

ARTICLE

Introducing and validating a single-item measure of identity leadership: The visual identity leadership scale (VILS)

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Abstract

In the present research, we introduce and validate a single-item measure of identity leadership—the visual identity leadership scale (VILS). The VILS uses Venn diagrams of sets of overlapping circles to denote different degrees of alignment between a leader's characteristics and behaviours and a group's values and goals. Key advantages of the VILS over other existing multi-item scales are that it provides a holistic assessment of identity leadership, is short, and can be adapted to address novel research questions that are impractical to address with existing scales (e.g. in diary studies, assessing multiple comparisons of many leaders or groups). Data from three studies (conducted in India, the United States and Germany) provide evidence of the VILS' construct reliability and validity. Results also showcase the instrument's capacity to be adapted to assess variations of identity leadership—for example, by assessing a leader's convergence with descriptive and ideal notions of collective self (i.e. with 'who we are' and 'who we want to be'). We discuss the value of including the VILS in the toolbox that researchers and practitioners can utilize to expand our understanding of identity processes in leadership and group behaviour.

KEYWORDS

group, identity, identity leadership, social identity, visual scale

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BACKGROUND

Leadership is commonly defined as the ability of one or more people to influence others in a way that motivates them to contribute towards the accomplishment of group or organizational goals (House et al., 2001; van Vugt et al., 2008). This definition makes it clear that leadership takes place in the context of a group and that it is a process of social influence that revolves around the accomplishment of collective rather than personal goals. One increasingly influential explanation of these processes is provided by the social identity approach—an approach that starts with an analysis of how groups inform people's sense of self.

This social identity approach refers to a body of theorizing that is informed by more than four decades of research inspired by social identity theory (Tajfel & Turner, 1979) and self-categorization theory (Turner et al., 1987). This observes that people are capable of defining themselves, and acting, not only in terms of their personal identity (a sense of themselves as 'I' and 'me') but also in terms of social identity (a sense of themselves as 'we' and 'us'). It further proposes that a sense of shared social identity (e.g. 'us members of organization X'; 'us citizens of nation Y') underpins important group and organizational behaviours because it serves to align group members' psychology with the norms and ideals of what it means to be a member of a particular (in)group (Ashforth & Mael, 1989; Haslam, 2004; Hogg & Terry, 2000; Reicher et al., 2010). Supporting these ideas, previous work in organizational contexts has shown that group identification is a basis for a range of phenomena including group (organizational) commitment (Riketta & van Dick, 2005), health and well-being (Steffens et al., 2017), and both in- and extra-role performance (Lee et al., 2015).

Expanding this theorizing to leadership and social influence processes, researchers have proposed that leadership is a group-based process that centres on leaders' capacity to mobilize group members by cultivating and advancing shared social identity (a sense of 'we' and 'us'). This is because social identity binds followers and leaders together and provides the basis for mutual influence. This cultivation of shared identity is commonly referred to as (social) *identity leadership* (Haslam et al., 2020). This can be broken down further into four components which involve leaders being seen (a) to craft a sense of shared identity within the group (identity entrepreneurship; e.g. Reicher & Hopkins, 2001), (b) to embody the group's shared identity (identity prototypicality; e.g. Hogg, 2001), (c) to champion the shared interests of the group (identity advancement; e.g. Haslam & Platow, 2001) and (d) to embed shared identity through structures, practices and events that give 'substance' to the group (identity impresarioship; e.g. Haslam et al., 2011). Research shows that these four dimensions are distinct, but also that they contribute to a unifying higher-order construct of (global) identity leadership that centres on a leader's management of a sense of 'us' (Steffens et al., 2014; van Dick et al., 2018).

Supporting these ideas, a growing body of research indicates that identity leadership—conceptualized in terms of specific dimensions or in terms of the unifying higher-order construct of identity leadership—is associated with a range of key outcomes, including group members' commitment, performance and well-being (for reviews, see Ellemers et al., 2004; Epitropaki et al., 2017; Haslam et al., 2020; Steffens et al., 2021; van Knippenberg, 2011). This includes evidence from a large international project by van Dick et al. (2018, 2021) involving participants from 30 nations and across all continents. This confirmed that (global) identity leadership (a) is distinct from other commonly discussed forms of leadership (i.e. transformational leadership, leader-member exchange, authentic leadership) and (b) makes a unique contribution to team identification, citizenship and innovative behaviour at work as well as to reduced stress and burnout.

Hitherto, the most common instrument for assessing identity leadership has been a 15-item scale—the Identity Leadership Inventory (ILI; Steffens et al., 2014). In line with its conceptualization in terms of both distinct dimensions and a unifying overarching construct, this has been used to assess both the parts and the whole of identity leadership. Researchers have also assessed global identity leadership using the ILI-Short form consisting of four items. Like most multi-item measures, the ILI and the ILI-SF have proven to be very useful, not least because multi-item measures can enhance measurement accuracy.

However, some features of the ILI also limit its usefulness, particularly when researchers are interested in global levels of identity leadership. In common with other multi-item measures, one potential problem is that because it relies on a uniform question-and-response format and uses multiple items to assess a single focal construct this can contribute to participant fatigue in ways that compromise data quality and completion. Indeed, a key limitation of multi-item measures is that they add to survey length and thereby increase the burden on participants (Rogelberg & Stanton, 2007). Furthermore, when multiple items assess the same construct the fact that they are necessarily similar in focus means that they are often experienced as redundant by participants (Wanous et al., 1997). Moreover, research indicates that once a clear and valid single item is included in the assessment of a given construct, adding more items leads to increasing levels of semantic redundancy and often adds little to explanatory power (Drolet & Morrison, 2001). Indeed, in a recent comprehensive review and evaluation of 91 single-item measures in the applied organizational sciences, Matthews et al (2022) found that the vast majority (82%) of these measures had very good validity (see also Allen et al., 2022).

An additional problem of common measurement approaches that can exacerbate response fatigue is that surveys often become monotonous for participants because they ask similar questions in similar ways. In particular, surveys often have little variation in the way they pose questions and typically rely on similarly structured items. One way to minimize fatigue is therefore to alternate the presentation format by using pictorial scales (Bergami & Bagozzi, 2000; Hornsey et al., 2012; Shamir & Kark, 2004). Pictorial scales have the advantage of serving as a 'cognitive speed bump' that can disrupt the monotony of responding to Likert-type scales by introducing novel response formats which increase participants' engagement (Harrison & McLaughlin, 1993) and, in the process, reduce common method variance (Gardner et al., 1998).

