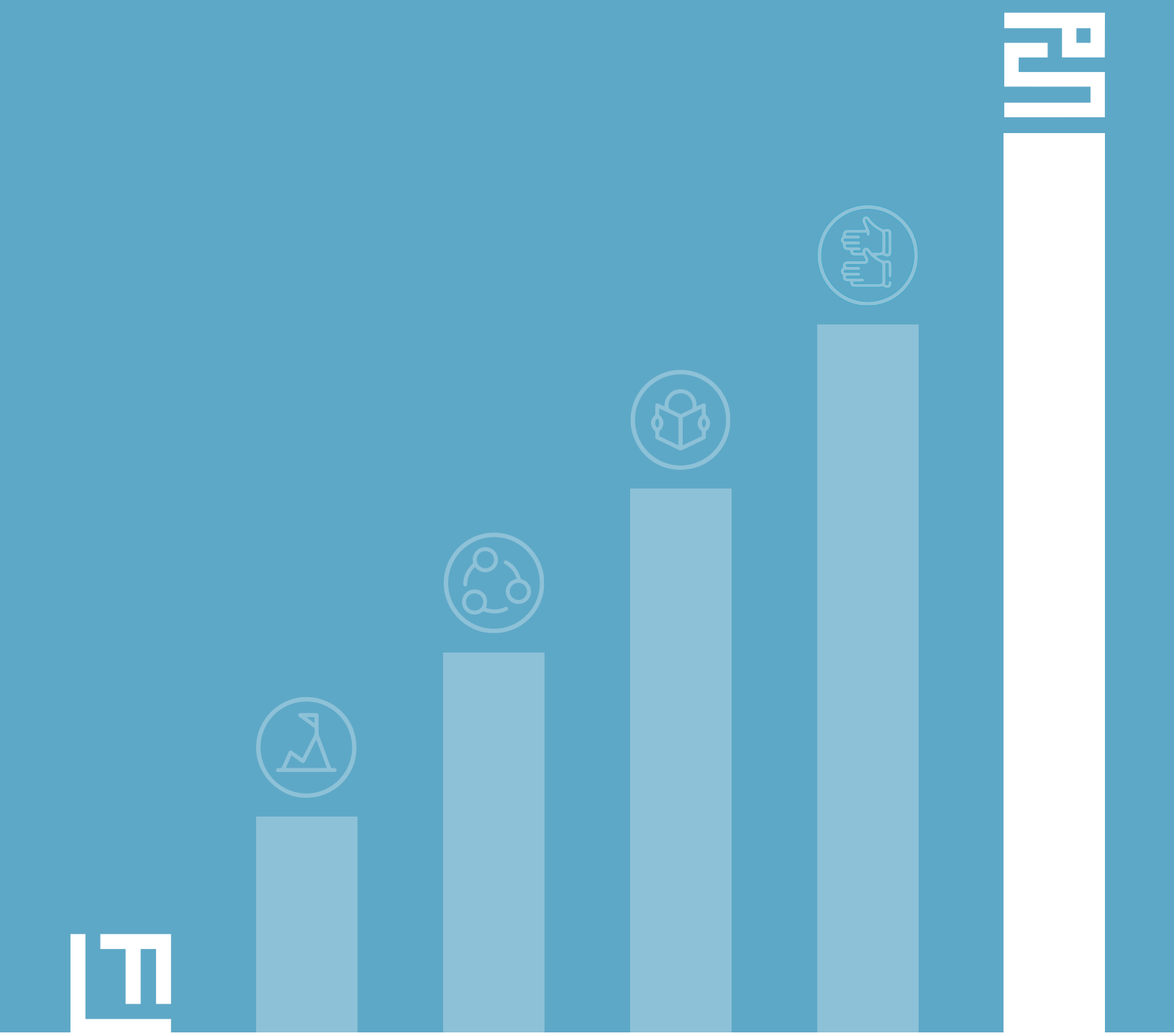
The 4 Stages of Psychological Safety™ Team Survey Technical Report



DESIGN, VALIDATION, & RELIABILITY

Contents

About **Leader**Factor

LeaderFactor is a leadership assessment, training, and coaching firm with a primary focus in the following practice areas:

- Psychological Safety
- Emotional Intelligence
- Organizational Change & Transformation
- Strategic Agility
- Micro-coaching & Accountability
- CEO services & Executive Development

We work with leading organizations around the world in the private, public, and non-profit sectors and in every major industry. For more information, please visit **LeaderFactor.com**

The Concept of Psychological Safety

We define psychological safety as “an environment of rewarded vulnerability.”

Vulnerability is exposure to the possibility of harm or loss. When humans engage in acts of vulnerability and those acts are rewarded, they are motivated to continue to engage in those acts. When those same acts of vulnerability are punished, they are motivated to discontinue those acts.

Based on our research, we have identified four categories of vulnerability:

- Connecting (Sociocultural belonging)
- Learning (Cognitive development)
- Contributing (Value creation)
- Challenging the status quo (Innovation & continuous improvement)

These four categories of vulnerability require a rewarded response in order to increase in frequency. If acts of vulnerability are punished in any of these categories, humans exhibit a response pattern of retreat and withdrawal. Punished vulnerability has a strong tendency to:

- Activate the pain centers of the brain.
- Trigger the self-censoring instinct.
- Shift the individual to a defensive mode of performance in which they are now preoccupied with personal risk management, self-preservation, and loss avoidance.

