

Investigating the Participation of Female Software Developers in Retrospective Meetings

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Abstract. *Retrospective meetings represent a crucial SCRUM event for software development teams to reflect and identify directions for improving collaboration and performance for the sprint. For this, professionals should feel comfortable and in a favourable environment to express their thoughts and be heard. In this paper, we report an interview-based study conducted with eight female software developers aiming to understand participation in retrospective meetings and how this affects their experience in the work environment in which they are inserted. Despite being identified with their teams and recognizing the promotion of gender diversity in their company, we found that they diverge in feeling comfortable expressing their thoughts.*

1. Introduction

In the dynamic landscape of today's agile software development, characterized by inherent collaboration, the evolution of practices faces escalating challenges. The complexities intensify with the widespread adoption of remote work as the standard, introducing challenges across geographical, temporal, and sociocultural dimensions, as discussed by Conchúir in 2009. The SCRUM methodology, widely embraced in the current market [VersionOne 2022], emphasizes retrospective meetings for reflection and continuous improvement. However, exploring the impact of these meetings requires addressing the complexities of remote development and persistent gender disparities.

Addressing gender disparity in software engineering is an evident challenge in academia and the job market [S. Overflow Survey 2022] [Github Survey 2017], which extends to minimal female participation in higher education, particularly in computer science [INEP 2022]. Despite these challenges, a growing industry movement, driven by ethical imperatives and a recognition of its crucial benefits, aims to significantly increase diversity in software engineering teams [Github 2023] [Google 2023] [Oracle 2023]. This effort, spanning race, gender, sexual orientation, and age, enhances problem-solving and decision-making and fosters innovation [David Rock 2016].

Even though diverse teams face challenges, such as interpersonal conflicts [Wickramasinghe and Nandula 2015], it is crucial to consider that individual attributes such as values, beliefs, knowledge, skills, and abilities play a more significant role in the effectiveness of software development teams than demographic affinities among its members, such as age, tenure, and gender [Kang et al. 2006]. Besides, it is worth noting

that several non-technical factors may harm the software development team's communication, such as the team climate [Dutra et al. 2022], leader behavior, and to which extent the developers identify with their team [de Souza et al. 2023].

Given the context above, the need to understand the role of communication in remote retrospective meetings becomes evident, especially considering gender disparities and challenges faced by gender-diverse teams. Retrospective meeting is an important ceremony that should be run at the end of sprints [Sutherland and Schwaber 2020]. In retrospective meetings, the team evaluates the previous sprint to extract insights about the development experience, team communication, and iterations. It formulates plans to improve the next sprint cycle [Przybyłek and Kotecka 2017]. So, retrospective meetings can be considered a sensitive space to reveal whether the team embraces its diversity in terms of promoting equitable space for the female developers to share their concerns and opinions.

Due this scenario presented above, this paper presents an initial investigation of communication in remote retrospective meetings from the perspective of female developers. To support our investigation, we employed an instrument for characterizing the social identity of female developers with their teams. The theory of Social Identity (SI) belongs to the field of social psychology, focusing on theorizing about individuals' sense of belonging and their relationship to the groups to which they belong, also addressing intragroup relationships [Abrams and Hogg 1990].

We present in the following sections the related work, the design of the interview-based study we conducted, and its results. Next, we discuss the main study findings and the study limitations.

2. Related Work

Gren (2020) suggests that software engineering can particularly benefit from the social identity theory due to its nature of addressing the individual's relationship with and between groups, which is essential for understanding development team dynamics [Gren 2020]. Besides, the author argues that certain agility practices may be justified by social identity and other theories from social psychology. However, further studies are needed to prove it.

In the software engineering technical literature, we found few empirical studies supported by the social identity theory. None of them address the communication in retrospective meetings. Bäckevik et al. (2019) [Bäckevik et al. 2019] conducted a qualitative study to examine how individuals' social identity within the team affects the agility of the software development process. Souza (2023) [de Souza et al. 2023] employs Social Identity to understand how the sense of belonging can impact feedback practices in development teams.