To address these challenges, scholars across different fields have developed single-item visual scales as alternatives to commonly used multi-item scales. For example, there are several widely used graphical scales that assess a person's degree of social identification or fusion with a group (Bergami & Bagozzi, 2000; Schubert & Otten, 2002; Shamir & Kark, 2004; Swann Jr et al., 2009). They typically do this by asking respondents to select a picture from a series of visual (e.g. Venn) diagrams depicting different levels of overlap between the self and the group. Along similar lines, Aron et al. (1992) developed a visual scale that assesses the extent to which a person includes another individual in their sense of self as a measure of psychological closeness (see also Gächter et al., 2015). In addition, in the field of leadership, Van Quaquebeke et al. (2010) developed a visual scale that assessed respondents' implicit leadership theories by asking them to indicate different degrees of overlap between their actual leader and their ideal leader.

Overview of present research

In the present research, we expand upon current measurement tools to introduce and validate a single-item visual measure of perceived (social) identity leadership—the Visual Identity Leadership Scale (VILS). The VILS uses Venn diagrams in which circles indicate different degrees of convergence between the social identity of a given group and the leader of that group (Figure 1). Expanding upon research that uses pictorial scales to assess (a) overlap between a perceiver (self) and another individual (Aron et al., 1992; Gächter et al., 2015) and (b) overlap between perceiver (self) and a group (Bergami & Bagozzi, 2000; Schubert & Otten, 2002; Shamir & Kark, 2004; Swann Jr et al., 2009), the VILS is a pictorial scale that uses overlapping Venn diagrams to assess a respondent's perceptions of a would-be leader's (global) identity leadership in relation to a social identity.

Venn diagrams were originally developed as logical diagrams, but over the decades they have been used across sciences to communicate all sorts of relations between entities or concepts (Moktefi & Lemanski, 2022). To understand Venn diagrams, participants are presented with graphical relationships

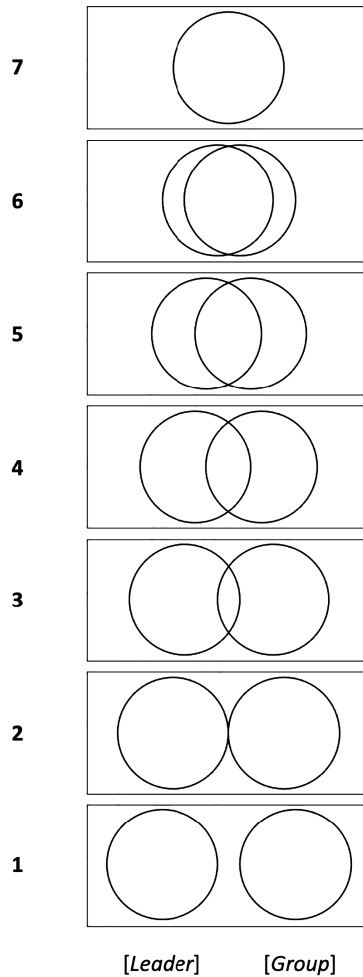


FIGURE 1 The visual identity leadership scale (VILS). *Note:* This measure assesses the identity leadership of a given leader in relation to the social identity of a given group (e.g. a team, an organization, a nation). If applicable, references to [leader] and [group] can be replaced by their proper names in both the figure and the instructions. Sample rubric: *Please select the set of overlapping circles that best represents the degree to which [the leader's] characteristics and actions align with [the group's] values and goals.*

in which there are varying degrees of overlap between entities and they need to understand what these represent psychologically (Hegarty & Just, 1993). This is not a straightforward process but requires basic information to be provided by administrators (e.g. researchers) to contextualize the measure and provide an indication of what the entities are and what their relationship means. This can be seen in the fact that visual representations that rely on Venn diagrams depicting the self and another person or object have been used to measure a range of psychological constructs including ingroup identification, self-other overlap, inclusion of other in self, identity fusion and implicit leadership theories. In the present research, we examine whether they can also be used as a valid measurement of a leader's identity leadership by assessing participants' perceptions of the degree to which the characteristics and behaviours of a leader align with a group's values and goals.

Relative to the standard multi-item tool for assessing identity leadership (the ILI or the ILI-SF), a key advantage of the VILS is that it addresses the limitations of multi-item measurement noted above. The VILS also creates new research opportunities as it can be used to address novel research questions in contexts where using a multi-item scale to assess identity leadership would be impractical (e.g. comparing

the identity leadership of many leaders or many groups, requiring multiple assessments of identity leadership in diary or experience sampling studies).

With these various points in mind, the present paper reports three studies subjected to a systematic process of construct validation (following common recommendations; Flake et al., 2017; MacKenzie et al., 2011; Schwab, 2005) designed to assess the degree to which VILS scores reflect the target construct of identity leadership. Specifically, we examine the measure's (a) *convergent validity*: examining whether the VILS is associated with (global) identity leadership as assessed through a multi-item scale (i.e. the ILI); (b) *discriminant validity*: examining whether the VILS is unrelated or weakly related to constructs which, theoretically, it should be unrelated or weakly related to (workload and group members' personal self-esteem in Study 1, and general life satisfaction in Study 2); and whether it is less strongly associated with perceptions of other leadership constructs (leader-member exchange, identification with the leader and trust in the leader than with identity leadership in Study 3) and (c) *predictive validity*: examining whether the VILS is related to constructs that conceptually it should be associated with (group members' collective self-esteem and collective self-efficacy in Study 1, leader endorsement in Study 2 and a set of variables that identity leadership has been found to be related to previously—team identification, psychological safety, innovative work behaviour, job satisfaction, organizational citizenship behaviour, burnout—in Study 3). Following presentation of the results from each study, we report the results of an integrated systematic examination of the VILS' reliability and validity following procedures for evaluating single-item scales outlined by Matthews et al. (2022). Data, code and study materials are available on the open science framework project page: https://osf.io/axvfz/?view_only=3c5814f7c4db47b391433761843d4e62.¹

STUDY 1

Method

Participants

Participants were 434 employees working in two organizations in India: a retail bank and an IT company. Their average age was 32.11 years ($SD=5.98$), and of these 250 were male (140 female; 44 indicated other or preferred not to say). They had worked for the organization for an average of 5.4 years ($SD=4.6$), and with their current leader for an average of 2.3 years ($SD=2.0$).