When social environments reward rather than punish acts of vulnerability, individuals and social units move through a linear progression of four successive stages of psychological safety. To learn more, visit https://www.leaderfactor.com/psychological-safety.

Stage 1: Inclusion Safety

Inclusion safety satisfies the basic human need to connect and belong. Everyone wants to be accepted, whether at work, school, home, or other social settings. In fact, the need to be accepted precedes the need to be heard. When others invite us into their society, we develop a sense of shared identity and a conviction that we matter. Inclusion safety allows us to gain membership within a social unit and interact with its members without fear of rejection or humiliation, boosting confidence, resilience, and independence. But what if you're deprived of that basic acceptance and validation as a human being? In short, it's debilitating. It activates the pain centers of the brain. Granting inclusion safety to another person is a moral imperative. Indeed, only the threat of harm can excuse us from this responsibility. When we create inclusion safety for others, regardless of our differences, we acknowledge our common humanity and reject false theories of superiority and arrogant strains of elitism.

Stage 2: Learner Safety

Learner safety satisfies the basic human need to learn and grow. It allows us to feel safe as we engage in all aspects of the learning process--asking questions, giving and receiving feedback, experimenting, and even making mistakes, not if but when we make them. We all bring some level of inhibition and anxiety to the learning process. We all have insecurities. Who hasn't hesitated to raise their hand to ask a question in a group setting for fear of feeling dumb? Learning is both intellectual and emotional. It's an interplay of the head and the heart. When we sense leaner safety, we're more willing to be vulnerable, take risks, and develop resilience in the learning process. Conversely, a lack of learner safety triggers the self-censoring instinct, causing us to shut down, retrench and manage personal risk. When we create learner safety for others, we give encouragement to learn in exchange for a willingness to learn.

Stage 3: Contributor Safety

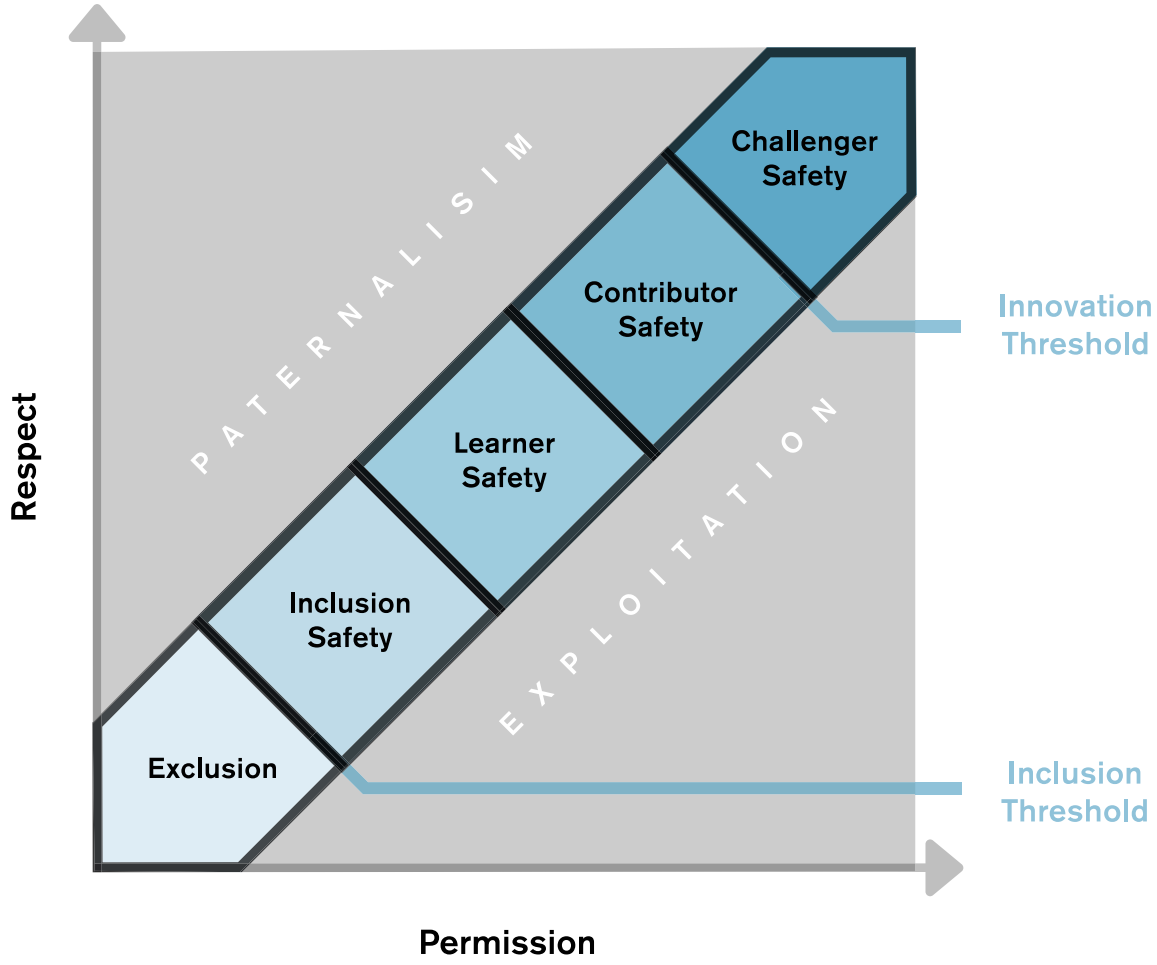
Contributor safety satisfies the basic human need to contribute and make a difference. When contributor safety is present, we feel safe contributing as a full team member, using our skills and abilities to participate in the value-creation process. We lean into what we're doing with energy and enthusiasm. We have a natural desire to apply what we've learned to make a meaningful contribution. Why do we dislike micromanagers? Because they don't give us the freedom and discretion to reach our potential. Why do we like empowering bosses? Because they encourage us and draw out our best efforts. The more we contribute, the more confidence and competence we develop. When we create contributor safety for others, we empower them with autonomy, guidance, and encouragement in exchange for effort and results.

