# Psychological Safety as a Perceived Outcome of Agile Practices: Evidence from Scrum Teams

Linda Bessah[†] and Rébecca Deneckère[*,†]

*Centre de Recherche en Informatique, Paris 1 Panthéon-Sorbonne University, Paris, France*

**Abstract**

Psychological safety has been shown to support learning behaviors and open communication in teams, yet its relationship with agile practices is still not well established. This paper examines how Scrum practices are perceived by team members to contribute to a speak-up climate, treated as a proxy for team-level psychological safety. We adopt a sequential explanatory mixed-methods design that combines a questionnaire-based quantitative phase with a qualitative phase based on open-ended responses and semi-structured interviews. The research model links Scrum ceremonies, supportive leadership expectations associated with the Scrum Master role, perceived organizational obstacles, and agile experience to perceived speak-up climate. Results suggest that Scrum ceremonies are not perceived as contributing equally to a speak-up climate: sprint retrospectives appear more conducive to open expression than other ceremonies. Supportive leadership expectations are positively associated with perceptions of a speak-up climate, whereas organizational obstacles are negatively associated with both the perceived contribution of ceremonies and the attribution of psychological safety outcomes to agile methods. In addition, some respondents associate complementary team practices and greater agile experience with stronger speak-up climates. The findings suggest that agile practices may support psychological safety-related perceptions, but this relationship appears conditional on facilitation, leadership posture, agile experience, and organizational context.

**Keywords**

Psychological safety, agile practices, Scrum, agile governance, information systems development

## 1. Introduction

Agile methods such as Scrum emphasize collaboration, adaptability, and continuous feedback in software development contexts [1][2][3]. However, the formal adoption of agile practices does not guarantee their effective enactment. Scrum ceremonies, iterative cycles, and feedback mechanisms presuppose that team members are willing to speak up, challenge decisions, report difficulties, and discuss failures. When individuals hesitate to express concerns due to fear of negative interpersonal consequences, agile practices risk becoming procedural rituals rather than mechanisms of learning and adaptation.

Psychological safety refers to a shared belief that team members can speak up without fear of negative interpersonal consequences [4][5]. Prior research associates psychological safety with learning and open communication [4][6], but empirical evidence regarding how agile practices contribute to these dynamics remains limited [7][8][9]. This issue remains underexplored in agile software development research, particularly regarding how specific Scrum practices contribute to psychological safety-related dynamics. Rather than claiming causal effects, this paper provides exploratory mixed-method evidence on how Scrum practices are perceived to contribute to a speak-up climate.

Prior qualitative work examined how psychological safety influences Scrum dynamics [1], but the reverse perspective remains underexplored. This study therefore examines how Scrum practices, leadership expectations, and organizational constraints are associated with perceived speak-up climate through a mixed-methods design.

This paper contributes exploratory evidence in three ways. First, it examines Scrum ceremonies individually rather than treating Scrum as a homogeneous set of practices. Second, it analyzes how

*Baltic DB&IS 2026 Conference Forum and Doctoral Consortium, 28 June - 1 July 2026, Tartu, Estonia*

[*] Corresponding author

[†] These authors contributed equally.

lindabessah1@gmail.com (L. Bessah), denecker@univ-paris1.fr (R. Deneckère)

supportive leadership expectations and organizational obstacles are associated with perceived speak-up climate. Third, it extends prior qualitative work on psychological safety in Scrum teams [1] by providing exploratory mixed-method evidence from survey responses and interviews.

The remainder of this paper is structured as follows. Section 2 reviews the theoretical background on psychological safety and agile practices. Section 3 presents the mixed-methods research design. Section 4 reports the results of the analyses. Section 5 discusses the implications of the findings, and Section 6 concludes the paper.

## 2. Theoretical background

**Psychological Safety as a Team-Level Construct.** Psychological safety refers to shared perceptions that speaking up, asking questions, or admitting mistakes can occur without negative interpersonal consequences [4]. In this study, we focus on the observable communicative dimension of psychological safety through the notion of speak-up climate, defined as respondents' perceived ability to express concerns, ask questions, admit mistakes, and raise issues without fear of negative interpersonal consequences. This operationalization focuses on observable interaction patterns and is used as an exploratory proxy rather than as a validated psychometric construct.