Our investigation addresses the communication in retrospective meetings from the point of view of female professionals. This work contributes to filling a research gap on gender diversity in agile teams. Kohl and Prikladnicki [Kohl and Prikladnicki 2018] present a systematic literature review to identify empirical studies on diversity in Software Engineering and agile methodologies. After the filtering stages, the authors found that 221 investigated diversity in Software Engineering, but only 12 specifically focused

on agile methods. From these, seven studies addressed gender diversity and agility. The analysis of these studies suggests that the characteristics of agile methods can support diverse team collaboration and better deliveries. However, none of these studies focus their investigation on the perception of female developers about communication in retrospective meetings.

Aksekili and Stettina [Aksekili and Stettina 2021] present a primary study on female leadership in teams following agile methodologies for software management. The study employed the Teamwork Quality Model (TWQ) to measure team collaboration quality. The authors conducted an online survey, gathering the perceptions of 77 professionals about their daily activities. The results indicate that companies supporting the presence and advancement of women positively impact team collaboration. Alternatively, our study aims to investigate the perspective of female developers on their participation in a particular ceremony for supporting teams' reflection and improvement, i.e., retrospective meetings.

The work by Catolino et al. [Catolino et al. 2019] conducted a data analysis focusing on the presence of women in software development teams and how this can impact the community. They aim to assess whether the presence of women in a team can create a more pleasant team atmosphere, with fewer exclusive subgroups and individuals who are more integrated. Ultimately, the study evidenced that the presence of women in teams does indeed alleviate interpersonal issues that may exist within a team. In our study, we want to understand the impact of retrospective meetings in female developers' work experience, taking their social identity into account.

3. Study Design

We developed a qualitative research design to address the research question *How does communication in remote retrospective meetings affect female developers' work experience?*. Given the interest in investigating women's experience in SCRUM teams during the SCRUM event of retrospective meetings, a retrospective study was chosen based on a questionnaire [de Souza et al. 2023] and semi-structured interviews. Firstly, participants were recruited for the research; with their confirmation, the interview was scheduled, and a questionnaire was sent for them to answer before the appointment.

We conducted the study with individuals who identify as female and work as software developers in a Brazilian company (Company X to preserve anonymity) following Scrum-based processes, including ceremonies. It is relevant to add that Company X and the participants were chosen by convenience. Before the interviews, the recruited subjects answered a consent form agreeing with their participation in the study. Although all developers were from the same company, they were from different teams. Company X is known for being vocal about its commitment to promoting diversity. The company has implemented a quota system in its recruitment process to ensure diversity in its workforce. Additionally, their marketing campaigns portray actors from different minority groups using their products. Thus, outsiders may perceive gender diversity as part of Company X's culture.

3.1. Characterization Questionnaire

We sent an individual invitation to each subject. As the candidates indicated their interest in participating, we sent them the characterization questionnaire (available in an open

repository¹) to fill out before the interview session. The characterization questionnaire was grouped into three sections: (i) consent form, (ii) participant characterization, and (iii) social identity form. As the questionnaire is sent before the interviews, the consent form aims to align the participant with the research objectives, explain how the collected data will be used, and advise them about their freedom to quit the study. Section (ii) focuses on characterizing the participant's profile, including questions about their experience in terms of years of experience, number of projects, and their own perception of this experience.

The last section of the characterization questionnaire follows the social identity form proposed by Souza (2023) [de Souza et al. 2023]. This form aims to understand if the participants identify with their software development team from four dimensions: *esteem of affiliation*, *private collective self-esteem*, *public collective self-esteem*, and *importance*. The subjects' social identity will support analyzing their perceptions about the retrospective meetings. There are mixed types of questions, varying between open-ended and closed-ended. The close-ended questions follow a seven-point Likert agreement scale (1 - completely disagree, 7 - completely agree).

3.2. Interview

The semi-structured interview (available in an open repository²) took place remotely through the Google Meet platform, given the diverse location of the participants. The questions focused on understanding the participant's retrospective meeting practice and their perceptions about it. For this, we organized the interview into four parts: (i) ice-breaker, (ii) retrospective, (iii) expressing opinions, and (iv) conclusion. The first part aims to make the participant comfortable before starting the questions. Thus, part (ii) consists of questions about the characteristics of the retrospective meetings in her team. The third part has questions to gather the participant's perceptions about the retrospective meetings. Finally, part (iv), the conclusion, aims to check if the participant wants to report any questions or issues regarding the study.

