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# The Impact of Homefront Factors on Student-Instructor Interactions in Science Technology Engineering Arts and Mathematics (STEAM) Education: An Empirical Study of Canvas Messages

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## BACKGROUND AND GOALS

Student learning and outcomes, in STEAM education, is heavily impacted by factors such as needs for technology [1], shelter, income-earning activities, family care [2], teamwork and security. We have been examining the impact of these “Homefront factors” on student-instructor interactions since 2019 and sharing some insights of our qualitative analysis in various forums with the same running title. While efficient communication via Canvas messaging between students and instructors is crucial, little is known about how Homefront factors affect the exchanges. The goal for this project has been to analyze the trends of metrics, such as scholarly preparedness, for insights of student communication with their instructors to study Homefront factors. We have found that *preparedness* were high (65%) in 2019, then increased to even higher values (89%) in 2023.

## RESEARCH DESIGN

1. We evaluated qualitative data that was gathered from a wide range of students between 2019 and 2023.
2. We used a Likert grading system to make this analysis easier. Ratings were from 1 (very unprepared) to 5 (very prepared).
3. Six elements were assessed in the study: preparedness, respect, human behavior, social structure, greetings and salutations, and request specification (as shown in **Table 1**).
4. Results from the scoring are then analyzed using IBM Statistical Package for Social Sciences (SPSS).

## DATA ANALYSIS: MULTI-ELEMENT SCORING TOOL

A multi-element scoring tool was developed to analyze Canvas messages. A given message is scored with adapted Likert scale from Very impolite (*score 1*) to Very polite (*score 5*). Examples of messages along with the scores given by the reviewer are shown in **Table 1**.

Element	Score: 1	Score: 2	Score: 3	Score: 4	Score: 5	Table 1: Multi-element Scoring Tool						
Greeting and Salutations	Very impolite	Somewhat impolite	Neutral	Somewhat polite	Very polite	Greeting and Salutations	Respect	Request Specification	Social structure	Human Behavior	Preparedness	
Respect	Very disrespectful	Somewhat disrespectful	Neutral	Somewhat respectful	Very respectful							
Request Specification	Very unspecific	Somewhat unspecific	Neutral	Somewhat specific	Very specific							
Social structure	Very inappropriate	Somewhat inappropriate	Neutral	Somewhat appropriate	Very appropriate							
Human Behavior	Very inappropriate	Somewhat inappropriate	Neutral	Somewhat appropriate	Very appropriate							
Preparedness	Very unprepared	Somewhat unprepared	Neutral	Somewhat prepared	Very prepared							
“Hello , i can not find the rubic for the measurement assignment can you please send me a copy of it? Thank you”						3	3	3	2	3	2	
“Hello There, I wanted to know if our groups' team leaders are assigned or chosen amongst the group. Also, I wanted to know when this assignment due. Thanks,”						1	1	4	1	1	4	
“Good morning Professor, My assignment is not submitting on canvas. Is there an alternate way of submission. Thanks,”						5	4	4	3	3	3	

## RESULTS AND DISCUSSION

There are ten significant findings in this study. **First**, 1005 Canvas messages from 2019 to 2023 were scored using the multi-element scoring tool (see **Table. 1**). This dataset covers the period *before, during and after* COVID-19. **Fig. 1 to Fig. 6** show the percentages of messages scored for different elements in the years 2019 (296), 2020 (236), 2021 (34), 2022 (412) and 2023 (27) [3,4]. **Secondly**, over 30% of students began their messages with polite greetings and salutations in 2019, increasing to almost 70% in 2023 (**Fig. 1**). **Thirdly**, the same pattern is observed with the *respect* metric (**Fig. 2**). **Fourthly**, the percentage of messages with respect was 25% in 2022 and increased to 74% in 2023. However, it declined to 14% in 2020. Such a change probably is caused by an increased fear of loss with students being away from their friends and normal social environment, away from the usual learning atmosphere and resources they are used to, and away from their possible form of employment. Causing a biological reaction that increases dishonest behavior [5]. **Fifth**, this study found that Homefront factors do play a significant role in shaping the students’ interaction on Canvas as displayed by the scored undertone of their individual experiences. **Sixth**, the trends shown in the metric *request specification* tracks very well with that of the metric *preparedness* (**Figs. 3 and 4**). **Seventh**, the percentage of message showing clear *request* and demonstrating *preparedness* were high (70% and 89%) in 2019, decreased in 2020. It then increased to even higher values (74% and 89%) in 2023. **Eighth**, *social structure*, only 25% of the student’s messages showed projected social inclination and refined ability to relate well in 2019. The percentage increased to about 70% in 2023 (**Fig. 5**). **Ninth**, the element *human behavior* improves to 90% in 2023 from 25% in 2019 (**Fig. 6**). **Tenth**, our study indicates a common trend in the six elements analyzed with the scoring tool showing a significant ( $p < 0.001$ ) improvement compared to during COVID-19 period.