Measures

Identity leadership (VILS)

We used the VILS to assess participants' perceptions of their supervisor's identity leadership within their workgroup. Instructions were adapted from Shamir and Kark (2004) to assess the perceived convergence between the leader and the workgroup (all materials available on OSF). The item was measured on a 7-point scale (see Figure 1).

Identity leadership (ILI)

We also used the 15 items of the ILI to measure identity leadership (Steffens et al., 2014; e.g. 'This leader embodies what [the group] stands for'). Each of the four dimensions and the global measure were highly reliable ($.93 < \alpha < .98$). Participants responded to all scales on 7-point scales ranging from 1 (*not at all*) to 7 (*completely*)—as they did on all other measures unless stated otherwise.

¹Studies 1 and 2 included additional measures reserved for a different research project that were therefore not reported in the present paper. The OSF materials include all measures (including the ones not reported in the present manuscript).

Personal self-esteem

We used the single-item measure ('I have high self-esteem') developed by Robins et al. (2001) to assess participants' personal self-esteem.

Quantitative workload

This comprised the five items developed by Spector and Jex (1998; $\alpha = .84$; e.g. 'How often does your job require you to work very hard?') indicated on 5-point scales ranging from 1 (*less than once per month or never*) to 5 (*several times per day*).

Collective self-esteem

This was measured with the three-item scale developed by Bollen and Hoyle (1990; $\alpha = .91$; e.g. 'I am enthusiastic about my team').

Collective self-efficacy

This was measured using the scale developed by Guzzo et al. (1993; $\alpha = .91$; comprising seven of the eight items as one item was missing due to a technical error; sample item: 'This team feels it can solve any problem it encounters').

Results

Intercorrelations between all variables are displayed in [Table 1](#).

Convergent validity

As expected, and providing evidence of the instrument's convergent validity, the VILS was strongly associated with the multi-item measure of identity leadership, the global ILI ($r = .66$) and its subdimensions ($.57 < r_s < .65$).

Discriminant validity

Supporting VILS' discriminant validity, as expected, the measure was weakly associated with personal self-esteem ($r = .16$) and quantitative workload ($r = -.05$).

Criterion validity

As expected, and speaking to the instrument's criterion validity, the VILS was associated with collective self-esteem ($r = .38$) and collective self-efficacy ($r = .37$).

Discussion

Study 1 provided evidence of the VILS' multiple forms of validity. Specifically, it demonstrated the instrument's capacity (a) to converge with the construct it seeks to assess—namely, (global) identity leadership (as indicated by strong associations with a multi-item measure of identity leadership), (b) to discriminate what it assesses from other constructs that conceptually it should be no more than weakly associated with

TABLE 1 Means, standard deviations and correlations between variables (Studies 1 and 2).

Variable	M	SD	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Study 1												
1. VILS	5.15	1.37	—									
2. ILI	5.08	1.45	.66	—								
3. ILI-Entrepreneurship	5.14	1.44	.65	.95	—							
4. ILI-Prototypicality	5.23	1.52	.63	.96	.91	—						
5. ILI-Advancement	5.13	1.54	.64	.96	.87	.90	—					
6. ILI-Impresarioship	4.79	1.61	.57	.91	.82	.82	.85	—				
7. Personal Self-Esteem	5.47	1.31	.16	.18	.18	.21	.16	.14	—			
8. Quantitative Workload	3.17	0.97	-.05	.04	.04	.04	.04	.05	.00	—		
9. Collective Self-Esteem	5.56	1.42	.38	.58	.59	.55	.53	.55	.31	.04	—	
10. Collective Self-Efficacy	5.71	1.11	.37	.59	.58	.54	.56	.54	.29	.07	.79	—
Study 2												
1. VILS-descriptive	3.57	1.41	—									
2. VILS-ideal	3.21	2.26	.45	—								
3. ILI	2.96	1.80	.54	.73	—							
4. ILI-Entrepreneurship	3.10	1.72	.52	.67	.95	—						
5. ILI-Prototypicality	2.77	1.85	.54	.71	.97	.90	—					
6. ILI-Advancement	3.12	2.03	.53	.71	.97	.88	.92	—				
7. ILI-Impresarioship	2.83	1.87	.49	.71	.95	.88	.89	.91	—			
8. Leader Endorsement	3.02	2.30	.50	.71	.91	.81	.89	.90	.90	—		
9. Life Satisfaction	3.99	1.43	-.06	-.04	-.01	-.01	.00	-.02	-.02	-.01	—	

Note: Study 1: N = 384-414. $r > |.10|$ are statistically significant at $p < .05$, $r > |.13|$ at $p < .01$ and $r > |.16|$ at $p < .001$ (two-sided); Study 2: N = 431. $r > |.09|$ are statistically significant at $p < .05$, $r > |.12|$ at $p < .01$ and $r > |.15|$ at $p < .001$ (two-sided).
 Abbreviations: ILI, identity leadership inventory; VILS, visual identity leadership scale.

(i.e. personal self-esteem and workload) and (c) to reveal links to relevant criteria that identity leadership should conceptually be associated with (i.e. collective self-esteem and collective self-efficacy).

Yet despite this evidence of validity, questions of generalizability are raised by the fact that data were obtained in only one context and in only one country. Accordingly, we sought to address these limitations in a second study.

STUDY 2

In Study 2 we administered the VILS in the context of a leadership contest (the US Presidential Elections 2016), assessing the identity leadership of two competing candidates (Donald Trump and Hillary Clinton) who were vying to become the nation's next President. Here we tested the VILS' (a) convergent, (b) discriminant and (c) criterion validity—examining whether the candidates' visually assessed identity leadership (a) converged with assessments made using a multi-item scale. Furthermore, we examined whether using the VILS to assess the identity leadership of a national leader had (b) discriminant validity from a measure of life satisfaction which conceptually should be different from a measure of identity leadership. Previous research found small positive associations between shared social identification with a national leader and life satisfaction (Greenaway et al., 2015) and so we anticipated that national leaders' identity leadership should only be weakly associated with life satisfaction. Finally, we examined whether the VILS (c) relates to relevant criteria (i.e. people's endorsement of the candidates' leadership).

In addition, we explored the VILS' versatility as a tool to address novel research questions. More specifically, in light of claims that groups are often as much about *becoming* as they are about being (Reicher & Hopkins, 2003), we examined the degree of convergence in respondents' perceptions of the leader and the group's descriptive (actual) and injunctive (ideal) identity (i.e. the degree to which the leader is seen to embody a sense of 'who we are at present' and 'who we want to be in the future'). Previous work suggests that leaders' embodiment of the ideal, rather than descriptive, group identity would be more strongly associated with leadership outcomes (Steffens et al., 2021). However, these ideas are supported by only limited evidence from secondary meta-analytic coding and only one set of primary studies using other operationalizations and measures (see van Knippenberg et al., 2024). Here, then, we expected that candidates' convergence with both notions of collective self would be associated with multi-item measures of identity leadership and leader endorsement, but that these associations would be stronger for candidates' convergence with the ideal (vs. the descriptive) collective self.

