CHALMERS
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Conflict Management Styles In Software Engineering

A Comparative Analysis with Regard of Gender and Profession

Master's thesis in Computer science and engineering

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CHALMERS UNIVERSITY OF TECHNOLOGY
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Abstract

In software engineering teams, interpersonal conflicts are inevitable and can significantly impact project outcomes and team dynamics. These conflicts can arise from a variety of causes, including when the needs and desires of individuals or parties contradict. To resolve these conflicts, effective management strategies are required to ensure successful project delivery and optimal team functionality. The Thomas-Kilmann Conflict Mode Instrument (TKI) is widely utilized to evaluate conflict management approaches, based on two principal dimensions: Assertiveness and Cooperativeness. These dimensions define five distinct conflict management styles: Avoiding, Compromising, Accommodating, Competing, and Collaborating.

This study examines the distribution of conflict management styles among software engineers, with a specific focus on gender differences and the distinctions between students and practitioners, by using the TKI model. It also examines their level of awareness regarding these styles. We employed a mixed-methods approach, integrating a quantitative survey using the TKI with qualitative interviews. We analyzed responses from 82 survey participants and conducted 10 in-depth interviews. We used Bayesian data analysis to interpret the survey results and applied thematic analysis to the interview data.

The findings reveal that Collaborating style is predominantly favored across all demographics. However, notable differences were observed: students exhibited a significant preference for the Avoiding style, indicative of their less confrontational approach, whereas practitioners tended towards Accommodating and Compromising, reflecting their more seasoned conflict resolution skills. Gender analysis showed females have higher tendency toward Collaborating and Compromising style, while that males were more inclined towards Competing style. We found no significant differences between genders in the Avoiding and Accommodating styles.

Qualitative insights confirm that while the Collaborating style is preferred, many individuals adapt their conflict management strategies based on situational demands, interpersonal interactions, and organizational hierarchy. The results emphasize the importance of tailored training programs in educational institutions and professional organizations.

Keywords: Conflict management styles, software engineering, Thomas-Kilmann Conflict Mode Instrument, gender differences, professional experience, Bayesian analysis, Thematic analysis.

Acknowledgements

We would like to extend our heartfelt gratitude to our supervisor, Birgit Penzenstadler, for her invaluable guidance and support throughout the process of understanding and completing this thesis.
We are also profoundly thankful to Richard Torkar for his enthusiastic support and expertise in Bayesian analysis, which was instrumental in achieving the results of this study. His dedication significantly shaped the analytical framework of our research.
Our sincere appreciation goes to our examiner, who provided critical insights and feedback, enhancing the quality and depth of our work.
Additionally, we are grateful to all the participants of our survey and interviews, with a special acknowledgment to the participants from Husqvarna Group and Volvo Cars. Their contributions have been invaluable, and this research would not have been possible without their involvement and support. A special thanks to the manager at Husqvarna Group, whose insights during the interview were particularly enlightening.
Finally, we must express our profound gratitude to our family and friends (Romrama and Mina from Sogeta), (Aniket and Prasanna from Pallavi) for their unwavering support and continuous encouragement throughout our years of study and during the process of researching and writing this thesis. Their support has been a cornerstone of our journey, providing both motivation and strength. This accomplishment would not have been possible without them. Thank you.

Sogeta Al-Bazi and Pallavi Pattewar, Gothenburg, July 2024

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1
Introduction

Teamwork has become a common practice in software engineering, as firms tend to assign workers to different team tasks and activities rather than assigning one person per project [33]. A team can be defined as "A small number of people with complementary skills who are committed to a common purpose, performance goals and approach for which they hold themselves mutually accountable" [26]. This collaborative approach has proven to yield more successful outcomes due to the diverse perspectives, skills, and experiences that team members bring to a project [33].

However, despite the advantages of teamwork, conflicts within software engineering teams are inevitable and can be time-consuming, ultimately detracting from team performance [4]. In 2008, it was found that employees spent an average of 2.8 hours per week dealing with conflict, with 25% of conflict situations resulting in personal attacks and 10% causing project failure [33]. Furthermore, the cost of project failure in the European Union was estimated to be $142 billion Euros in 2004, with interpersonal conflicts and requirements uncertainty being the primary contributing factors in software development, according to [29].

Conflict can be defined as "A process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about"[27]. In other words, conflict arises when the needs and desires of two parties are in opposition. Conflicts can be caused by various factors, such as communication problems, dissatisfaction with management, a desire for power, ineffective leadership, and insufficient openness [27].

The first step in effectively managing and resolving conflicts is to identify and understand the various conflict management styles of software engineers. Conflict management styles can be described as the communication strategies for avoiding, addressing, or resolving conflicts [23]. The conflict management styles employed in this study are based on the Thomas-Kilmann Conflict Mode Instrument (TKI), which identifies an individual's behavior in conflict situations and methods for dealing with conflicts [22]. The TKI consists of five styles: Accommodating, Avoiding, Collaborating, Competing, and Compromising. Each style represents a unique approach, suitable for different situations, with its own strengths and weaknesses. There are, however, several challenges associated with managing conflict in software engineering, including gender differences and the academia-industry gap.

In the field of software engineering, the significance of gender studies is growing, particularly for addressing diversity and inclusion issues. Some of these studies have shown that gender diversity enhances productivity within software development teams [16],[37],[10]. This may be due to the fact that gender diversity adds

different skills, perspectives, and experiences to the discussion, which contributes to more innovative solutions and ideas. Nevertheless, gender plays a significant role in conflict management style preferences. Studies in various fields have consistently shown significant differences in the conflict management styles adopted by different genders [40], [27], [2]. These differences are partly due to the alignment of chosen conflict management styles with traditional gender roles [2]. However, there is currently a lack of research on gender differences in conflict management styles within software engineering, highlighting the need for more research in this area.
In software engineering, it is evident that the gap between academia and industry has a direct effect on both the organizations that represent both groups [34], as well as how conflict is handled within teams. Studies in other fields have shown that differences in conflict management styles between students and practitioners exist, with students tending to use Collaborating and Compromising styles [32], whereas practitioners tend to use Competing and Collaborating [40]. Furthermore, the organizational level has an influence on the choice of conflict management style, as the organizational level increases, the preference for Competing style also increases [40]. In part, this is due to differences in experience and expertise, as students may only be learning about conflict management theoretically, while practitioners may have years of experience working in teams and resolving conflicts. The existing literature in the software engineering field has primarily focused on the gap between academia and industry, which underscores the need for further research in this field.
The management of software engineering projects involves both social interaction and technical direction [39]. A key question arises: what constitutes a good software engineer? The answer, according to Capretz and Ahmed [9], is that software engineers must possess a blend of hard and soft skills to succeed in the workplace. The hard skills include the knowledge of relevant methodologies and techniques, as well as the ability to apply that knowledge. While, soft skills include collaboration, communication, problem-solving, and similar interpersonal and critical thinking skills. By understanding and utilizing different conflict management styles, software engineers can improve communication within the team, which can help them manage disagreements more effectively and thereby increase the performance and quality of the final product [33]. In current studies, little is known about software engineers' awareness of conflict management styles, which is crucial for developing essential soft skills and effective conflict management techniques.
This study aims to investigate the distribution of the predominant conflict management styles across genders, specifically focusing on both students and practitioners within the software engineering field. Additionally, the study examines software engineers' awareness of different conflict management styles. The findings of this study can provide valuable insights into how educational institutions and organizations can enhance conflict management training and resources, ultimately promoting a more productive working environment.

1.1 Problem statement

In software engineering, conflicts are inevitable, and effective conflict management is crucial for ensuring successful project outcomes and team performance. Despite the importance of conflict management styles in this field, there is a lack of research on the distribution of these styles across genders and the academia-industry gap. The under-representation of women in male-dominated software engineering teams can lead to conflicts related to gender bias, unequal opportunities, and communication differences. It is therefore essential to raise awareness of the different conflict management styles used by each gender to improve communication, avoid misinterpreting each other's actions, and achieve better project results.
Moreover, while several studies have examined the gap between academia and industry in software engineering, none have looked at conflict management styles in relation to this gap. The differences in demands between industry and academia pose significant challenges for academia to provide realistic experiences for students [34]. This lack of practical experience hinders students' ability to acquire the essential soft skills to collaborate and communicate effectively. Therefore, by understanding the dominant conflict management styles in the industry, students can develop the necessary skills and strategies to deal with conflicts effectively. As for the practitioners, access to the latest research and theoretical frameworks can improve their conflict management capabilities, leading to improved team dynamics and project success.
This study examines the distribution of conflict management styles among software engineers, with a specific focus on gender differences and the distinctions between students and practitioners, by using the TKI model. Additionally, it examines software engineers' awareness of different conflict management styles. The methodology used in this study includes a survey and post-survey interviews, targeting both student and practitioner software engineers. The findings will provide insights into how to develop effective conflict management strategies for improving software development outcomes. Additionally, the result will contribute to a better understanding of conflict management styles within software engineering teams, enabling software engineering organizations to design conflict management training programs and create a more inclusive and collaborative work environment.

1.2 Significance of study

The significance of this study lies in its potential contribution to managing conflict within software engineering teams, thereby improving team dynamics and productivity. By investigating the level of awareness of conflict management styles, this study can assist scrum masters, product owners, and project managers in developing more effective training programs and strategies to manage conflicts in software engineering teams. Furthermore, researchers can use the findings of this study to further study conflicts within software engineering teams, and explore how to reduce conflict costs within them, by considering the predominant styles used among software engineers.

1.3 Thesis outline

The thesis is structured as follows:

- Chapter 2 defines conflicts, explores conflict management styles along with their strengths and weaknesses, and reviews previous research in the field.
- Chapter 3 outlines the research methodology, detailing how the surveys and interviews were conducted and the process used to analyze the acquired data.
- Chapter 4 presents the results of the survey and interviews.
- Chapter 5 offers a discussion of the findings, conclusions, and recommendations for future research.

2

Literature review

This chapter consists of literature reviews and research papers that provide the foundational support for this study. The following sections include definitions of conflict and types of conflicts within software engineering teams, a historical overview of conflict management styles, a detailed description of the Thomas-Kilmann Conflict Mode Instrument (TKI) styles along with their advantages and disadvantages, and related studies examining gender differences and distinctions between students and practitioners in conflict management styles.

2.1 Conflict-Definition

Conflict has been defined by Khanaki and Hassanzadeh [27] as "A process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about". Another definition of conflict by Deutsch [12] is:

> A conflict occurs whenever incompatible activities occur... An action that is incompatible with another action prevents, obstructs, interferes, injures, or in some way makes the latter less likely or less effective.

Conflict within teams is defined by Thomas and Thomas [41] as "The condition in which the concerns of different team members—the things they care about—appear to be incompatible" . In other words, conflict arises as a result of a clash of values, interests, goals, beliefs, preferences, attitudes, manners, or methods.

2.1.1 Root causes of conflict

Various causes of conflict have been identified in numerous studies over the years. Some studies have addressed organizational conflicts, while others focused on personal conflicts associated with romantic relationships. Interestingly, the findings from these personal conflict studies can also be applied to other types of conflicts, including those at the organizational level.

At the organizational level, Thomas and Thomas [41] argue that conflict occurs when two conditions are present—interdependence and differences. As shown in Figure 2.1.

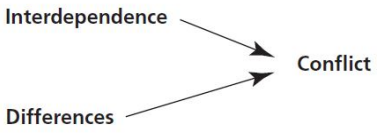


Figure 2.1: *Cause of conflict [41]*

Interdependence occurs when team members must collaborate to address their concerns, which is especially true when team decisions impact everyone. Consequently, conflicts are more common during collaborative meetings than during independent work. On the other hand, the differences between team members are due to their varying responsibilities, values, temperaments, sources of information, or experiences. As differences increase, team decision-making is likely to be impacted by a greater variety of concerns, which can lead to a greater amount of conflict. Different viewpoints may create more conflict within a team, but they can also lead to a deeper understanding of the issue [41].
Canary *et al.* [8] defines three levels of experience that a conflict can occur:

- **Specific disagreement** (e.g. argument over a particular issue)
- **Problem-solving discussion** (e.g. bargaining)
- **Unhappy/distressed relationships** (i.e. patterns of interaction that indicate distressed couple)

While Jones [23] identified four triggers that cause interpersonal conflicts: criticism, demand, cumulative annoyance, and rejection. Table 2.1 presents these four causes of conflict.

Table 2.1: Causes of conflict.

Criticism	The act of criticizing another person, or making comments about their personality, behavior, appearance, or life choices, can lead to conflict. Comments are not always intended to be constructive, but they are often perceived as criticism.
Demand	Conflict can also arise from demands, especially if the demands are viewed as unfair or irrelevant. Rephrasing demands as questions can still appear as demands depending on context and tone of voice.
Cumulative annoyance	Cumulative annoyance is a buildup of frustration or anger over time, leading to conflict and it can be caused by criticism and demands.
Rejection	Rejection can lead to conflict when one person perceives the other as ignored or invalidated by one's comments or behaviors.

There are also three other main drivers of conflict according to Khanaki and Hassanzadeh [27]: Power, Value, and Economics.

- **Power conflict** arises when two parties or individuals strive for more power or influence over one another at the expense of the other.

- **Value conflict** arises from differences in people's cultures and lifestyles. It also involves ethical issues and divergent perceptions of what is considered right.
- **Economic conflict** arises when individuals or groups compete for limited resources.

In conclusion, conflicts can arise for a variety of reasons. However, according to many studies, what determines a team's success is not the absence of conflicts, but rather how effectively these conflicts are managed [8], [27], [33], i.e. how to make conflict constructive rather than destructive.

2.1.2 Conflict-history

Conflicts during the 1930s and 1940s were viewed as major obstacles to group functioning and were to be avoided at all costs [27]. Furthermore, conflicts were seen from the perspective of competition and cooperation, with studies focusing on the effect of "competition" versus "cooperation" on individual task performance. These early investigations into cooperative competition did not address crucial aspects such as social interaction, communication processes, problem-solving methods, interpersonal attitudes, or attitudes toward self, work, or the group [12]. The modern approach, however, emphasizes the importance of facing conflict rather than avoiding it [12]. Thus, conflicts are considered a creative force that can lead to innovation but they should be managed properly [27]. They can prevent stagnation, stimulate interest and curiosity, serve as a forum for voicing problems and generating creative solutions, and act as a catalyst for social and personal change [12].
While there is a risk that some conflicts may negatively impact cooperation and productivity among team members, leading to destructive outcomes, the project's success or failure largely depends on how the project manager supervises and manages these conflicts [33].

2.2 Conflict management styles models

A variety of classifications have been used to measure conflict management style. Behavioral conflict-handling strategies were first conceptualized by Mary Follett in the 1920s. According to Follett, individuals typically engage in Dominance, Compromise, Integration, Avoidance, and Suppression when dealing with conflict [11]. In 1949, Deutsch proposed a conceptual scheme to classify conflict based on a simple dichotomy between cooperation and competition [11].
In 1964, Blake and Mouton introduced a two-dimensional grid that classified five styles for handling conflicts, focusing on how concerned individuals—specifically managers—are with production and people. The styles identified by Blake and Mouton include Forcing, Withdrawing, Smoothing, Compromising, and Problem-Solving [11]. Building on this framework, Kenneth W. Thomas and Ralph H. Kilmann, in 1976, developed the Thomas-Kilmann Conflict Mode Instrument (TKI). This model attempted to reduce the inherent social desirability bias found in previous models [11]. The TKI measures a person's behavior under conditions of conflict, specifically when the issues of two parties are contradictory and appear antagonistic.

2.2.1 Thomas-Kilmann Conflict Mode Instrument (TKI)

In the TKI, five conflict-management styles are measured: Competing, Collaborating, Compromising, Avoiding, and Accommodating. These styles are assessed along two independent dimensions: Assertiveness, the extent to which individuals satisfy their own concerns, and Cooperativeness, the extent to which individuals attempt to satisfy other people's concerns.
Each of the five distinct styles is related to these dimensions as illustrated in Figure 2.2. Additionally, Table 2.2 provides definitions for each style along with their respective advantages and disadvantages.

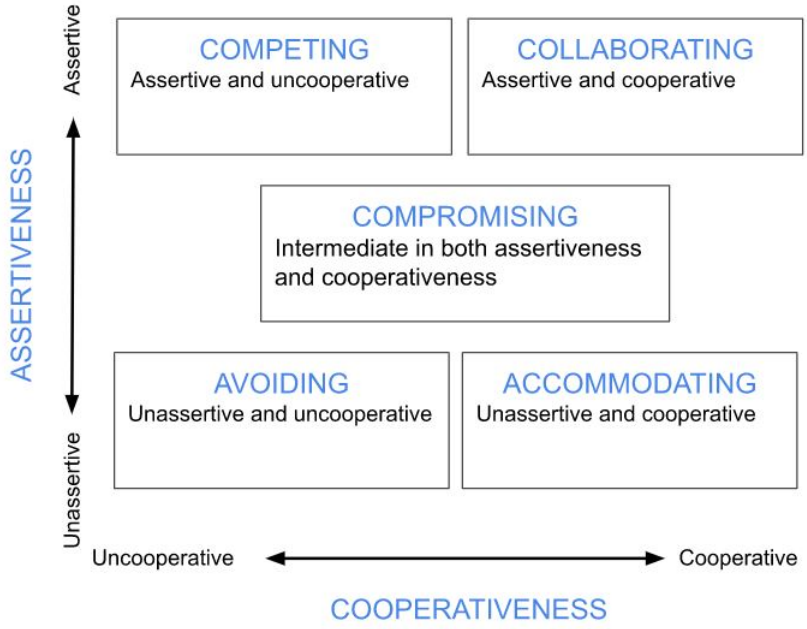


Figure 2.2: *TKI conflict management styles relationship with Assertiveness and cooperativeness*

An individual's dominant style is the conflict management style with the highest percentile score and is the style most commonly utilized during conflicts. It is also possible for an individual to score equally in two different styles; this scenario is considered a 'Tie', indicating that the person has a combination of two dominant styles without one overriding the other. For instance, a team member dominant in both the collaborating and accommodating styles might function as a "supportive problem solver" or a "problem-solving helper" [41].
Additionally, if a person has a second style that is almost as strong as the dominant style, it is termed a 'Close Second' [41]. This study focuses only on dominant styles and Ties.

Table 2.2: Overview of Conflict Management Styles in the TKI Model

Style	**Description** [24][41]	**Advantages** [41]	**Disadvantages** [41]
Competing	The competing style is characterized by a high concern for self and a low concern for others. In this style, individuals prioritize their own needs and objectives over those of others.	This style is particularly useful when the team leader must enforce an unpopular but crucial decision or take decisive action during a crisis. It is also effective when championing concerns that significantly impact the team or when a proposed course of action requires rigorous challenge and critical evaluation.	Individuals who adopt this style tend not to consider other people's viewpoints. Their primary goal is to assert their own position and win the argument.
Collaborating	The collaborating style typically shows a high level of concern for both self and others, suggesting that the individual values the relationship and considers the conflict situation to be significant.	This style is particularly useful when the issues at stake are too significant for the team to make sacrifices. It is also essential when innovative solutions are required for the project. Additionally, it proves effective in resolving interpersonal tensions within the team.	This style is time-consuming, as getting everyone on the same page takes time. This can have a negative effect during a crisis when quick decision-making is critical.
Compromising	The compromising style is characterized by a moderate concern for both oneself and others. In this approach, both parties need to make compromises, resulting in a partial win/lose solution rather than a clear win-win outcome.	This style is effective when a win-win solution is difficult to achieve and the team needs a quick and temporary solution to a critical issue. It provides a practical approach in scenarios where immediate action is required.	With this style, no one is completely satisfied; it often results in a compromise where all parties make concessions.

Avoiding	In this style, minimal importance is given to both one's own views and those of others. A person who adopts this approach typically avoids the current situation or buys time to postpone it.	This style is used when issues are relatively unimportant and do not justify the team's time and energy. Postponing a team discussion can lead to more productive outcomes, allowing time for better preparation and helping to cool tempers.	With this style, we avoid a person or situation, leaving issues unresolved. This approach involves not addressing difficult issues, hoping they will disappear or resolve themselves, and being inattentive to schedules and deadlines.
Accommodating	The accommodating style is the opposite of competing. In this approach, an individual neglects their own concerns to satisfy those of another person. Self-sacrifice is a key component of this style, as it prioritizes the needs and desires of others above one's own.	Accommodating can be the best approach in certain situations, such as when resolving a minor conflict quickly to focus on more pressing issues, or when a teammate requires support.	An unexpressed feeling will affect a relationship for a longer period of time.

2.3 Conflicts within software engineering

Conflicts within software engineering teams are typically classified into three types: task conflict, process conflict, and relationship conflict [29]

- **Task Conflict:** Also known as cognitive conflict, this refers to differences in ideas, attitudes, and behaviors related to teamwork and team tasks, such as disagreements over organizational policies and procedures. Task conflict arises when stakeholders have differing views on the priority, scope, or requirements of a project.
- **Process Conflict:** Refers to the disagreements on how to accomplish a task, such as who should handle a specific task or how much work a person should handle. Process conflict occurs when team members disagree about who is responsible for completing a certain task, or how to execute tasks to accomplish project objectives.
- **Relationship Conflict:** This involves disagreements among team members regarding interpersonal issues, such as personality clashes or differences in values, norms, or attitudes.

In software engineering teams, task conflicts are more common than relationship and process conflicts [33]. However, relationship conflicts have a particularly detrimental effect on group performance, as they damage working relationships, reduce creativity, lower morale, and make it extremely challenging to reach a consensus.

Relationship conflict can even mitigate the positive effects of task conflict [29]. Additionally, requirements instability is directly related to interpersonal conflict, which in turn negatively affect the final project performance [29].
Conflict management is closely associated with job satisfaction, often influencing an employee's decision to remain with an organization more significantly than financial rewards. When conflicts are poorly managed, the likelihood that team members will seek employment elsewhere dramatically increases [4]. Furthermore, unresolved conflicts hinder project management, leading team members to continually disagree over criteria, strategies, tactics, and solutions [33]. These conflicts can also compromise the quality, deadlines, and cost of the final product:

> Functional conflict is centered on improving team performance by implementing the goals set by the team, while dysfunctional conflict is encountered when one tries to exceed what is required by a group while trying to accomplish the goals set. Possible outcomes of destructive conflict are cost overruns, communication drastically reduced between individuals and groups, change resistance, increased tension, and stress, project deadlines exceeded, lower performance, profit reduction, and unhealthy business relationships.