**Antecedents and Consequences of Psychological Safety.** Prior research identifies leadership posture, organizational culture, and interpersonal trust as key antecedents of psychological safety [4][6][10]. Most studies examine psychological safety as an antecedent of learning and performance. This paper instead examines whether agile practices are perceived as contributing to psychological safety-related dynamics.

**Agile Practices as Structured Interaction Mechanisms.** Agile methods emphasize frequent interaction, collective ownership, and continuous feedback. In Scrum environments, ceremonies such as retrospectives, sprint reviews, and daily scrums are intended to support transparency, collective coordination, and iterative learning. These recurring interaction spaces increase the frequency of communication among team members and create opportunities for feedback, adjustment, and collaborative problem-solving. However, their effectiveness depends on whether team members feel able to express concerns openly. Scrum structures work around defined roles, artifacts, and ceremonies designed to support transparency, inspection, and adaptation [1]. Sprint planning, daily scrums, sprint reviews, and retrospectives create recurring interaction spaces in which work is discussed, evaluated, and adjusted. These ceremonies increase interaction density and redistribute accountability within teams. Scrum ceremonies can also be interpreted as structured interaction spaces that regulate communication frequency, collective visibility, and opportunities for feedback within teams. Their effectiveness therefore depends not only on procedural compliance, but also on whether organizational and interpersonal conditions allow participants to engage openly in these recurring interactions. They make interpersonal dynamics central to the effective enactment of Scrum. Scrum ceremonies implicitly rely on team members being willing to speak openly about problems, uncertainties, and disagreements. When such conditions are not present, inspection and adaptation mechanisms may be perceived as less effective. Transparency may become superficial, and feedback loops may fail to generate meaningful learning.

Empirical studies in agile contexts suggest that leadership behaviors, work design characteristics, and interaction quality influence psychological safety [7][9][6][11]. Within the IS community, it has been argued that psychological safety should be considered a socio-technical factor in agile information systems development [8]. These contributions highlight that agile methods cannot be analyzed solely as procedural frameworks; they must be examined in relation to the social conditions under which they are enacted.

**Psychological Safety in Agile and Scrum Contexts.** Recent research in agile software development suggests that psychological safety is associated with learning, knowledge sharing, and collaboration in agile teams [7][8][9]. Prior work also highlights the importance of leadership posture and interaction quality in Scrum environments [1][11]. However, empirical evidence remains limited regarding how specific Scrum ceremonies contribute differently to a psychologically safe climate and how organizational constraints condition these dynamics.

**Research Gap and Practice-Oriented Perspective.** Existing research rarely differentiates Scrum ceremonies when examining psychological safety-related dynamics. This study addresses

this limitation by analyzing Scrum ceremonies as structured interaction mechanisms whose effects depend on leadership posture, organizational context, and agile experience.

The next section details the methodological choices that operationalize this practice-oriented perspective.

# 3. Research methodology

This part presents the mixed-methods design, research model, hypotheses, and data analysis procedures used to examine perceived relationships between Scrum practices and speak-up climate.

## Research design

The study follows a sequential explanatory mixed-methods design combining questionnaire data with qualitative interviews and open-ended responses. Quantitative findings identify general patterns, while qualitative data provide contextual interpretation [1][7][9]. The mixed-methods design was selected because psychological safety-related dynamics involve both observable evaluative tendencies and context-dependent interpersonal interpretations. Quantitative data make it possible to identify recurring perception patterns across respondents, whereas qualitative data provide insight into how Scrum ceremonies, leadership behaviors, and organizational constraints are experienced in practice.

This complementary logic is particularly relevant in agile environments, where interaction quality and communication dynamics may vary significantly depending on facilitation practices, organizational culture, and team history. The sequential explanatory design therefore supports a richer interpretation of the relationship between agile practices and perceived speak-up climate.

## Analytical perspective and research model

This study adopts a socio-technical and practice-oriented perspective in which psychological safety is treated as a perceived team-level outcome emerging from structured interaction mechanisms. Rather than conceptualizing psychological safety solely as an antecedent of performance, we examine how specific agile practices are perceived by team members as contributing to a speak-up climate.