Method

Participants and design

Participants were US residents recruited through Prolific. The study employed a quasi-experimental design in which participants were randomly assigned to assess either Donald Trump's or Hillary Clinton's leadership. Of the 455 who started the survey, 431 completed it. Participants had an average age of 33.4 years ($SD=12.1$), and 217 (50.3%) were female.

Measures

Identity leadership (VILS)

As in Study 1, we used the VILS to assess each candidate's identity leadership. In addition to using the VILS to assess the extent to which the candidate was seen to converge with an explicit descriptive

notion of collective self ('who we (Americans) are at present'; VILS-descriptive), we used another modified version of the scale to assess the degree to which each candidate converged with an aspirational, ideal notion of collective self ('who we (Americans) want to be in the future'; VILS-ideal).²

Identity leadership (ILI)

As in the previous study, participants also assessed the candidate's identity leadership using the 15 items of the ILI (Steffens et al., 2014; $.93 < \alpha < .99$). Responses to this and all other scales were made on 7-point scales ranging from 1 (*not at all*) to 7 (*completely*).

Leader endorsement

This was measured with the five-item scale developed by Ullrich et al. (2009; $\alpha = .98$; e.g. 'This person is the right person to lead the US').

Life satisfaction

Participants' life satisfaction was measured using Diener and colleagues' five-item Life Satisfaction Scale (1985; $\alpha = .93$; e.g. 'I am satisfied with my life').

Results

Intercorrelations between all measures are displayed in Table 1.

Convergent validity

The leader's embodiment of the descriptive and embodiment of the ideal group self was distinct but positively correlated ($r = .45$). They were positively associated with the multi-item measure of identity leadership, but consistent with previous research (Steffens et al., 2021), the ideal VILS ($r = .73$) had a somewhat stronger association with the ILI than the descriptive VILS did ($r = .54$). These results provide evidence of the VILS' convergent validity.

Discriminant validity

Supporting the instrument's discriminant validity, the candidate's identity leadership as assessed by the VILS-descriptive (and the VILS-ideal) was weakly associated with constructs that it conceptually should correlate weakly with—participants' general life satisfaction ($-.04 < r < -.06$).

Criterion validity

As expected, both the VILS-descriptive and the VILS-ideal were positively associated with leader endorsement. However, the link between the VILS-ideal ($r = .71$) and leader endorsement was stronger than the corresponding link for the VILS-descriptive ($r = .50$; Steiger's Z -test; $t = 5.77$, $p_{\text{one-sided}} < .001$).

²The study also included two other items for each descriptive and ideal notion of collective self with the aim of stratifying these by time (past, present and future), but the international consistencies were low and some constellations are unclear and conceptually difficult to make sense of (e.g. the item 'who we wanted to be in the present' as a measure of present-ideal) because the ideal notion of self is by definition aspirational, future-oriented.

Discussion

The results of this second study provided further evidence of the validity of the VILS, while also showcasing the possibility of repurposing the measure to address new research questions—in this case, assessing the leader's convergence with descriptive and ideal notions of 'us'. Results indicate that responses on the VILS assessing perceptions of US Presidential candidates' identity leadership are (a) associated with a multi-item measure of identity leadership, (b) largely uncorrelated with measures that it is conceptually unrelated to (general life satisfaction) and (c) strongly associated with a relevant predictive criterion—namely, the degree to which participants endorsed a candidate as the next President (which the VILS-ideal was particularly strongly associated with).

Yet while Study 2 provides additional evidence for the utility of the VILS, the insights from this study are also somewhat limited. In particular, Studies 1 and 2 provide little indication of (a) the VILS' test–retest reliability, (b) the association between the VILS and a broader range of commonly examined organizational attitudes and behaviours, (c) the degree to which the VILS correlates with perceived identity leadership vis-à-vis other leadership perceptions, or (d) the extent to which the VILS shows evidence of measurement invariance. To address these questions, we conducted a third study.

STUDY 3

In Study 3, we examined the VILS in yet another country (Germany) among a sample of employees reflecting on the leadership of their workplace supervisor. Here we also sought to follow up with participants over 6 weeks to estimate the VILS' test–retest reliability. As in previous studies, we assessed (a) convergent validity by examining how the VILS converges with a multi-item measure of identity leadership, (b) discriminant validity by examining whether the VILS is associated more strongly with a measure of identity leadership than with alternative constructs that revolve around respondents' perceptions of leadership and of their relationship with a leader (leader–member exchange, identification with the leader and trust in the leader) and (c) criterion validity by examining whether the VILS is associated with relevant criteria that identity leadership has been theorized to relate to—namely, team identification (Krug et al., 2021), psychological safety (Fransen et al., 2020), innovative work behaviour (Bracht et al., 2023), job satisfaction, organizational citizenship behaviour and burnout (for more detailed discussions, see van Dick et al., 2018). To be able to examine the VILS' test–retest reliability, after 6 weeks, we invited participants to complete a shorter second survey that included all scales except measures of alternative leadership constructs. For the scale validation, we report the analysis of the Time 1 survey responses and the VILS' test–retest reliability over 6 weeks.

Method

Participants and design

Participants were residents in Germany recruited via social media and invited to complete an online study about workplace experiences. To be eligible, they had to be employed and have a direct supervisor at work. Upon completion of the survey, participants were informed that the study aimed to survey people over time and they were asked to indicate if they would be willing to be contacted for a second survey after 6 weeks. Two-hundred-and-fourteen people took part in the survey, of whom 72 were 18–25 years of age, 90 were 25–35 years, 23 were 35–45 years, 18 were 45–55 years, 11 were 55 years or older (151 participants were female, 60 male, and 3 indicated 'other'). At Time 1, we randomized the order of the presentation of the VILS and the ILI so that about half of the participants ($n = 113$) responded first

to the VILS followed by the leader-member exchange (LMX) and ILI scales while the remaining half ($n = 101$) responded first to the ILI followed by the LMX scale and the VILS. One hundred participants completed a second survey 6 weeks later.