Within software development teams, all conflict management styles are applicable in certain situations. However, the Avoiding and Competing styles are generally considered more detrimental to software engineering teams [33]. These two styles, along with Accommodating style, are identified as dysfunctional conflict management styles and are associated with decreased team member satisfaction [4]. The Avoiding style is particularly unfavorable because it leaves conflicts unresolved, creating the potential for these unresolved issues to become sources of future conflicts [33]. Additionally, Competing tends to have a more negative impact at the team level than at the organizational level [4].
In contrast, the Collaborating and Compromising styles are viewed as functional conflict management approaches, contributing to increased satisfaction among team members. In some cases, however, Collaborating is preferred over Compromising when the issues are too important to be compromised. This is because the Collaborating style facilitates faster and more effective decision-making, enhances relationships, improves performance, and ensures better follow-through by team members [4].

2.4 Related Studies on Conflict Management Styles

2.4.1 Gender differences in conflict management styles

The current literature lacks studies that specifically examine gender differences in conflict management styles within software engineering. While various studies in different fields have explored these gender differences, their results often contradict each other, complicating the ability to draw definitive conclusions. It is important to note that findings from these studies might not be directly applicable to the software engineering field due to distinct differences in work environments.
One notable study by (Khanaki and Hassanzadeh) [27] studied the effect of cul-

ture on the conflict management styles by comparing the predominant styles among Iranian and Swedish students and practitioners. Both male and female technical students and engineers participated in the study. The results indicated that the predominant styles among Iranian female engineers are Compromising and Competing, whereas male engineers tend to use Avoiding, Collaborating and Accommodating styles. Although this study enriches our understanding of how cultural influences can shape gender differences in conflict management, it does not specifically address these differences within the software engineering field.
Another study involving university students majoring in Information Systems observed that males exhibited a higher tendency toward Avoiding than females, while females were more inclined toward Collaborating. The study also found no significant differences between males and females in terms of Compromising, Accommodating, and Competing styles [2]. A study conducted by Thomas, one of the co-creators of the TKI [40] studied the gender differences in conflict management styles at six organizational levels, from entry-level positions to top executives. While this study did not target software engineers specifically, it involved a larger sample size of 200 men and 200 women from different professions and positions. The findings revealed that the dominant style among men is Competing, while women scored higher in the other conflict management styles. While this study offers valuable insights into gender differences in conflict management styles, it lacks direct relevance to software engineering.
Moreover, these studies examined specifically gender differences in conflict management styles. Their results suggest significant differences in conflict management styles between males and females. Based solely on the findings of these studies, it is challenging to make accurate predictions about conflict management styles among software engineers.

2.4.2 Student versus practitioner

Existing research on software engineering students has primarily focused on whether students are suitable participants for research or if they represent the broader software engineering industry. However, studies specifically investigating conflict management styles within this field are scarce. To date, no research has exclusively targeted the conflict management styles of software engineering students or practitioners. Nevertheless, several studies from various fields have explored conflict management styles among both students and practitioners, offering potential insights for the software engineering context.
These studies can provide insights into this area. Below are some examples of studies that have examined conflict management styles in fields other than software engineering. It is important to note that some of the studies discussed in this section overlap with those mentioned previously, focusing on students or practitioners and investigating various factors, including gender.
One study [32] analyzed conflict management styles among university students in different academic years. However, the specific program or field of study of the students was not mentioned in the study. The results indicated that Collaborating, Compromising, and Avoiding were the dominant conflict management styles among

students. Notably, first-year students tended to use more Compromise and Collaboration styles compared to third-year students. The authors of this study suggest that the reason behind this may be due to their lack of knowledge and social relationships in the new environment, as well as their need to cooperate and reach a middle ground with their peers.
Another study that explored the relationship between age and conflict management styles among postgraduate students, found that older students were more likely to adopt the Avoiding style, whereas younger students favored the Competing style [15].
According to the study conducted by [27], the differences in conflict management styles between Iranian students and practitioners were examined. The findings revealed that both Iranian engineering students and practitioners tend to use avoiding style. Swedish students, on the other hand, are more likely to use collaborating style, followed by competing. This study did not examine the conflict management style of Swedish practitioners, only that of students.
At an organizational level, Competing and Collaborating are becoming more common as levels increase while Avoiding and Accommodating are becoming less common [40]. The participants for this study were randomly selected from the TKI instruments database, but it is not clear if software engineers were included in this study.
As we delve deeper into the influence of various factors on conflict management styles, it becomes apparent that, although the existing studies offer valuable insights, they provide limited direct applications to software engineering. Which highlights the need for research specifically to this field.

2.4.3 Awareness of Conflict Management Styles

The current literature reveals a significant gap in studies specifically examining the level of awareness of conflict management styles, not only in the software engineering field but also across other disciplines.
A notable pilot study by Katz and Flynn [25] conducted in Florida, USA, explored whether managers are aware of the conflict management systems within their organizations. The findings highlighted a general lack of awareness regarding the impact of conflict on an organization's performance and finances, as well as a limited understanding of the tools and strategies available to mitigate workplace conflict. Importantly, this study did not address the software engineering field nor did it explore awareness of the different TKI styles.
Another study by Golubeva [17] investigated the relationship between increasing awareness of conflict management styles and enhancing empathy among undergraduate students. This study measured awareness levels before and after educational interventions, noting an increase in empathy as students became more familiar with conflict management concepts. However, participants had no prior knowledge of TKI styles, and their awareness was gained as part of the study. Additionally, the students self-assessed their own TKI styles, and the study did not utilize the TKI instrument in its methodology.
A further study involving medical students was conducted by [18] to determine the

effect of awareness of conflict resolution styles on conflict resolution performance. The research divided the students into two groups, where one group took the TKI before a conflict simulation and the other group took it after the simulation. The findings indicated that self-awareness of one's conflict resolution styles, as measured by the TKI, did not correlate with improved conflict resolution skills.
These studies collectively underscore a broader need for research into the level of awareness of conflict management styles to provide the training needed across various professional fields, including but not limited to software engineering.

3
Methods

The aim of this study is to explore the dominant conflict management styles among software engineering students and practitioners, across both genders, and to assess their awareness of these styles. A mixed-methods approach, combining categorical, quantitative and qualitative techniques, has been used for this study. The categorical and quantitative data were gathered through surveys distributed to software engineering students and practitioners, using the TKI to measure conflict management styles. This was followed by qualitative data collection, which involved conducting post-survey interviews with a select group of survey's respondents. The detailed methodology used is described in this chapter. For transparency and to facilitate replication of the study, all materials and data used are available in a replication package [1].

3.1 Research questions

Drawing from the study's objectives and the insights gleaned from the literature review, we hypothesize that significant differences may exist between the dominant conflict management styles of females and males, as well as between students and practitioners. Additionally, we anticipate variations in awareness levels regarding these conflict management styles, specifically among students and practitioners. Therefore, the research questions of this study are:
RQ1:How do gender differences influence the distribution of conflict management styles among software engineers, and how do these differences manifest in everyday work life?
RQ2: How do professional differences influence the distribution of conflict management styles among software engineering students and practitioners, and how do these differences manifest in everyday work life?
RQ3: How aware are software engineers of the various conflict management styles, and how does this awareness manifest in everyday work life?

[1]The link to the replication package: https://doi.org/10.5281/zenodo.12661110

3.2 Survey

3.2.1 Survey Design

For the survey, we followed (Kitchenham and Pfleeger)[28], as well as (Punter)[36] guidelines for online surveys. The survey was organized into three parts: demographics, the Thomas-Kilmann Conflict Mode Instrument (TKI), and awareness among software engineers. Each part aimed to gather specific data to support the study's overarching research questions effectively.

Demographics. The demographics part of the survey contains questions aimed at understanding the respondents' backgrounds and experiences. It also enabled the analysis of results by distinct groups, such as gender (female, male, or other specified identities), profession (students and practitioners), and other demographics. These questions cover age, highest educational level, country of residence, and professional seniority. For gender, participants were given options to identify as female, male, or provide their preferred gender identity.

TKI. The questions in the second part of the survey are based on the standardized Thomas-Kilmann conflict mode instrument (TKI), which includes 30 forced two-choice items derived from [43]. Each of the five conflict management styles is represented by a statement, and each style is compared against the other four styles three times. This results in 30 pairs of statements and twelve statements for each style. Participants are required to select the statement that best reflects their usual approach to conflict, even if both options seem equally viable. For example, one of the three comparisons between Competing and Avoiding (B) is as follows:

- **Competing:** I press to get my points made.
- **Avoiding:** I sometimes avoid taking positions that would create controversy.

Scores are calculated based on the number of times a participant selects a statement associated with each style, with the maximum possible score for each style being 12 and the minimum being 0. The participant's dominant style, the one used the most often in conflicts, is the one with the highest score[41]. The dominant style will be utilized to address Research Questions 1 and 2 (RQ1 and RQ2), as outlined in our study methodology.

Table 3.1 provides the statement for each style used in the survey. The statements are derived from [43].

Table 3.1: *Conflict Management Styles and Their Corresponding Statement.*

Conflict management style	**Statement**
Avoiding	I sometimes avoid taking positions that would create controversy.

Competing	• I press to get my points made. • I try to convince the other person of the logic and benefits of my position.
Compromising	I propose a middle ground.
Accommodating	If it makes other people happy, I might let them maintain their views.
Collaborating	• I tell the other person my ideas and ask for his/hers. • I always lean toward a direct discussion of the problem.

Awareness. The third part of the survey includes questions designed to assess participants' awareness of the five different conflict management styles. This section specifically addresses Research Question 3 (RQ3). At the conclusion of this part, participants are invited to provide their email addresses if they are interested in participating in a follow-up interview. The full survey is detailed in Appendix A.1

3.2.2 Recruitment of Respondents

The target population for this study included software engineers, both students and practitioners, across all degree levels. Participants included those currently pursuing or holding degrees in software engineering or related fields, as well as professionals at various career stages—from entry-level to senior levels. To ensure a diverse and representative sample of respondents, several recruitment methods were used:

- The survey link was distributed through direct messages on WhatsApp and posted on our personal LinkedIn page. It received additional shares by two professors from Chalmers University.
- A manager at Husqvarna Group has shown an interest in the study and provided 22 email addresses of interested employees, resulting in a total of 23 emails sent to potential participants at Husqvarna Group
- Similarly, three managers at Volvo Cars expressed interest in the study and forwarded the survey to their teams.

In addition, snowball sampling was employed to increase the number of participants by asking the participants to forward the survey to other people who meet the target population. It is important to note that no compensation will be provided for participation in this study.

3.2.3 Collected Data

The data gathered from the survey primarily consisted of categorical data. This form of data involves variables being measured on a scale that categorizes respondents into a certain number of categories or groups[1]. The categorical data can be divided into two types depending on the level of measurement: nominal data and ordinal data. The nominal data refers to data classified into categories without any specific order, while ordinal data involves categorizing data into ordered categories [1]. From the survey, a total of 7 variables were collected, encompassing both types of categorical data[2]. The types, categories, and their relevance to the corresponding research questions are detailed in Table 3.2.

Table 3.2: *Overview of Variables, Their Data Types, and Categories Used for Data Analysis*

Variable	**Type**	**Categories**	**Relevant to question**
Gender	Nominal	Male, Female	RQ1, RQ2
Profession	Nominal	Student, Practitioner	RQ1, RQ2, RQ3
Age	Ordinal	• 18-25 • 26-30 • 31-40 • 41-50 • 51- above	RQ1,RQ2, RQ3
Country	Nominal	Sweden, India, other	RQ1,RQ2, RQ3
Education	Ordinal	• High school diploma or equivalent • Some college or vocational training, but no degree • Bachelor's degree • Master's degree • Ph.D.'s degree	RQ1,RQ2, RQ3

[2]Two variables, namely "Years of work experience" and "Working area for practitioners," were excluded from the Bayesian analysis. This decision was made because these variables were included in the survey solely for demographic information-gathering purposes and were intended to target only practitioners, excluding students.

Years of Working Experience	Ordinal	• Less than 1 year • 1 to 3 years • 3 to 5 years • 5 to 10 years • 11 to more	RQ3
Awareness	Numeric((Likert scale-based numbers)	• zero • 1 • 2 • 3 • 4 • 5	RQ3
Result (i.e. conflict management style)	Nominal	Avoiding, Competing, Accommodating, Compromising, Collaborating, Tie	RQ1, RQ2

The collected data were entered into a Google Sheets spreadsheet to identify the dominant conflict management style for each participant. Additionally, data cleaning procedures were performed within the spreadsheet to prepare the data for analysis, including checking the missing values, removing duplicate entries, and properly categorizing the data.

3.2.4 Data Analysis

3.2.4.1 Research Question 1 and 2

To address RQ1 and RQ2, a Bayesian analysis methodology was used to explore the association between conflict management styles and demographic factors, specifically gender and profession. The analysis was conducted using the BRMS package (Bayesian regression models using Stan) in R. In Bayesian analysis, Bayes' theorem is applied to ascertain the probability of an event based on prior knowledge of conditions potentially associated with the event [13]. This probability, known as the Bayesian posterior probability, is proportional to the likelihood times the prior [14]. In this context:

- **Prior Probability:** Refers to pre-existing knowledge regarding the hypothesis, representing the probability of the hypothesis before any new data is considered [14].
- **Likelihood:** Indicates the probability that the observed data stems from a

distribution with specific parameters [42].
- **Posterior probability:** Represents the revised probability of the hypothesis after taking the data into account [14].

In other words, Bayesian analysis allows the integration of existing information or assumptions into the analysis, rather than solely relying on the data. This feature makes it particularly fitting for our study, given our limited dataset. In which Bayesian analysis enables us to make more reliable conclusions and derive valuable insights despite the constraints of a small dataset.
The data analysis process was initiated with importing the survey data from an Excel sheet into R, followed by fitting a null model (m0) which was used as a baseline for comparison with other models. Prior distributions for model parameters were defined based on our assumptions and pre-existing knowledge of the data.
To address RQ1, two detailed statistical models were developed using the BRMS package in R, which accommodates categorical distributions within its family settings. In these models, the TKI result served as the dependent variable, with gender as the main predictor. The first model (m1) relied only on a Normal (Gaussian) distribution for its priors, while the second model (m2) used a combination of Normal and Dirichlet distributions for a more nuanced approach. Model comparison was conducted for the three models using Leave-One-Out Information Criteria (LOO), which showed superior performance by the second model (m2). This model was then selected for generating further results.
Posterior predictions were generated for the simulation of hypothetical data points that show the differences in conflict management styles across different respondent groups, specifically between male and female respondents, as well as between students and practitioners. Finally, the results of these posterior predictions were visually represented through bar plots, which displayed the frequency distribution of conflict management styles within each group.
To address RQ2, the same methodological approach was applied, but with the Profession variable serving as the main predictor instead of gender.

3.2.4.2 Research Question 3

To address RQ3, descriptive statistics were employed using the R language to calculate the mean values and standard deviations. The reason behind choosing descriptive statistics over Bayesian analysis to answer this specific question was driven by our objective of understanding the present status of awareness, rather than simulating the data or making predictive inferences.
To investigate whether there is a statistically significant difference in the awareness of conflict management styles between students and practitioners, an independent T-test was conducted. The T-test is a widely used statistical tool that compares the means of two groups to determine if the differences between their means are statistically significant [31]. For this T-test, the awareness variable, consisting of Likert scale values ranging from zero to five, was used as the test variable, while the grouping variable was Profession, categorized into two groups: student and practitioner.
The results of the T-test are expressed through a p-value, which assesses the significance of the observed difference between the two groups. A p-value less than 0.05

is considered the threshold for statistical significance [31]. If the p-value is below this threshold, it suggests that the difference in awareness scores between practitioners and students is statistically significant, indicating that the two groups differ in their understanding and knowledge of conflict management styles. Conversely, a p-value above 0.05 would suggest that any observed differences are not statistically significant, implying similar levels of awareness between the two groups.
Regarding other variables—Age, Country of Residence, Education Level, and Years of Working Experience—a One-Way ANOVA test was conducted. The One-Way ANOVA is an extension of the independent samples T-test. While the independent samples T-test is used to compare the means between two groups, the One-Way ANOVA is used to compare means among three or more groups [31]. Given that all the variables mentioned above consist of more than two groups (i.e. categories), a One-Way ANOVA was appropriate.
In the One-Way ANOVA, a significant p-value indicates that there is at least one pair among the groups where the mean difference is statistically significant [31]. For variables that showed statistical significance, post hoc tests were conducted to determine the specific pairs. Specifically, Post hoc Tukey HSD tests were calculated to identify the source of any significant differences among all possible group pairings. The findings from the descriptive statistics, T-test, and ANOVA test regarding the awareness of conflict management styles are presented in Chapter 4.1.3

3.3 Interviews

The interviews were conducted using a semi-structured format and were guided by the detailed protocol outlined in Appendix A.2. The interview process was divided into three main sections:

- **Introduction:** In the first part, the purpose of our research, the reasons for conducting interviews, and the outline of the interview were explained.
- **Conflict Management Style Discussion:** In the second part, the interviewee's conflict management style score was revealed and an explanation regarding what these scores indicated, as well as the characteristics associated with the interviewee's dominant style, was provided.
- **Interview Questions:** In the final part, open-ended questions were asked about whether they identified themselves as shown by the results, their experiences with conflicts involving different styles, their awareness of other styles, and how they acquired this knowledge, if relevant. Depending on their responses, follow-up questions were asked to gain better insight into how they navigate conflict management in their roles as practitioners or students.

Below is a sample of the interview questions:

1. Do you feel that the results are relevant to you? If yes, why?
2. Do you feel you use these styles in your everyday life? If yes, how do you use them?
3. Have you encountered other styles in your everyday life? If yes, which ones? If not, looking back at the last few weeks or months, given what you learned in the survey, can you now see that there was a person with a different conflict style?
4. Can you describe a conflict you encountered recently?
5. Do you think your conflict management style was useful in resolving conflict? Why, or why not?
6. Are there any particular styles that you feel are effective in the team? If yes, why?
7. Are there any particular styles that you feel are not effective in the team? If yes, why?
8. Have you ever needed to adjust your style based on the other person's behavior or attitude?
9. Were you aware of the different conflict management styles when you encountered this conflict?
10. Have you received any training programs or university courses that have been found helpful in understanding the different conflict management styles?
11. How do you think being aware of different conflict management styles can be beneficial/useful for your team at work or university?

3.3.1 Recruitment of Interviewees

The participants for the interviews were selected from survey respondents who had expressed an interest in further participation and had provided their email addresses.

This recruitment strategy was employed because it allowed us access to the interviewees' TKI results, which were necessary for preparing the interviews. These results were obtained earlier through the survey.
Before conducting the interviews, a preliminary analysis of the survey responses was performed. This analysis involved calculating the TKI results for each participant and then identifying suitable candidates for the interviews to ensure representation across the population. The goal was to include at least one student and one practitioner from both male and female categories for each conflict management style.
However, two exceptions were noted in the selection process: the compromising style and a student with accommodating style. Unfortunately, no survey participants representing these styles had provided their email addresses for interview participation. As a result, interviewees specifically representing these two styles could not be included. Despite this limitation, the selection criteria contributed to obtaining a diverse and inclusive sample that would enrich the insights gained from the interviews.

3.3.2 Data Analysis

The qualitative data gathered from the interviews were analyzed using thematic analysis based on the guidelines outlined by (Braun and Clarke)[3]. Thematic analysis is a widely used qualitative research method that is used to identify and examine patterns or themes within the dataset, providing a detailed description of the data[3]. The analysis was conducted by a single author, specifically the second author (Pallavi Pattewar). To mitigate potential author bias, each phase of the analysis was reviewed and discussed with the first author (Sogeta Al-Bazi).
In the analysis, an inductive approach was used, meaning that the data was analyzed without predefined coding frames based on theoretical assumptions. Instead, themes emerged directly from the data itself, derived from the participants' responses. Additionally, a semantic approach was utilized which involved identifying the themes that directly emerged from what participants have said, without assuming anything beyond their expressed statements[3].
The thematic analysis of the interviews included the following phases:
Data Familiarization
The interviews were transcribed and each interviewee's responses were organized into individual spreadsheets on Google Sheets. This approach was adopted to facilitate the coding process during later stages of analysis. Afterward, both authors thoroughly read all the transcripts multiple times to gain a good understanding of the content. This iterative reading process was necessary to ensure that any new insights obtained from the data could inform the interpretation of the overall content.
Coding
In this phase, initial codes were identified from the transcripts, involving the assignment of labels to specific segments of text that represented certain ideas or concepts. These codes serve as a basis for identifying themes in the later stages of analysis.
Guidelines from (Saldana) [38] were used in the coding phase, particularly employing Elemental methods such as the In vivo coding technique. This technique involves

using participants' own words or phrases as codes, directly drawn from the interview transcripts [38].

Additionally, Descriptive Coding was used, where codes briefly summarize the basic topic of a passage of qualitative data, typically as a noun [38]. These techniques were selected for their accessibility and suitability for those new to qualitative analysis.

The coding extraction process was conducted manually within the spreadsheets. Each statement was highlighted with a specific color corresponding to the assigned code. All codes for each interview were listed at the top of the spreadsheet. After the initial coding was completed by one author, the second author reviewed the codes and transcripts to refine the process. This involved removing redundant codes, renaming existing codes, and adding new codes as necessary to ensure clarity and accuracy in the coding process.

Furthermore, to maintain consistency in coding and interpretation, a codebook was developed. The codebook consisted of a table containing the names of the codes, their definitions, and examples of quotes extracted from the interviews. The codebook is available in the replication package.