Stage 4: Challenger Safety

Challenger safety satisfies the basic human need to make things better. It's the support and confidence we need to ask questions such as, "Why do we do it this way?" "What if we tried this?" or "May I suggest a better way?" It allows us to feel safe to challenge the status quo without retaliation or the risk of damaging our standing or reputation. Challenger safety provides respect and permission to dissent and disagree when we think something needs to change, and it's time to say so. It allows us to overcome the pressure to conform and gives us a license to innovate and be creative. As the highest level of psychological safety, it matches the increased vulnerability and personal risk associated with challenging the status quo. When we create challenger safety, we give air cover in exchange for candor.

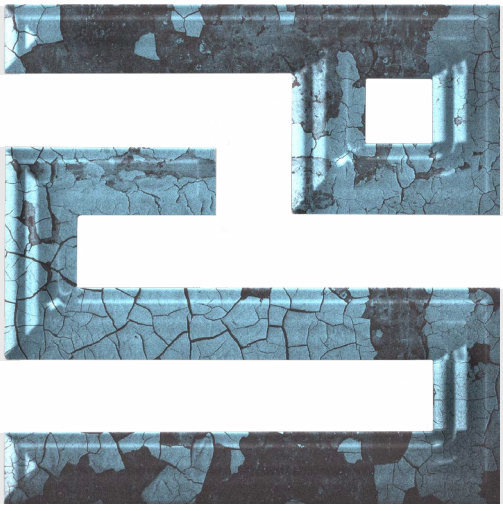
The 4 Stages of Psychological Safety are shown graphically on the following page:

The 4 Stages of Psychological Safety™



The History of Psychological Safety

The concept of psychological safety is as old as the first human interaction. But it's only been in recent years that we have consolidated the concept under a unifying term.[1] Here is a brief genealogy of the concept:



1844 Soren Kierkegaard identifies creativity as both a generative and destructive force that produces anxiety in the person who engages in the process.[2]

1942 Joseph Schumpeter identifies a pattern of creative destruction in which continuous innovation mutates and destroys the status quo in the process.[3]

1943 Abraham Maslow identifies "belongingness needs," stating that, "if both the physiological and the safety needs are fairly well gratified, then there will emerge the love and affection and belongingness needs."[4]

1947 Herbert Simon suggests that fully functioning organizations require "attitudes of friendliness and cooperation."[5]

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[1] The term psychological safety began appearing in physical safety related publications in the 1940s. See, for example, Dallas D. Dupre, Jr. & Charles. R. Sutton, "Fifth Short Course on Highway Development, The Ohio Department of Highways and The Ohio State University," (Columbus, Ohio): 1946. See also Joseph A. Dolan, Managing editor, Aerospace Safety, Vol. 16, No. 7., July, 1960.

[2] Søren Kierkegaard The Concept of Anxiety: A Simple Psychologically Orienting Deliberation on the Dogmatic Issue of Hereditary Sin June 17, 1844 Vigilius Haufniensis, Edited and translated by Reidar Thomte Princeton University Press 1980 Kierkegaard's Writings, VIII

[3] Joseph Schumpeter (1994) [1942]. Capitalism, Socialism and Democracy. London: Routledge. pp. 82–83.

[4] Here's the full quote: "When a man's physiological needs are satisfied and he is no longer fearful about his physical welfare, his social needs become important motivators of his behavior. These are such needs as those for belonging, for association, for acceptance by one's fellows, for giving and receiving love." Abraham H. Maslow, "A Theory of Human Motivation," Psychological Review 50 (1943): 380.

[5] Herbert A. Simon, Administrative Behavior (New York: The Free Press, 1997), 214. (First published in 1947).

The History of Psychological Safety

1957 Carl Rogers identifies optimal conditions that a therapist must create with a client, including genuineness, acceptance, and a desire to understand with empathy.[6]

1960 Douglas McGregor refers to nonphysical "security needs." [7]

1965 Edgar Schein and Warren Bennis use the term psychological safety and define it as "providing an atmosphere where one can take chances . . . without fear and with sufficient protection."[8] Their treatment of the concept effectively puts psychological safety on the academic research agenda.

1990 William Kahn links psychological safety to attitudes and behavior.[9]

1999 Amy Edmondson connects psychological safety to team learning.[10]

2014 Google conducts its "Project Aristotle" in which the organization studies 180 of its own teams for a period of three years and identifies psychological safety as the defining characteristic of its most high performing teams, along with four other factors.

2020 Timothy R. Clark identifies a pattern of linear progression in which social units advance through four successive stages of psychological safety.