## DATA AND SCORING RESULTS

Fig. 1: Greetings and Salutations

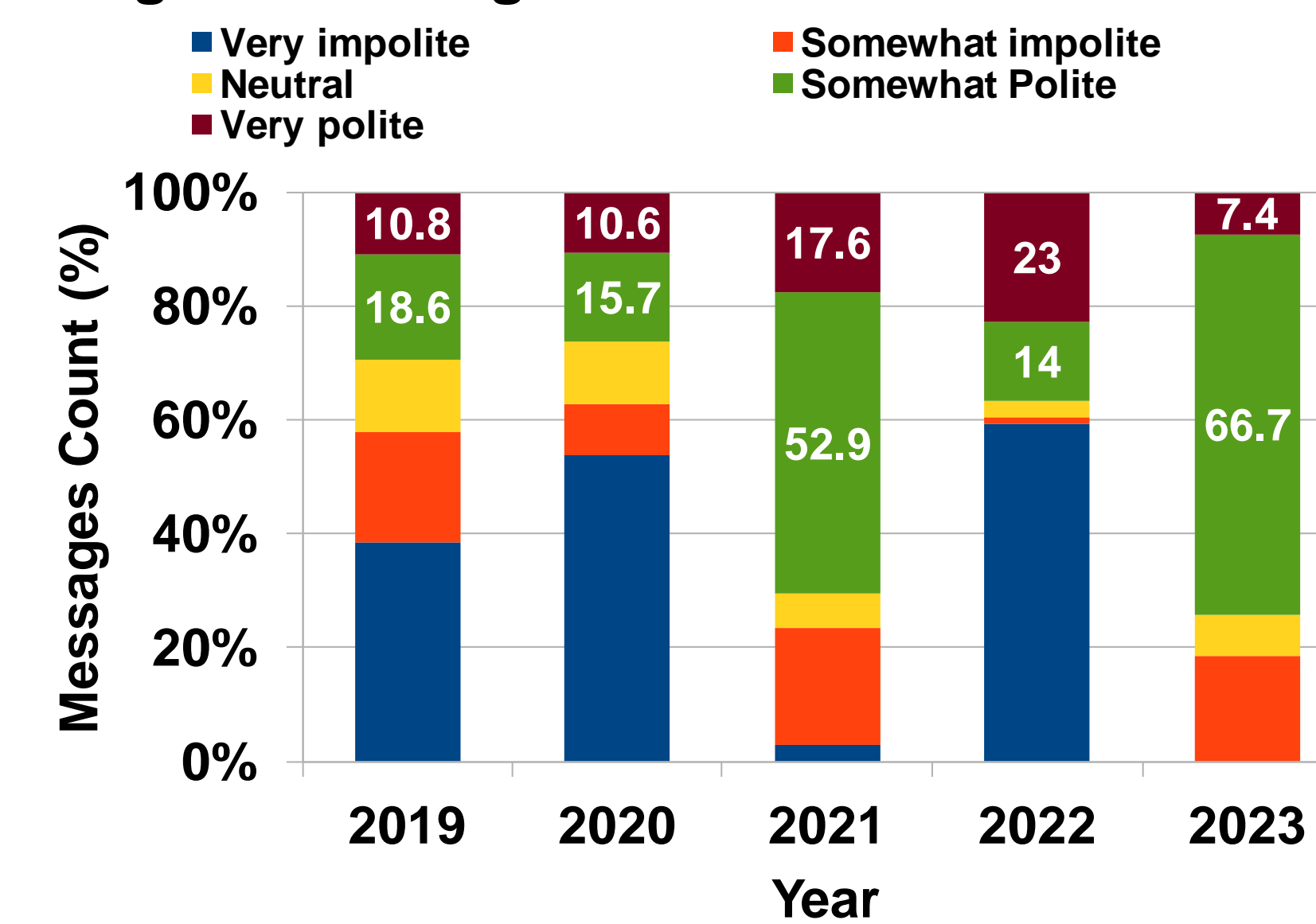


Fig. 2: Respect

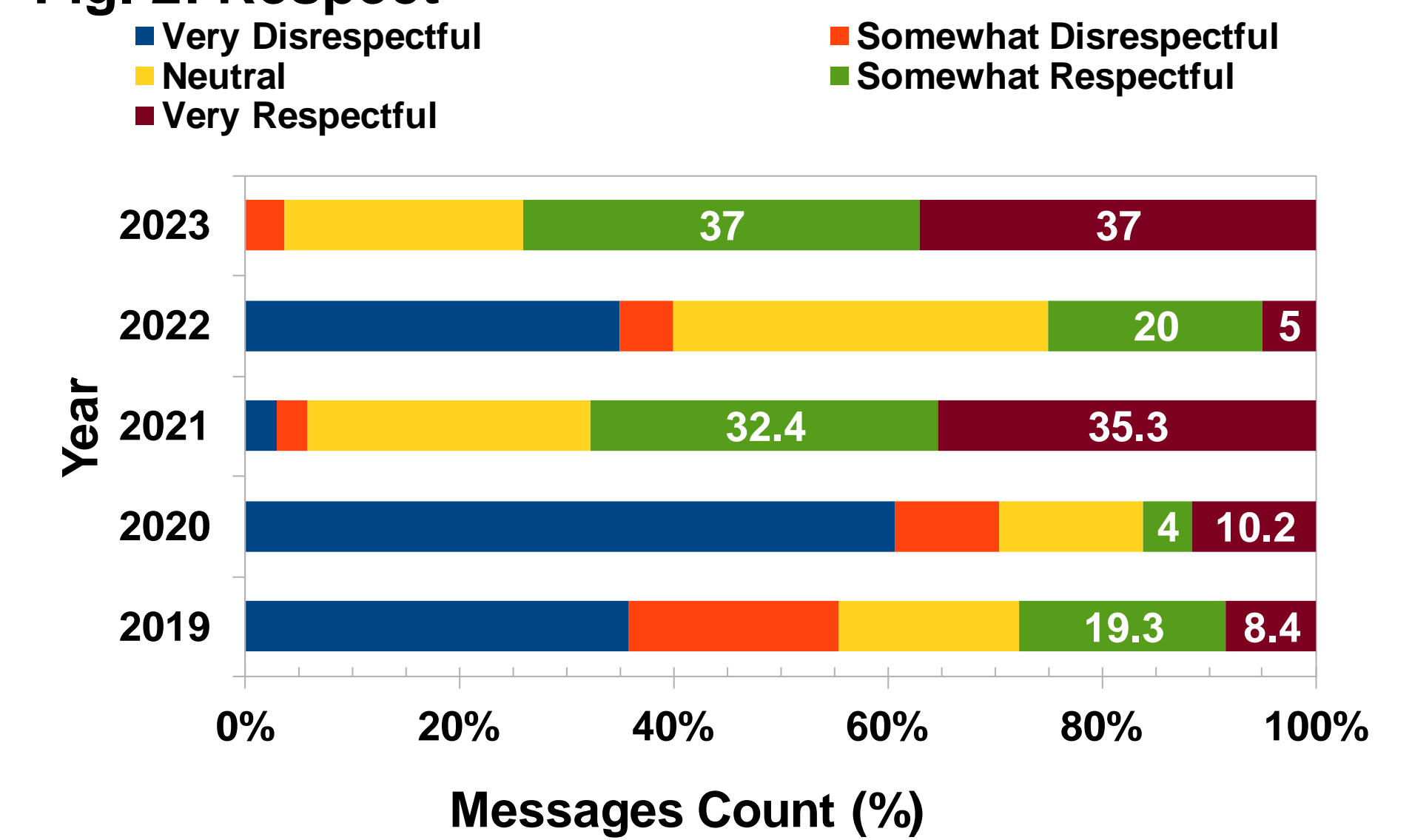