Comparison Sorting
Given the research questions exploring gender differences and distinctions between students and practitioners in conflict management styles, interviewees were categorized into four groups: males, females, students, and practitioners. As a pre-step before identifying the themes, all codes were grouped separately for each group. This step was executed using the visual discussion board platform, Miro [3].

Subsequently, within each group, the initial codes were reviewed, and similar codes were grouped together. This step helped in organizing the data and identifying potential themes.

Theme Identification
The codes were grouped into themes and sub-themes for each group. Subsequently, the emerged themes within each group were compared, such as male versus female and students versus practitioners. This comparison aimed to identify similarities, differences, or divergent perspectives between the two groups. Additionally, it involved analyzing the unique aspects of each group's themes.

Furthermore, a thematic map was developed to visually represent the relationship between the themes and sub-themes and how they correlate to the four groups. This map provided a comprehensive overview of the correlation of themes across the different groups, which helped in the interpretation and presentation of the findings.

Theme Defining and Naming
In the final step of the thematic analysis, we thoroughly reviewed the data once more to assign citations that effectively illustrated the identified themes. The selection of these citations was primarily based on their relevance to each theme; However, consideration was also given to ensuring that citations covered a significant part of the collected data. The detailed findings of the thematic analysis are presented in Chapter 4.2.

[3]Miro: https://miro.com/

3.4 Usage of Artificial Intelligence

In this study, multiple artificial intelligence-based tools were utilized, including Wordtune[4], Grammarly[5], and ChatGPT[6]. These tools were used solely for language enhancement purposes, such as improving grammar and vocabulary. They were not involved in the analysis process of the survey or the interviews. Additionally, the outputs from these tools were carefully reviewed to ensure that they did not introduce any incorrect information or text not written by the authors.

[4]Wordtune: https://www.wordtune.com/
[5]Grammarly: https://www.grammarly.com/
[6]ChatGPT: https://openai.com/chatgpt/

4

Results

This chapter presents the findings from both the survey and the interviews. The survey involved 82 participants, while 11 interviews were conducted. The results from the Bayesian analysis of the survey data are displayed in bar plots, which illustrate the frequencies of each conflict management style. Additionally, the results of the descriptive statistics for the awareness segment are presented in a table that includes mean values, standard deviations, and a corresponding bar plot. The findings from the thematic analysis of the interviews are presented in various formats, including graphs, coded themes, and quotes. All results are presented in chronological order, beginning with the survey data of all participants and followed by detailed results from the interviews, which include a thematic map and further thematic analysis.

4.1 Survey

The survey was open from March 29th, 2023, to May 5th, 2023, during which a total of 83 responses were received. After data cleaning, one response was excluded due to duplication. This issue arose because a participant completed the survey twice using two different email addresses—one personal and one company—to receive their TKI results. To resolve this, the participant was contacted via email by one of the authors. In the email, both sets of results were presented to the participant along with additional material describing the characteristics of each conflict management style. The participant selected the Accommodating style, which was then included in the analysis, resulting in a total of 82 valid responses for further evaluation. Due to the usage of snowball sampling and the survey being published on social networks, accurately calculating the response rate is not feasible.

Out of the 82 participants, 49 (60%) were male and 33 (40%) were female. The majority, 56 (68%), were practitioners, and the remaining 26 (32%) were students. In terms of country of residence, Sweden and India had the highest representation, with 38 participants (46%) from Sweden and 31 participants (37.8%) from India. Regarding age, the largest group consisted of 31 individuals (37.8%), who fell into the 26-30 age range. Figure 4.1 and 4.2 illustrate the distribution of participants by country of residence and age, respectively.

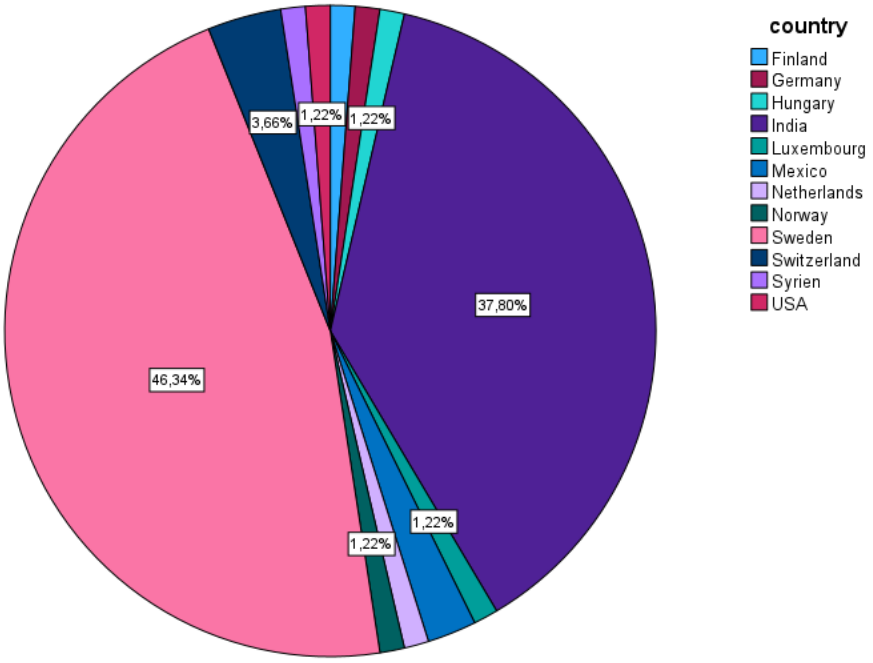


Figure 4.1: *Distribution of participants by Country of Residence.*

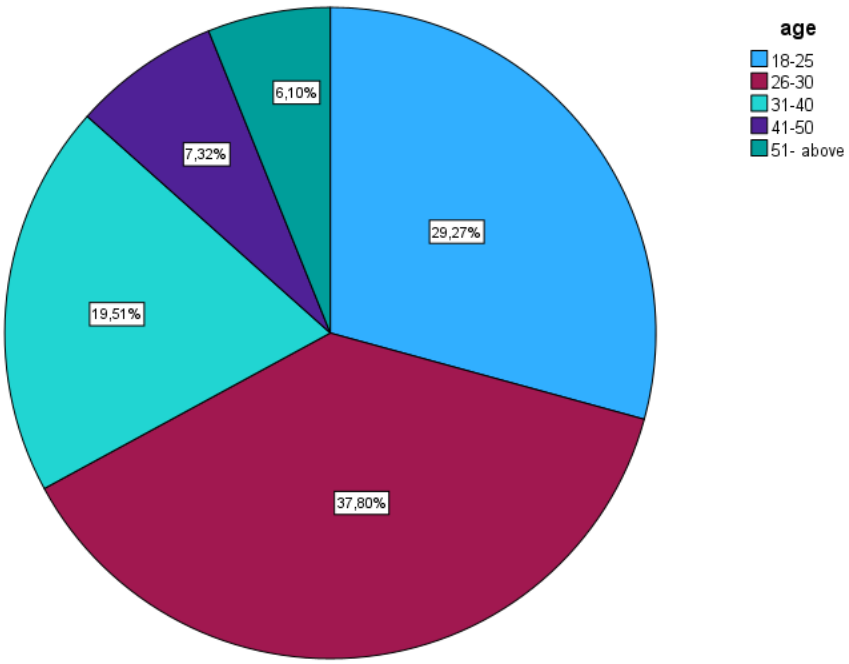


Figure 4.2: *Distribution of participants by Age.*

Concerning educational levels, 42% of the students were pursuing a bachelor's degree, followed by 30% who were working towards a master's degree. Among the practitioners, 50% held a bachelor's degree, and 44% had a master's degree.
Regarding years of working experience, information was provided by 43 practitioners. Of these, 15 (34.9%) have over 11 years of experience, 10 (23.3%) have between 5

to 10 years, 9 (20.9%) have between 3 to 5 years, 5 (11.6%) have between 1 and 3 years of experience, and 4 (9.3%) have less than a year, . Additionally, 10 students reported having work experience, with the majority (7 participants) having less than 1 year.The fields in which the practitioners work vary, including roles such as software developers, software testers, quality assurance engineers, product owners, scrum masters, and project managers.

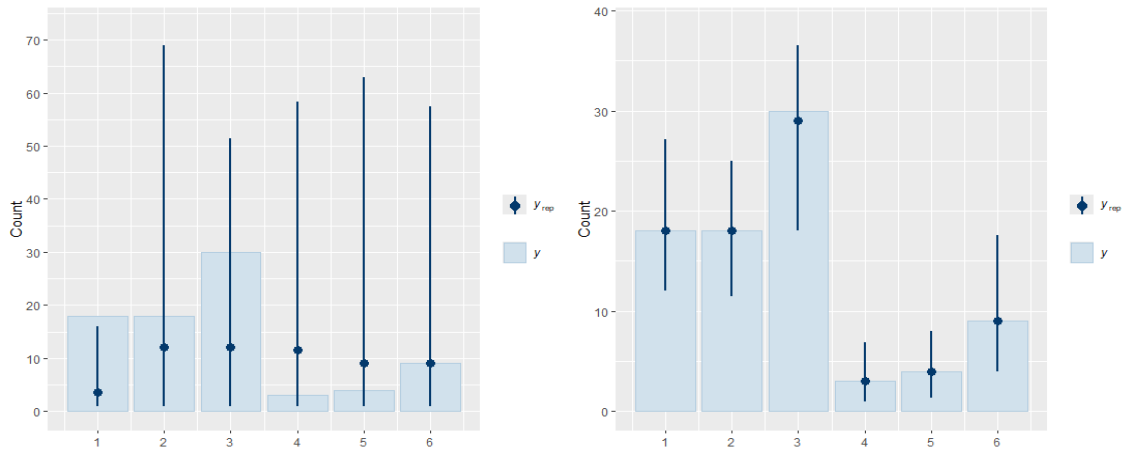
4.1.1 Gender Differences

The Bayesian model developed for the gender differences uses the TKI result as the dependent variable to explore dominant conflict management styles. These results categorize dominant conflict management styles into six distinct types: Accommodating, Avoiding, Collaborating, Competing, Compromising, and Tie.
The primary predictor variable of interest is Gender, which is explored to understand its influence on the choice of conflict management style. To ensure a comprehensive analysis, the model also incorporates other control variables that may affect the dependent variable including: Education Level, Age, Country of Residence, and Profession. The model is specified as follows:

$$
\begin{aligned}
Result_i &\sim \text{Categorical}(\phi_i) \\
\phi_i &= \beta_G Gender + \sum_{j=0}^{Gender_i - 1} \delta_j + \beta_E EducationLevel_i + \beta_A Age_i + \\
&\quad \beta_C Country_i + \beta_P Profession_i \\
\beta_G, \beta_E, \beta_A, \beta_C, \beta_P &\sim \text{Normal}(0, 1) \\
\delta &\sim \text{Dirichlet}(2) \\
\phi &\sim \text{Exponential}(1)
\end{aligned}
$$

In this analysis, each conflict management style is modeled using a categorical likelihood function, with the parameter ϕ includes both the linear regression coefficients and the intercepts for each style. Given that we have six styles, and **'brms'** treats the first category as a reference category [6], the Accommodating style in this model serves as the reference category in this analysis.
For the model, five parameters need to be estimated - $\beta_G, \beta_E, \beta_A, \beta_C, \beta_P$- corresponding to the predictors Gender, Education Level, Age, Country, and Profession, respectively. Normal(0, 1) priors are assigned to all these parameters, suggesting no initial bias toward positive or negative effects, with each parameter expected to vary around a mean of zero and a standard deviation of one.
Additionally, a Dirichlet prior is assigned to the parameter δ. The Dirichlet(α) prior is the multivariate generalization of the Beta distribution, which is used for modeling probabilities that sum to one across more than two response categories. Like the Beta distribution, the Dirichlet is parameterized by pseudo-counts, α, for each category [30]. In this case, a Dirichlet(2) prior is used, indicating a weak prior belief reflecting limited prior knowledge about the category probabilities. This approach helps in shaping the initial assumptions of the model while allowing the data itself to have a substantial influence on the posterior outcomes.

The Bayesian model employs Markov Chain Monte Carlo (MCMC) sampling, and before interpreting the results, it is crucial to assess the convergence of the model. One effective method to do this is by examining the scale reduction factor ($\widehat{R}$) which should ideally be close to one , specifically <1.05. This value suggests that the chains have converged effectively, indicating consistent results across multiple chains. Additionally, the effective sample size should be as large as possible, with a minimum of 400 to ensure reliable convergence diagnostics[7].
In this model, the $\widehat{R}$ are reported as being uniformly 1.00 for all parameters. This uniformity strongly indicates that the MCMC chains have converged adequately, reinforcing the model's statistical reliability. Additionally, the effective sample sizes for this model with Bulk_ESS and Tail_ESS values ranging from 1836 to 5913, strongly support the trustworthiness of the estimates.
Further insight into the model's performance and assumptions can be gained through predictive checks. Prior predictive checks, which involve sampling from the priors without considering the data, and posterior predictive checks, which incorporate both the priors and the data, are illustrated in Figure 4.3. These checks are essential for visualizing the influence of the priors and the alignment of the model outputs with the observed data.
In the predictive checks, the dots represent the mean values, while the lines (denoted as (y_{rep})) capture the range of uncertainties. The bars represent the observed data (y). During the prior predictive check, it is observed that the mean values across different categories are roughly equivalent, and the uncertainties associated with each category are uniformly distributed.



(a) **(b)**

Figure 4.3: *prior predictive check (a) and posterior predictive check (b) of the model.*

In contrast, the posterior predictive check reveals that the model provides an excellent fit for five of the styles, with the exception of the Collaborating style (3), where the estimated mean is slightly lower than observed. Notably, the reduction in uncertainty in the posterior checks compared to the prior checks indicates that the priors have been effectively 'swamped' [35] . This term refers to the scenario

where the influence of the priors is significantly reduced due to the strength of the data. The decreased uncertainty is a positive sign, demonstrating that the model's estimates have become more precise and are strongly informed by the data, which is a robust indicator of the model's validity.
Next, we delve into the results of the Bayesian model by presenting the posterior distributions and summary statistics, which detail the means and standard deviations for each conflict management style. This analysis is essential for understanding the nuanced differences in how conflict management styles vary across genders. Table 4.1 showcases the group-level effect derived from the posterior distributions of the model.

Table 4.1: *Summary of Posterior Distributions and Standard Deviations by Conflict Management Style*

	Est.	**Est.Error**	**l-95% CI**	**u-95% CI**
Avoiding	0.49	0.47	0.02	1.78
Collaborating	0.87	0.70	0.04	2.69
Competing	1.13	0.91	0.04	3.42
Compromising	1.09	0.83	0.04	3.09
Tie	1.57	0.98	0.16	3.96

The first column labeled "Est" represents the mean of the parameter from the posterior distribution. The second column, labeled "Est.Error," indicates the standard deviation of the posterior distribution. The last two columns, l-95% CI and u-95% CI, represent the lower and upper bounds of the 95% credible intervals, respectively [5]. These intervals are critical in assessing the statistical significance of the effects. If the interval is entirely above or below zero (strictly positive or negative), it suggests a significant effect in the corresponding direction. Conversely, if the interval overlap zero (i.e. spans zero), the effect cannot be definitively deemed non-zero, indicating a potentially non-significant result [20].
Moreover, the narrower these intervals, the greater the precision of the estimated effect, reflecting less uncertainty in the parameter estimates. It's important to recognize that the credible interval in Bayesian analysis is distinct from the confidence interval in the frequentist approach. The interpretation of a confidence interval in frequentist statistics is as follows [20]:

> *We can be 95% confident that the true (unknown) parameter estimate would fall within the lower and upper limits of the interval, based on hypothetical repeated sampling of the experiment.*

In contrast, the Bayesian credible interval is interpreted to mean [20]:

> *There is a 95% probability that the true (unknown) parameter estimate lies within this interval, given the evidence provided by the observed data.*

The Bayesian perspective offers a direct probabilistic assessment of the parameter's uncertainty based on the observed data and prior knowledge.

The estimates are invaluable for understanding the extent of differences in conflict management styles between genders. The higher the estimate, the more substantial the variation between genders in their conflict management styles, whereas a lower estimate indicates a greater degree of similarity between the genders for the particular style. For example, from the table, Avoiding (0.49) and Collaborating (0.87) have lower estimates, suggesting only minimal differences between genders, indicating that both males and females are equally likely to adopt these styles.

In contrast, Competing (1.13), Compromising (1.09), and Tie (1.57) show higher estimates, indicating significant differences in the likelihood that males and females will choose these styles. However, the large standard errors associated with these estimates indicate considerable uncertainty about these differences. Despite the wide credible intervals across all styles, which indicate significant uncertainty about the magnitude of these differences, each style is statistically significant, as none of the credible intervals overlap zero. This analysis confirms consistent gender differences across all examined conflict management styles.

Regarding Tie, as previously mentioned, a tie occurs when an individual scores equally in two different conflict management styles. Theoretically, there are 10 possible pairs of ties among the styles. Therefore, all pairs were considered as a single category in the statistical models to simplify the analysis. This approach reduces complexity and enhances interpretability of the model. It also consolidates the data into fewer groups, which is crucial given the modest size of our dataset—only 82 participants—where creating more categories could significantly reduce statistical power.

However, an analysis of the raw data—excluding results from the Bayesian model-reveals that only 9 out of 82 participants experienced a tie. Among these, the most common combinations were Collaborating-Accommodating (5 participants), followed by Avoiding-Accommodating (2 participants), Competing-Accommodating (1 participant), and Avoiding-Compromising (1 participant). This distribution underscores the rarity of ties within our sample and supports the decision to aggregate all tie scenarios into a single category to maintain statistical efficacy and clarity in our model interpretation.

Figure 4.4 visualizes the posterior probability distribution, enabling a direct visual comparison of the likelihood that each gender will utilize different conflict management styles. This comparison is enhanced by the inclusion of credible intervals (95%) presented as error bars, which reflect the uncertainty of these estimates. Each color in the plot corresponds to a distinct conflict management style, with dots marking the mean (estimate) of the posterior probability for each style and gender. Where these intervals overlap, it suggests that the differences in probabilities between genders are not statistically significant, indicating similar preferences between males and females for those styles.

For the Accommodating and Avoiding styles, the mean values for males are slightly higher or nearly equal to those for females; however, the overlapping intervals indicate no significant differences between genders.

In contrast, the Collaborating style shows a difference, with females showing a slightly higher probability of adopting this style compared to males. The slight overlap in intervals here suggests some uncertainty regarding this significant dif-

ference, pointing to potential variability in how distinct this preference is across genders.

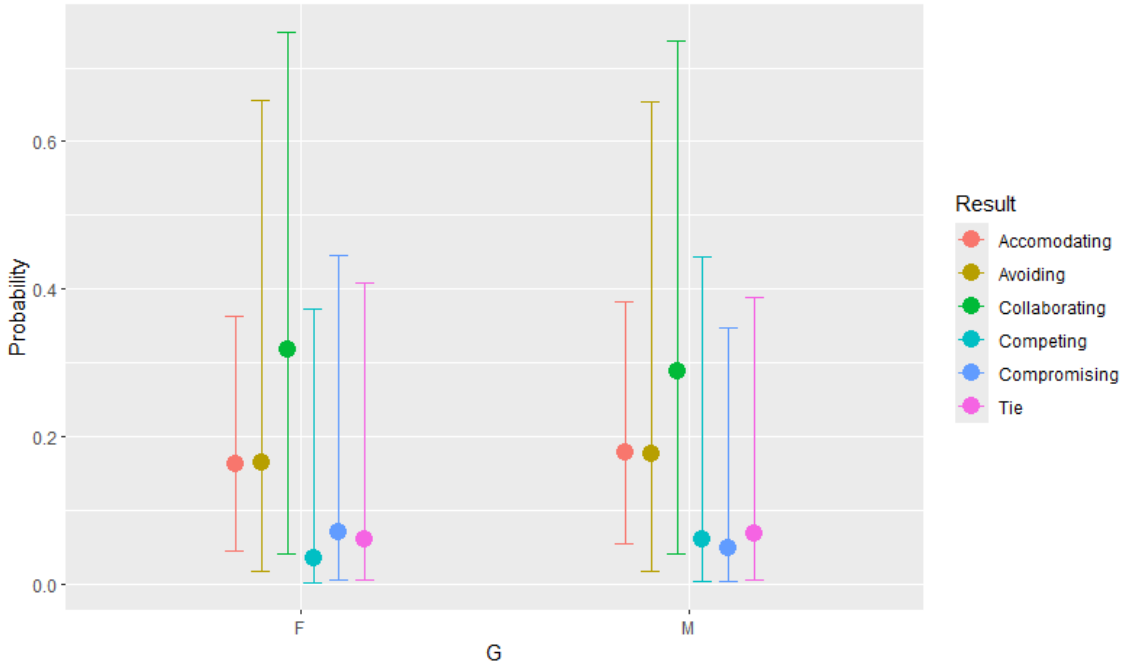


Figure 4.4: *Posterior distribution. X-axis (G): Represents gender, with categories labeled as 'F' for Female and 'M' for Male. Y-axis (Probability): Represents the probability of each conflict management style being chosen or exhibited by the respective gender.*

Differences are also observed in the Competing and Compromising styles. Males are more likely to adopt the Competing style, whereas females show a higher inclination towards the Compromising style. Although there is some overlap in the intervals for these styles, the overlap suggests a degree of uncertainty about the extent of these differences. This indicates that while there are clear gender influences, they might not be as sharply defined as one might assume. This nuanced view helps to understand the complex dynamics of gender influences in conflict management strategies.

Figure 4.5 illustrates the distribution of conflict management styles by gender, as derived from a Bayesian analysis using a sample drawn from the posterior distribution to simulate outcomes. The plot showcase the frequencies of each style—Collaborating, Avoiding, Accommodating, Competing, Compromising, and Ties among male and female participants.

The Collaborating style emerges as the most common style for both genders, particularly among females, suggesting a preference for cooperative problem-solving. Males display a slightly higher frequency of using Avoiding and Accommodating styles, indicating a tendency to sidestep conflicts or maintain harmony. The Competing style, though less common overall, shows a marginally higher occurrence among males, reflecting a more assertive approach.