Scrum ceremonies are treated as structured interaction mechanisms whose perceived contribution to speak-up climate depends on leadership posture and organizational context. Organizational obstacles may weaken these effects, while agile experience may reinforce them. The research model is presented in Figure 1.

The Speak-up climate is a dependent exploratory construct, used as a proxy for psychological safety-related perceptions at the team level. The research model includes four explanatory dimensions associated with perceived speak-up climate.

- Scrum ceremonies: Structured interaction spaces (Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective) designed to support transparency, inspection, and adaptation [1].
- Supportive leadership expectations: Perceived expectations regarding the facilitative and supportive posture of the Scrum Master, consistent with leadership behaviors associated with psychological safety [4][1].
- Perceived organizational obstacles: Perceived contextual constraints such as hierarchical culture, delivery pressure, and resistance to change, which have been identified as inhibitors of psychological safety [6].
- Agile experience: Duration and depth of experience working in agile environments.

The arrows represent the hypotheses examined in the study and explained in the next section. This model reflects an integrated view in which governance mechanisms and organizational context jointly shape team dynamics [8].

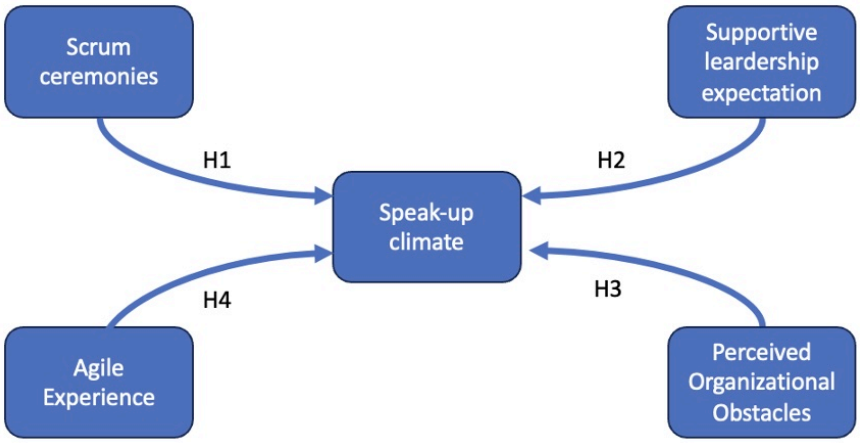


**Figure 1.** Research model linking agile practices, leadership expectations, organizational context, and speak-up climate.

## Exploratory hypotheses

The hypotheses derive from the research model but are framed as exploratory because of the limited sample size and the perception-based nature of the data. The aim is not to validate a full causal model, but to identify associations that can guide interpretation and future research.

- H1. Sprint retrospectives are perceived as contributing more strongly to speak-up climate than other Scrum ceremonies.
- H2. Supportive leadership expectations associated with the Scrum Master role are positively associated with perceived speak-up climate.
- H3. Perceived organizational obstacles, such as hierarchy, delivery pressure, resistance to change, and misunderstanding of agility, are negatively associated with perceived speak-up climate.
- H4. Agile experience is positively associated with perceived speak-up climate.

## Data collection

Quantitative data were collected through an online questionnaire distributed to members of Scrum teams operating in various contexts. The final sample included 62 respondents occupying different agile roles, including Developers, Scrum Masters, Product Owners, Agile Coaches, and other roles involved in agile teams. Participants were recruited through professional agile communities, LinkedIn networks, and practitioner-oriented communication channels.

The objective was not to obtain a statistically representative sample of Scrum practitioners, but rather to collect heterogeneous perceptions from individuals involved in agile environments. The sampling strategy therefore follows a purposive and exploratory logic commonly used in exploratory mixed-methods research. Respondents came from different organizational contexts and levels of agile maturity, allowing the study to capture a diversity of perceptions regarding Scrum practices and open communication dynamics.

The qualitative phase followed the quantitative phase in order to contextualize and interpret emerging patterns. Interview participants were selected based on their experience with agile transformations and Scrum facilitation in organizational settings.

The questionnaire included items related to Scrum ceremonies, leadership expectations, organizational obstacles, agile experience, and perceived speak-up climate. Qualitative data were collected through open-ended survey questions and semi-structured interviews conducted with a subset of participants. Four semi-structured interviews were conducted with experienced agile coaches working in large organizational contexts. The interviews explored participants' experiences with Scrum ceremonies, leadership posture, and organizational constraints in greater depth.