Prior to Schein and Bennis, scholars used various terms to identify psychological safety and its antecedents. Since then, research on the topic has unified around the term of psychological safety globally. In the last five years, the academic research literature on the subject has exploded.[11]

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[6] Carl R. Rogers, "The Necessary and Sufficient Conditions of Therapeutic Personality Change," Journal of Consulting Psychology 21 (1957): 95–103. See also Carl R. Rogers, On Becoming a Person (Little Brown: New York), 1967. First published in 1961. See also Michael A. Zaccaria, Ernest C. Types, and Harry G. Lawrence, "Development Characteristics of the USAF Officer Activity Inventory," Personnel Research Laboratory, Air Force Personnel and Training Research Center, Air Research and Development.

[7] Douglas McGregor, The Human Side of Enterprise (New York: McGraw-Hill, 1960), 37.

[8] Edgar H. Schein and Warren G. Bennis, Personal and Organizational Change Through Group Methods: The Laboratory Approach. John Wiley & Sons (New York), 1965, p. 44.

[9] William A. Kahn, "Psychological Conditions of Personal Engagement and Disengagement at Work," The Academy of Management Journal 33, no. 4 (December 1990): 692–724.

[10] Amy Edmondson, "Psychological Safety and Learning Behavior in Work Teams," Administrative Science Quarterly 44, no. 2 (June 1999): 350–383, http://web.mit.edu/curhan/www/docs/Articles/15341_Readings/Group_Performance/Edmondson%20Psychological%20safety.pdf. For a useful review of the psychological safety literature, see Alexander Newman, Ross Donohue, Nathan Evans, "Psychological Safety: A Systematic Review of the Literature," Human Resource Management Review 27, no. 3 (September 2017): 521–535,

[11] https://www.sciencedirect.com/science/article/abs/pii/S1053482217300013; Amy C. Edmondson and Zhike Lei, "Psychological Safety: The History, Renaissance, and Future of an Interpersonal Construct," Annual Review of Organizational Psychology and Organizational Behavior 1 (March 2014): 23–43. Also, see findings from Aspen Institute, "From a Nation at Risk to a Nation at Hope." http://nationathope.org/wp-content/uploads/aspen_final-report_execsumm_final_forweb.pdf

Instrument Developer

The 4 Stages of Psychological Safety™ Team Survey was developed by Dr. Timothy R. Clark.

Dr. Clark is founder and CEO of LeaderFactor. He earned a Ph.D. from Oxford University in Social Science and was both a Fulbright and British Research Scholar. Dr. Clark several has decades of experience in survey instrument design, including the design of the EQometer™ emotional intelligence assessment.

Dr. Clark is the author of five books:

The 4 Stages of Psychological Safety: Defining the Path to Inclusion and Innovation.
(Berrett-Koehler 2020)

The Employee Engagement Mindset.
(McGraw-Hill 2012)

Epic Change: How to Lead Change in the Global Age.
(John Wiley/Jossey-Bass 2007)

Leadership Bones.
(Bradmore Road Press 2009)

Leading with Character and Competence.
(Berrett-Koehler 2016)

He has also written more than 175 articles on leadership, change, strategy, human capital, culture, and employee engagement. He is a highly sought-after advisor, coach, and facilitator to CEOs and senior leadership teams. He has worked with more than 100 CEOs of leading organizations around the world.

Instrument Design

LeaderFactor provides organizations with the analysis and insights necessary to create deeply inclusive environments, accelerate learning, increase contribution, and stimulate innovation. As such, we employ a defensible assessment development process consistent with applicable testing standards and guidelines. This process is supervised by professional psychometricians and adheres to professional and technical standards ensuring assessment reliability, validity, and fairness. The primary controlling document for development and ongoing verification of our assessment development process is:

The American Educational Research Association (AERA) Joint Standards, *Standards for Educational and Psychological Testing.*[12]

The Standards provide guidelines for test construction, evaluation, and documentation. In addition, various subsections relate to validity, reliability, and errors of measurement, test development and revision, scales, norms, score reporting, and supporting documentation for all assessments.

In the field of validity research, construct validity refers to the degree to which an instrument accurately accounts for and measures the facets of the construct. Therefore, the conceptual framework used to capture a construct is of primary importance. If construct validity is flawed, other measures of validity, however sound, measure the flawed conception of the construct.

To operationalize psychological safety as a measurable construct, we use the 4 Stages framework as the basis of our design. The instrument consists of 12 items, including four three-item scales. Thus, there is a three-item scale for each of the following stages:

- Stage 1: Inclusion safety
- Stage 2: Learner safety
- Stage 3: Contributor safety
- Stage 4: Challenger safety

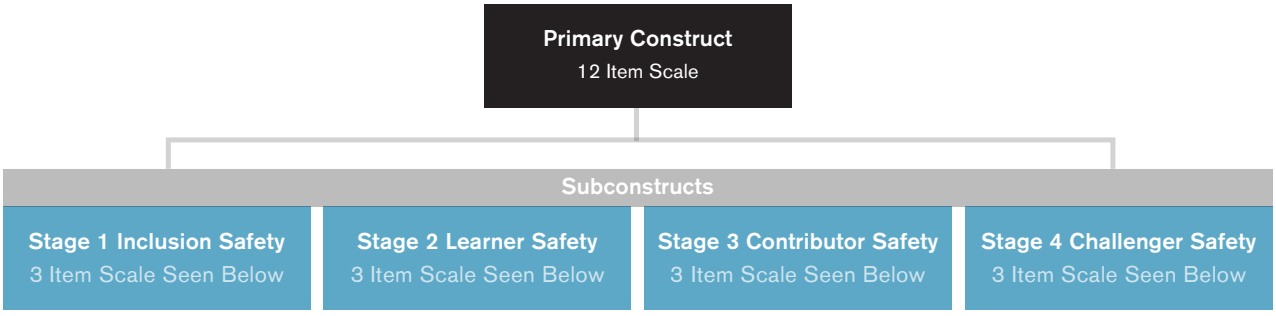
The overall construct of psychological safety is based on our general definition of the concept as "an environment of rewarded vulnerability." The intended design is that the 12-item scale will serve as an accurate measure of the construct defined this way. Psychometrically, this implies that in performing factor analysis, the factor loadings of the variables would load on one primary factor that would explain the majority of the variance among the variables, or 12 items. We explain the results of this analysis in a section below.