Fig. 3: Request Specification

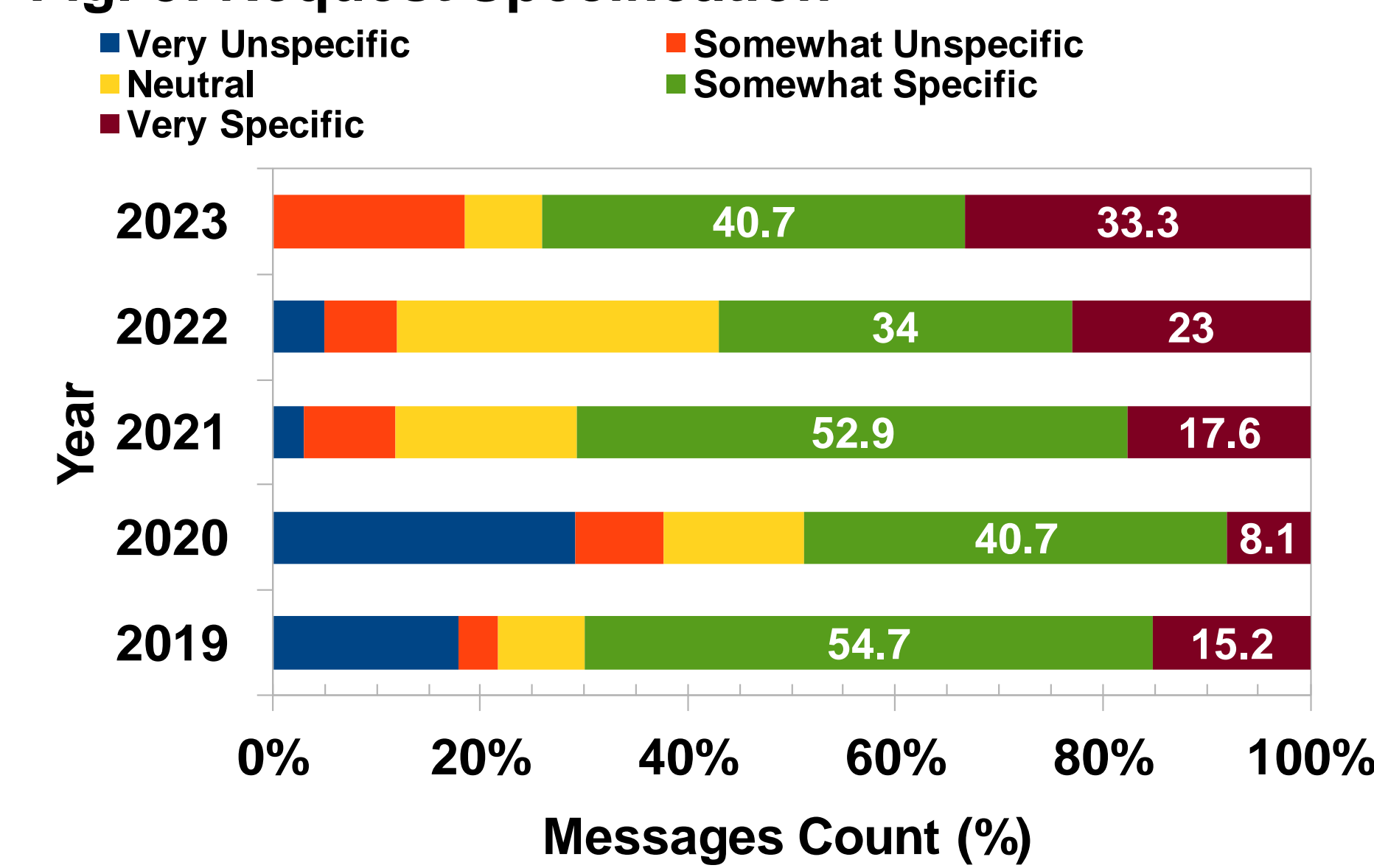