## Measures

Speak-up climate was measured through questionnaire items focusing on respondents' perceived ability to express concerns, ask questions, admit mistakes, and raise issues without fear of negative interpersonal consequences. This construct was used as an exploratory proxy for psychological safety, rather than as a validated psychometric scale.

The questionnaire used 5-point Likert scales. Depending on the question type, anchors ranged from 1 ("Not at all") to 5 ("Very much"), or from 1 ("Strongly disagree") to 5 ("Strongly agree"). Items related to Scrum ceremonies asked respondents to evaluate the perceived contribution of each ceremony to open expression. Leadership items measured perceived expectations regarding the Scrum Master's supportive and facilitative posture. Organizational obstacle items measured perceived barriers such as hierarchy, delivery pressure, resistance to change, toxic behaviors, and misunderstanding of agility. Agile experience was measured through self reported experience categories.

The questionnaire combined closed-ended and open-ended questions in order to capture both evaluative perceptions and contextual explanations. Closed-ended items focused on the perceived contribution of Scrum ceremonies, leadership expectations, organizational obstacles, and agile experience. Open-ended questions invited participants to describe situations in which Scrum practices either facilitated or constrained open communication.

The use of a perceived speak-up climate proxy was motivated by the exploratory objective of the study. Rather than attempting to validate a psychometric model of psychological safety, the questionnaire focused on observable communication-related perceptions associated with agile practices.

Because the study is exploratory and based on a limited sample, these measures are not presented as a validated psychological safety scale. They are used to capture perceived speak-up dynamics associated with agile practices.

## Quantitative data analysis

Given the ordinal nature of Likert-scale data, the limited sample size, and the exploratory nature of the study, non-parametric statistical techniques were used. Descriptive statistics, including mean scores (M), were computed to characterize perceptions across ceremonies and constructs.

H1 was examined through comparisons of mean ratings across Scrum ceremonies, with particular attention to retrospectives. H2, H3, and H4 were examined using Spearman rank correlations and descriptive group comparisons, depending on the variable type. Given the exploratory objective, results are interpreted cautiously and are not presented as causal evidence.

## Qualitative data analysis and integration

Qualitative data were analyzed using a thematic analysis approach. An initial coding framework was informed by the analytical dimensions of the research model while allowing for inductive refinement. The qualitative phase focused particularly on explaining why retrospectives were perceived as distinctive (H1), how leadership posture shaped ceremony dynamics (H2), and how organizational constraints limited open communication (H3).

Integration followed a sequential explanatory logic. Quantitative results were first interpreted independently. Qualitative findings were then used to contextualize and explain statistical patterns. Joint interpretation occurred in the Results and Discussion sections. The integration strategy aimed to identify convergence, complementarity, and contextual explanation between quantitative patterns and qualitative interpretations. Quantitative findings were used to identify broad tendencies, while qualitative data helped explain how these tendencies were experienced and interpreted by practitioners in Scrum environments. This integration strengthens internal validity and allows for a richer understanding of how agile practices and socio-organizational conditions jointly shape psychological safety-related dynamics.

# 4. Results

This section presents the results of the quantitative and qualitative analyses. Quantitative findings are first reported to identify general patterns, followed by qualitative results that help explain and contextualize these patterns.

## Quantitative results

**Sample Characteristics.** The quantitative analysis is based on 62 questionnaire responses. Respondents occupied different roles within agile teams, including Developers, Scrum Masters, Product Owners, Agile Coaches, and other agile-related roles. Agile experience varied from less than one year to more than three years, and team sizes ranged from fewer than five members to more than ten members. Because of the limited sample size, the analysis should be interpreted as exploratory rather than generalizable. Levels of experience in agile environments and team sizes also vary, allowing for exploratory comparisons across contexts.