The four sub-constructs of our definition of psychological safety are based on the four stages and are each measured with three-item scales built for each stage. Similarly, the reliability of the four scales can be measured based on whether the items in the scales co-vary with each other-

[12] American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (Eds.). (2014). Standards for educational and psychological testing. American Educational Research Association.

at a significant level based on a Chronbach's alpha statistical test. We address this psychometric property below as well.

Reliability refers to the consistency and stability of results. Unreliable assessments have a substantial amount of error, or noise, compared to reliable assessments which have little error. Reliability is measured based on the consistency of scores. We measure internal consistency using Cronbach's alpha, which is one of the most widely used approaches to estimating reliability.[13] This analysis measures the correlation between question loadings onto the same factor. It is a measure of reliability inasmuch as it determines the degree to which the responses are consistent.



The 4 Stages™ Team Survey items:

1.	I feel included by the people I work with.	Inclusion safety
2.	I'm treated with respect.	Inclusion safety
3.	I'm accepted as a member of my team.	Inclusion safety
4.	My team supports my efforts to learn.	Learner safety
5.	I'm allowed to learn from my mistakes.	Learner safety
6.	I feel comfortable asking questions.	Learner safety
7.	My team values my contribution.	Contributor safety
8.	I'm encouraged to contribute as much as I can in my role.	Contributor safety
9.	My team allows me to do my job.	Contributor safety
10.	I have the freedom to challenge the status quo.	Challenger safety
11.	I can take reasonable risks without being punished.	Challenger safety
12.	I feel safe disagreeing with the way my team does things.	Challenger safety

[13]A Cronbach, L. J. & Meehl, P. E. (1955). Construct validity in psychological tests. Psychological Bulletin, 52, 281-302. Kane, M. T. (1992a). An argument-based approach to validity. Psychological Bulletin, 112, 527-535. Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. American Psychologist, 55(1), 5-14. Sireci, S. G. (2001). Sireci, S. G. (1998a). Gathering and analyzing content validity data. Educational Assessment, 5, 299-321. Sireci, S. G. (1998b). The construct of content validity. Social Indicators Research, 45, 83-1

The 11-point Response Scale

The 4 Stages of Psychological Safety™ Team Survey makes use of an 11-point scale, ranging from 0 to 10, rather than a traditional 5 or 7-point Likert scale. We acknowledge that the 11-point scale is that it naturally skews the data distribution to the higher end of the scale because respondents typically see points 1-4 as exceptional and not reflective of their cultural conditions, even when those conditions are far from optimal. The descriptors or reference points at the ends of the rating scale are labeled as “Completely Disagree.” at point 0 and “Completely Agree” at point 10. **We use the scale for two reasons:**

First, the weakness of the traditional Likert scale is reflected in its lack of sufficient response points, or gradations, thereby forcing respondents into intermediate response values. Respondents tend to instinctively resist the end-points of a scale, perceiving them as absolute conditions that do not exist in the real world. In the case of a 5-point Likert scale, this perception influences the respondent to choose a 2 or 4 when a perceived value is not in the middle of a scale. This creates a narrow distribution that congregates closer to the midpoint of the scale.

Second, when measuring psychological safety, we must account for interpersonal conditions that are acutely dysfunctional or toxic. A 5 or 7-point Likert scale will hide rather than reflect these outlier conditions. In the study of organizational culture, it is vital that we are able to quantify extreme cases, especially in the world of practical application.

Outlier scores become actionable to the leaders and organizations that reflect them. In the measurement and improvement of psychological safety, it is of utmost importance to obtain a baseline measure that accurately reflects the current state. The lower the measure of psychological safety, the more important it becomes to undertake an intervention to improve that condition.

Standards of Validity

Samuel Messick defined validity as "an integrated evaluative judgment of the degree to which empirical evidence and theoretical rationale support the adequacy and appropriateness of inferences and actions based on test scores or other modes of assessments." Establishing validity regarding psychological safety is an ideological, semantical, and experimental undertaking. Psychological safety must be adequately defined and logically defended before it may be experimentally explored.

Construct Validity

Establishing construct validity in relation to psychological safety has typically constituted a task highly prone to dispute. For example, the 4 Stages of Psychological Safety is designed to assess four basic human needs that largely follow a linear progression. Thus, while no clear consensus regarding the meaning of "psychological safety" exists, we are able to make an empirically compelling case because of the consistent way in which social units demonstrate a pattern of progression through the stages. As the term has been vulnerable to ambiguity, divergent definitions, and discord, it is reasonable to define the 4 Stages of Psychological Safety in a clear and valuable manner whether one fully accepts that such terms tell the whole story or not.