Measures

Identity leadership (VILS)

As in previous studies, we used the VILS to measure the degree to which participants perceived their leader to display identity leadership using the same instructions and 7-point scale as used in Study 1.

Leader-member-exchange

Participants responded to the 7-item leader-member-exchange (LMX-7) measure developed by Graen and Uhl-Bien (1995; $\alpha = .89$; e.g. 'How would you characterize your working relationship with your leader?'). Participants responded on 1–7 scales matching the respective question (e.g. 1 (*extremely ineffective*) to 7 (*extremely effective*)).

Identity leadership (ILI)

As in previous studies, participants also indicated their perceptions of their leader's identity leadership using the ILI (Steffens et al., 2014; van Dick et al., 2018; $.87 < \alpha < .97$), on 7-point answer scales ranging from 1 (*not at all*) to 7 (*completely*).

Identification with the leader

Participants also responded to a four-item measure of personal identification with a leader on an adapted version of the group identification scale from Doosje et al. (1995) where the referent 'my group' was replaced by 'my leader' (e.g. 'I identify with my supervisor'). Responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

Trust in the Leader

This was measured with a six-item measure developed by Podsakoff et al. (1990; $\alpha = .91$; e.g. 'I have complete faith in the integrity of my leader') on scales ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Team identification

This was measured with the four-item scale from Doosje et al. (1995; $\alpha = .93$; e.g. 'I identify with my team'), with responses ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Psychological safety

Participants responded to a seven-item measure assessing psychological safety (Edmondson, 1999; Fischer & Hüttermann, 2020; $\alpha = .87$; e.g. 'It is safe to take a risk on this team'). Response scales ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

Innovative behaviour at work

This was measured with the nine-item scale developed by Janssen (2000; $\alpha = .92$; e.g. 'How often do you search out new working methods, techniques or instruments?'). This was measured on a 7-point scale ranging from 1 (*never*) to 7 (*always*).

Job satisfaction

Participants responded to six items of Hackman and Oldham's (1980) Job Diagnostic Survey ($\alpha = .78$; e.g. 'Generally speaking, I am very satisfied with this job') using a 7-point scale ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Organizational citizenship behaviour

This was measured with the five-item scale developed by van Dick et al. (2006; $\alpha = .69$: e.g. 'I help colleagues who have heavy workloads') with responses ranging from 1 (*completely disagree*) to 7 (*completely agree*).

Burnout

Participants responded to the nine-item measure developed by Maslach and Jackson (1981; $\alpha = .69$: e.g. 'I feel used up at the end of the workday') on scales ranging from 1 (*never*) to 7 (*every day*).

Results

Intercorrelations between all measures are displayed in Table 2. Results indicated that the mean response for the VILS did not differ between participants who responded to this measure first ($M = 4.56$; $SD = 1.36$) and those who responded first to the ILI, $M = 4.53$; $SD = 1.35$; $t(212) = 0.12$, $p = .901$. Neither did the mean response to the ILI differ between those who responded first to the VILS ($M = 4.53$; $SD = 1.58$) and those who responded first to the ILI, $M = 4.66$; $SD = 1.34$; $t(212) = 0.65$, $p = .513$. The correlations between the VILS and the ILI were also similar across participants who responded first to the VILS and those who responded first to the ILI ($r = .72$ and $r = .74$).

Re-test reliability

Results indicated that the VILS had good test–retest reliability (.56) across 6 weeks. This is comparable to the test–retest reliability of the single-item social identification (SISI) measure by Postmes et al. (2013; Study 3) that was found to have a test–retest reliability of .57 and .53 over 2-week and 3-week intervals.

Convergent validity

As in the previous studies, identity leadership assessed by the VILS was positively associated with the multi-item measure of identity leadership ($r = .72$).

Discriminant validity

As one might expect, the VILS was positively associated with all leadership perceptions. As expected, and consistent with the aims of the VILS, identity leadership assessed by the VILS was more strongly associated with a multi-item scale of identity leadership ($r = .72$) than with measures of alternative leadership perceptions including leader–member–exchange ($r = .66$), identification with the leader ($r = .64$) and trust in the leader ($r = .64$), providing some indication of the VILS' discriminant validity. Steiger's Z-test for correlated correlations indicated that the correlation of the VILS with the ILI was significantly stronger than the correlation between the VILS and other leadership constructs (identification with the leader: $t = 2.55$, $p_{\text{one-sided}} = .006$; LMX: $t = 1.93$, $p_{\text{one-sided}} = .027$; trust in leader: $t = 2.67$, $p_{\text{one-sided}} = .004$).

Criterion validity

As anticipated, the leader's perceived identity leadership assessed by the VILS was positively associated with employees' team identification ($r = .33$), their experienced psychological safety

TABLE 2 Study 3 (Time 1): Means, standard deviations and correlations between variables.

Variable	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. VILS	4.55	1.35	–													
2. ILI	4.59	1.47	.72	–												
3. ILI-Entrepreneurship	4.66	1.64	.66	.94	–											
4. ILI-Prototypicality	4.50	1.67	.72	.93	.82	–										
5. ILI-Advancement	4.99	1.49	.70	.92	.84	.83	–									
6. ILI-Impresarioship	4.07	1.67	.51	.83	.72	.70	.67	–								
7. LMX	4.85	1.18	.66	.78	.74	.71	.79	.56	–							
8. Identification with Leader	4.37	1.72	.64	.78	.72	.79	.72	.59	.76	–						
9. Trust in Leader	5.29	1.40	.64	.80	.72	.77	.81	.60	.78	.77	–					
10. Team Identification	5.36	1.40	.33	.47	.50	.42	.42	.34	.46	.52	.42	–				
11. Psychological Safety	5.25	1.14	.38	.50	.52	.44	.47	.38	.49	.49	.50	.69	–			
12. Innovative Behaviour	4.62	1.13	.19	.26	.26	.28	.20	.18	.27	.28	.23	.31	.21	–		
13. OCB	5.94	0.78	.09	.17	.18	.19	.17	.05	.22	.16	.27	.31	.24	.30	–	
14. Job Satisfaction	5.25	1.10	.41	.55	.54	.50	.57	.39	.61	.60	.62	.63	.55	.29	.32	–
15. Burnout	2.92	1.37	–.31	–.35	–.32	–.30	–.41	–.25	–.33	–.30	–.45	–.24	–.30	–.05	–.13	–.58

Note: $N = 214$; $r > |.13|$ are statistically significant at $p < .05$, $r > |.19|$ at $p < .01$ and $r > |.22|$ at $p < .001$ (two-sided).