In contrast, females exhibit a higher frequency of adopting the Compromising style

compared to males. Additionally, males exhibit higher occurrences of Ties compared to females. The occurrence of Ties indicates a subset of individuals who do not have a single dominant style but instead they adjust their conflict resolution approach to align with the varying demands of each specific scenario, showcasing flexibility in their conflict management techniques within the professional setting.

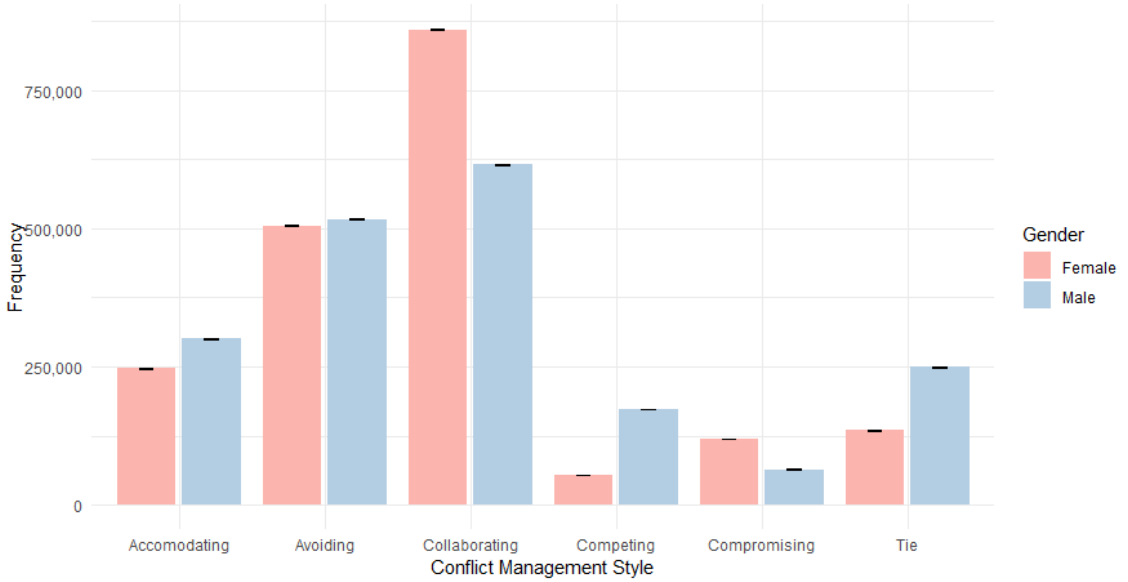


Figure 4.5: *Distribution of Conflict Management Styles among Male and Female software engineers.*

The error bars represent the credible interval for each frequency estimate, showing the potential variability or uncertainty in these estimates. Most bars are small, indicating a relatively high confidence level in these frequency measurements.
By examining additional variables such as age, country of residence, and education level, we can gain further insight into how these factors influence gender differences in conflict management styles. Figure 4.6 presents a sample from the posterior analysis, illustrating the differences between females and males from India and Sweden. The focus on these two countries stems from the fact that the majority of our survey participants are residents of these two countries.
In Sweden, Collaborating style is the predominant conflict management style , particularly favored by females, while in India, although females also tend to collaborate more than males, the overall frequency of this style is significantly lower than in Sweden.
As for the Avoiding style, it is adopted at almost similar rates in both countries, with only minor gender differences. In Sweden, females are less likely to use the Avoiding style compared to males, whereas in India, the roles are reversed. Nevertheless, the difference is so slight that the rates are nearly identical between genders. The Competing style is slightly more prevalent among Swedish males than their Indian counterparts, although it is still relatively uncommon in both countries. A significant difference is noted in the frequency of ties, which is substantially higher in India for both genders compared to Sweden.

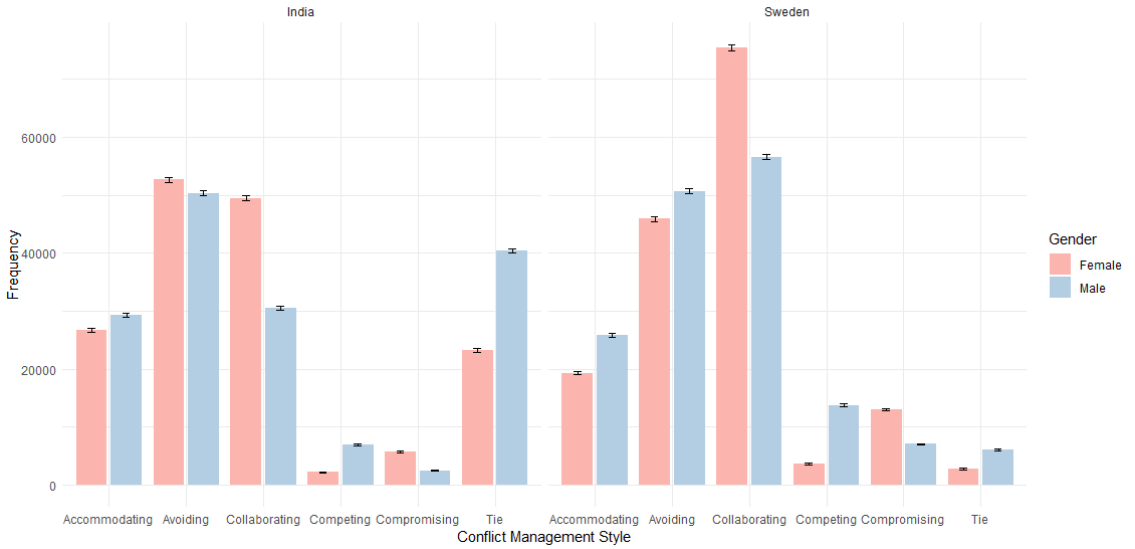
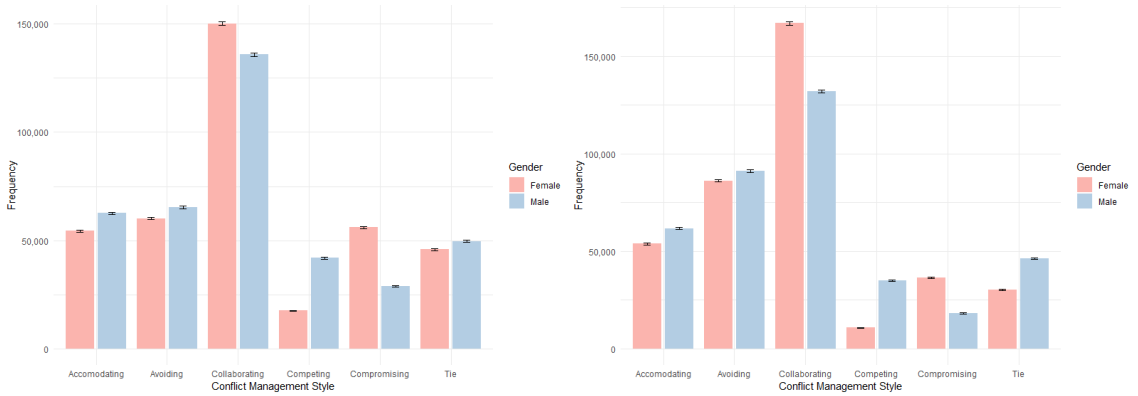


Figure 4.6: *Distribution of Conflict Management Styles Among Male and Female Software Engineers in India and Sweden*

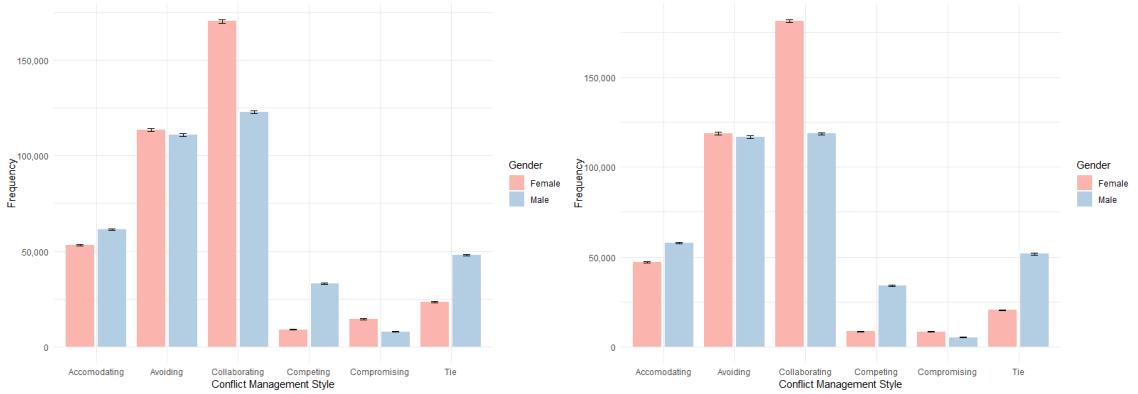
Figure 4.7 highlights the gender differences in conflict management styles across various age groups. While there are minor variations in the styles, a notable trend observed in the figure is the decreasing frequency of the compromising style as the age of participants increases. In the 18-25 age group (Subfigure a), females exhibit a higher tendency towards the compromising style compared to males. This frequency continues to decline across the age spectrum, reaching its lowest point in the 51-and-older age group (Subfigure e), where the frequency becomes very low and the differences between females and males diminish significantly.

Regarding educational level, no significant trend was observed for gender differences across various educational levels. The plots illustrating these gender differences across different educational levels are available in the replication package.



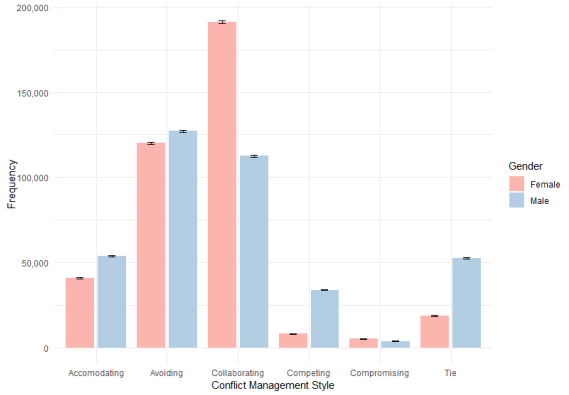
(a) 18-25

(b) 26-30



(c) 31-40

(d) 41-50



(e) 51-more

Figure 4.7: *Comparative Analysis of Gender Differences in Conflict Management Styles Across Age Groups*

4.1.2 Student vs. practitioner

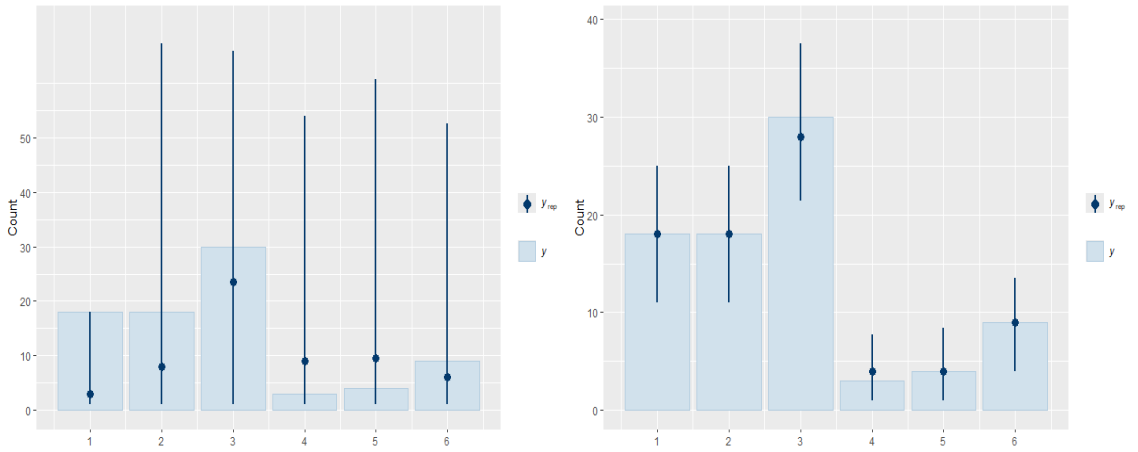
The Bayesian model developed to analyze the differences between students and practitioners uses the TKI result as the dependent variable. The main predictor of interest in this model is Profession, designed to evaluate how conflict management styles vary between these two groups. In addition to Profession, other influential variables included in the analysis are Education Level, Age, Country of Residence, and Gender. These variables are incorporated to control for potential confounding effects and ensure a comprehensive understanding of the factors affecting conflict management styles. The model is specified as follows:

$$
\begin{aligned}
Result_i &\sim \text{Categorical}(\phi_i) \\
\phi_i &= \beta_P Profession + \sum_{j=0}^{Profession_i - 1} \delta_j + \beta_E EducationLevel_i + \beta_A Age_i + \\
&\quad \beta_C Country_i + \beta_G Gender_i \\
\beta_P, \beta_E, \beta_A, \beta_C, \beta_G &\sim \text{Normal}(0, 1) \\
\delta &\sim \text{Dirichlet}(2) \\
\phi &\sim \text{Exponential}(1)
\end{aligned}
$$

Similar to the first model analyzing gender differences, this model also employs a Categorical likelihood to effectively handle the discrete nature of the dependent variable, which classifies conflict management styles. For the parameters $\beta_G, \beta_E, \beta_A, \beta_C, \beta_P$ representing the effects of Gender, Education Level, Age, Country of Residence, and Profession, respectively—priors are assigned as Normal(0, 1), indicating a mean of zero and a standard deviation of one. A Dirichlet(2) prior is assigned to δ. As part of the model diagnostics, the $\widehat{R}$ values are uniformly at 1.00 across all parameters, confirming that the MCMC chains have adequately converged. Additionally, the effective sample sizes, with Bulk_ESS and Tail_ESS ranging from 1882 to 4930 which further affirm the trustworthiness of the estimates.

The visual inspections of the model's performance are provided in Figure 4.8, showcasing both the prior predictive checks and the posterior predictive checks. From these visualizations, it is evident that the influence of the priors has been 'swamped' by the data, as indicated by a noticeable decrease in uncertainty. However, the posterior predictive checks some deviations in the model's predictions: the model estimated perfectly on four styles, but the estimates for the Collaborating style (3) are slightly lower, and those for the Competing style (4) are slightly higher than expected.

Table 4.2 presents the group-level effects derived from the posterior distributions of the model. The estimates for the different conflict management styles are fairly consistent, ranging from 0.72 to 0.82, with the "Avoiding" and "Competing" styles showing slightly higher estimates than the others. This suggests a potentially greater difference between students and practitioners in these two styles compared to the other styles.



(a) (b)

Figure 4.8: *prior predictive check (a) and posterior predictive check (b) of the model.*

Despite the similarity in estimates, the credible intervals are notably wide, indicating a significant level of uncertainty surrounding these estimates. However, the fact that these intervals do not overlap zero indicates that the differences observed, while uncertain in their exact magnitude, are statistically significant. This means there is a meaningful distinction in how students and practitioners utilize these conflict management styles, albeit with some uncertainty regarding the precise extent of the differences.

Table 4.2: Summary of Posterior Distributions by Conflict Management Style and profession

	Est.	**Est.Error**	**l-95% CI**	**u-95% CI**
Avoiding	0.82	0.76	0.03	2.83
Collaborating	0.72	0.72	0.02	2.69
Competing	0.82	0.78	0.02	2.87
Compromising	0.77	0.77	0.02	2.84
Tie	0.77	0.77	0.02	2.85

Figure 4.9 offers a detailed visualization of the posterior probability distributions, providing valuable insights into the likelihood of students and practitioners adopting various conflict management styles.
The means for the Collaborating and Avoiding styles are higher for students, and the credible intervals for these styles are also broader compared to practitioners. However, these intervals slightly overlap, indicating some uncertainty regarding the magnitude of the difference in the preference for these styles between students and

practitioners. Conversely, for the Accommodating and Competing styles, where the mean is higher for practitioners than for students, the intervals still overlap, suggesting uncertainty about the significant differences in these styles as well.
In the case of the Compromising style, the mean values for both students and practitioners are identical, and the intervals are also the same, indicating no significant difference between these two groups in their use of the Compromising style.

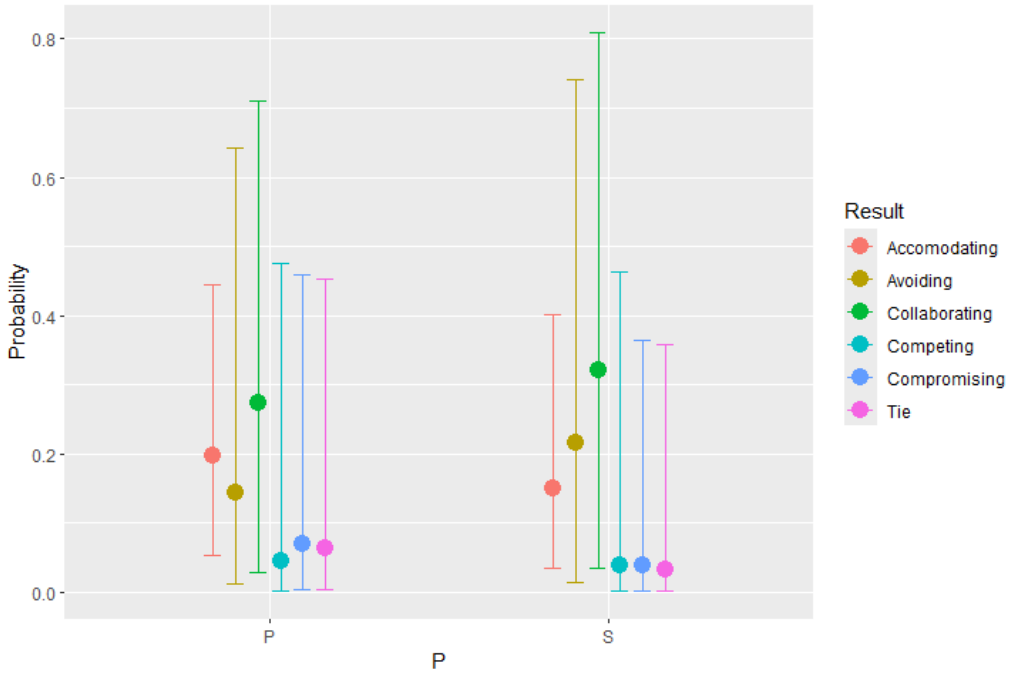


Figure 4.9: *Posterior distribution. X-axis (P): Represents profession, with categories labeled as 'P' for practitioners and 'S' for students. Y-axis (Probability): Represents the probability of each conflict management style being chosen or exhibited by the respective group.*

Figure 4.10 illustrates the distribution of conflict management styles by profession, using a Bayesian analysis where a sample is drawn from a posterior distribution to simulate the outcomes. The plot reveals that Collaborating is the predominant style among practitioners, indicating a general preference for cooperative problem-solving.
Students exhibit a noticeably higher frequency of the Avoiding style compared to practitioners, suggesting a tendency among students to avoid conflicts, potentially within academic settings. In contrast, practitioners are more inclined to use the Accommodating style than students.
Both the Compromising and Competing styles are generally less favored by both students and practitioners, with only very slight variations between the two groups, indicating a near-equal preference. Additionally, Ties are observed more frequently among practitioners than students, suggesting that practitioners may exhibit greater adaptability in their conflict management approaches.
The error bars in the plot represent the credible intervals for each frequency estimate, which illustrate the potential variability or uncertainty associated with these

estimates. The relatively small size of most error bars indicates a high level of confidence in these frequency measurements.

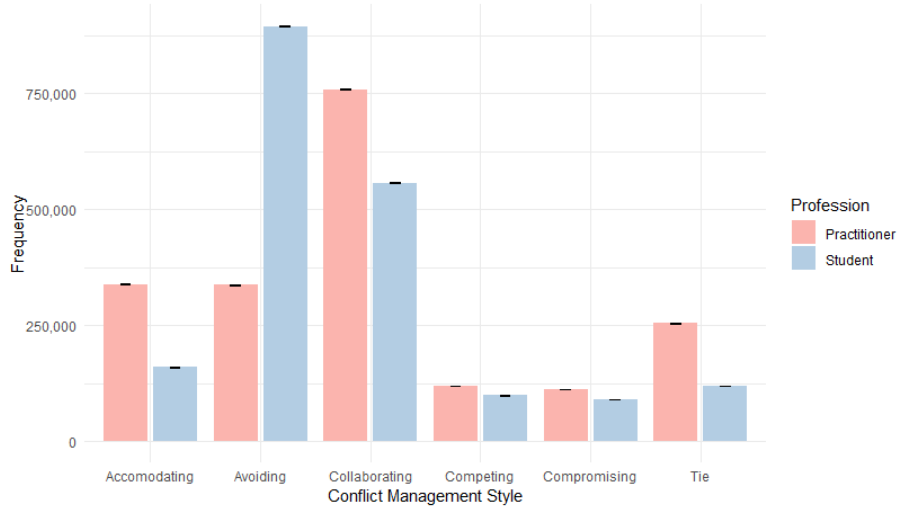
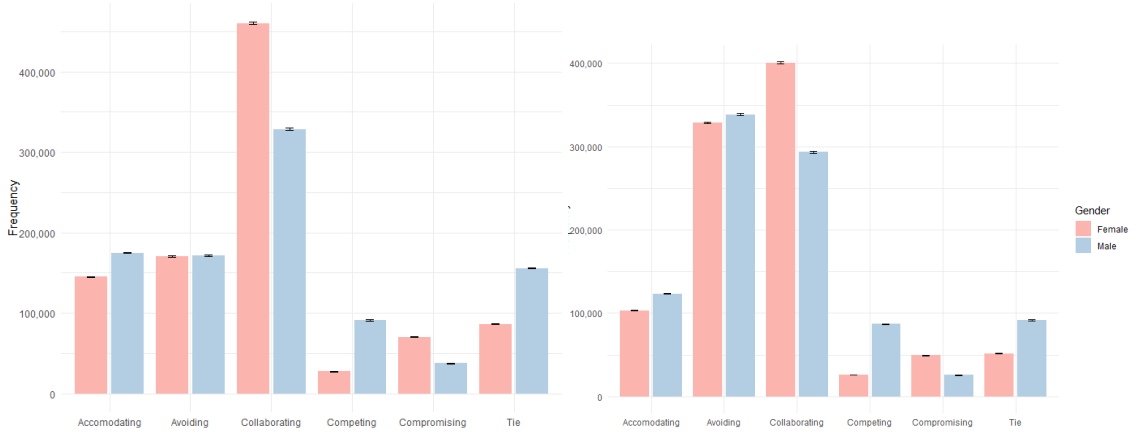


Figure 4.10: *Distribution of Conflict Management Styles Among Students And Practitioners.*

By exploring additional variables such as Gender, Age, Country of Residence, and Education Level, we gain deeper insights into the factors that influence variations in conflict management styles between students and practitioners.
Figure 4.11 demonstrates the variations in conflict management styles across genders and professional categories—students and practitioners. These plots enable a deeper understanding of the interplay between gender and professional status in conflict management styles.