Construct Validity

Once psychological safety has been concretely defined in ways that hinge on quantifiable data, it can be measured and operationalized. Put somewhat differently, despite the current lack of consensus regarding the definition of psychological safety until now, we believe it is both justifiable and productive to furnish an operational, and empirically defensible, definition of psychological safety that may be subsequently validated via sound assessment design and empirical research. We also believe that in doing so, we provide organizations a tool that will increase the likelihood that they will successfully cultivate high-performing and inclusive cultures than they would otherwise be able to do sans the validated assessment.

Our operationalized definition of psychological safety is "a condition in which human beings feel (1) included, (2) safe to learn, (3) safe to contribute, and (4) safe to challenge the status quo—all without fear of being embarrassed, marginalized, or punished in some way." As such, the 4 Stages of Psychological Safety forecasts an individual's propensity to thrive in psychologically safe environments in a manner that will be explained more fully in the remaining sections of this report. We selected predictors and outcomes that empirical research and psychological theory have deemed significant. In this sense, the construct we are measuring is a relationship that links the essential fulfillment of human needs to organizations' ability to create conditions considered psychologically safe.

Validity & Reliability Analysis

This section describes results obtained from an exploratory factor analysis of The 4 Stages of Psychological Safety™. Exploratory factor analysis identifies the principal components, or factors, that explain the patterns of correlations within a set of variables. In testing and assessment, it is often used to identify and categorize items into a few factors that explain most of the observed variance in a much larger set of items. Organizing the items by factors helps assessment developers better understand respondents' interpretation of the items and the underlying measurement construct.

Results showed a single principal component accounting for 65.85% of the total variance among the 12 assessment items (see Figure 1). Total variance is the variance accounted for by each component to the total variance in all the variables. The Results section further describes the outcomes derived from the factor analysis.

A scree plot is a line pilot of the eigenvalues of factors or principal components in the analysis. The scree plot is used to determine the number of factors to retain in an exploratory factor analysis (EFA) or principal components to keep in a principal component analysis (PCA). For example, there is one dot near the value of 8 on the y-axis This indicates an Eigenvalue of 7.90.

Reference scree plot on the following page:

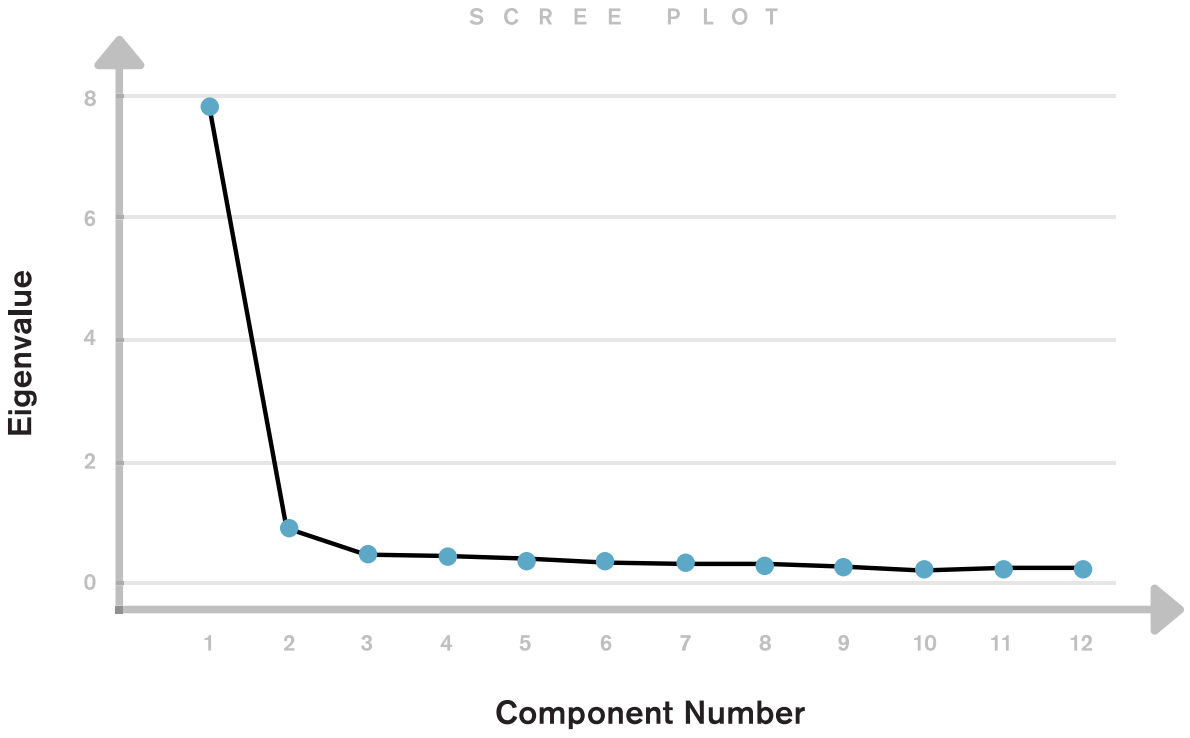


Figure 1. Scree plot of principal components analysis.

Measures

The 4 Stages of Psychological Safety™ is a 12-item assessment measuring four stages: Inclusion Safety, Learner Safety, Contributor Safety, and Challenger Safety. Each Stage contains three items. Respondents rate their level of agreement to each item using an 11-point sliding scale. The scale is anchored at 0 (Completely Disagree) and 10 (Completely Agree). Total scores range between 0 - 120 points. Sub-scores are summed and provided for each of the four stages; each sub-score ranges between 0 - 30 points.