3.3. Data Analysis

The analysis of the interview data was conducted through thematic analysis, utilizing the first two levels of analysis: coding and categorization. In this way, it is possible to capture codes from the participants' responses, create an inventory of codes, and obtain categories. Additionally, we performed quantitative (closed questions) and qualitative analysis (open questions) over the questionnaire answers to characterize the participants' experience and social identity with their teams.

4. Results

We ran our study with eight female software developers between November 2023 and January 2024. The following subsections present the results of our study.

¹Questionnaire available in <https://anonymous.4open.science/r/gender-and-retrospective-E670/questionnaire-en.pdf>

²Interview script available in: <https://anonymous.4open.science/r/gender-and-retrospective-E670/interview-Script.pdf>

4.1. Questionnaire Results

According to the results³, of the eight study participants (S1, S2, S3, S4, S5, S6, S7, and S8), six identified as white, one as black, and the other identified herself as brown-skinned. Four participants, i.e., half of them, are senior developers (S1, S3, S4, S7) and feel experienced in software development activities. Two participants (S2, S5) play mid-level roles and do not consider themselves experienced. The other two participants (S6, S8) are junior developers; one considered herself experienced, while the other did not. The average years of experience in software development is 6.36 years. At the current company, they have an average experience of 1.93 years. The characteristics of the study participants point to diversity in roles and experience levels while not ethnically diverse. We report the results of the participants' answers to the questions from the four dimensions of social identity in the following.

When analyzing the questions related to *esteem of affiliation* (Q10, Q11, and Q12) we found a very high median (7) for all items, with the mean being approximately 6.6. This result indicates that most participants feel participatory and valuable to their teams. The participants emphasized their active involvement in projects, with comments such as “*I participate throughout the entire development cycle, from business definitions to the final delivery.*” (S3).

When analyzing the questions about *private collective self-esteem* (Q14 and Q15), the respondents demonstrate a strong sense of it within their teams. Almost all of them agreed with the sentence “I am satisfied with the development team in which I participate,” with the lowest grade being 5, the average being 6.375, and the median being 7. Besides, most of them (S1, S2, S3, S4, S5, S7, S8) disagreed with the sentence “I understand that the team I participate in does not collaborate enough in the project” from Q15. However, one participant (S6) partially agreed with this statement, pointing out a situation in which she felt unsatisfied with belonging to the team: “*At times, it seems that what I did or my opinion is not considered.*”

In general, most of the participants expressed deep satisfaction in being on their teams, which can be seen by some answers to the open-ended questions: “*Proactive team, very diverse, motivated with deliveries and results.*” (S1), and “*I feel satisfaction for belonging to my team due to the results frequently disclosed by the Product Owners about the features we developed, and also when I see how much we achieve from our goals.*” (S8).

We found a considerable response variability in the questions about *public collective self-esteem* (Q17, Q18, Q19, Q20), with medians 6, 4, 7, and 5.5, respectively. It represents a slightly less positive perception than the previous dimensions, especially regarding the perception of higher performance (Q18) and synergy with other teams (Q20). In this sense, some participants expressed their points of view, for example, “*Generally, we do what we set out to do, but we don't impress as much as others regarding what is being accomplished.*” (S6) or simply stating that “*I don't have this perception*” (S4). Other respondents shed light on positive comments such as: “*I hear many compliments from leadership about the team's performance, with impacting deliveries and always meeting*

³Raw data available in: <https://anonymous.4open.science/r/gender-and-retrospective-E670/raw-questionnaire-answers.xlsx>

deadlines.” (S2) and “*My team adds value to the product*” (S8).