Abbreviations: ILI, identity leadership inventory; LMX, leader–member–exchange; OCB, organizational citizenship behaviour; VILS, visual identity leadership scale.

($r = .38$), their innovative work behaviour ($r = .19$) and job satisfaction ($r = .41$). At the same time, it was unrelated to employees' organizational citizenship behaviour ($r = .09$), but negatively associated with their burnout ($r = -.31$).

Additional results

Measurement invariance

Given that we examined the VILS in three different countries (India, United States and Germany), we also sought to assess the VILS' measurement invariance. To do this, we inspected the invariance of a model that included the VILS and the 15 ILI items across all available data (Study 1, Study 2, Study 3 Time 1 and Time 2) using the alignment optimization method (Asparouhov & Muthén, 2014; Muthén & Asparouhov, 2018). Results indicated that the R^2 of the factor loadings (0.990) and intercept (0.998) were high, suggesting a high level of invariance of the model across the datasets. The examination of each combination of item/dataset (i.e. 60 combinations) showed all combinations had invariant factor loadings, suggesting metric invariance for the items across the different datasets (Study 1, Study 2, Study 3 time 1 and 2). However, there were 23 combinations (35.9%) of item/dataset combinations that had non-invariant intercepts. These results showed that most invariant combinations were due to ILI items (items 2, 12, 13 and 14), not the VILS. The VILS had a non-invariant intercept in two of the four datasets (which is not surprising given that differences in mean levels of identity leadership assessed by VILS may vary across the different targets examined here, which included national and workgroup leaders). Averaging the proportion of non-invariant factor loadings and intercepts indicated a total invariance of 18.0%, which is below the upper threshold of 25%. This suggests that there was trustworthy alignment indicative of partial scalar measurement invariance (Muthén & Asparouhov, 2018).

Discussion

Findings from this third study provided further support for the VILS' convergent validity, as indicated by strong associations with a multi-item measure of identity leadership in another country (Germany). Results also showed that the VILS was strongly associated with various other leadership perceptions. This is not surprising in light of the limits of questionnaire-type measures of leadership where measures of different leadership constructs are subject to the same biases that may conflate associations between measures (Fischer et al., 2023). However, supporting the VILS' discriminant validity, the positive association between the VILS and the multi-item measure of perceived identity leadership was stronger than its positive association with alternative leadership constructs (i.e. leader–member–exchange, identification with the leader, and trust in the leader). Furthermore, the results provide evidence of VILS' criterion validity in indicating that the more employees perceived their leader to show identity leadership, as assessed by the VILS, the more strongly they identified with their team, the greater their experience of psychological safety, the more they reported engaging in innovative behaviour, and the more satisfied they were with their job. Against expectations, identity leadership assessed by the VILS was unrelated to organizational citizenship behaviour, although, as expected, it was negatively associated with the degree to which employees felt burnt out.

EXAMINATION OF OVERALL VALIDITY OF VILS AS SINGLE-ITEM MEASURE (STUDIES 1–3)

In what follows, we provide a systematic evaluation of the VILS' reliability and validity as a single-item measure following the procedure recommended by Matthews et al. (2022). Results are presented in detail in Table 3 and summarized below. Across the three studies, analyses indicate that the VILS

TABLE 3 Reliability and validity evaluation of the VILS as per single-item validation procedure outlined by Matthews et al. (2022).

Form of reliability/ validity	Analysis	Results	Interpretation
a. Content validity/ Definitional correspondence (as per Matthews et al.'s Study 1)	<p>1. Assessment of representativeness of definition To assess the VILS' representativeness of the underlying construct, we compared the correlations between VILS and identity leadership (as assessed by the ILI) and between VILS and identity leadership dimension prototypicality (most examined and earliest dimension of identity leadership) and VILS and other identity leadership dimensions (entrepreneurship, advancement and impressarioship). Note: we did not include explicit measures to assess representativeness (as included by Matthews et al.)</p> <p>2. Assessment of readability/comprehensibility Examination of complete vs. missing responses to VILS (we did not include a measure assessing participants' reason for not responding)</p> <p>3. Pearson r between VILS at Time 1 and VILS at Time 2</p> <p>4. Intra-class correlation coefficient (ICC) (ideally at least .40 indicating acceptable, fair reliability or higher; Cicchetti, 1994)</p> <p>5. Overall model fit of confirmatory factor analysis of a model in which VILS and 15 ILI items load on same latent factor (demonstrating ideally acceptable fit based on Hu & Bentler, 1999)</p>	<p>S1: VILS-ILI: $r = .66$; VILS-prototypicality: $r = .63$; VILS-other ILI dimensions: $r_s = .57-.65$ S2: VILS-ILI: $r = .54$; VILS-prototypicality: $r = .54$; VILS-other ILI dimensions: $r_s = .49-.53$ S3 (time 1): VILS-ILI: $r = .72$; VILS-prototypicality: $r = .72$; VILS-other ILI dimensions: $r_s = .51-.70$</p>	<p>VILS is representative of the underlying construct: VILS corresponds at least as strongly if not stronger with (global) identity leadership than with identity prototypicality or other dimensions of identity leadership</p>
b. Usability (as per Matthews et al.'s Study 2)	<p>3. Pearson r between VILS at Time 1 and VILS at Time 2</p>	<p>S1: Complete responses to VILS = 97% S2: Complete responses to VILS = 100% S3 (time 1): Complete responses to VILS = 100%</p>	<p>The vast majority of participants can respond to VILS, suggesting the VILS is usable</p>
c. Test-retest reliability (as per Matthews et al.'s Study 3)	<p>3. Pearson r between VILS at Time 1 and VILS at Time 2</p>	<p>$r = .56$ S3: ICC = .57</p>	<p>Good test-retest reliability Acceptable, fair reliability</p>
d. Construct validity (as per Matthews et al.'s Study 4)	<p>5. Overall model fit of confirmatory factor analysis of a model in which VILS and 15 ILI items load on same latent factor (demonstrating ideally acceptable fit based on Hu & Bentler, 1999)</p>	<p>S1: $\chi^2(df) = 760.03$ (104); CFI = .91; SRMR = .04 (comparative fit of model without VILS: $\chi^2(df) = 751.54$ (90); CFI = .91; SRMR = .04) S2: $\chi^2(df) = 990.67$ (104); CFI = .92; SRMR = .03 (comparative fit of model without VILS: $\chi^2(df) = 973.29$ (90); CFI = .92; SRMR = .03) S3 (time 1): $\chi^2(df) = 704.88$ (104); CFI = .84; SRMR = .06 (comparative fit of model without VILS: $\chi^2(df) = 656.43$ (90); CFI = .84; SRMR = .06)</p>	<p>Acceptable model fit in Study 1 and Study 2, but poor fit in Study 3. However, results are similar to those when VILS is removed, showing acceptable fit in Study 1 and 2, but poor fit in Study 3 (at least in part likely because as indicated by prior research the ILI tends to have a better fit when modelled as a second-order, correlated four-factor model). These suggest overall marginal construct validity, but the inclusion of VILS does not reduce validity</p>