Data Screening

The Statistical Package for the Social Sciences (SPSS) was used for all data analyses. The data contained 3,122 records and were screened for univariate (observations on a single characteristic) outliers. Z-scores +/-2.68 were identified as outliers. A total of 75 records were removed ($Z < 2.68$); there were no scores above $Z = 2.68$. The remaining sample contained 3,047 records.

Factor Analysis

We first examined the factorability of the 12 items:

First, it was observed that the communalities (i.e., the correlation of the items to components) for all 12 items was > .30, suggesting reasonable factorability (see Appendix A).

Second, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was .959, well above the commonly recommended value of .50, and The test measures sampling adequacy for each variable in the model and for the complete model. The statistic is a measure of the proportion of variance among variables that might be common variance. The lower the proportion, the more suited your data is to Factor Analysis.

Third, Bartlett's test of sphericity was significant ($\chi 2$ (66) = 29,965.18, $p < .001$).compares an observed correlation matrix to the identity matrix. Bartlett's test of sphericity checks for redundancy among the variables. The null hypothesis of the test is that the variables are orthogonal, i.e. not correlated. The alternative hypothesis is that the variables are not orthogonal, i.e. they are correlated enough to show a correlation matrix diverging significantly from the identity matrix. This test is performed prior to data reduction techniques such as principal component analysis or factor analysis to verify that a data reduction technique can actually compress the data in a meaningful way.

Finally, the diagonals of the correlation matrix were also all over .5 (but not greater than .80, an indication of multicollinearity), further confirming that each item shared some common variance with the other items. Given these overall indicators, factor analysis was considered suitable with all 12 items. Multicollinearity occurs when the model includes multiple factors that are correlated, not solely to the response variable, but also to each other, which may indicate factor redundancy.

Principal Component Analysis

Principal component analysis using direct oblimin rotation[15] revealed a single factor (Eigenvalue = 7.90) explaining approximately 66% of test score variance (see Table 1), and all 12 items loaded on that factor (see Table 2). Because of this single factor, the factor solution could not be rotated.

Eigenvalues describe the amount of variance contributed by each of the eigenvectors derived from rotations of the original set of variables to orthogonal variables (uncorrelated). This results in a reduction of the number of variables (eigenvectors) required to explain most of the total variance among the original variables. The contribution of each variable to the direction of the eigenvectors indicates that the most important variable can be summarized in just a few vectors.

Thus, the simplest solution is a single component. This indicates that the 12 items are non-orthogonal (i.e., statistically dependent) and an effective measure of construct validity; they are all related to psychological safety.

The 4 Stage labels proposed by Leader Factor suited the extracted sub-scales and were retained, although the correlation matrix revealed four items with alternative inter-item correlations (see Appendix B).

[15] Direct oblimin is one method used when factors are allowed to correlate.

Total Variance Explained

Component	Initial Eigenvalue			Extraction Sums of Squared Loading		
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %
1	7.902	65.848	65.848	7.902	65.848	65.848
2	.922	7.683	73.532			
3	.469	3.906	77.437			
4	.445	3.708	81.145			
5	.377	3.142	84.288			
6	.349	2.911	87.199			
7	.324	2.700	89.899			
8	.289	2.409	92.308			
9	.258	2.152	94.460			
10	.231	1.924	96.384			
11	.223	1.856	98.240			
12	.211	1.760	100.000			

Extraction Method: Principle Component Analysis

Table 1. Total variance explained.

Component Matrix[a]

	Component
Inclusion_q1	.812
Inclusion_q2	.833
Inclusion_q3	.843
Learner_q4	.813
Learner_q5	.817
Learner_q6	.795
Contributor_q7	.850
Contributor_q8	.836
Contributor_q9	.816
Challenger_q10	.791
Challenger_q11	.761
Challenger_q12	.765

Table 2. Component matrix.

Extraction Method: Principle Component Analysis

a. 1 Components Extracted

[16]Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. Psychometrika, 16, 297-334.

Reliability

Reliability for each of the scales was examined using Cronbach's alpha. Reliability is a psychometric measure that describes the internal consistency of an assessment. It indicates the degree to which a respondent's repeated attempts at the same test form would result in the same score, assuming no learning has occurred between attempts. Reliability, as calculated by Cronbach's alpha (Cronbach,[16] 1951), is a number that ranges from 0 to 1, where the higher the value, the more reliable the test. Table 3 shows generally accepted values across the testing industry.

Alpha Cronbach Value	Interpretation
0.91 – 1.00	Excellent
0.81 – 0.90	Good
0.71 – 0.80	Good & Acceptable
0.61 – 0.70	Acceptable
0.10 – 0.60	Not Acceptable

Table 3. Interpretation of the alpha Cronbach value.

Cronbach's Alpha Reliability analysis of 12-Item Scale

Reliability analysis of 12 assessment items is excellent (Cronbach's alpha = .951).

Cronbach's Alpha Reliability analysis of 3-Item Subscales

Table 4 shows the reliability coefficients for each of the four subscales.

Stage	Alpha Cronbach Value
Inclusion	.895 (Good)
Learner	.847 (Good)
Contributor	.879 (Good)
Challenger	.883 (Good)

Conclusion

The factorability of the 4 Stages™ of Psychological Safety scale was examined using three common indicators (communalities, KMO, and Bartlett's test of sphericity) and deemed appropriate for factor analysis. Overall, the analysis indicated a single distinct factor underlying responses to the 12 items that comprise the construct of Psychological Safety, and this factor demonstrated excellent internal consistency. While four of the 12 items were moderately correlated with items not within their Stage, reflecting some overlap and interdependency in the 4 Stages, the original factor structure is retained.