(a) Practitioners **(b)** Students

Figure 4.11: *Gender Differences in Conflict Management Styles Among Practitioners and Students*

Collaborating emerges as the predominant style among both male and female prac-

titioners, as well as female students. However, a noticeable difference is observed in the Avoiding style, where male students exhibit a slightly higher frequency than female students, whereas among practitioners, the frequency of Avoiding is equal for both genders. Notably, the frequency of the Avoiding style is higher among students than among practitioners, indicating a stronger tendency to evade conflicts in academic settings.
Moreover, in both the student and practitioner groups, males are more inclined towards the Accommodating and Competing styles than females. In contrast, females demonstrate a higher frequency of adopting the Compromising style than males, regardless of their professional status. Across both categories, males show a higher tendency for Ties compared to females, with a notably higher frequency of Ties among practitioners than students. This pattern may indicate a higher level of adaptability or a strategic approach to conflict management among experienced professionals.
Figure 4.12 highlights the differences in conflict management styles between students and practitioners from India and Sweden. It is evident that the frequency of the collaborating style is higher in Sweden than in India for both groups. Additionally, the frequency of Tie is more prevalent in India compared to Sweden. The differences in other styles are relatively minor.

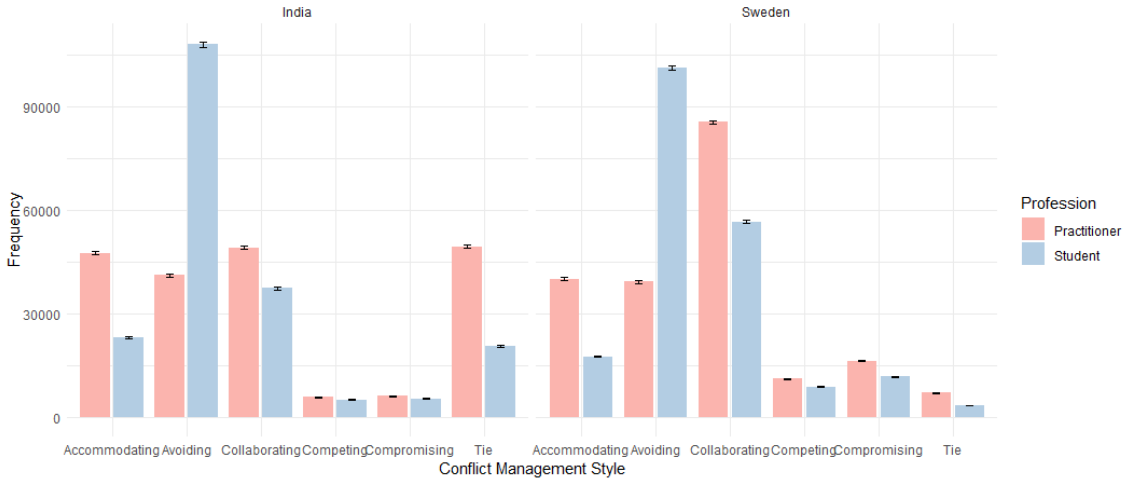
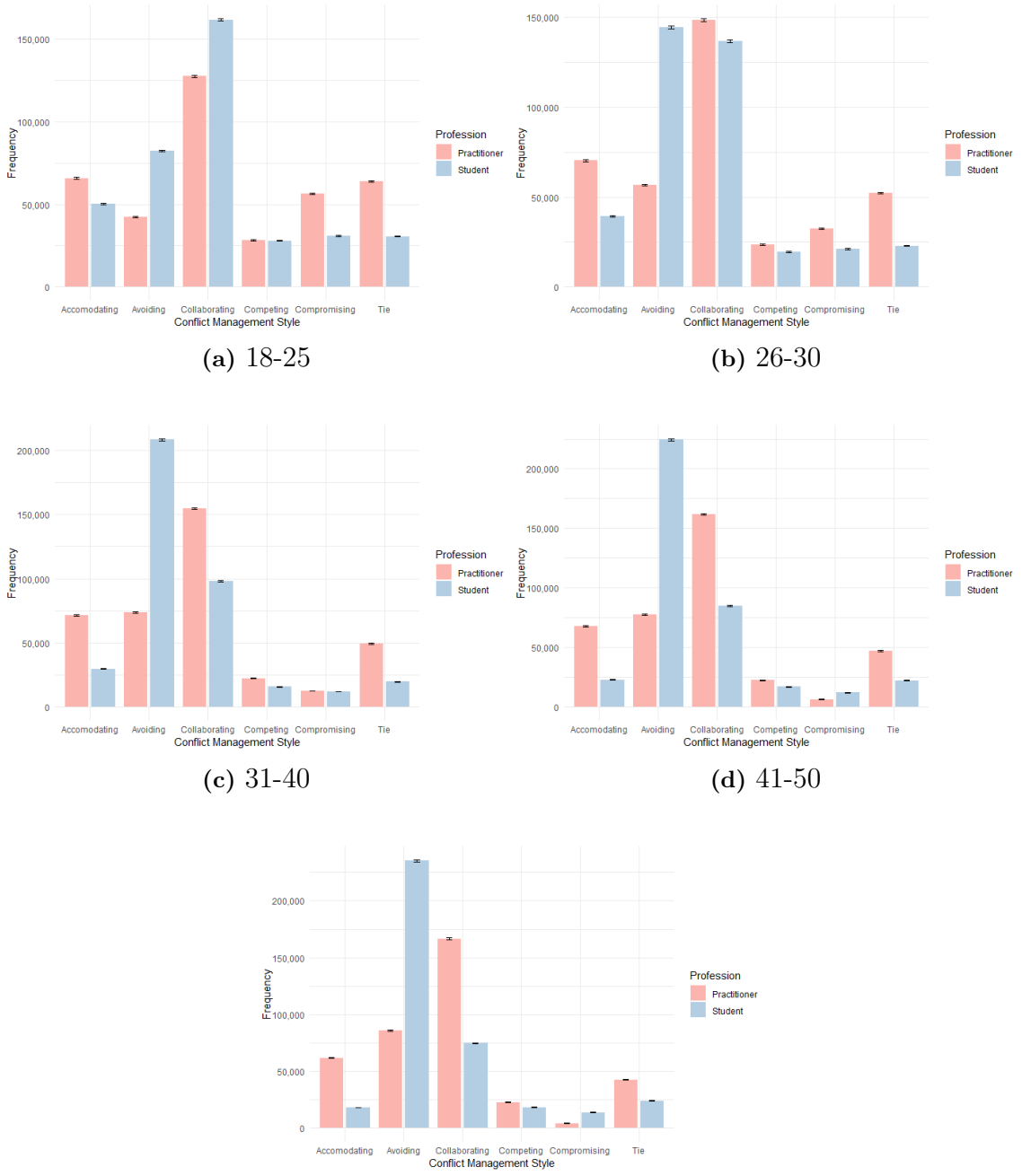


Figure 4.12: *Distribution of Conflict Management Styles among Students and Practitioners in India and Sweden*

Figure 4.13 illustrates the differences in conflict management styles across various age groups between students and practitioners. Notably, there is a decline in the frequency of the Collaborating style among students as they age, whereas the frequency of the Avoiding style among students tends to increase with age. Additionally, the frequency of the compromising style decreases as age increases for both students and practitioners.
Regarding education level, only minor variations were observed in the frequencies of different conflict management styles. Detailed plots illustrating these changes are available in the replication package.



(a) 18-25

(b) 26-30

(c) 31-40

(d) 41-50

(e) 51-more

Figure 4.13: *Differences in Conflict Management Styles Between Students and Practitioners Across Different Age Groups*

4.1.3 Awareness

For assessing the awareness of conflict management styles among software engineers, descriptive statistics were utilized to analyze the data. The main variable, awareness, is measured on a Likert scale from zero to five, where zero indicates no knowledge and five signifies very good knowledge of conflict management styles.
Table 4.3 displays the mean values of awareness, along with standard deviations and variances, reflecting the average understanding of conflict management styles among a total of 82 participants, with a breakdown for practitioners and students. The mean awareness level across all participants is 3.11 on a scale of 0 to 5. The standard deviation of around 1.165 for the total group, as well as similar values for practitioners (1.173) and students (1.167), suggests a moderate level of variability in awareness. This variability indicates that there is a spread in the data, with some individuals showing much higher or lower awareness than the average (mean) value. This degree of variability is consistent across both practitioners and students. Figure 4.14 shows the awareness for students and practitioners.

Table 4.3: *Awareness of Conflict Management Styles, Showcasing Mean Values, Standard Deviations, and Variances for Practitioners and Students.*

Profession	**Mean**	**std**	**Variance**
Total (N=82)	3.109756	1.165408	1.358175
Practitioners (N=56)	3.071429	1.173296	1.376623
Students (N=26)	3.192308	1.16685	1.361538

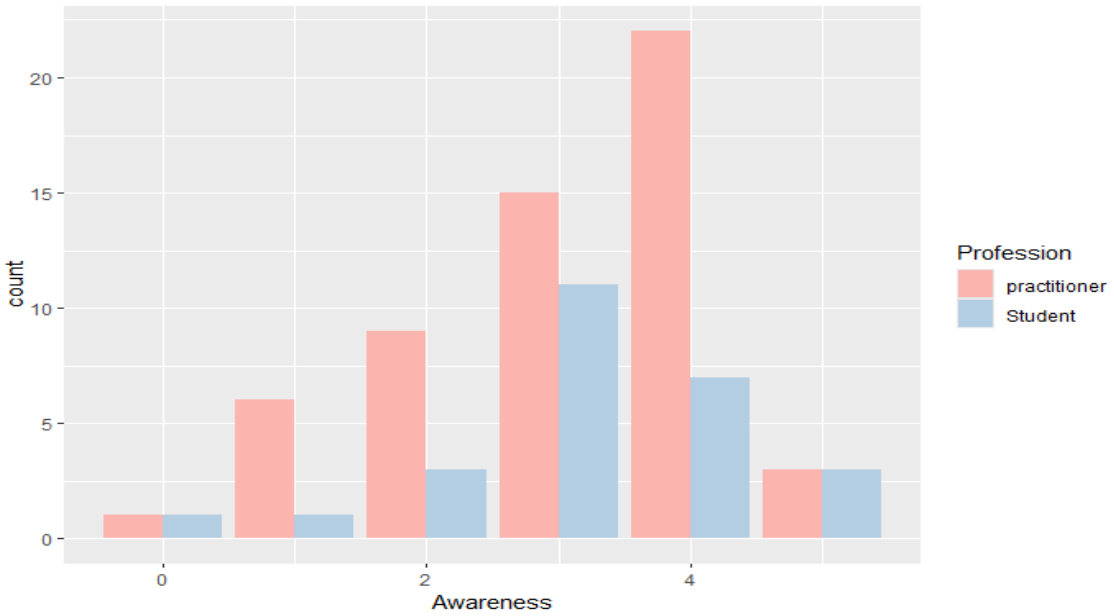


Figure 4.14: *Awareness Levels of Conflict Management Styles Among Students and Practitioners.*

The results of the T-test, assessing differences in awareness scores between practitioners and students, are displayed in Table 4.4. The purpose of this analysis is to determine if there is a statistically significant variance in the levels of awareness regarding conflict management styles between the two groups.

Table 4.4: *Summary of Two-Sample t-Test Comparing Awareness Levels of Conflict Management Styles Between Practitioners and Students*

	t	**df**	**p-value**	**95% confidence interval**	
				Lower	**Upper**
Awareness	-0.43487	80	0.6648	-0.6740456	0.4322874

The T-test yielded a t-value of -0.43487 and a two-sided p-value of 0.6648. These results do not provide sufficient evidence to reject the null hypothesis, which posits that the mean awareness levels between students and practitioners are equal. Furthermore, the 95% confidence interval for the difference in means spans from -0.674 to 0.432, importantly including zero. This further supports the conclusion that there is no significant difference in the awareness levels of conflict management styles between the two professional categories.

Table 4.5 provides the mean values and standard deviations of awareness for different variables, including Age, country of residence, educational level and years of working experience.

Table 4.5: *Mean Values and Standard Deviations of Awareness Across Different Variables Including Age, Country of Residence, Educational Level, and Years of Working Experience*

		Mean	**std**	**variance**
Age	18-25 (N=24)	**3.25**	**0.989**	**0.978**
	26-30 (N=31)	3.258	1.210	1.464
	31-40 (N=16)	2.75	1.238	1.533
	41-50 (N=6)	2.333	1.366	1.866
	51- above (N=5)	3.6	0.894	0.8
Country	Sweden (N=38)	2.868	1.234	1.522
	India (N=31)	**3.516**	**0.769**	**0.591**
	Other countries (N=13)	2.85	1.519	2.307

Education level	High school diploma (N=1)	3	NA	NA
	vocational training, but no degree, (N=5)	3.75	1.892	3.583
	Bachelor's degree (N=40)	**3.341**	**0.938**	**0.880**
	Master's degree (N=33)	2.818	1.285	1.653
	PhD degree (N=3)	2.333	1.154	1.333
Years of working experience	less than 1 years (N=11)	**3.454**	**1.035**	**1.072**
	1 to 3 (N=4)	3.25	0.957	0.916
	3 to 5 (N=10)	3	1.563	2.444
	5 to 10 (N=11)	3.454	1.035	1.072
	11 to more (N=15)	2.733	1.334	1.780

The majority of survey participants fall within the 18-25 and 26-30 age brackets. For the 18-25 group, the mean awareness score is 3.25, accompanied by a relatively low standard deviation, indicating less variability in responses. Figure 4.15 illustrates a bar plot of awareness across different age groups, where scores for the 18-25 age group are primarily clustered around 3 and 4.

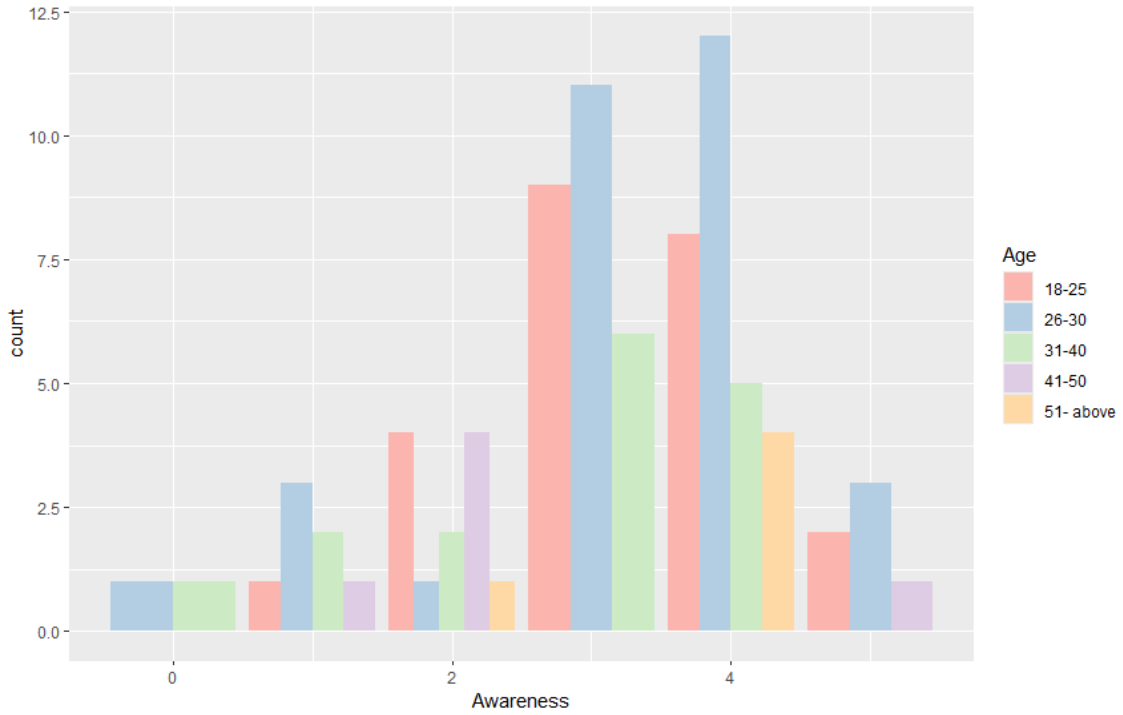


Figure 4.15: *Awareness Levels of Conflict Management Styles Among Students and Practitioners by age groups*

In contrast, the 26-30 age group shares the same mean awareness score of 3.25 but features a higher standard deviation of 1.21. This suggests a broader distribution of scores, including scores as low as 2 and as high as 5, although most responses still center around 3 and 4. For older age groups, specifically the 41-50 and 51-above, the numbers of participants are lower, with 6 and 5 respectively. The bar plot for these groups indicates that the majority of individuals aged 41-50 scored a 2, while the predominant score for those aged 51 and above was 4, showing different patterns of awareness with increasing age.

The participants in the study reside in 12 different countries, with the vast majority from Sweden and India. For analytical clarity and to save space, the data is categorized into three groups: Sweden, India, and other countries. The analysis shows that India has a higher mean awareness score (3.516) with a relatively lower standard deviation compared to the other groups.
Figure 4.16 illustrates the distribution of awareness levels across these countries. Indian participants predominantly score at levels 3 and 4, indicating a higher overall awareness, with the lowest recorded awareness level being 2. In contrast, awareness levels for Swedish participants also center around 3 and 4, but include some instances at levels 2, 1, and even 0. The distribution for participants from other countries is more spread out, with a dominance at level 4, suggesting that while the awareness is generally high, it varies more significantly than in India or Sweden.

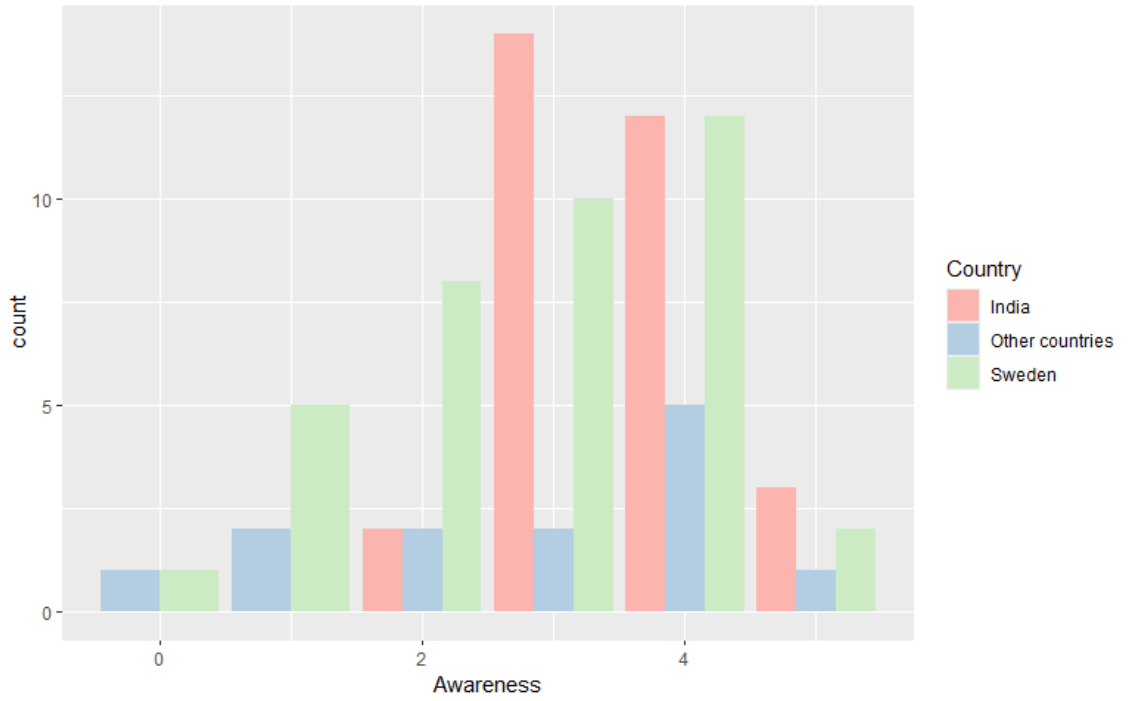


Figure 4.16: *Distribution of Awareness Levels in Conflict Management Styles Among Participants from India, Sweden, and Other Countries*

The examination of educational levels among both students and practitioners shows that the majority possess or are pursuing a bachelor's degree, exhibiting a relatively

high mean awareness level of 3.341 with a modest standard deviation. In comparison, those with a master's degree demonstrate a lower mean awareness level of 2.818 and a higher standard deviation of 1.285, indicating more variability in their understanding of conflict management styles.
Figure 4.17 illustrates the distribution of awareness levels across the different educational qualifications. At the bachelor level, awareness scores primarily center around levels 4 and 3, showing a focused understanding.Conversely, the distribution for master's degree holders is more spread out, encompassing levels 4, 3, and 2, suggesting a broader range of awareness. For the limited number of PhD participants, most scores were recorded at level 3, with one individual scoring a 1, underscoring that higher academic qualifications do not necessarily equate to increased awareness of conflict management styles.