TABLE 3 (Continued)

Form of reliability/ validity	Analysis	Results	Interpretation
e. Criterion validity (as per Matthews et al.'s Study 4)	<p>6. Factor loading of single-item VILS on latent factor in the model in which VILS and 15 ILI items load on the same latent factor (ideally above .45 indicating at least fair construct validity; Comrey & Lee, 1992)</p> <p>7. Multi-trait multi-method (MIMMT) analysis of differences between (i) the relationship between VILS and criterion/outcome measure and (ii) the relationship between ILI and criterion/outcome measure (Raykov, 2011)</p>	<p>S1: Single-item loading = .66 S2: Single-item loading = .54 S3 (time 1): Single-item loading = .74</p> <p>S1: (a) Self-esteem: VILS = .38; ILI = .58; $\Delta = -.20$, 95% CI = $-.27, -.13$ (b) Collective self-efficacy: VILS = .37; ILI = .59; $\Delta = -.22$, 95% CI = $-.29, -.15$ S2: (a) Leader endorsement: VILS = .50; ILI = .91; $\Delta = -.41$, 95% CI = $-.48, -.35$ S3 (time 1): (a) team identification: VILS = .33; ILI = .47; $\Delta = -.14$ 95% CI = $-.23, -.05$ (b) psychological safety: VILS = .38; ILI = .50; $\Delta = -.12$, 95% CI = $-.21, -.04$ (c) innovative work behaviour: VILS = .19; ILI = .26; $\Delta = -.07$, 95% CI = $-.26, .03$ (d) burnout: VILS = $-.31$; ILI = $-.35$; $\Delta = -.04$, 95% CI = $-.05, .14$ (e) OCB: VILS = .09; ILI = .17; $\Delta = -.08$, 95% CI = $-.18, .02$ (f) job satisfaction: VILS = .41; ILI = .55; $\Delta = -.14$, 95% CI = $-.22, -.05$</p>	<p>Greater than minimum construct validity, ranging from very good (S1), fair (S2) to excellent (S3) construct validity</p> <p>No meaningful difference in criterion validity estimates between VILS and multi-item measure in 33.3% (3/9) criteria, while criterion validity estimate for the multi-item measure was higher than that for the VILS in 66.7% (6/9) of outcomes, with a mean difference in criterion validity estimates of .16 across all outcomes. These analyses suggest that depending on the criterion the VILS has slightly lower (in some cases comparable) criterion validity than the multi-item measure</p>
f. Consistency reliability (as per Matthews et al.'s Study 4; supplementary analyses)	<p>8. Communality of VILS (squared loading on latent factor) in the model in which VILS and 15 ILI items load on the same latent factor</p>	<p>S1: VILS communality = .44 S2: VILS communality = .30 S3 (time 1): VILS communality = .55</p>	<p>The VILS has a mean communality of .43 which is slightly higher than mean communality of .41 of all single-item measures examined by Matthews et al. (2022), suggesting VILS has comparable consistency reliability</p>

(Continues)

TABLE 3 (Continued)

Form of reliability/ validity	Analysis	Results	Interpretation
g. Overall Construct Validity (as per Matthews et al.; p. 664 and supplementary materials)	9. Triangulated overall construct validity across multiple estimates of usability (content validity was assessed using a different analysis and so this was not included in the overall score), ICC test–retest reliability, construct validity and criterion validity using the combined rating score provided by Matthews	<p>Mean ratings across studies:</p> <p>a. Mean usability = 99% responded to VILS: 3 points</p> <p>b. Mean ICC test–retest reliability = .57: 2 points</p> <p>c. Mean construct validity (factor loadings) = .65: 3 points</p> <p>d. Mean criterion validity = VILS replicated convergent validity of III, albeit weaker: 4 points</p> <p>Overall construct validity = 3 points, indicating very good construct validity</p>	Overall, the VILS has very good construct validity

corresponds at least as strongly if not more strongly with the global measure of identity leadership than with any sub-dimensions, suggesting (a) that the VILS is representative of the target construct of perceived global identity leadership. The vast majority of participants were also able to respond to the VILS (there was no indication of a large amount of missing data), thereby indicating (b) that the measure has a high degree of usability.

The results across the studies also provided insight into various forms of reliability and validity of the VILS. In particular, results from Study 3 indicated (c) that the VILS has good test–retest reliability (.56 across 6 weeks) and acceptable reliability as indicated by the intra-class correlation coefficient (.57). Further, results across the studies indicated (d) that, overall, the VILS has acceptable construct validity, with confirmatory factor analyses for most studies showing acceptable overall model fit and factor loadings for a model in which the ILI items and VILS load onto the same underlying factor.

Further, results across the studies reveal (e) that the VILS has good criterion validity as indicated by evidence that the measure was associated with most criteria across all three studies. For one-third of all outcomes, there was no meaningful difference in criterion validity estimates between the VILS and the multi-item ILI. However, for the remaining two-thirds of outcomes, the multi-item ILI showed stronger criterion validity estimates than the VILS, with a mean correlation difference of .16, suggesting some degree of trade-off in criterion validity for these outcomes between the single-item (VILS) and multi-item (ILI) measure.

The results also indicate (f) that the VILS has consistency reliability as indicated by a communality of the VILS (in a model that includes the ILI and the VILS) that is higher than the mean of communalities of other single-item measures in the applied organizational sciences as reviewed by Matthews et al. (2022). Finally, triangulation of the various estimates above indicates that, overall, the VILS has very good construct validity, comparable to the majority (61%), lower than 21% and higher than 18% of the 91 single-item measures reviewed by Matthews et al. (2022).

