership, contrasting it with a transactional (four experiments) or non-transformational (one experiment) styles. Results of these experiments are summarized in Table 1.

Table 1 Impact of transformational leadership on creativity

Treatment	Creativity measure	Results	Study
Transformational leadership as opposed to non-transformational leadership	Divergent thinking (fluency)	*Significant positive* β=.25, p<.01	Bono & Judge (2003)
Transformational leadership as opposed to transactional leadership	Divergent thinking (fluency and flexibility)	*Significant positive* Fluency: $F_{(1,188)}=14.78$, p<.01; Flexibility: $F_{(1,188)}=4.78$, p<.05	Jung et al. (2001)
Transformational leadership as opposed to transactional leadership	Convergent thinking (imaginativeness, innovativeness, and value addition)	*Significant positive* Convergent thinking: β=.15, p<.01	Sosik et al. (1997, experiment 2)
Transformational leadership as opposed to transactional leadership	Individual: Divergent thinking (3-item measure of overall creativity)	*Insignificant* β=-.02, p>.05 (individual)	Jaussi & Dionne (2003, experiment 1)
Transformational leadership as opposed to transactional leadership	Divergent thinking (fluency, flexibility, originality);	*Significant negative* Divergent thinking: β= **-**.24, p<.01,	Sosik et al. (1997, experiment 1)
Transformational leadership as opposed to transactional leadership	Divergent thinking (originality)	*Significant negative* No tests shown, but see p.519 "groups generated more original solutions […] under transactional leadership than under transformational leadership"	Kahai et al. (2003)
Transformational leadership as opposed to transactional leadership	Group: Divergent thinking (composite score of fluency, flexibility, and originality)	*Significant negative* β=-.27, p<.01 (group)	Jaussi & Dionne (2003, experiment 2)

As Table 1 shows, the experiments provide mixed support for the effect of transformational leadership on creativity. In three experiments, researchers *did* find that a transformational leadership style positively influenced creativity, both divergent thinking (Bono & Judge, 2003; Jung et al., 2001) and convergent thinking (Sosik et al., 1997, experiment 2). One experiment (Jaussi and Dionne, 2003, experiment 1) found no effect of transformational leadership on individual creativity. Three experiments even found that transformational leadership style *negatively* impacted creativity, all looking at divergent thinking (Sosik et al., 1997, experiment 1; Kahai et al., 2003; Jaussi & Dionne, 2003, experiment 2).

Transactional leadership style: contingent reward.

Next to the general transformational and transactional leadership styles, a number of studies also focused on goal-setting. This can be related to one particular aspect of transactional leadership: contingent reward, of which an important element is setting clear goals.

First, leaders could give their participants a 'creativity goal': telling them that they should be creative: they should generate novel and useful solutions (see Table 2). In general, creativity goals have either positive or no effects on creativity. Hence, it seems that not much harm can be done. In two experiments, Shalley (1991, 1995) found that when leaders state a creativity goal (versus not doing this), this positively influenced convergent thinking. Chua & Iyengar (2011) found no differences when comparing creativity goals versus general 'do your best' or 'be persuasive' goals.

Table 2. Impact of creativity goals on creativity

Treatment	Creativity measure	Results	Study
State that the participant should be creative: generating novel and useful solutions (versus no goal)	Convergent thinking (consensual assessment technique)	*Significant positive* $F=10.96$, $p<.05$	Shalley (1991)
State that the participant should be creative: generating novel and useful solutions (versus no goal)	Convergent thinking (consensual assessment technique)	*Significant positive* $F(1,128)=12.32$, $p<.001$	Shalley (1995)
State that the participant should be creative: develop a solution which is as creative as possible (instead of a general 'do your best')	Convergent thinking (consensual assessment technique)	*Insignificant* $F(1,92)=.09$, partial $\eta^2=.001$, $p>.05$	Chua & Iyengar (2011, experiment 1)
State that the participant should be creative: develop a solution which is as creative as possible (instead of 'be persuasive')	Convergent thinking (consensual assessment technique)	*Insignificant* $F(1,106)=.19$, partial $\eta^2=.002$, $p>.05$	Chua & Iyengar (2011, experiment 2)

Leaders could also give participants a 'performance goal', for instance by stating that they should be productive: generating many solutions. In general, goal-setting theory shows that setting specific and difficult goals result in better performance (Locke & Latham, 2002). On

the other hand, setting 'performance' goals may undermine creativity as they weaken intrinsic motivation (Mossholder, 1980). As shown in Table 3, Redmond et al. (1993) and Shalley (1991) investigated whether setting a performance goal ('develop as many solutions as possible') resulted in more creative solutions but did not find significant effects. In contrast, Zhou (1998) found in her experiment that such a performance goal—she talks about 'controlling feedback'—had a negative impact on employee creativity. Hence, in sum it seems that setting performance goals is not a very good idea when you want to increase creativity.