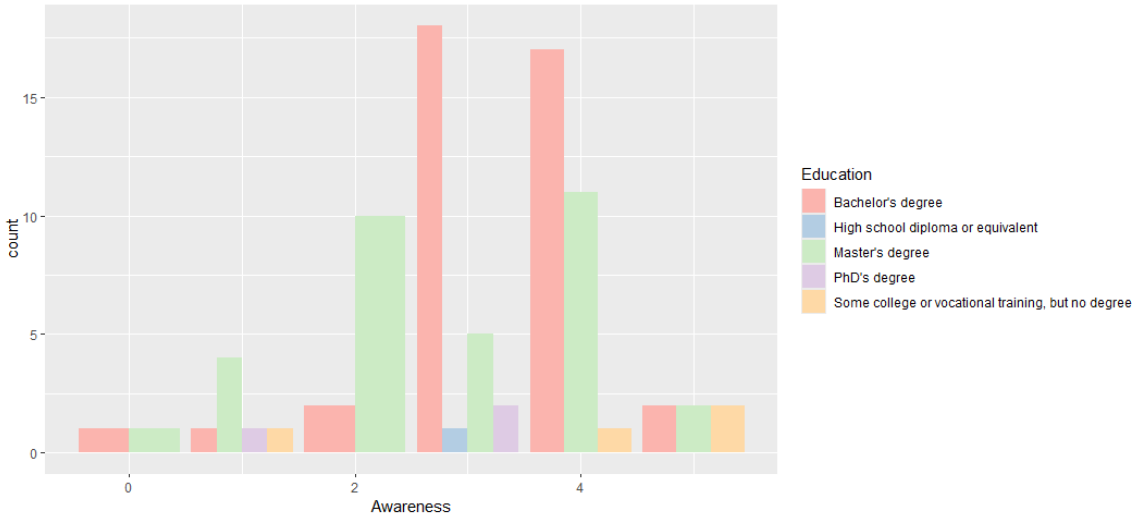


Figure 4.17: *Distribution of Awareness Levels in Conflict Management Styles Across different educational levels*

The analysis of years of working experience among software engineers reveals distinct trends in their awareness of conflict management styles. Engineers with fewer years of experience, specifically less than 1 year to 3 years, show relatively high awareness, with mean values of 3.454 and 3.25, respectively. These figures are coupled with moderate standard deviations, indicating some variability within this group. In contrast, engineers with 3 to 10 years of experience display a notable decrease in both awareness levels and variability. Interestingly, the most seasoned engineers, those with 11 years of experience or more, exhibit the lowest levels of awareness yet have higher variability in their scores. Figure 4.18 visually represents these findings, illustrating the distribution of awareness across different years of experience.
From the plot, it is evident that engineers with over 11 years of experience often score at lower awareness levels, such as 2 and 1, but there are also significant occurrences at level 4. This suggests that while some highly experienced engineers maintain a strong awareness of conflict management styles, a portion may experience a decline. Conversely, engineers with less than 1 year of experience predominantly score higher, around levels 4, 3, and 5, indicating a fresher engagement with conflict man-

agement concepts. Engineers with 1 to 3 years of experience tend to have their scores distributed mainly around levels 4, 3, and 2. These patterns suggest that greater years of experience do not necessarily correlate with enhanced awareness of conflict management styles.

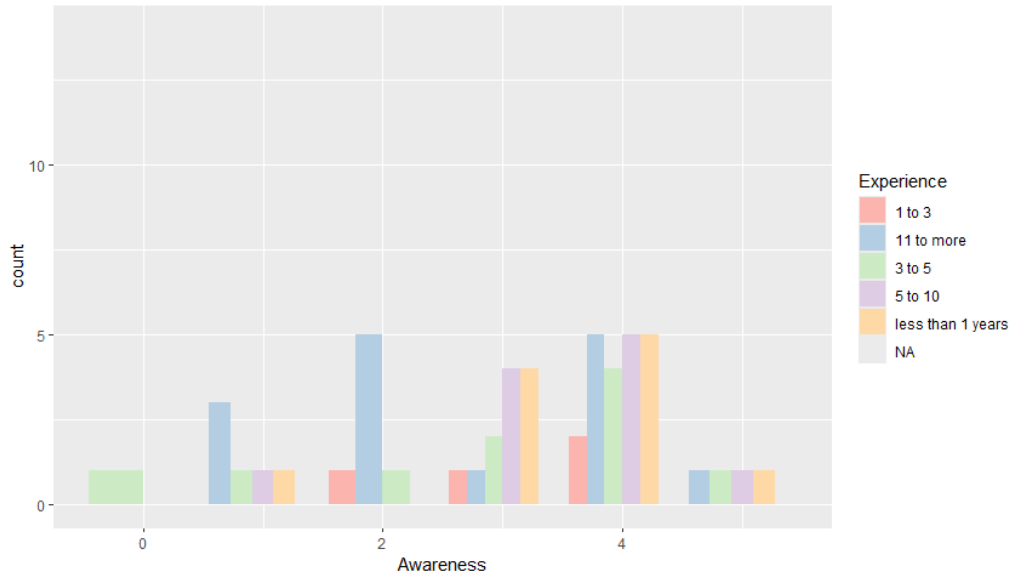


Figure 4.18: *Distribution of Awareness Levels in Conflict Management Styles Across years of experience*

ANOVA tests were conducted to examine if there is a statistically significant correlation between various factors and awareness of conflict management styles among software engineers. Specifically, One-Way ANOVA was utilized to determine if the variables tested—such as country of residence, age, education level, and years of working experience—have significant correlations with awareness.

Table 4.6: *Results of the One-Way ANOVA Examining the Impact of Country of Residence, Age, Education Level, and Years of Working Experience on Awareness of Conflict Management Styles Among Software Engineers*

		Df	Sum Sq	Mean Sq	F value	Pr(>F)
Age		4	8.04	2.011	1.518	0.205
	Residuals	77	101.97	1.324		
Country		2	8.24	4.118	3.196	**0.0463**
	Residuals	79	101.78	1.288		
Education level		4	8.47	2.117	1.605	0.182
	Residuals	77	101.55	1.319		

Working Experience		4	4.90	1.225	0.792	0.536
	Residuals	46	71.14	1.546		

The results of the ANOVA, presented in Table 4.6, indicate that among the variables tested, only the country of residence has a statistically significant effect on awareness, with a p-value of 0.0463, which is below the threshold of 0.05. This suggests that where an engineer resides may influence their awareness of conflict management styles. In contrast, age, education level, and years of working experience do not show a statistically significant impact on awareness, with p-values of 0.205, 0.182, and 0.536, respectively.
A post hoc Tukey test was conducted to further investigate the differences between pairs of country groups—namely Sweden, India, and other countries—following the ANOVA test that showed significant differences in awareness of conflict management styles. The analysis revealed no statistically significant difference between the awareness levels in India and other countries (p-adjusted = 0.1807526) and between Sweden and other countries (p-adjusted = 0.9979469). However, the comparison between Sweden and India displayed a borderline significant p-value of 0.0538061, with a confidence interval narrowly including zero, suggesting a potential, albeit not statistically confirmed, lower awareness in Sweden compared to India (the negative difference of -0.64770798).

Table 4.7: *Post-Hoc Tukey Test Results Detailing Differences in Awareness of Conflict Management Styles Between Country Groups—Sweden, India, and Other Countries.*

	diff	**95% Confidence Interval**		**p-adjusted**
		Lower	**Higher**	
Other countries-India	-0.669	-0.669	-1.565	0.180
Sweden-India	-0.647	-1.303	0.008	0.053
Sweden-Other countries	0.0222	-0.848	0.893	0.997

Figure 4.19 visualizes the 95% family-wise confidence intervals for differences in conflict management awareness levels between India and other countries, as well as between Sweden and other countries. The interval for Other Countries versus India is entirely below zero, indicating a statistically significant higher awareness level in India compared to other countries. This significant difference, demonstrated both by the confidence interval not including zero and supported by statistical analysis, suggests that India may have more effective conflict management training or practices. In contrast, the interval for Sweden versus Other Countries includes zero, reaffirming the lack of a statistically significant difference in awareness levels between these regions.

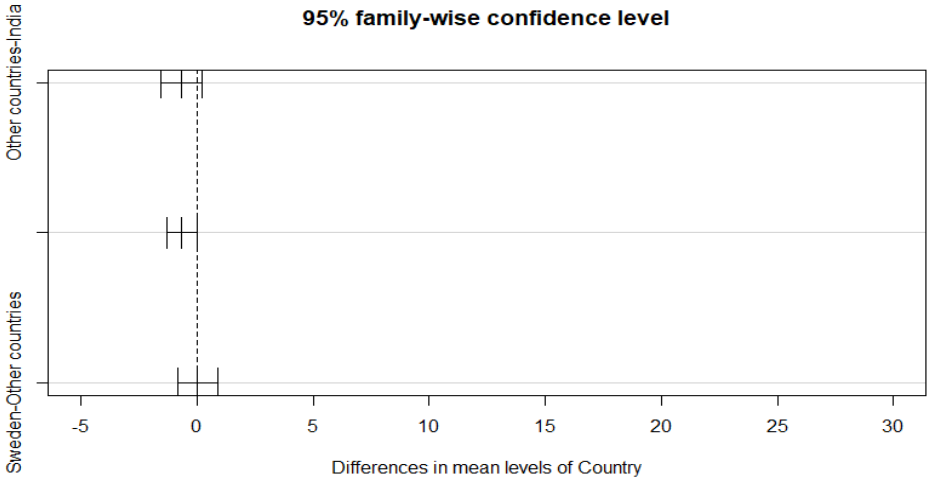


Figure 4.19: *Visualization of 95% Family-wise Confidence Intervals for Differences in Conflict Management Awareness Levels Between Sweden, India, and Other Countries*

4.2 Interview

In total, ten interviews were conducted with five females and five males, comprising six practitioners and four students. These interviews took place between April and May 2023. Based on the participants' preferences and availability, some interviews were conducted in person, while others were held virtually.
Table 4.8 presents detailed information about the interview participants, which was derived from the demographic questions included in the survey. To identify the participants in the analysis, a specific code is assigned for each interviewee which has the following pattern [Gender-profession-Style], in which for gender two codes are used "M" for males and "F" for Females. As for professions, "P" is for practitioners, and "S" is for students. The style indicates the participant's predominant conflict management style. For example, [F-S-avoiding] refers to the female student who has an Avoiding style.

Table 4.8: Interview participants

ID	**Information**
[F-P-Avoiding]	Female practitioner with less than a year of working experience and she holds a bachelor's degree. She falls within the age range of 31-40 and is a resident of Sweden.
[M-P-Avoiding]	Male practitioner working in the field of software development. He holds a Master's degree and has 11 or more years of working experience in the industry. The participant's age falls within the range of 31 to 40 and is a resident of Sweden.
[F-S-Avoiding]	Female student currently pursuing a Master's degree. She falls within the age range of 31 to 40 and is a resident of Sweden. In the interview, she mentioned that she had prior experience working in the industry for a few years before deciding to pursue her Master's degree.
[M-P-Collaborating]	Male practitioner working as a software engineer. He holds a Master's degree and has 3 to 5 years of working experience in the field. He falls within the age range of 26 to 30 and is a resident of the USA.
[F-S-Collaborating]	Female student currently pursuing a Master's degree. She falls within the age range of 31 to 40 and is a resident of Sweden. In the survey, she indicated having 5 to 10 years of prior working experience in the industry, which she also mentioned during the interview. However, the main focus of the interview was her experience as a student.
[F-P-Accommodating]	Female practitioner working in the field of software development. She holds a Master's degree and has 5 to 10 years of working experience in the industry. She falls within the age range of 31 to 40 and is a resident of Norway.

[M-P-Competing]	Male practitioner working as a Software Engineering Manager. He holds a Master's degree and has more than 11 years of working experience in the industry. He falls within the age range of 41 to 50 and is a resident of Sweden.
[M-S-Competing]	Male student currently pursuing a Master's degree in software engineering. Falling within the age range of 18 to 25, he is a resident of Sweden but originally from Cyprus.
[F-P-Tie]	Female practitioner working as a Software Engineer. She holds a Bachelor's degree and falls within the age range of 18 to 25. She has 4 years of working experience in the industry. She is a resident of India.
[M-S-Tie]	Male student pursuing a Bachelor's degree. He falls within the age range of 18 to 25 and is a resident of India.

In the thematic analysis, a total of 62 codes were generated from the transcripts, leading to the identification of nine distinct themes. Seven of these themes, specifically themes 1, 2, 3, 4, 5, 7, and 9, directly emerged from the interview questions. In contrast, themes 6 and 8 surfaced from comments made by the participants. The first theme addresses conflicts in software engineering teams between students and practitioners, while the last theme explores awareness of conflict management styles among these groups. The remaining themes delve into various aspects of conflict management styles.
Given the diversity of our study groups—comprising females, males, students, and practitioners—some themes were specifically relevant to one group while others spanned multiple groups. Figure 4.20 provides a thematic map that illustrates the connections between the themes and their relevance to each demographic group. Additionally, Table 4.9 lists each theme and sub-theme along with their corresponding definitions .

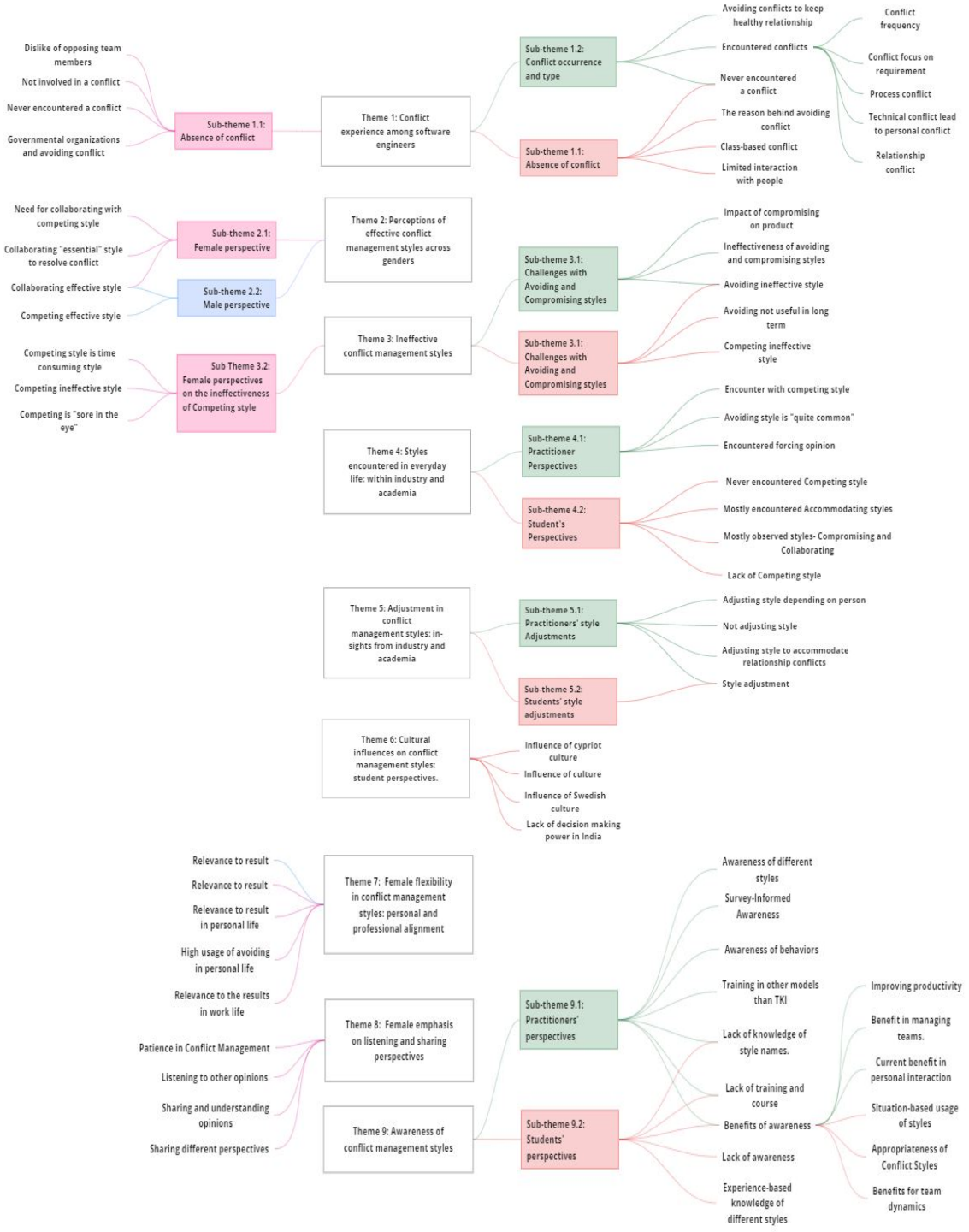


Figure 4.20: *Visualization of Thematic Analysis Results. Black squares represent themes, while colorful squares represent sub-themes. The un-bordered text indicates individual codes. Color coding helps identify the participant groups: pink for female-related themes, blue for male-related themes, red for student-related themes, and green for practitioner-related themes.*

Table 4.9: Overview of Identified Themes and Sub-Themes with Corresponding Definitions

ID	Theme	Description
T1	Conflict Experience Among Software Engineers	This theme investigates the nature and frequency of conflicts encountered by software engineers, with a focus on how these experiences differ based on gender, professional role, and academic involvement. It unfolds into two sub-themes: The first sub-theme reveals a general absence of conflict among female practitioners and both male and female students. The second sub-theme contrasts this by documenting more frequent and diverse conflicts among more experienced practitioners.
T1.1	Limited Conflicts Among Female Practitioners and University Student's	
T1.2	Conflict Occurrence and Types among Experienced Practitioners	
T2	Perceptions of Effective Conflict Management Styles Across Genders	This theme offers insights into how individuals assess the effectiveness of different conflict management styles within academia and industry. While participants, regardless of being students or practitioners, generally agreed that the collaborating style was effective, a significant gender difference in perception was observed. This theme specifically explores and highlights the variations in how males and females perceive effective conflict management styles.
T2.1	T2.1: Females perspective	
T2.2	T2.1: Males perspective	
T3	Ineffective conflict management styles	This theme delves into the perceptions of software engineering practitioners and students regarding ineffective conflict management styles. It examines the impact of these styles on team dynamics and project outcomes. Both practitioners and students, irrespective of gender, share a consensus that compromising and avoiding styles are ineffective, with a subset of females expressing reservations about the competing style.
T3.1	Challenges with Avoiding and Compromising Styles	
T3.2	Female Perspectives on the Ineffectiveness of Competing Style	
T4	Styles encountered in everyday life: within industry and academia	This theme explores the prevalent conflict management styles observed by participants in their daily interactions, emphasizing the dominance of competing and avoiding styles among practitioners. It also highlights gender variations, with observations of both male and female practitioners frequently exhibiting competitive behaviors. Conversely, students report a wider range of styles within academic settings, reflecting a broader diversity in conflict management approaches among their peers.
T4.1	Practitioner's Perspectives	
T4.2	Student's perspectives	

T5 T5.1 T5.2	Adjustment in Conflict Management Styles: insights from Industry and Academia Practitioners' style adjustments Students' style adjustments	This theme investigates how individuals adjust their conflict management styles based on others' behavior or attitude, this theme reveals practitioners' tendencies to adapt styles with increasing working experience. In contrast, students exhibit adaptability based on the individuals they interact with.
T6	Cultural Influences on Conflict Management Styles: Students' Perspectives	This theme highlights the profound impact of cultural backgrounds on conflict management which showcases distinct patterns in students' adoption of conflict management styles based on their countries of origin. Thus, it emphasizes the correlation between culture and conflict management styles.
T7	Female Flexibility in Conflict Management Styles: Personal and Professional Alignment	This theme draws from participants' acknowledgment of their style usage. It highlights the ability of female software engineers to distinguish between work and personal life, adapting conflict management styles accordingly.
T8	Female Emphasis on Listening and Sharing Perspectives	This theme highlights the significance of listening and sharing perspectives, this theme underscores the prominent role of females, particularly those with a collaborating style, in fostering collaboration and enriching discussions with diverse viewpoints.
T9 T9.1 T9.2	Awareness of conflict management styles Practitioners' Perspectives Students' Perspectives	This theme explores the awareness of conflict management styles among software engineering students and practitioners, assessing their familiarity with different styles and the extent of formal training received. It further examines the perceived benefits of this awareness, particularly how it influences conflict resolution, team dynamics, and overall productivity within professional and academic settings.

T1: Conflict Experience Among Software Engineers

This theme emerged from the question " Can you describe a conflict you encountered recently?" which explores the different types of conflict the software engineers encounter within academia and industry, with a specific emphasis on gender variations. Two sub-themes emerged; the first indicated a lack of conflicts among university students and female practitioners, while the second revealed the diverse conflict experiences of male practitioners based on their experience levels and roles within professional environments.

T1.1: Limited Conflicts Among Female Practitioners and University Students

This sub-theme predominantly emerged among female practitioners and students of both genders, signifying a lack of conflict experience in their workplace or university courses. Two female practitioners explicitly stated that they did not experience conflict within their teams, due to various factors such as being new to the team or the dynamics within the team.

The influence of being new to the team on the lack of conflicts was evident in the interviews. [F-P-Tie] pointed out: "No, I didn't have any conflicts because I am new in the team. Even in the older team, I didn't have any conflicts". Being new to the team can affect self-confidence, which may act as a deterrent to engaging in conflict. [F-P-Avoiding] said: "I am still new to the team i did not had any conflict, in the older team i have never encountered any conflict." She also added: "because I am new to the working in industry, and I don't have enough confidence".

Group dynamics also played a role, with [F-P-Tie] mentioning, "Because I don't like opposing other teammates" indicating a preference for maintaining harmony within the team to avoid potential conflicts from opposing viewpoints.

Fear of job loss emerged as another factor influencing the lack of conflicts among practitioners, as noted by [F-S-Avoiding], who worked in a governmental agency in India: "I just wanted to not get fired but he did not care. I used to work in a governmental organization in India so most of the other people were avoiders and were afraid to raise their voice".