Lastly, analyzing questions 19, 20, and 21 about the *importance* of the team to the individual, we have medians 4, 4.5, and 4.5, respectively, suggesting that the participants tend to have a fair perception of how the team influences who they are and how they behave. Besides, this result may indicate that the study participants feel inspired by their teams. This is demonstrated by the comments: “*The environment that surrounds us influences us. I believe that the team’s motivation and pro-activity greatly influence the way, speed, and quality with which I work*” (S1), “*I understand that the team strongly influences the way of working; that is, a productive team induces you to produce more. On the other hand, self-demand is also higher; this is a daily challenge for me. I often work more than necessary to stand out - which is unhealthy.*” (S2), “*As people I spend at least 8 hours a day with, I feel influenced by the friendship and culture of others who come from different places and have different life stories.*” (S6), and “*I understand that experiences bring some learning to life, not necessarily the team itself. I believe that each person has something to teach us.*” (S4).

4.2. Interview Results

We transcribed the interviews and conducted a thematic analysis (coding and categorization) of the responses. The raw data of the interviews and the detailed thematic analysis are available⁴. Based on the codes identified in the participants’ answers, we obtained the following categories described in the following subsections: frequency, duration, dynamics, being heard, expression, team behavior, and environment.

4.2.1. Frequency, Duration and Dynamics

Seven participants stated they hold the retrospective meeting every 2 weeks and one (S3) monthly due to greater flexibility in ceremonies within their team: “*It’s not set in stone, but we try to have a frequency of at least once a month to talk*” S3 states. Through the sessions, the researchers understood that the company guides the teams to follow a two-week sprint, and almost every developer we talked to has teams that do the retrospective meeting by the end of the sprint. This shows that most teams value the retrospective meeting.

Three participants stated that their retrospectives last for 1 and a half hours, with four stating that hers is around 1 hour, while one subject retrospective is about two hours. Usually this duration is due to the dynamics, for example S2 says “*Usually an hour and a half because there’s always the initial icebreaker. And then the icebreaker leads to the retro itself*” and S8, the longest meeting time, states, “*They take from one to two hours... it’s because we have the time for relaxation, right? So everyone can feel more at ease. There is time to write the cards on the board, then reflect on them and pick up the action points*”.

All subjects pointed out they use the retrospective default questions [Przybyłek and Kotecka 2017] to guide the meeting: (i) what worked well that we might

⁴Raw data available in: <https://anonymous.4open.science/r/gender-and-retrospective-E670/raw-interview-data.xlsx>

forget to do in the next sprint if we don't discuss it?; (ii) What didn't work well, and how can we do it differently in the next sprint?; (iii) What have we learned?

All participants shared that a typical retrospective meeting happens with them answering these questions using an online tool that simulates a "post-it wall"; it was mentioned the "EasyRetro"⁵. The team has a limited time to answer each of them. After the virtual wall is full of notes, the team proceeds to discuss and come up with conclusions and action plans for the next sprint. S4 shared that, sometimes, her team follows a different dynamic in the meeting: *"We used to occasionally pick one retro or another for us to play, precisely to bring this camaraderie, have some fun. So, we set aside a bit of this well-structured retro to bring this more playful environment so we could bond better."* Additionally, some (S1, S2, S3, S8) reported that before answering those questions, there was an icebreaker to ease the environment: *"Oh, I like the icebreaker! But I think sometimes we extend the icebreaker too much because we want to talk a lot, make friends, laugh, you know? Say those things, and sometimes we leave little time for the actual retrospective [...]"* (S1). By that, it's possible to see that some teams search for ways to stimulate collaboration and integration during the perspective meetings.

Some pointed out that the answers in the dynamics of post-its wall does not result in anonymous contributions in the practice, which may influence team collaboration. *"So, we wrote, but we didn't know what each one was writing. And then, in the end, each one would speak, so we would open the microphone for each one to say what they had put on the board. [...] It was only anonymous when writing"* (S7). Also, S8 told how this could influence her and her team's participation: *"The cards were not anonymous... as everyone wrote, we could already see what people had put in. Sometimes, I didn't write much anymore because I could see that other people had made a point. I agreed, and then I didn't want to repeat it. You know?... And then I felt that participation could decrease a bit, like from some people. Not everyone put all the points they found relevant, right?"*