**Perceived Contribution of Scrum Ceremonies to a Speak-Up Climate.** Respondents evaluated the extent to which Scrum ceremonies contribute to a climate in which team members feel able to speak up freely. Overall, perceptions vary across ceremonies, suggesting that not all events contribute equally to this climate. Sprint retrospectives received the highest mean rating (M = 4.3 on a 5-point scale), followed by daily scrums (M = 3.8). Sprint reviews (M = 3.4) and sprint planning meetings (M = 3.3) were rated lower. Sprint retrospectives are consistently perceived as contributing more strongly to a speak-up climate than other ceremonies. These descriptive results support H1: retrospectives are perceived as the ceremony most conducive to open expression. This finding should be interpreted as exploratory, since the analysis is based on perception data and a limited sample.

**Supportive Leadership Expectations.** Respondents reported strong agreement with statements describing a supportive and facilitative Scrum Master posture. Descriptive analyses suggest a positive association between supportive leadership expectations and perceived speak-up climate, supporting H2. This suggests that leadership posture is not separate from agile practices, but conditions how Scrum ceremonies are experienced.

**Organizational Obstacles.** Perceived organizational obstacles were rated relatively high, with mean values above 4 on a 5-point scale for toxic behaviors, hierarchical culture, resistance to change, misunderstanding of agility, and delivery pressure. Descriptive analyses suggest a negative association between perceived organizational obstacles and speak-up climate, supporting H3. This suggests that Scrum practices may lose part of their expressive function when embedded in hierarchical, high-pressure, or poorly aligned organizational contexts.

**Attribution of Psychological Safety to Agile Methods.** Respondents differ in how they attribute psychological safety to agile methods. Specifically, 11% of respondents reported that psychological safety was mainly attributable to agile methods, 40% reported that it was partly attributable, 34% reported that it was not attributable to agile methods, and 15% selected another or undecided response category. Respondents reporting higher organizational obstacles were less likely to attribute psychological safety outcomes to agile practices.

**Agile Experience and Adaptations.** Respondents with greater agile experience tended to report stronger perceptions of speak-up climate, although this association remained weak and exploratory. This supports H4 cautiously. Respondents also mentioned complementary practices such as serious games, icebreakers, anonymous retrospectives, and team-building activities as useful mechanisms for reinforcing open communication. These adaptations are treated as qualitative explanatory elements rather than as a separate hypothesis.

Table 1 summarizes the main observed relationships emerging from the quantitative and qualitative analyses.

Overall, the observed relationships suggest that Scrum practices contribute to speak-up climate conditionally rather than automatically.

**Table 1**
Summary of Main Observed Relationships with Speak-Up Climate

| Factor | Observed Relationship with Speak-Up Climate | Interpretation |
|---|---|---|
| Sprint retrospectives | Strongest perceived contribution among Scrum ceremonies | Retrospectives are perceived as supporting open discussion and collective reflection |
| Supportive Scrum Master posture | Positive exploratory association | Facilitative leadership appears associated with more positive ceremony experiences |
| Organizational obstacles | Negative exploratory association | Hierarchy, delivery pressure, and resistance to change may inhibit open expression |
| Agile experience | Weak positive exploratory association | Familiarity with agile environments may reinforce participation dynamics |
| Complementary adaptations | Qualitatively perceived as supportive | Anonymous retrospectives, icebreakers, and team-building practices may reinforce open communication |

## Qualitative results

The qualitative analysis draws on open-ended questionnaire responses and semi-structured interviews conducted after the survey phase. The analysis focuses on explaining and contextualizing the quantitative findings.

**Retrospectives as Spaces for Safe Expression.** Participants frequently describe retrospectives as moments where sensitive issues can be discussed more openly. One interviewee explained that retrospectives become ineffective when team members fear judgment or blame: “If people do not feel safe, retrospectives remain superficial” (I2). Similar interpretations are reported in Moussaoui's qualitative study, where retrospectives are framed as key mechanisms for psychological safety in Scrum teams [1]. Several respondents also describe retrospectives as one of the few formal moments where tensions, misunderstandings, and interpersonal frustrations can be discussed collectively. However, participants emphasize that these discussions remain highly dependent on facilitation quality and group trust.

**Leadership as an Enabling or Constraining Factor.** Participants emphasize the importance of facilitative Scrum Master behaviors such as listening, neutrality, and conflict mediation. Several participants describe facilitation quality as more important than the formal structure of ceremonies themselves. When these behaviors are absent, ceremonies are described as formalistic and less conducive to open communication. Some participants explicitly distinguish between “mechanically applying Scrum” and creating conditions that genuinely encourage participation. In several accounts, facilitative leadership was perceived as more important than the formal existence of Scrum ceremonies themselves.