Appendix A: Communalities

Communalities indicate the amount of variance in each variable that is accounted for. Initial communalities are estimates of the variance in each variable accounted for by all components or factors. For principal components extraction, this is always equal to 1.0 for correlation analyses.

The "initial" estimate of communality was (and still is, for a number of factoring programs) the squared multiple correlation (R-squared) for the variable, found by using that variable as a DV and all the other variables as IVs in a regression model.

The reason that this might be less preferable than a final/extraction estimate is that it presumes that all of the variance in the other variables is common. Sums of squared loadings is a better indication of what portion of variance associated with a specific variable is shared in common with the (final) factor model.

Initial estimates are helpful in deciding whether a data/variable set is suitable for factoring in the first place, along with other common indicators, such as measure of sampling adequacy (KMO) and Bartlett's test of sphericity.

The analysis of communalities occurs before the factor analysis.

Communalities

	Component	Component
Inclusion_q1	1.000	.660
Inclusion_q2	1.000	.694
Inclusion_q3	1.000	.710
Learner_q4	1.000	.660
Learner_q5	1.000	.668
Learner_q6	1.000	.632
Contributor_q7	1.000	.723
Contributor_q8	1.000	.699
Contributor_q9	1.000	.665
Challenger_q10	1.000	.625
Challenger_q11	1.000	.580
Challenger_q12	1.000	.586

Extraction Method: Principle Component Analysis

Appendix B: Correlation Matrix

Component Matrix[a]

CORRELATION	Inclusion_q1	Inclusion_q2	Inclusion_q3	Learner_q4	Learner_q5	Learner_q6	Contributor_q7	Contributor_q8	Challenger_q9	Challenger_q10	Challenger_q11	Challenger_q12
Inclusion_q1	1.000	0.718	0.756	0.659	0.592	0.604	0.703	0.640	0.615	0.557	0.516	0.526
Inclusion_q2	0.756	1.000	0.752	0.652	0.647	0.634	0.669	0.679	0.652	0.587	0.542	0.552
Inclusion_q3	0.756	0.752	1.000	0.704	0.642	0.607	0.737	0.694	0.672	0.548	0.519	0.536
Learner_q4	0.659	0.652	0.704	1.000	0.703	0.594	0.693	0.653	0.645	0.533	0.519	.538
Learner_q5	0.592	0.647	0.642	0.703	1.000	0.651	0.628	0.644	0.644	0.590	0.637	0.578
Learner_q6	0.604	0.634	0.607	0.594	0.651	1.000	0.620	0.615	0.587	0.632	0.590	0.620
Contributor_q7	0.703	0.669	0.737	0.693	0.628	0.620	1.000	0.749	0.688	0.609	0.564	0.589
Contributor_q8	0.640	0.679	0.694	0.653	0.644	0.615	0.749	1.000	0.687	0.615	0.573	0.568
Contributor_q9	0.615	0.652	0.672	0.645	0.644	0.587	0.688	0.687	1.000	0.599	0.571	0.571
Challenger_q10	0.557	0.587	0.548	0.533	0.590	0.632	0.609	0.615	0.599	1.000	0.735	0.725
Challenger_q11	0.516	0.542	0.519	0.519	0.637	0.590	0.564	0.573	0.571	0.735	1.000	0.692
Challenger_q12	0.526	0.552	0.536	0.538	0.578	0.620	0.589	0.568	0.571	0.725	0.692	1.000
SIG (1-TAILED)												
Inclusion_q1		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Inclusion_q2	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Inclusion_q3	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Learner_q4	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Learner_q5	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Learner_q6	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
Contributor_q7	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
Contributor_q8	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000
Contributor_q9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
Challenger_q10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000
Challenger_q11	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
Challenger_q12	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Note on sub-scale item intercorrelations: Items q4, q6, q7, and q8 have high correlations with items not in their Stage. Those are noted in green text. This is due to the fact that while the 4 Stages™ of psychological safety represents a linear progression, the stages and acts of vulnerability associated with each stage bleed into each other. There is no clear line of demarcation, for instance, between Stage 2: Learner Safety and Stage 3: Contributor Safety. They are overlapping. Thus, we expect some high correlations between items from different stages.

q4 is correlated w/ q3 (r = .70)

q6 is correlated w/ q10 (r = .63)

q7 is correlated w/ q3 (r = .74)

q8 is correlated w/ q3 (r = .69)

We can explain these interstage correlations based on the fact that there are no clear behavior demarcations between one stage and the next. For example, there is overlap from where Stage 1: Inclusion safety ends and Stage 2: Leaner Safety begins. Each stage bleeds into the other. The three-items subscales for each stage focus on the primary vulnerability activities represented by that stage, but those activities are not exclusively confined to that stage.

For example, question 4, “My team supports my efforts to learn” is correlated with question 3, “I’m accepted as a member of my team.” The primary thrust of question 4 is that it supports learner safety, but it is also a fundamental indication of socio-cultural acceptance, which is a part of Stage 1: Inclusion Safety. The overall interdependency and linear progression of the 4 Stages will never allow discrete measures of one stage that are wholly separate and distinct from the other stages.

LeaderFactor™