Table 3. Impact of performance goals on creativity

Leadership strategy	Creativity measure	Results	Study
Performance goal Argue that participants should perform (as opposed to a learning goal)	Convergent thinking (quality and, originality)	*Insignificant* Quality: F=.55, p>.05 Originality: F = 1.46, p.>.05	Redmond et al. (1993)
Performance goal State that the participant should be productive: generating many solutions	Convergent thinking (consensual assessment technique)	*Insignificant* F=.78, p>.05	Shalley (1991)
Performance goal Controlling feedback: telling the participants that they should deliver good performance (versus informational: just tell results).	Convergent thinking (consensual assessment technique)	*Significant negative* Change in R^2=.06, p<.01 M=4.09 versus M=4.51	Zhou (1998)

Empowering leadership

One of the dimensions of empowering leadership is 'participation in decision making': allowing subordinates to have a say in decision-making (De Hoogh & Den Hartog, 2008). Two experiments showed that this indeed positively effected on employee creativity (Table 4). Anderson and Balzer (1991) found that employees generated more creative solutions if their team leaders gave them room to express their opinion. Streicher et al. (2014) concluded that – over time - employees were more creative if they were given opportunity to explain their creative ideas.

Table 4. Impact of participation in decision-making on creativity

Leadership	Creativity measure	Results	Study
Leaders state problems and only expressing their opinions after each team member could contribute (instead of giving their opinion immediately after the problem statement)	Divergent thinking (fluency); Convergent thinking (feasibility of adoption, likelihood of adoption)	*Significant positive* $t(17)=2.21, p<.05, \eta^2=.22$; $t(17)=2.52, p<.05, \eta^2=.27$; $t(17)=2.36, p<.05, \eta^2=.25$;	Anderson & Balzer (1991)
The leader (member of the committee) gave participants the opportunity to explain their draft and idea (versus no voice).	Convergent thinking (consensual assessment)	*Significant positive over time* $F<0.25, p>.05$. However, it became positive significant over time: Week 4: $t(21)=2.41$, $p=.01$	Streicher et al. (2014)

Another dimension of empowering leadership providing autonomy. However, creativity did not vary between employees who were given much task autonomy and employees who were on a 'tight leash' (Shalley, 1991; Zhou, 1991).

Table 5. Impact of autonomy on creativity

Leadership	Creativity measure	Results	Study
Autonomy Stating that the participant has complete freedom in completing the task	Convergent thinking (consensual assessment technique)	*Insignificant* $F=.68, p>.05$	Shalley (1991)
Autonomy Stating that the participant has complete freedom in completing the task (based on Shalley, 1991)	Convergent thinking (consensual assessment technique)	*Insignificant* Change in $R^2=.00, p>.05$	Zhou (1998)

Authentic leadership behavior

Although the term authentic leadership was not used in any of the experiments in our sample, several strategies that can be grouped under 'authentic leadership' were found. As Table 6 shows, Avey et al. (2012) found that employees were more creative if leaders were capable of stimulating employee's psychological capital. That is, creativity was higher if leader succeed

in conveying employee self-efficacy, resilience, optimism, and hope. A similar conclusion can

be drawn from Redmond et al. (1993) and Zhou (1998) who found that employees were more

creative if their self-efficacy was stimulated. Overall, authentic leadership (here: increasing

psychological capital and self-efficacy) seems to be a beneficial strategy for improving

creativity.

Table 6 Impact of authentic leadership on creativity

Leadership strategy	Creativity measure	Results	Study
Psychological capital A leader showing confidence (efficacy), being able to overcome big changes (resilience), being positive (optimism), persevering towards goals (hope).	Divergent thinking (fluency)	*Significant positive* β=.16, p<.05/F(190)=7.98, p<.01	Avey et al. (2012)
Self-efficacy Increasing s belief of participant that he/she can be creative	Convergent thinking (quality and, originality)	*Significant positive* Quality: F=7.47, p<.05 Originality: F=7.50, p<.05	Redmond et al. (1993)
Self-efficacy (here described as feedback valence) Increasing belief of participant that he/she can be creative. Here: positive or negative feedback: showing that the participant is in the top 20% of creative solutions (versus bottom 20%).	Convergent thinking (consensual assessment technique)	*Significant positive* Change in R^2=.24, p<.01 M=4.48 versus M=3.91	Zhou (1998)

3.3   Other leadership strategies and creativity

A number of experiments tested the potential effect of leadership strategies which are not

directly related to four leadership styles/strategies mentioned. This is shown in Table 7. With

the exception of Redmond et al.'s (1993) strategy of letting employees write down all

important aspects of the current situation before thinking about creative solutions (problem

construction), none of these strategies resulted in more creative solutions. For example,

employees were not more creative if their leader showed specific emotions (Van Kleef et al.,

2010; Visser et al., 2013) or showed unconventional behavior (Jaussi & Dionne, 2003).