4.2.2. Being Heard

Most of the participants shared that they felt heard in the retrospective meetings. S3 said *"I generally feel well heard. I think everyone on the team takes both what I say and what others say seriously. Usually, everyone tends to contribute, sharing both positive aspects and areas for improvement. This way, there is no silence, and everyone actively participates."* However, S7 and S8 shared their thoughts on this matter. S8 pointed out that she felt heard only when she spoke about her tasks, while S7 detailed her feelings: *"During the retrospective, I feel heard. But when it comes to putting it into practice, it's a different story, right? The practice is another thing. [...]. The points I was talking about were considered, but when it came to putting it into practice, we didn't see much."*

4.2.3. Expression

When analyzing reports from the three senior (S1, S3, S4) interviewees, we see a comfortable scenario for expressing themselves. In this sense, it is worth noting that S1 stated

⁵<https://easyretro.io/>

that she understands that this comfort comes from her seniority and that it was not a reality when she was junior, she mentions *“I think that at the beginning of my career when I was junior, I was much more afraid to say some things. I thought, am I going to say something rude or something that doesn’t fit my position? Today, I think I feel more secure there with more context of things”*. Additionally, S4 states that this comfort comes from the fact that her team has a good rapport.

Study participants with less experience shared that they don’t feel comfortable expressing their opinions. S2, a mid-level developer in a team whose majority is male, shared *“I feel like I need to prove myself more, you know? Of course, part of it is also my responsibility, maybe being insecure, but I think a percentage of it is because I’m a woman. Generally, statistically, we need to prove ourselves more.”*. Also, S7 presents a scenario in which she feels disregarded, making her uncomfortable. *“So, there was only me as a woman, right? So, there were some things there that people kind of, you know! Let’s see if this really happens to see if what she’s bringing is a fact or not.”*. Although S5, a mid-level developer, feels comfortable expressing her opinion, she shared that in her team, junior developers usually don’t participate as much as seniors.

Even though seniority seems to influence the expression of the participants, S6 and S8, junior developers feel comfortable collaborating in the retrospective meeting due to their identification with their colleagues. S8 mentions *“The team members were very similar to me, so we had the same tastes and opinions. Everyone’s opinions were very well articulated. They gave very constructive contributions. So, I felt even better in the other team, more comfortable contributing.”*. Throughout the interview, S8 stated that team rapport is crucial to let her feel comfortable expressing herself, while S6 exemplified that when she changed teams inside Company X, she no longer felt comfortable expressing her thoughts. S5 expressed that her comfort is because she made a career transition once she was a senior in her previous job: *“I’ve always felt very comfortable, and I think that has made a big difference in my career, especially considering that I transitioned careers. I was already senior in what I did before, so speaking up has never been a problem to me.”*

The results indicate that seniority and team rapport are major factors in female developers expressing their opinions in retrospective meetings. The arguments provided by the participants suggest that leaning on seniority is a way for female developers to deal with the sensation of gender inequality. However, more investigations are needed.

4.2.4. Team Behavior

Participants generally shared that their team collaborates in the retrospective meeting having a comfortable space to share their thoughts. *“The other team we were more integrated with had much participation. I think everyone spoke.”* S4 spoke about a previous team she was part of. *“I think there is room to disagree, and we actually disagree on quite a few things”* S1 shared about her team retrospective meetings. However, some reported less participation from Junior developers, *“I think that the earlier in their career someone is, the more insecure they are, and the less people contribute”* S1 also shared. *“What I notice...is that junior individuals tend to be quieter than more senior individuals. This is a general observation in any meeting context”* S5 said about her team.

Additionally, some participants shed light on their opinion about a collaborative team in the retrospective meeting. *“Maybe I would change the way, for example, if a person doesn’t want to expose themselves to say something, they don’t need to, you know? A slightly more comfortable environment to speak”* S2 exposed her view on making people participate more. *“I think that when the team is well-connected, people have the freedom to speak without the fear of accusing, and I believe that this is important.”* S4 shares her belief in making the team more comfortable. While S1 shared her thoughts on how diverse teams helps the collaboration, specially in the retrospective meeting: *“I think that not only in my team but also in other teams, we had some difficult cases, where people struggled to work in a team that was not very diverse, right? So it was only white, heterosexual men, and then there was a woman in the team. This woman faced a lot of challenges within the team. There was prejudice, a lack of space. So I do think that the diverse environment becomes more collaborative. People feel more comfortable contributing and expressing their opinions. So, I believe that the more diverse, the better. I think these people experience things differently. They also have different perspectives.”*