GENERAL DISCUSSION

Multi-item scales are instruments of choice for assessing a range of psychological constructs that are rooted in people's perceptions and experiences. Yet while clearly useful, they also have limitations associated with being lengthy and containing semantically similar items that can make surveys tedious to complete. This is particularly problematic when the question-and-answer format of a survey becomes repetitive in ways that can lead to participant fatigue and disengagement (Drolet & Morrison, 2001). To tackle these issues and develop instruments that can be used in a broader range of research contexts (e.g. diary studies), researchers have proposed single-item scales as viable alternatives (Allen et al., 2022; Fuchs & Diamantopoulos, 2009). Indeed, a recent review and analysis by Matthews et al. (2022) showed that the vast majority of single-item measures in the applied organizational sciences have very good construct validity.

In the present research, we sought to address the shortcomings of multi-item measures of (social) identity leadership and expand researchers' and practitioners' toolbox by introducing a single-item measure of identity leadership—the VILS. Results across three studies show that the VILS has convergent, discriminant and criterion validity, and can be adapted to assess variations in perceived global identity leadership. Furthermore, results from a series of analyses, following the steps recommended by Matthews et al. (2022) to evaluate single-item measures, indicate that the VILS is a reliable and valid single-item measure of perceived identity leadership. Indeed, its very good overall construct validity is comparable to that of other single-item measures used in the organizational sciences.

In this regard, it is noteworthy that the VILS shows strong convergence with identity leadership as measured by the full 15 item set of the identity leadership inventory (Steffens et al., 2014). Across the three studies, these correlations are substantial and similar to the correlations of other single-item measures with their multi-item measures. For instance, a large-scale validation study by Reysen et al. (2013)

of the single item measure of social identification (SISI; Postmes et al., 2013) shows that the SISI correlates between $r = .41$ and $r = .84$ with a range of global measures of social identification (with a mean of $r = .69$ and median of $r = .71$). The correlations of the VILS with global measures of identity leadership across our studies (Study 1: $r = .66$; Study 2: $r = .54$ and $r = .74$ and Study 3: $r = .72$) sit comfortably within these ranges. At the same time, the correlation with the underlying construct assessed via a multi-item measure is only one of many analytic indicators suggested by Matthews et al.'s (2022) procedure for evaluating the construct validity of single-item measures. Here, the procedure and evidence suggested by Matthews et al. (2022) indicated that the VILS compares favourably—in terms of this specific indicator but also against a host of other indicators of construct validity—to a wide range of valid single-item measures in the social sciences.

That said, we would stress that we do not regard the VILS as a replacement for multi-item scales of identity leadership. Instead, we see it as having some uniquely advantageous features that should generate new research possibilities. In particular, the scale can be useful in answering research questions using elaborate designs such as those that require (a) a high response rate across a target population that could be jeopardized by the use of multi-item measures (e.g. in large-scale studies that need to be short to guarantee representative samples or in surveys that involve participants from hard-to-reach populations where drop-out is costly), (b) assessing a given person's leadership of many different groups, (c) comparing the identity leadership of many different people in relation to one or more groups or (d) multiple assessments of a person's identity leadership over a short period of time (e.g. in diary or experience sampling studies). Furthermore, as it is a visual scale that uses a series of graphics, these graphics can also be used (e) with the aim of reducing common method variance by using the (graphical) VILS and examining its relationship with common Likert-type measures and (f) to evaluate leadership training interventions such as the 5R program (Haslam et al., 2017, 2023) where the VILS can be used to measure the effects of the training and its specific components multiple times (e.g. before the program starts, after particular training sessions and then again sometime after program completion). More generally, it is also the case (g) that the measure can be easily adapted or visually enriched to suit particular purposes or contexts (e.g. by superimposing logos or symbols to represent a specific group).

Limitations and future research

The present research is not without limitations. First, as the VILS is a single-item measure, it is necessarily unable to capture different dimensions of identity leadership. Researchers interested in uncovering specific dimensions should therefore revert to other assessment tools (i.e. the longer multi-item ILI). Relatedly, for research that focuses on global identity leadership where measurement accuracy is more important than survey brevity, researchers might want to use multi-item measures of identity leadership (e.g. the full ILI or the shorter four-item measure) instead of the present single-item measure.

Second, it is also worth noting that, as with the multi-item ILI and ILI-SF, the VILS assesses people's *perceptions* of a leader's identity leadership and not actual or objective identity leadership behaviours. In light of the limits of questionnaire-type measures of leadership (Fischer et al., 2023), it would therefore be worthwhile using other complementary (e.g. observational, ethnographic) methods to explore how the VILS is associated with other (e.g. rhetoric, behaviours, artefacts) indicators of identity leadership and associated outcomes, as well as the degree to which identity content may account for differences in manifestations of identity leadership across groups.

We also note that the findings in Study 2 regarding descriptive and ideal notions of the group are preliminary, and there are likely other more suitable and comprehensive methods and operationalizations of these ideas that future research should use. It would also be worthwhile examining how meta-beliefs around a group prototype (e.g. subjective clarity, certainty, perceived consensus) impact on participants' responses. Relatedly, across the studies, we used instructions that were similar to those used by Shamir and Kark (2004), but we recognize these are complicated and lengthy and so we suggest simplified, shorter instructions (as per the sample instructions in Figure 1).

CONCLUSION

To overcome the shortcomings of multi-item measures of identity leadership and expand the arsenal of suitable measurement tools available to researchers, in the present research, we introduced and examined the merits of using a pictorial single-item instrument to assess perceived (global) identity leadership—the VILS. Results indicate that this measure not only provides a reliable and valid visual means of assessing identity leadership but can also be used in different contexts to address novel questions of theoretical and practical substance. In assessing identity leadership, as in life, a picture can be worth a thousand words (or at least 161).

AUTHOR CONTRIBUTIONS

Niklas K. Steffens: Conceptualization; investigation; methodology; writing – review and editing; writing – original draft; formal analysis. **Srinivasan Tatachari:** Conceptualization; investigation; methodology; writing – review and editing. **S. Alexander Haslam:** Conceptualization; investigation; methodology; writing – review and editing. **Jérémy E. Wilson-Lemoine:** Investigation; methodology; writing – review and editing; formal analysis. **Mazlan Maskor:** Investigation; methodology; writing – review and editing. **Rolf van Dick:** Investigation; methodology; writing – review and editing. **Benedikt E. Kratzer:** Investigation; methodology; writing – review and editing. **Julia Christensen:** Investigation; methodology; writing – review and editing. **Rudolf Kerschreiter:** Investigation; methodology; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors confirm they have no conflict of interests.

DATA AVAILABILITY STATEMENT

All materials including data, analysis code and study materials are available on the open science framework project page: https://osf.io/axvfz/?view_only=3c5814f7c4db47b391433761843d4e62.

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