Table 7 Impact of other strategies on creativity

Treatment	Creativity measure	Results	Study
Problem construction Instruct participants to write down all important aspects of the problem and reformulate problem	Convergent thinking (quality and originality)	*Significant positive* Quality: F=11.08, p<.05 Originality: F=5.11, p<.05	Redmond et al. (1993)
Unconventional leader behavior The leader behaving in unique, novel and unexpected ways, such as standing on a chair or delivering instructions written on the back of T-shirts.	Individual: Divergent thinking (3-item measure of overall creativity)	*Insignificant* β=-.03, p>.05 (individual); β=.08, p>.05 (group)	Jaussi & Dionne (2003, experiment 1)
Unconventional leader behavior The leader behaving in unique, novel and unexpected ways, such as standing on a chair or delivering instructions written on the back of T-shirts.	Group: Divergent thinking (composite score of fluency, flexibility, and originality)	*Insignificant* β=.08, p>.05 (group)	Jaussi & Dionne (2003, experiment 2)
Regulatory focus Leaders addressing followers directly, using words such as 'you', instead of 'people'.	Divergent thinking (fluency)	*Insignificant* Experiment 1: No tests shown, but see p. 462 "The results showed no significant effects." Experiment 2: No tests shown, but see p. 464 "We found no significant main effects."	Stam et al. (2010)
Displaying happiness Showing happiness ('happy leader'): smiling, speaking enthusiastically, looking cheerful (versus sad leader in experiment 1 and sad and neutral leader in experiment 2).	Experiment 1: Divergent thinking (Originality) Experiment 2: Divergent thinking (Average of fluency, originality, flexibility, elaboration)	*Insignificant* Experiment 1: No main effect tests shown, but see means (p.178): M=.11 (SD=1.02) versus M=-.11 (SD=.97), calculated by authors: t=0.22, n.s. Experiment 2: No main effect tests shown, but see means (p.181): M=.14 (SD=0.44), M=-.11 (SD=.34), M=.01 (SD=.42). calculated by authors: F=1.38, n.s.	Visser et al. (2013)
Displaying anger Showing anger ('angry leader'): frowning a lot, speaking with irritable voice, clenching fists	Divergent thinking (Fluency, originality, flexibility)	*Insignificant* β=-.09, p>.05 (fluency), β=-.05, p>.05 (originality), β=-.12 p>.05 (flexibility)	Van Kleef et al. (2010)

4   Conclusions and future research

In this study we provided a comprehensive overview of the published experimental evidence

on the impact of leadership style on followers creativity. Based upon the content of the 16

eligible studies, we distinguished between four types of leadership styles: a) transformational,

b) transactional, c) empowering; and d) authentic leadership. Furthermore, we also identified

a number of other leadership styles or strategies such as displaying happiness or being

unconventional. The results of our analysis are summarized in Table 7. Based on our

preliminary findings, we will draw conclusions and suggest future research directions.

Table 7 Summary of results

Leadership behavior/style	Positive	Insignificant	Negative	Conclusion
Transformational leadership				
General	3	1	2	Positive (weak)
Transactional leadership: contigent reward				
Creativity goal	2	2	0	Positive (medium)
Performance goal	0	2	1	Negative (weak)
Empowering leadership				
Participation in decision-making	2	0	0	Positive (strong)
Autonomy	0	2	*0*	No effect
Authentic leadership				
Psychological capital	1	0	0	Positive
Self-efficacy	2	0	0	Positive
Other leadership styles or strategies				
Problem construction	1	0	0	Positive
Other: Unconventional leadership behavior, regulatory focus, displaying happiness, displaying anger	0	4	0	No effect
Total	**11 (42%)**	**11 (42%)**	**4 (16%)**	

Note: each experiment casts one 'vote'.