4.2.5. Environment

Some participants expressed how the company’s concern for gender diversity influences their comfort level. For example, S1 spoke about her team *“I work on a very diverse team, you know? So, I think having other women on the team certainly helps, always unlocks a bit more”*. S5 expressed her positive thoughts about the culture when asked about how she felt heard during the retrospective meetings *“I think this is a general thing. Like, in all teams here, in all meetings I participate in within this area and as a whole. I believe that the culture here is very strong, you know? So, people care about listening”*.

Further, S8 expressed her feelings on the gender diversity policies *“Company X has a lot of lectures specifically focused on the development of women, right? They have several affirmative action positions for women, so I think there’s this extra thing that comes from the core of the company. Women are encouraged to grow. [...] There’s this little something from the core of the company that makes us feel that women are valued.”*. Besides, when questioned about a previous experience in another company, S8 shared her feelings *“I felt completely left out. It was a company where nobody was close to anyone; nobody talked to me. The retrospectives were purely to discuss what happened, so there was no casual atmosphere like we have here [...] I didn’t feel comfortable commenting on anything there because it was all about what was developed, and that’s it. Besides, my team was composed of very different people. Here, everyone is young, but there it was a team of older white gentlemen [...] so I didn’t feel comfortable commenting, purely about what was developed, and that’s it.”*

5. Discussion

The Social Identity Questionnaire results indicate that participants feel they belong to their teams and have favourable views about them. Some participants even highlighted that such identification influences their positive experiences with retrospective meetings. Besides, the participants tend to understand the importance of retrospective meetings for the team’s productivity. Although the retrospective meeting may be long (approximately

one hour or more), the icebreaker practice seems to smooth the experience, probably promoting their feeling of belonging and esteem of affiliation.

Although the participants believe they are heard in retrospective meetings, the study findings reveal that they considerably diverge in feeling comfortable expressing their thoughts. Based on their arguments, we identified two favourable factors for expressing themselves: *seniority level* and company culture. We found that participants commonly attribute to their senior levels and experience their active engagement in the retrospective meetings. Besides, they frequently recognize the culture of gender equality in Company X. This finding strengthens previous findings regarding the importance of supporting gender diversity for team collaboration improvement [Aksekili and Stettina 2021].

The study findings also indicate that, despite the company promoting a favourable culture for gender diversity, the sensation of vulnerability due to being a woman and minority in their teams is still present, producing the self-censoring behaviour of women developers in their early careers.

Thus, considering the research question of this work *How does communication in remote retrospective meetings affect female developers' work experience?* and the discussion presented above, we found concerning issues to be addressed to stimulate women's participation in retrospective meetings. Retrospective meetings influence team collaboration and productivity throughout the sprints, so when female developers do not feel comfortable participating this can impact their sprint. The goal of this SCRUM event is for the team to build companionship; any discomfort experienced by individuals can detrimentally affect the overall working experience [Sutherland and Schwaber 2020].

6. Limitations and Conclusion

The study reported in this paper aimed to investigate communication in remote retrospective meetings from the perspective of female developers. For this purpose, we interviewed eight female developers from a company with a gender-inclusive culture. The analysis of responses obtained indicated that they identify themselves with their teams. However, they diverge in feeling comfortable expressing their thoughts in these meetings. In this way, we see the seniority level as a way to overcome the sensation of gender inequality. However, we need to conduct further investigations to provide a more comprehensive analysis of this phenomenon.

We reported a qualitative study investigating a particular case to explore female participation in retrospective meetings. Replications are needed to address other contexts. However, we understand that organizations with similar characteristics may consider the study findings an evidence-based resource for reflection. We recognize that other minorities that may also influence the work experience are not well-represented in our sample.

In future studies, we see the opportunity to investigate the participation of early career professionals in retrospective meetings to observe gender bias. It is also possible to expand the investigation with early career professionals from other minorities, such as neurodivergent and LGBTQAP+. Furthermore, we intend to replicate our study with professionals from companies with different levels of engagement in promoting diversity.

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