University students, On the other hand, tend also to have a conflict-free environment, with rare instances in their academic projects. Only One student mentioned a conflict with a teacher due to dissatisfaction with the course organization, but conflicts with fellow students are infrequent. For the other students interviewed, conflicts mostly occur at their workplaces rather than at university.

One reason for the low level of conflicts among university students, according to [M-S-Competing], is their desire to avoid making others upset. He says: "They don't want to make anyone sad so they collaborate or try to avoid the hassle". Another reason he mentioned is that he has limited interaction with other students. Although some students had conflicts in their past professional experiences, they currently avoid conflicts while studying. As expressed by [F-S-Collaborating], "We don't have conflicts in the university; in the work, we have more conflict."

T1.2: Conflict Occurrence and Types among Experienced Practitioners

In contrast, practitioners, especially those with more experience or who were older in the team, reported encountering more conflicts. Both [M-P-Competing] and [M-P-Avoiding], with 11 years or more of working experience, mentioned experiencing both task and process conflicts with other team members. [F-P-Accommodating] mentioned that she encountered conflicts regarding quality assurance regarding the requirement implementation. [M-P-Competing], a team manager, also emphasized that he has to deal with relationship conflicts among team members, stating,

> *We had another conflict, which is a more personal conflict. As a manager, I need to talk. So it's several people involved need to get people talking to each other. So I try to accommodate that. It is like people saying bad things about each other. Maybe not true, but people feel bad about it, and then we have to bring it up.*

He also highlighted that relationship conflicts often started as technical conflicts and then evolved into personal or relationship conflicts.

T2: Perceptions of Effective Conflict Management Styles Across Genders
This theme surfaced from the question 'Are there any particular styles that you feel are effective in the team?' which provides insights into how individuals assess and perceive the effectiveness of different styles in managing conflicts within academia and industry. The perception of effective styles was not significantly different between students and practitioners, since all participants generally agreed that the collaborating style was effective. However, a significant gender difference in perception was observed. Therefore, this theme specifically explores and highlights the variations in how males and females perceive effective styles.

T2.1: Females perspective
All female participants unanimously agreed that Collaborating style is highly effective in managing conflicts within a team. [F-S-Avoiding] emphasized the importance of collaboration, stating,

> *We should be more collaborating. The most important point in the team is good communication, and with collaboration, we can build good communication and resolve all the conflicts that we may face.*

[F-S-Collaborating] supported this view, highlighting that Collaborating style can effectively resolve conflicts and foster the brainstorming of ideas. [F-P-Avoiding] added that Collaborating style is particularly needed when dealing with a person having a Competing style within the team.

T2.2: Males perspective
In addition, all male participants agreed that the collaborating style is effective, with a noteworthy addition that the competing style also emerged as an effective approach. Two males specifically highlighted both collaborating and competing styles as effective conflict management styles. [M-P-Collaborating] believes that both Collaborating and Competing styles can lead to the best outcomes for the team. [M-S-Competing] underscores the effectiveness of the Competing style saying:

> *Competing because when the manager is making a decision and it is not a good decision, you need someone to correct that. They might be wrong but they also might be right. In collaborating, you might be right but it does not mean that the other person is wrong, hearing everyone's opinion is sometimes needed.*

T3: Ineffective conflict management styles
This theme emerged in response to the question, "Are there any particular styles that you feel are not effective in the team?" which explores the participants' perceptions and experiences regarding the ineffectiveness of certain conflict management styles. The main objective aims to understand how individuals with different styles perceive each other and whether certain situations arising from these styles lead to tension within the team. Notably, both practitioners and students, regardless of gender, share the viewpoint that compromising and avoiding styles are ineffective,

with a subset of females also expressing reservations about the ineffectiveness of the competing style.

T3.1: Challenges with Avoiding and Compromising Styles
A prevalent opinion among practitioners is the ineffectiveness of the Avoiding and Compromising styles. [F-P-Accommodating] said, "If you use Avoiding, then our nature will be like let it be. So it is not a good approach for team growth or the end product or company". She also expresses hesitation about compromising, especially in product implementation, asserting, "I have mixed feelings about compromising. If it is related to product implementation, then anyone should not use this style; it may affect the product". [M-P-Collaborating] also expresses concerns about avoiding stating " Avoiding, It will not resolve conflict completely. It will remain in their mind which is not healthy for team building ". [M-P-Avoiding] shares a similar view, stating, "Avoiding is not effective in a team because every time you can't avoid the conflict".
This viewpoint aligns with [M-S-Competing] and [F-S-Collaborating] among students, where [M-S-Competing] said "There is nothing to gain from avoiding conflict, they only you may gain is having peace of mind for a short term but it may get bad later. There is almost zero cases where avoiding is good. ".

T3.2: Female Perspectives on the Ineffectiveness of Competing Style

While the Competing style is also identified as ineffective, it is noteworthy that this perspective is predominantly shared by females, including both students and practitioners, in comparison to males. [F-P-Avoiding] criticizes Competing for being time-consuming, she states "Competing, it is time-consuming, causes a bad working environment and we lose a lot of energy on unnecessary stuff". [F-P-Tie] agrees with this sentiment, stating, "In my opinion, the competing style is not effective in a team because their behavior can impact the team's performance". It is apparent that female practitioners tend to disfavor the competing style in the workplace. This viewpoint was also shared by the student [F-S-Collaborating], who views both competing and avoiding as ineffective styles. She states:

> *Because sometimes in the short term, it is good to share their ideas, but in the long term it may break the teamwork because some people may feel uncomfortable and may feel unsafe when you are competing. therefore it will break the trust and relationship in the team.*

T4: Styles encountered in everyday life: within industry and academia
This theme emerged from the question, "Have you encountered other styles in your everyday life?" which aimed to delve into the predominant conflict management styles experienced by both students and practitioners in their daily interactions. The central goal was to ascertain if the observed conflict management styles by interviewees aligned with the survey results. Among the various styles encountered, two predominant ones identified by practitioners were Competing style and Avoiding style.

T4.1: Practitioner's Perspectives

Remarkably, practitioners have encountered individuals of both genders, male, and female, exhibiting a Competing style characterized by a tendency to impose their opinions. The interviewee [F-P-Avoiding] described instances of a highly Competing style within her team, highlighting a team member with autism who tends to force their opinions on the group. She stated

> *Yes, two people in the team have a high Competing style. One of them has autism and tends to force his opinion onto the team. Otherwise, all the other members have a high Collaborating style.*

[M-P-Avoiding] has expressed: "Yes, one of my teammates was using a Competing style because, in any situation, she wanted to implement her opinion only." [F-S-Avoiding] shared her experience of having a colleague with a Competing style in her previous workspace. She elaborated

> *Yes one of my colleagues is sort of Competing in my organization, he is sort of sore in the eye. He is very talented, he is from a top university and has high technical skills. He openly discusses his opinion about projects, and he does not care what other people think, if something is not good for the organization he will openly say that we should not do the project. He is not a people pleaser. I just wanted to not get fired but he did not care.*

On the contrary, [M-P-Competing], serving as a team manager, frequently encountered an Avoiding style within his team. He remarked

> *Yes, some are Avoiding. That's quite common; they refer to someone else or simply evade involvement. They may transfer the responsibility to someone else with comments like, 'You're probably right, but I don't want to discuss this with you. Go talk to...'*

[F-P-Tie] has also confronted both Competing and Avoiding conflict management styles within her team.

T4.2: Student's perspectives

Conversely, students reported different observations, with none encountering Competing styles in their university projects. [F-S-Collaborating] encountered an Accommodating style within her team. In contrast, [M-S-Competing] predominantly encountered Compromising and Collaborating conflict management styles. He expressed

> *Yeah, definitely. I would say the style I have seen the most is Compromising and Collaborating. People that I know don't really compete when it comes to argument or conflict. They don't want to make anyone sad, so they collaborate or try to avoid the hassle.*

T5: Adjustment In Conflict Management Styles: Insights from Industry and Academia

This theme emerged from the question 'Have you ever needed to adjust your style based on the other person's behavior or attitude?' designed to investigate the adaptability of students and practitioners in their behavior within a workspace or univer-

sity setting. This theme sheds light on how years of working experience influence practitioners' inclinations to adjust their conflict management styles. In contrast, students tend to adapt their styles based on the individuals they interact with. It is crucial to note that gender played no role in influencing whether individuals adjusted their conflict resolution styles or not.

T5.1: Practitioners' Style Adjustments
One determinant for practitioners to modify their style is their years of working experience; the more experienced they are, the more likely they are to adjust their style. [F-P-Avoiding], with 2 years of working experience, mentioned not having adjusted her style in the team. [M-P-Collaborating] and [F-P-Tie], with 3 to 5 years of experience, similarly do not adjust their styles. [F-P-Tie] specifically stated: 'No, I am already using Accommodating style so it was never required to change my style.' However, [F-P-Accommodating], with 5 to 10 years of experience, shared that she occasionally adjusts her style, avoiding conflicts when her Accommodating style is not effective. [M-P-Competing] and [M-P-Avoiding], with 11 or more years of experience, also acknowledged adjusting their styles in the workplace. The rationale behind practitioners' style adjustments, according to [M-P-Avoiding], is if there are financial or physical harms, as he stated, 'Yes, If I feel the things will harm me financially or physically, then I have to adjust my avoiding style'. Furthermore, he emphasized that when interacting with clients, he tends to adapt his style and compromise to maintain a healthy relationship. [M-P-Competing], influenced by workspace hierarchy, despite the fact that he is a team manager, explained

> *Depends on who I talk to, if it is a manager, then most of the time I am avoiding because I don't want to get in conflict. But if I am with my nearest colleagues, then I am more myself. Also, if someone is very strong and I see no value in it, I mean, it's obvious that he or she is wrong or I don't agree. But I feel it wouldn't lead anywhere to argue, and I say let it be. Especially if it's not really my responsibility is probably wrong, but I'm not going to get hurt. It's bad for the company but it's not my problem.*

T5.2: Students' style adjustments
On the other hand, all students acknowledged adjusting their styles, citing the person they are interacting with as a key factor. [F-S-Avoiding] stated, 'Yes, a lot, I keep on adjusting based on people around.' [F-S-Collaborating] mentioned accommodating depending on a person's attitude or hierarchy level. [M-S-Competing] disclosed adjusting his style based on people's reactions, explaining

> *Yes, sometimes when I am doing tense in my conflict, the other person may not be able to handle the intensity, so I try to change to not sound mean or aggressive because it is easy for other people to misinterpret my intentions. I usually go to collaborating if I see people can't handle how I handle conflict.*

T6: Cultural Influences on Conflict Management Styles: Student Perspectives

The interviews with students have highlighted that the cultural background of the interviewees significantly influences their adoption of conflict management styles. In specific countries, certain students may lean towards an Avoiding or Compromising style, while in others, they exhibit a more confrontational approach, utilizing the Competing style. For instance, [F-S-Avoiding], originally from India and currently studying in Sweden with working experience in both countries, shared her experience of transitioning from an Avoiding style in India to a more Collaborating one in Sweden. She explained

> *In India, we did not have decision-making power, even if we have opinions it is always the higher manager's responsibility to make the decision, so being competing is not necessary but in Sweden, it changed, here we can reason our opinions and make them. It is totally dependent on where I am working. There was a change in where I used these conflict management styles. Here I try to understand the context and discuss. It is totally based on the organization I work and the culture I am working in. In India, I was in middle management, and all the decisions were made by higher managers, people that I had to report to them, they are the decision-makers. Even if we have an opinion about the project, they will still make the decision.*

On the other hand, [M-S-Competing], a Greek from Cyprus studying in Sweden, expressed that " People in Cyprus are very talkative and want to be dominant in their argument, so it is more competing but in Sweden, I think people are more compromising than collaborating." His observation reflects the cultural influence on conflict management styles, emphasizing the prevalent competing style in Cyprus. Overall, these insights emphasize the role of cultural backgrounds in shaping individuals' approaches to conflict resolution, specifically for students. Notably, these insights were absent in the practitioners' interviews suggesting that the influence of cultural backgrounds on conflict management may present differently across professional contexts.

T7: Female Flexibility in Conflict Management Styles: Personal and Professional Alignment

This theme emerged from the questions "Do you feel that the results are relevant to you?" and "Do you feel you use these styles in your everyday life?". The main goal of these questions was to investigate whether participants acknowledged their usage of their dominant style. Answers to the questions indicated that two of the female participants recognized the partial relevance of their style usage, whether in their work or personal lives. This highlights the ability of female software engineers, including both practitioners and students, to distinguish between their work and personal lives, enabling them to adapt their conflict management styles accordingly. As a result, they can employ approaches that can achieve desired outcomes in certain situations Which can indicate that they have the ability to distinguish between private life and professional life.

One specific observation within this theme was related to [F-S-Avoiding], where she stated

> *Yes, to some extent where it is my personal scenario with my dear once,*

> *but in my professional, I thought am more collaborating than the results. Avoiding I use a lot in my personal life, avoid situations with my family members.*

On the other hand, [F-P-Avoiding] indicated that the avoiding style was 70% relevant in her personal life and fully relevant in her work life, indicating that she tends to avoid conflicts with her colleagues.

It is worth noting that this theme did not emerge for other female participants who identified with the other conflict management styles, as all of them reported full relevance to their scores and dominant style. Furthermore, this theme did not emerge among male participants either. All male participants, including the male practitioner with Avoiding style, agreed that they felt fully relevant to their conflict management style scores.

T8: Female Emphasis on Listening and Sharing Perspectives

This theme surfaced prominently among females, specifically focusing on the significance of listening and sharing perspectives. [F-S-Collaborating], for instance, values listening to others' opinions, believing it brings diverse perspectives and better ideas. She tries to understand and even incorporates alternative opinions if they are more valuable. Another female, [F-P-Tie], similarly engages in active listening and emphasizes the importance of patience. She expressed, "I think I can manage any conflicts using my style because I have patience, and I usually listen to others' person's opinions." Additionally, she mentioned, "I try to understand what is the opinion of the other person." This theme initially emerged among females in the analysis.

However, a commonality between these two interviewees, besides their gender, is their high scores in the Collaborating style. [F-S-Collaborating] predominantly exhibits a Collaborating style, while [F-P-Tie] has a tie between Collaborating and Accommodating styles. Interestingly, the male practitioner with a Collaborating style also emphasized, 'Team members feel that I do consider their opinions and suggestions positively whenever necessary'. This statement was not shared by other male participants. This suggests that the trait of listening and understanding different perspectives is notably high among software engineers with a strong Collaborating style.

T9: Awareness of conflict management styles

This theme emerged from the last three interview questions, which explored students' and practitioners' awareness of conflict management styles. The questions asked were:

- Were you aware that there are different conflict management styles when you encountered this conflict?
- Have you received any training or taken university courses that helped you understand the different conflict management styles?
- How do you think being aware of different conflict management styles can benefit your team at work or university?

The main reason why this theme encompasses three questions is because a single theme effectively captures the varying levels of awareness regarding conflict man-

agement styles. This unified approach not only highlights the level of awareness among the respondents but also examines the training and educational opportunities provided by organizations and educational institutions. Additionally, this theme considers the perceived benefits of such training or courses for both students and practitioners. From this, two sub-themes emerged: one exploring practitioners' perspectives and the other focusing on students' viewpoints.

T9.1: Practitioners' Perspectives

All practitioners acknowledged their awareness of the behaviors and attitudes associated with different conflict management styles, but not specifically the names of the five TKI styles. [M-P-Avoiding] mentioned gaining awareness only from the survey completed before the interview. [F-P-Tie] expressed, "No, I know the behavior but was not aware of the exact name of conflict management styles."

[M-P-Competing] reflected on his awareness during a previously mentioned conflict, stating,

> *Yes I was, but did not thought of it until afterward. I seldom choose the style consciously, I just act naturally and I can reflect afterward that I did it like this. Being aware of the styles I can adjust my behavior going forward, I can think of things in this case I was too competing, and I could choose another strategy.*

When asked about training in conflict management styles, responses varied. [M-P-Collaborating] had attended a personality development course, While [F-P-Avoiding] received training at a company that used animal names for the styles, instead of the traditional TKI style names. Both [M-P-Avoiding] and [F-P-Tie] reported no training received. [M-P-Competing], a team manager, noted that he received a training which focused mainly on handling conflicts within the team rather than on personal conflict management styles, saying, "In conflict Yes. As a manager was part of a program, it was not as much related to my own conflict management but more to handle conflicts in a team and how to accommodate them."

Regarding the benefits of awareness, [F-P-Tie] and [M-P-Collaborating] believe it will aid in resolving team conflicts. While, [M-P-Avoiding] thinks it will enhance team productivity, commenting, "I think yes, once everyone gets more information on different conflict styles and how to use the styles in different conflict situations then definitely it will help the team to improve the productivity." Meanwhile, [F-P-Avoiding] and [M-P-Competing] see benefits extending to managers, not just team members. [F-P-Avoiding] added,

> *Depending on my working position, at the moment it will help me to understand how to interact with other members without getting into conflict, but in the future, it can help me in managing the team when I work as a project manager.*

[M-P-Competing] noted,

> *I could identify different styles of team members and also the way I can coach them. The team will understand better how to handle the conflict. Being aware of styles you can see how to reply and understand better what happens, this will help the team. you must be open to that there are different perspectives but this is the way you handle them. That's the*

end goal to not avoid but to discuss.

T9.2: Students' Perspectives

All the students reported a lack of awareness about conflict management styles. [M-S-Competing] mentioned he was familiar with the behaviors but not their formal names or descriptions, saying, "I knew but not by name, but in principle you can avoid a conflict or compromise, but I didn't know the names or their description." Regarding training or university courses on conflict management, all students indicated they had not received any formal education in this area. [F-S-Avoiding], who has a degree in organizational psychology, specified,

> *No. I studied organizational psychology, we studied about personality and behaviors, and the behavior of people in different contexts but we have not studied about conflict management style specifically.*

While [M-S-Competing] and [F-S-Collaborating] shared that their ability to categorize people based on behaviors stemmed from their experience, they also recognized potential benefits from being aware of different conflict management styles. Both [M-S-Competing] and [F-S-Collaborating] agreed that this awareness would allow them to adapt their styles to better handle conflicts. Meanwhile [F-S-Avoiding] expanded on the advantages for both team members and managers, stating,

> *If we understand how people think or understand our actions it will help in the long run for team dynamics. If I am a manager and the team is having conflicts and I keep avoiding conflicts, then that will make the team members uncomfortable and see me as an incompetent manager because I don't listen to them and keep avoiding the conflicts. If he is competing that will be a problem as well. If we understand these styles and use them wisely it will be good for the team, productivity, and performance. We cannot use the same style in all situations, if we know different styles we will be able to use them correctly in different situations.*

5

Discussion

This final chapter discuss the findings from both the survey and interviews. The discussion is structured around each research question, examining the connections between the survey results and the insights gained from the interviews. This includes a comparison with related studies that have either supported or contradicted our findings. Additionally, this chapter outlines the benefits and limitations of the study's results. It also provides recommendations for future research based on the insights and gaps identified through this study.

Research Question 1 (RQ1) investigates the gender differences in conflict management styles within the field of software engineering. Our findings show that the Collaborating style is favored by both genders, though females exhibit a slightly higher probability of using this style compared to males. This pattern was also evident in plots sampled from the posterior distribution, where both genders predominantly favored Collaborating, albeit with females showing a higher tendency.

Interview insights, particularly from Theme 2, suggest that while females generally view the Collaborating style as effective, male responses were split between Collaborating and Competing styles. This difference in preferences might explain why the Collaborating style is more favored overall and why females are more inclined to collaborate than males. These gender-specific preferences could potentially lead to conflict, especially since Theme 3.2 indicated that females find the Competing style less effective, highlighting differing perceptions of what constitutes an effective conflict management approach.

Conversely, males demonstrated a similar or slightly higher likelihood to adopt the Avoiding and Accommodating styles compared to females. From the posterior samples, males showed a higher tendency to avoid and accommodate, particularly in the Accommodating style, where males exceeded females. This observation contradicts our initial expectations, influenced by experiences in both academia and industry. However, it aligns with findings from studies [27] and [2], which also reported a higher male inclination towards the Avoiding and Accommodating styles.

Interestingly, interviews offered a different perspective. Theme 1.1 highlighted that female interviewees, both students and practitioners, experienced fewer conflicts within their teams compared to males. A significant factor contributing to this difference is that these female practitioners were less experienced or new to their teams. It is important to note that Years of Working Experience variable was not included in our statistical models due to considerable missing data, as only practitioners (51 participants) responded to this question in the survey. Including this variable could complicate the model and introduce further uncertainty or bias. Future research could specifically model years of working experience to yield more

precise insights.

Moreover, males displayed a higher probability of adopting Competing styles, whereas females were more inclined towards the Compromising style, as shown in the posterior sample plots. In contrast, other studies [27] and [2] have not found significant differences between males and females in these styles.

An interesting observation was the influence of age on conflict management style, particularly that the Compromising style decreased with age for both genders. A study by [15], primarily involving students, also found that younger participants more frequently adopted Compromising. From the interviews, unfortunately, none of the survey participants with a Compromising style provided their email for an interview, hence further insights could not be gathered.

Research Question 2 (RQ2) investigates the differences in conflict management styles between students and practitioners. Our findings indicate that students are more likely to adopt Collaborating and Avoiding styles compared to practitioners. However, there is uncertainty regarding the significance of these differences due to overlapping credible intervals. This uncertainty was also evident in the sample from the posterior, where practitioners demonstrated a higher tendency towards Collaborating style than students. This finding contradicts the findings from [25], where Collaborating and Accommodating were ranked as the third and fourth most prevalent styles respectively, without significant differences between students and practitioners. One potential explanation for the predominance of Collaboration among practitioners could be their greater exposure to conflicts, including both task and relationship conflicts, as indicated in Theme 1.2. This exposure might have enhanced their skills in effectively managing and resolving conflicts, making them more collaborative.