**Organizational Constraints and the Limits of Agility.** Participants frequently mention organizational pressure, delivery constraints, and hierarchical culture as limiting factors. One participant noted that strong managerial pressure sometimes transformed Scrum ceremonies into reporting exercises rather than collaborative discussions. These constraints help explain why some respondents do not attribute psychological safety to agile methods despite adopting Scrum practices. Participants also describe situations in which organizational reporting structures, managerial oversight, or delivery urgency reduced the perceived openness of Scrum ceremonies. In these contexts, ceremonies were sometimes experienced as accountability mechanisms rather than collaborative reflection spaces.

**Integration of Quantitative and Qualitative Findings.** The integration of findings shows that agile practices, particularly retrospectives, can contribute to a speak-up climate, but only under certain conditions. Supportive leadership and reduced organizational constraints emerge as key enabling factors. Quantitative results identify patterns and relationships, while qualitative findings explain how these patterns materialize in practice. Overall, the qualitative phase supports

the interpretation that agile practices contribute to speak-up climate only under supportive organizational and leadership conditions.

Figure 2 summarizes the main empirical findings emerging from the quantitative and qualitative phases.

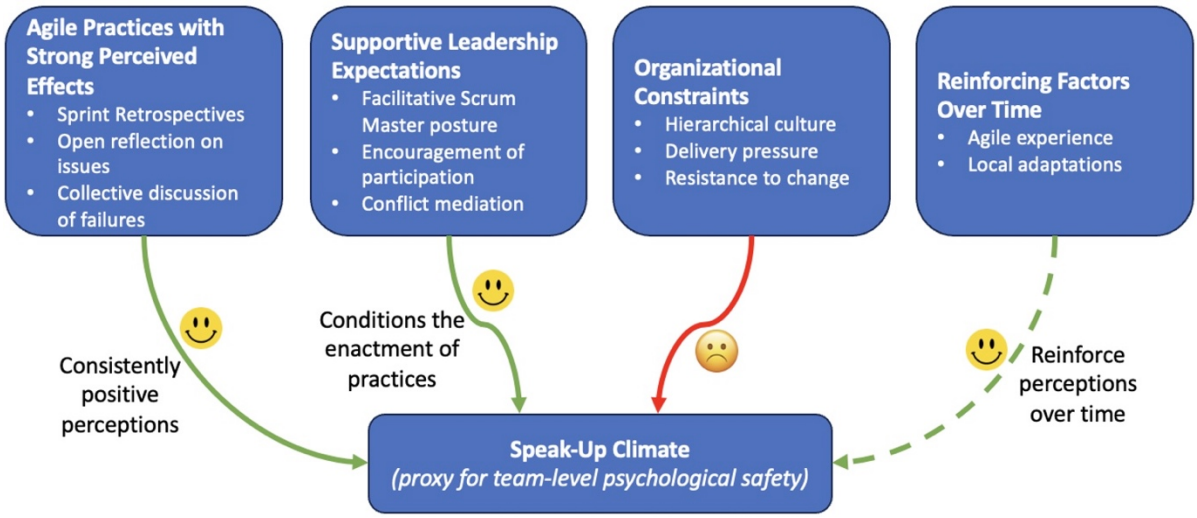


**Figure 2.** Synthesis of key findings on the perceived contribution of agile practices to a speak-up climate.

## 5. Discussion

This section discusses the findings as exploratory evidence on the conditional relationship between Scrum practices and perceived speak-up climate.

**Psychological Safety as a Practice-Embedded Outcome.** The findings suggest that Scrum ceremonies are not perceived as contributing equally to speak-up climate. Retrospectives appear particularly conducive to open expression because they formalize collective reflection and feedback [1]. This differentiation suggests that Scrum ceremonies may play distinct communicative roles within agile teams. This finding highlights the importance of practice enactment in agile environments. This suggest that agile methods should not be understood solely as procedural frameworks. Their perceived contribution to open communication depends on how interaction spaces are facilitated and socially enacted within teams. This observation reinforces the importance of examining agile practices as socio-organizational mechanisms rather than as isolated technical processes.