Table 7 shows that—unexpectedly—we did not find an unequivocal positive influence of

transformational leadership on creativity. On the one hand, one can argue that based on our

findings transformational leadership is indeed not the best way to stimulate creativity,

particularly given the positive effects of other leadership styles. On the other hand, one may

argue that insignificant and negative consequences of transformational leadership on

creativity are caused by specific research designs used. For example, Kahai et al. (2003) did use cash rewards to stimulate creativity while Sosik et al. (1997) did not. Kahai et al. (2003) themselves argued that the use of financial rewards may have resulted in a shift from intrinsic to extrinsic motivation and, thus, introduced an element of transactional leadership within the design.

More importantly, as the various leadership styles consist of several elements (or dimensions), it is very well possible that some elements facilitate creativity (such as intellectual stimulation) while other elements do not or have a negative impact on creativity (such as inspirational motivation). Indeed, Van Knippenberg and Sitkin (2013) criticize the transformational leadership literature for lacking proper conceptualization and definition of transformational leadership. Scholars developed multi-dimensional conceptualizations of transformational leadership, but did not specify why some dimensions are included while others are excluded.

Based on our mixed finding we recommend to stop studying the effect of general leadership styles on creativity. Instead, following Van Knippenberg and Sitkin (2013), we belief it would be more valuable to investigate the effects of separate elements of leadership styles. An example is studying the impact of goal-setting (part of contingency reward within transactional leadership). Experiments in our sample showed that creativity is potentially enhanced posing creativity goals instead of performance goals.

The second conclusion focuses on the potential benefits of the authentic leadership. While transformational and transactional leadership are very much researched, the topic of authentic leadership is quite new. Studies related to authentic leadership focused on psychological capital (Avey et al., 2012) and self-efficacy (Redmond et al., 1993; Zhou, 1998). All these studies showed significant positive impacts on divergent and/or convergent thinking. These studies are connected to work on 'positive psychology' and 'positive

organizational behavior'. Hence, we would suggest future studies to use insights from authentic leadership (and positive psychology more generally) to further foster creativity among employees (see also Gardner & Schemmerhorn, 2004).

The last conclusion and future research suggestions is based on the fact that we found that most articles involved students as participants in laboratory experiments and that all articles were conducted in either the United States or in Europe. Although a student sample for experimentation has the advantage of homogeneity between experiment groups and, consequently, high internal validity (Calder, Phillips and Tybout, 1982), other samples – especially from 'real' leaders and followers – have more face and ecological validity. Furthermore, the advantage of fields experiments over lab experiments is that they occur in real settings and are sometimes more useful for finding answers to practical problems (Antonakis et al., 2004, see also Anderson et al., 2014). Hence, future research could replicate the insights gained from experiments involving students using different kinds of participants in different settings. Furthermore, by primarily conducting in Western countries, a bias might be developed. Some values are more prominent in these countries and this can influence the results found. Hence, it would be valuable to replicate studies in countries with markedly different cultures (see also Dickson et al., 2003). Also more generally, we would advise authors to retest existing findings. This also aligns with the stress on replications, which is becoming increasingly prevalent in psychological and managerial research (Gelman & Loken, 2014).

Concluding, this systematic review shows that particular leadership strategies could indeed impact creativity, such as increasing the self-efficacy, increasing participation and increasing the psychological capital (confidence, hope, optimism and resilience) of subordinates. On the other hand, more general leadership strategies such as transformational leadership showed mixed results. Leaders can use this information. They can for instance try

to increase self-efficacy of their employees via coaching, feedback and task assignments. Furthermore, they may increase participation in order to boost creativity. A leader can do this for instance by first letting subordinates contribute and propose ideas and only hereafter expressing his or her view on the matter, instead of the other way around. In the end, such leadership strategies can improve creativity, which could lead to more innovations within and performance of organizations (Amabile, 1996; Im & Workman Jr., 2004).

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Appendix – PRISMA Checklist (based on Liberati et al., 2009)

Note: some checks are not applicable as they are meant for a meta-analysis, not a systematic review.

TITLE			page
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3-4
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3-4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	N.A.
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	6-7
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	6-7
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	TBD
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	9-11
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	7-12
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	N.A.

Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	N.A.
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	N.A.
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I) for each meta-analysis.	N.A.
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	7
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	N.A.
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	7-8
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	TBD
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	N.A.
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	N.A.
Synthesis of results	21	Present the main results of the review. If meta-analyses are done, include for each, confidence intervals and measures of consistency	12-19
Risk of bias	22	Present results of any assessment of risk of bias across studies (see Item 15).	N.A.
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	N.A.
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	19-24
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	19-24
Conclusion	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	19-24

FUNDING

Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	None