Conversely, the draw from the posterior highlighted a difference in the Avoiding style, with students showing a greater tendency to avoid conflicts. Theme 1.1 revealed that students reported experiencing fewer significant conflicts in their academic settings. The primary reasons for this include the limited interactions among students and and a mutual desire to avoid upsetting one another. There are also some other factors that may have contributed to this result. Three of the interviewed students are currently studying in Sweden at Chalmers University of Technology or the University of Gothenburg, where the typical course duration is only seven and a half weeks. Given that the majority of our survey participants are also from Sweden, it is probable that they are accustomed to this academic system. This short academic period may limit opportunities for students to form deep connections with other team members, potentially influencing their tendency to avoid conflicts due to insufficient familiarity with other team members.

cultural factors also play a crucial role, as highlighted in Theme 6, which emerged specifically among students. For instance, the influence of culture was particularly noted by a female student with an Avoiding style [F-S-Avoiding], who is originally from India and currently studying in Sweden. India, being the second-largest participant group in our survey, revealed notable differences in conflict management styles when compared to Sweden. The sample from the posterior also showed that the frequency of adopting the Collaborating style is higher in Sweden than in India, whereas the Tie style is more prevalent in India. This observation aligns with the

findings of [27], which examined differences between engineering students in Sweden and Iran. In that study, the Collaborating style was significantly more common among Swedish engineering students compared to their Iranian counterparts, suggesting a general propensity among Swedes towards collaboration. Conversely, the study noted that Iranian students displayed a greater tendency towards Avoiding and Accommodating styles compared to their Swedish peers. Our data similarly indicated that Indian students have a slightly higher frequency of these styles, although the differences were not markedly pronounced. These findings underscore the influence of cultural backgrounds on conflict management styles.

Additionally, the draw from the posterior showed differences between students and practitioners across different age groups, specifically in Collaborating and Avoiding styles, where Avoiding increases with age among students while Collaborating decreases. These findings align with a study [15] which also showed that older students are more likely to use the Avoiding style, while no significant age-related difference was found in Collaborating. This suggests that age influences the choice of conflict management style.

Research Question 3 (RQ3) investigates the level of awareness of conflict management styles among practitioners and students. Survey results showed that the mean awareness scores for students and practitioners are quite similar, at 3.19 and 3.07 respectively. Furthermore, results from the independent t-test confirmed that there is no significant difference in awareness levels between the two groups. The plots revealed that the majority of practitioners scored a 4 on a Likert scale ranging from zero to five, followed by scores of three and two, with very few scoring a five. Theme 9.1 from the interviews highlighted that while practitioners were aware of the behaviors associated with different styles, they often could not accurately name these styles. This finding helps to explain why most practitioners scored a 4 in the survey.

For students, the majority scored a 3, which does not definitively indicate whether they possess the necessary awareness of conflict management styles. This was followed by scores of 4 and 2. Theme 9.2 from the interviews revealed that students were not fully aware of the different styles, although they had developed the ability to categorize behaviors without being able to name them specifically.

One-way ANOVA and post-hoc Tukey tests indicated that among the tested variables, only the country of residence showed a significant effect on awareness levels, with participants from India displaying higher awareness compared to those from Sweden and other countries. This finding, however, was not corroborated in the interviews; for instance, one interviewee from India [F-S-Avoiding] with a former degree in organizational psychology had not received formal education in conflict management styles.

Notably, no previous studies have specifically explored the level of awareness of conflict management styles in software engineering or other fields, thus limiting comparative analysis between countries. However, a related study involving medical students examined the impact of awareness training on conflict resolution performance, revealing no positive effect from gaining such awareness of conflict management styles [18]. Contrarily, Theme 9 from the interviews suggested that interviewees believe training and courses would enhance conflict resolution skills, improve

productivity, and aid managers in coaching team members more effectively. It is important to acknowledge that the field of software engineering differs significantly from the medical field. Consequently, the impact of gaining awareness of conflict management styles may vary considerably from what the previous study have revealed.

Furthermore, the interviews underscored a significant need for more comprehensive training in companies, particularly for recognizing and managing different conflict styles, especially for managers. In Theme 9.1, a manager interviewee [M-P-Competing] reported receiving training on conflict resolution but noted a lack of training on identifying specific behaviors of each conflict management style and strategies for dealing with them. There is also a pressing need for university courses that not only raise awareness of these styles but also simulate a professional environment to better prepare students for the workplace. This is particularly crucial given the survey's indication that students have a high tendency to avoid conflicts, which could pose challenges when they enter the industry, work in larger teams, and engage in longer-term projects.

Overall Insights And Further Research: The predominance of the Collaborating style among software engineers is generally beneficial, as it is considered a constructive conflict management style. Our thematic analysis, specifically Theme 7, supports this advantage by revealing that individuals who favor the Collaborating style possess strong skills in listening and sharing opinions. These abilities can significantly enhance team dynamics and problem-solving capabilities.

However, a notable drawback of the Collaborating style, as identified by Thomas and Kilmann [41], is its time-consuming nature. Efforts to achieve consensus and satisfy all team members can lead to significant delays in decision-making processes. Therefore, the presence of high tendencies towards Avoiding and Accommodating styles, as revealed in our findings, could provide a counterbalance. In particular, Thomas and Kilmann [41] note that avoiding conflicts can be advantageous when the conflicts are minor or when resolving the conflict is not critical to project success.

Despite the low occurrence of the Competing style reported in our survey, our thematic analysis—specifically Theme 4—revealed frequent encounters with Competing styles, particularly among practitioners. There are two possible explanations for this. First, it might be that interviewees more readily identify individuals with Competing styles more than other styles due to their assertive behaviors, especially since interviewees reported encountering individuals who tend to forcefully assert their opinions within teams. Therefore, this perception might have led them to report more frequent encounters with Competing styles. Alternatively, the Competing style might actually be more prevalent in the industry than our survey data shows, potentially due to selection bias. This aspect will be further discussed in the validity threats.

From the interview and survey results, several factors that influence conflict management styles have been identified, including country or cultural background, age, years of working experience, and job hierarchy. The influence of cultural background was particularly noted among students, but may also be prevalent among practitioners. The survey results highlighted the differences between students and

practitioners from Sweden and India.
Years of working experience, especially among practitioners, also play a significant role. Our interview showed that avoiding conflicts is more common among junior engineers than among those with more experience, aligning with findings from [40], which observed that Competing and Collaborating styles tend to increase with higher organizational levels, while other styles remain relatively constant across all levels.
Additionally, The interviews revealed that job hierarchy influences conflict management. For instance, in Theme 6, one interviewee [F-S-Avoiding] with previous working experience in India noted that decision-making was reserved for higher management, which resulted in avoiding conflicts. Interestingly, in Theme 5.1, a Swedish manager [M-P-Competing] expressed a similar sentiment, indicating a tendency to avoid conflict with higher managers. Possibly due to fear of job loss or a desire to maintain a positive relationship with higher managers
The survey also revealed that age influences conflict management style differences between genders and between students and practitioners,aligning with studies outside the software engineering field that have shown age influences conflict management style [15], [19], [21]
The scope of this study is to examine the gender differences and differences between students and practitioners in conflict management style. Given the insights from the interviews and survey, further research is essential to explore the influence of the aforementioned factors more deeply and to develop specific Bayesian models where predictors include Country, Age, and Years of Working Experience. Future studies delve into how cultural differences impact conflict management styles across various countries and organizational cultures. Additionally, examining the influence of years of working experience on conflict management styles within different job hierarchies could provide valuable insights. These investigations will aid in optimizing conflict management strategies, ensuring that software engineering teams can maintain a productive working environment.

5.1 Validity threats

5.1.1 Threats to construct validity

Survey Questions: The main concern regarding construct validity in this study stems from the usage of the Thomas-Kilmann Conflict Mode Instrument (TKI) for studying conflict management styles. While the TKI is widely accepted, it does have certain limitations. To mitigate our potential misinterpretations of the TKI questions, we followed strictly the original TKI question format. However, this approach required repeating each conflict management style question 12 times, resulting in survey fatigue. Feedback from some participants within our personal network indicated that the survey was perceived as repetitive and tedious. While we did not systematically track all complaints, one remark from our network was particularly telling: "the survey as it is I couldn't possibly share with anyone not knowing you." Therefore, to address this issue, incorporating a greater variety of questions for each conflict management style could enhance participant engagement.

Sampling Methodology: Our recruitment methods of the survey participants, which included using personal networks and professional connections through LinkedIn, may have introduced selection bias. This approach potentially limits the diversity of the sample, as participants might share similar backgrounds or professional experiences that are not representative of the broader population of software engineers. Especially that interviews revealed a higher prevalence of Competing styles among practitioners compared to the survey results.
Additionally, the selection of interviewees from among the survey respondents presents potential validity threats due to the influence of the survey on the interviewees' responses. Furthermore, an introduction explaining the aim of the study and the characteristics of different conflict management styles was provided to participants before the interviews. Having completed the survey and understood its focus might have led interviewees to reflect on their answers or alter their perceptions, potentially resulting in responses more aligned with the study objectives rather than their actual views.
The rationale behind choosing this sample methodology was the need to ascertain the dominant conflict management style of the interviewees from the survey data before the interviews, as the interview questions were designed to explore these identified styles in depth. Furthermore, it was essential for the interviewees to have a foundational understanding of their own style and other conflict management styles to respond effectively to the interview questions. To mitigate these influences, future studies could consider delaying the disclosure of detailed study aims until after conducting the interviews, thereby reducing the potential for response bias.

5.1.2 Threats to internal validity

Participant Understanding: There is a risk that participants may have misunderstood the survey questions or their purpose, potentially leading to inaccuracies in the collected data. As mentioned, we utilized the questions from the TKI without providing specific contextual guidance. For instance, specifying that respondents should answer based on their experiences within a software engineering team rather than their personal lives could have improved clarity.
Data Analysis: While Bayesian analysis provides reliable insights, its accuracy heavily depends on the choice of priors, which presents a significant threat to internal validity by potentially introducing biases into the findings. Recognizing this, we developed three different models to mitigate this risk: a baseline model and two others incorporating distinct priors. To rigorously evaluate which model was most reliable, we employed the Leave-One-Out (LOO) cross-validation function for model comparison. Additionally, we conducted both prior predictive checks, to assess the influence of our prior assumptions, and posterior predictive checks, to ensure the accuracy of the model outputs. To further confirm the integrity of our models, we utilized convergence diagnostics such as the $\widehat{R}$ statistic, bulk_ESS and tail_ESS diagnostic, which helped verify the convergence and appropriateness of the sample size of the MCMC chains. Furthermore, we complemented the quantitative findings from the survey with qualitative data from the interviews, providing a more comprehensive understanding of the study's topics.

5.1.3 Threats to external validity

Generalizability: Given that the majority of participants are from Sweden and India, the findings may not be generalizable to software engineering populations in different geographic or cultural contexts. Although the survey was open to participants from various countries, the majority originated from Sweden and India. Consequently, variations in conflict management styles across different cultures and industries suggest that the results may not extend beyond the sampled demographics. This concern is underscored by insights from interviews, which indicated that culture can significantly influence conflict management styles.

5.2 Conclusion

In conclusion, this study examined the distribution of conflict management styles among software engineers, with a specific focus on gender differences and the distinctions between students and practitioners, utilizing the TKI model. Additionally, it assessed their level of awareness regarding these styles. The study measured the conflict management styles through a survey followed by post-survey interviews with participants from both groups.

The Bayesian analysis of the survey data indicated that the Collaborating style was predominantly favored among all participants, with females showing a higher tendency than males, underscoring a general preference for cooperative problem-solving within the field of software engineering. No significant differences between genders were found in the Avoiding and Accommodating styles. However, male participants showed a higher inclination towards the Competing style compared to their female counterparts, who favored the Compromising style. These results suggest gender-based differences in managing conflicts.

Notable differences were also observed between students and practitioners: students exhibited a higher preference for Avoiding style, suggesting a tendency to sidestep conflict, due to limited interaction and a desire not to upset peers. In contrast, practitioners predominantly adopted the Collaborating style and showed a greater tendency toward Accommodating and Compromising styles than students.

Qualitative interviews further enriched these findings by providing deeper insights into how these conflict management styles play out in everyday interactions among software engineers. Many participants recognized the descriptions of their styles from the TKI results. They also highlighted their flexibility in adjusting these styles depending on whom they are interacting with at work. For instance, the approach they choose might vary significantly when interacting with a peer versus when dealing with a manager or a subordinate. Additionally, the interviews revealed that variables such as culture and years of working experience significantly influence individual approaches to managing conflict.

Overall, this study contributes to the understanding of conflict management in software engineering by highlighting the predominant styles and the influence of gender and professional experience on conflict resolution strategies. These findings can assist educational institutions and organizations in developing targeted programs that enhance conflict management capabilities, tailored to the diverse backgrounds and

experiences of software engineering professionals.

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A

Appendix

A.1 Survey

Dear Participant,
We are conducting a survey to explore conflict management styles within the field of software engineering, using the Thomas-Kilmann Conflict Mode Instrument (TKI). The TKI is a well-established assessment tool that measures how individuals approach and respond to conflict in different situations. It is designed to help individuals and teams understand their natural tendencies in dealing with conflict and identify opportunities for improvement.
The TKI identifies five primary conflict management styles, each with its own strengths and weaknesses. They are as follows: Avoiding, Competing, Compromising, Collaborating, Accommodating.
Your participation in this survey is voluntary and your responses will be kept confidential. The survey will take approximately 10-15 minutes to complete, and we appreciate your time and thoughtful responses.
To ensure the validity and reliability of our study, please answer all questions as honestly and accurately as possible. Your input is valuable in helping us gain a better understanding of conflict management styles in software engineering and how we can improve team collaboration and project outcomes.
Thank you for your participation.
Informed Consent Form The purpose of this survey is solely for research purposes, and the involved researchers will not gain any financial benefits from conducting it. The survey responses will be used to generate reports and research papers. Rest assured that your participation in this survey will be completely anonymous, and you will not be required to provide any information that can be traced back to you. By responding to this questionnaire, you confirm the following: I confirm that I have read and understood the purpose of the survey and that my participation is voluntary. I have the right to withdraw from the survey at any point without providing any explanation. I also consent to the digital storage of my responses, which will only be accessible to the researchers involved in the study and will not be shared with any other individuals or organizations. If you have any questions please contact the responsible researchers:

Sogeta albazi- sogeta@chalmers.se
Pallavi Pattewar - pramodp@student.chalmers.se

Part One

* Indicates required question

1. What is your gender? *

Mark only one oval.

- Male
- Female
- Non-binary

2. What is your current profession? *

Are you currently a student or a practitioner in the field of software engineering/computer science or any related field?

Mark only one oval.

- Student
- Working in industry (practitioners)
- Other: _____

3. If you selected "Practitioners" in the previous question, please specify what area you are working in:

_____

4. What is your highest education? or what are you currently studying?

Mark only one oval.

- High school diploma or equivalent
- Some college or vocational training, but no degree
- Bachelor's degree
- Master's degree
- PhD's degree

5. If you are practitioner, how many year of working experience do you have?

Mark only one oval.

- less than 1 years
- 1 to 3
- 3 to 5
- 5 to 10
- 11 to more

6. What is your age?

Mark only one oval.

- 18-25
- 26-30
- 31-40
- 41-50
- 51- above

7. What is your country of residence?

_____

Part Two

Kindly ensure to respond to all the questions, even if they seem to be repetitive.

8. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I press to get my points made.

9. Which statement suits you the best? *

Mark only one oval.

- I try to convince the other person of the logic and benefits of my position.
- I propose a middle ground.

10. Which statement suits you the best? *

Mark only one oval.

- I always lean toward a direct discussion of the problem.
- I sometimes avoid taking positions that would create controversy.

11. Which statement suits you the best? *

Mark only one oval.

- If it makes other people happy, I might let them maintain their views.
- I try to convince the other person of the logic and benefits of my position.

12. Which statement suits you the best? *

Mark only one oval.

- I propose a middle ground.
- I sometimes avoid taking positions that would create controversy.

13. Which statement suits you the best? *

Mark only one oval.

- I press to get my points made.
- I tell the other person my ideas and ask for his/hers.

14. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- If it makes other people happy, I might let them maintain their views.

15. Which statement suits you the best? *

Mark only one oval.

- If it makes other people happy, I might let them maintain their views.
- I propose a middle ground.

16. Which statement suits you the best? *

Mark only one oval.

- I tell the other person my ideas and ask for his/hers.
- I propose a middle ground.

17. Which statement suits you the best? *

Mark only one oval.

- If it makes other people happy, I might let them maintain their views.
- I always lean toward a direct discussion of the problem.

Part Two

Kindly ensure to respond to all the questions, even if they seem to be repetitive.

18. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I press to get my points made.

19. Which statement suits you the best? *

Mark only one oval.

- I tell the other person my ideas and ask for his/hers.
- I propose a middle ground.

20. Which statement suits you the best? *

Mark only one oval.

- I try to convince the other person of the logic and benefits of my position.
- I propose a middle ground.

21. Which statement suits you the best? *

Mark only one oval.

- If it makes other people happy, I might let them maintain their views.
- I tell the other person my ideas and ask for his/hers.

22. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I always lean toward a direct discussion of the problem.

23. Which statement suits you the best? *

Mark only one oval.

- I propose a middle ground.
- If it makes other people happy, I might let them maintain their views.

24. Which statement suits you the best? *

Mark only one oval.

- I tell the other person my ideas and ask for his/hers.
- I try to convince the other person of the logic and benefits of my position.

25. Which statement suits you the best? *

Mark only one oval.

- I press to get my points made.
- If it makes other people happy, I might let them maintain their views.

26. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I propose a middle ground.

27. Which statement suits you the best? *

Mark only one oval.

- I propose a middle ground.
- I always lean toward a direct discussion of the problem.

28. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- If it makes other people happy, I might let them maintain their views.

Part Two

Kindly ensure to respond to all the questions, even if they seem to be repetitive.

29. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I press to get my points made.

30. Which statement suits you the best? *

Mark only one oval.

- I propose a middle ground.
- I try to convince the other person of the logic and benefits of my position.

31. Which statement suits you the best? *

Mark only one oval.

- I propose a middle ground.
- If it makes other people happy, I might let them maintain their views.

32. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I tell the other person my ideas and ask for his/hers.

33. Which statement suits you the best? *

Mark only one oval.

- I try to convince the other person of the logic and benefits of my position.
- I always lean toward a direct discussion of the problem.

34. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- I propose a middle ground.

35. Which statement suits you the best? *

Mark only one oval.

- I press to get my points made.
- If it makes other people happy, I might let them maintain their views.

36. Which statement suits you the best? *

Mark only one oval.

- If it makes other people happy, I might let them maintain their views.
- I tell the other person my ideas and ask for his/hers.

37. Which statement suits you the best? *

Mark only one oval.

- I sometimes avoid taking positions that would create controversy.
- If it makes other people happy, I might let them maintain their views.

Part Three

38. How confident are you in your knowledge of the different conflict management styles (i.e. collaboration, avoidance, compromise, competition, and accommodation)? *

Mark only one oval.

	No knowledge					very good knowledge
	0	1	2	3	4	5

A.2 Interview Guideline

Introduction [3 minutes]

Thanks for taking the time to meet with me/us today. We are doing a study on the conflict management styles in the software engineering field, what is the difference in styles between students and practitioners, as well as the styles used by different genders. During the interview, we will show you your dominant style, which you prefer to use in conflict situations. Later, we'll have a discussion about your experience with your dominant style. Do you mind if I record this discussion so that I can review it later? In any data collected, or in reports or papers that are published, you will not be identified by name. If you are a practitioner, please be careful not to discuss any sensitive information about the company you work for. If you do mention any, we will do our best to remove it from our transcripts, but better if you don't mention such sensitive information at all. If you wish to leave at any point during this interview, you are free to do so. The interview will last 20-30 minutes.

Survey result [5 minutes]
Here are your results for the conflict management style based on the answers you have given in the survey.

Competing : [number]
Avoiding : [number]
Compromising: [number]
Collaborating: [number]
Accommodating: [number]
Your dominant conflict management style is (the name of the style), which is the style you tend to use most often. These are the characteristics of your dominant style:

Competing: You try to satisfy your own concerns at your teammate's expense.
Avoiding: You sidestep the conflict without trying to satisfy your concerns or those of your teammate.
Compromising: You try to find an acceptable settlement that only partially satisfies your concerns and those of your teammate.
Collaborating: You try to find a win-win solution that completely satisfies both your concerns and your teammate's concerns.
Accommodating: You attempt to satisfy your teammate's concerns at the expense of your own.

Open-ended questions [15-20 minutes]

1. Do you feel that the results are relevant to you? If yes, why?
2. Do you feel you use these styles in your everyday life? If yes, how do you use them?
3. Have you encountered other styles in your everyday life? If yes, which ones?

If not, looking back at the last few weeks or months, given what you learned in the survey, can you now see that there was a person with a different conflict style?

4. Can you describe a conflict you encountered recently?
5. Do you think your conflict management style was useful in resolving conflict? Why, or why not?
6. Are there any particular styles that you feel are effective in the team? If yes, why?
7. Are there any particular styles that you feel are not effective in the team? If yes, why?
8. Have you ever needed to adjust your style based on the other person's behavior or attitude?
9. Were you aware of the different conflict management styles when you encountered this conflict?
10. Have you received any training programs or university courses that have been found helpful in understanding the different conflict management styles?
11. How do you think being aware of different conflict management styles can be beneficial/useful for your team at work or university?

Informed Consent Form

The purpose of this survey is solely for research purposes, and the involved researchers will not gain any financial benefits from conducting it. The interview responses will be used to generate reports and research papers. Rest assured that your participation in this interview will be completely anonymous, and you will not be required to provide any information that can be traced back to you. In the interview you do not need to give any kind of personal information, the only information we have will be based on your answers to the survey you received earlier.

By being part of this interview, you confirm the following: I confirm that I have read and understood the purpose of the study and that my participation is voluntary. I have the right to withdraw from the interview at any point without providing any explanation. I also consent to the digital storage of my responses, which will only be accessible to the researchers involved in the study and will not be shared with any other individuals or organizations.

If you have any questions please contact the responsible researchers:

Sogeta albazi- sogeta@chalmers.se
Pallavi Pattewar - pramodp@student.chalmers.se

Please sign the document if you agree with the statement above.