The results also suggest a distinction between the formal structure of agile methods and their situated enactment within organizational environments. Scrum formally prescribes recurring interaction spaces intended to support transparency, adaptation, and collaborative reflection. However, the perceived effectiveness of these mechanisms appears highly dependent on social conditions such as trust, facilitation quality, and the absence of excessive interpersonal risk. This distinction may help explain why organizations sometimes report difficulties sustaining collaborative dynamics despite adopting agile frameworks procedurally. The results therefore support a view of agile practices in which communication quality cannot be reduced to methodological compliance alone, but depends on how organizational actors collectively appropriate and enact agile structures in practice.

**Leadership as a Conditioning Mechanism.** The findings also highlight the importance of facilitative leadership behaviors such as neutrality, participation encouragement, and constructive feedback management. Scrum ceremonies appear more conducive to open communication when these behaviors are present. The results also suggest that similar Scrum practices may be

experienced differently across teams depending on local communication norms, organizational history, and the maturity of agile adoption.

**Organizational Constraints and the Limits of Agility.** Organizational constraints such as hierarchy, delivery pressure, and resistance to change appear to weaken the perceived contribution of agile practices to speak-up climate. This finding reinforces the idea that agile methods cannot be evaluated independently from the organizational environments in which they are implemented. In this respect, the findings align with socio-technical perspectives in information systems research, which emphasize the interdependence between formal structures, human interaction, and organizational context [8][12].

**Implications for Information Systems Research and Practice.** The results support a vision of agile practices in which psychological safety-related dynamics depend on the interaction between structured ceremonies, facilitative leadership, and organizational context. For practitioners, the results suggest that Scrum ceremonies alone are insufficient to ensure open communication.

**Practical Implications for Agile Governance. T**here are also implications for agile governance practices in organizations. Scrum ceremonies alone do not appear sufficient to foster open communication if organizational structures remain strongly hierarchical or delivery-oriented. This suggests that agile transformations should not focus exclusively on procedural adoption, but also on the social and managerial conditions that shape interaction quality within teams. In practice, organizations may need to support facilitative leadership behaviors, reduce excessive reporting pressure, and create interaction spaces where concerns and difficulties can be discussed without fear of negative interpersonal consequences.

Retrospectives should not be treated as routine procedural events, but as important organizational mechanisms for collective reflection and adaptive learning. These results reinforce the importance of aligning agile governance mechanisms with communication practices and team-level interaction dynamics rather than evaluating agility solely through process compliance indicators. Agile transformations may encounter limitations when organizations prioritize procedural adoption over communication quality and interpersonal dynamics. Simply introducing Scrum ceremonies or agile governance structures may not be sufficient if teams continue to experience strong hierarchical pressure, limited autonomy, or low interpersonal trust. This highlights the importance of considering agile transformation as both an organizational and interactional change process.

**Theoretical implications.** The study contributes to information systems research by treating psychological safety not only as an interpersonal climate variable, but also as a socio-organizational phenomenon embedded in agile work structures. Rather than assuming that agile methods inherently foster open communication, the findings suggest that the perceived contribution of Scrum practices depends on how interaction spaces are enacted and socially regulated within teams.

This perspective complements prior IS research emphasizing socio-technical interdependence in agile development environments [8][12]. Scrum ceremonies appear not merely as procedural coordination mechanisms, but as socially mediated interaction spaces whose effectiveness depends on facilitation quality, organizational support, and communication norms. This supports a practice-oriented interpretation of agile methods in which organizational context shapes how formal agile structures are experienced by practitioners.

**Methodological Contributions.** This study contributes methodologically by illustrating how exploratory mixed-methods designs can be used to investigate psychological safety-related dynamics in agile software development environments. Rather than relying exclusively on validated psychometric instruments, the study combines perception-based quantitative indicators with qualitative contextual interpretation in order to examine how practitioners experience communication dynamics within Scrum settings.

This approach makes it possible to capture dimensions of agile interaction that may remain difficult to observe through purely quantitative measurements alone. In particular, the integration

of qualitative interpretations helps explain why similar Scrum ceremonies may be experienced differently depending on leadership posture, facilitation quality, organizational pressure, and team history. It illustrates the value of combining socio-technical perspectives with mixed-method inquiry in information systems research on agile work practices and collaborative environments.

**Boundary Conditions and Limitations.** Several limitations must be acknowledged: (a) the study is exploratory and relies on a limited sample of 62 respondents; the results should therefore not be interpreted as generalizable evidence; (b) psychological safety is measured indirectly through perceived speak-up climate rather than through a validated psychological safety scale; (c) the qualitative phase is based on four interviews with agile coaches, whose perspectives may differ from those of developers, Product Owners, or ordinary team members; (d) the cross-sectional design prevents causal inference. Future research should use larger samples, validated measurement instruments, longitudinal designs, and interviews with a broader range of Scrum team members.

## 6. Conclusion

This study examined psychological safety as a perceived outcome of agile practices in Scrum teams, using perceived speak-up climate as an exploratory proxy. The findings suggest that Scrum practices do not automatically create psychological safety-related dynamics. Retrospectives appear to be the ceremony most conducive to open expression, while supportive Scrum Master leadership and organizational conditions shape whether agile practices are experienced as safe spaces for speaking up.

The study contributes exploratory mixed-method evidence to IS research by showing that the relationship between agile practices and psychological safety is conditional rather than automatic. Future work should rely on larger samples, validated psychological safety scales, longitudinal observations, and broader qualitative data from developers, Product Owners, Scrum Masters, and other team members. Beyond Scrum contexts, these findings also raise broader questions regarding how collaborative digital work environments support or constrain interpersonal risk-taking in contemporary information systems development settings. This issue may become increasingly important as distributed collaboration and digitally mediated teamwork continue to expand in contemporary software development environments.

The exploratory nature of the study also illustrates the methodological challenges involved in empirically studying communication-related dynamics in agile software development contexts. Future research may benefit from combining psychometric approaches, ethnographic observation, and longitudinal team analysis in order to better understand how psychological safety-related dynamics evolve over time within agile environments.

## Declaration on Generative AI

During the preparation of this work, the authors used GPT-5.5 for grammar and spelling checking. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the publication's content.

## References


[1] T. Moussaoui, R. Deneckère.: Psychological Safety and Its Consequences in Scrum Teams. In: Proceedings of INFORSID 2023, La Rochelle, France, 2023

[2] K. Conboy: Agility from first principles: Reconstructing the concept of agility in information systems development. Information Systems Research 20(3), 329–354, 2009

[3] P. Abrahamsson, O. Salo, J. Ronkainen, J. Warsta. Agile Software Development Methods: Review and Analysis. VTT Publications, 478, 2002

[4] A. Edmondson: Psychological safety and learning behavior in work teams. Administrative Science Quarterly 44(2), 350–383, 1999

[5] E.W. Morrison: Employee voice and silence. Annual Review of Organizational Psychology and Organizational Behavior 1, 173–197, 2014
[6] A.C. Edmondson, Z. Lei: Psychological safety: The history, renaissance, and future of an interpersonal construct. Annual Review of Organizational Psychology and Organizational Behavior 1, 23–43, 2014
[7] A. Alami, M. Zahedi, O. Krancher: Antecedents of psychological safety in agile software development teams. Information and Software Technology 162, 107267, 2023
[8] P. Diegmann, C. Rosenkranz: Investigating the "socio" in socio-technical development: The case for psychological safety in agile information systems development. Project Management Journal, 52(1), 11-30, 2021
[9] M.P. Buvik, A. Tkalich: Psychological Safety in Agile Software Development Teams: Work Design Antecedents and Performance Consequences. 55th Hawaii International Conference on System Sciences, 2022
[10] A. Newman, R. Donohue, N. Eva: Psychological safety: A systematic review of the literature. Human Resource Management Review 27(3), 521–535, 2017
[11] B. Marder, P. Ferguson, C. Marchant, M. Brennan, C. Hedler, M. Rossi, S. Black, R. Doig: Going agile: Exploring the use of project management tools in fostering psychological safety in group work within management discipline courses. The International Journal of Management Education, 19(3), 100519, 2021
[12] Bostrom, R.P., Heinen, J.S.: MIS problems and failures: A socio-technical perspective. Part I: The causes. MIS Quarterly 1(1), 9, 1977