Fig. 4: Preparedness

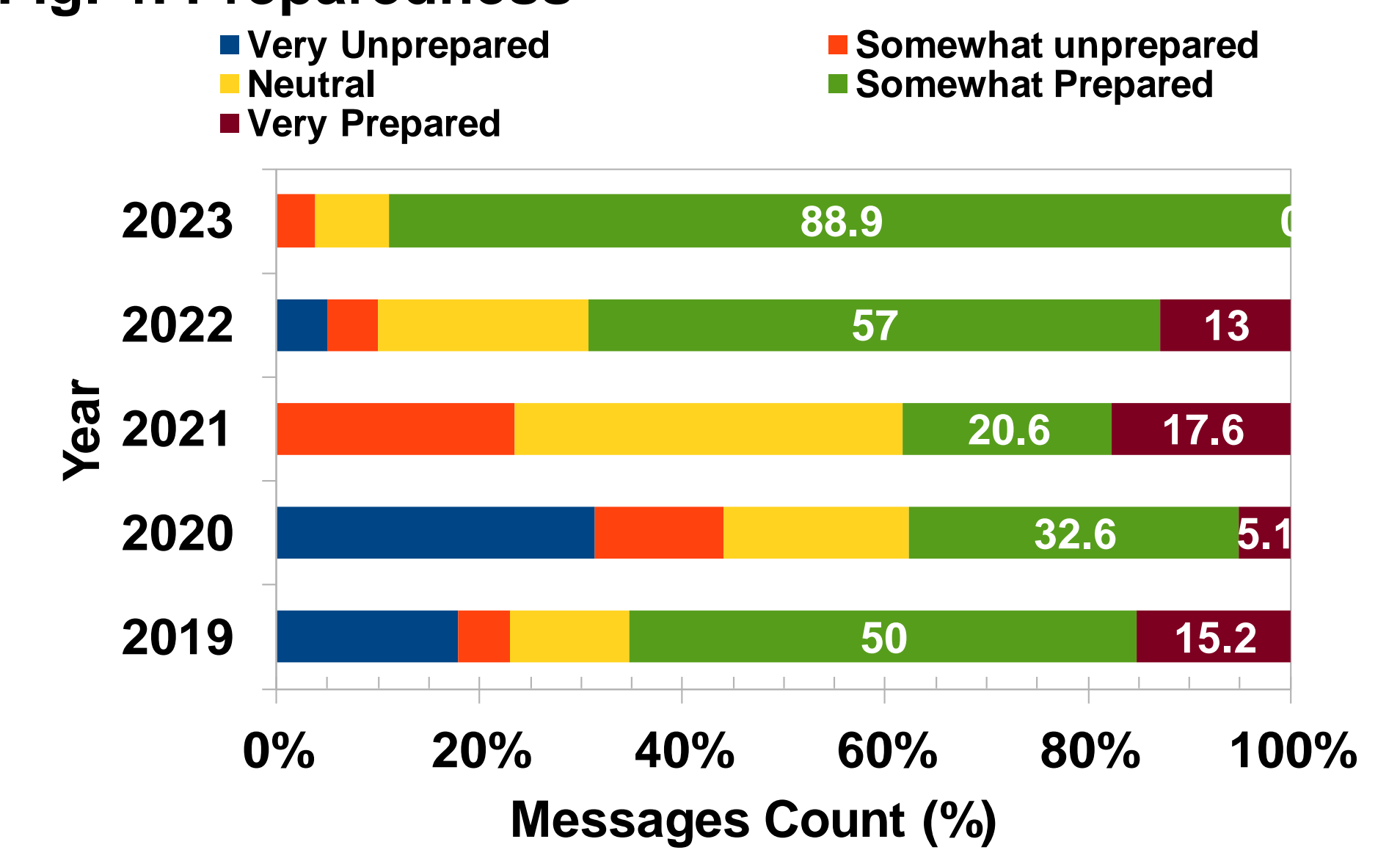


Fig. 5: Social Structure

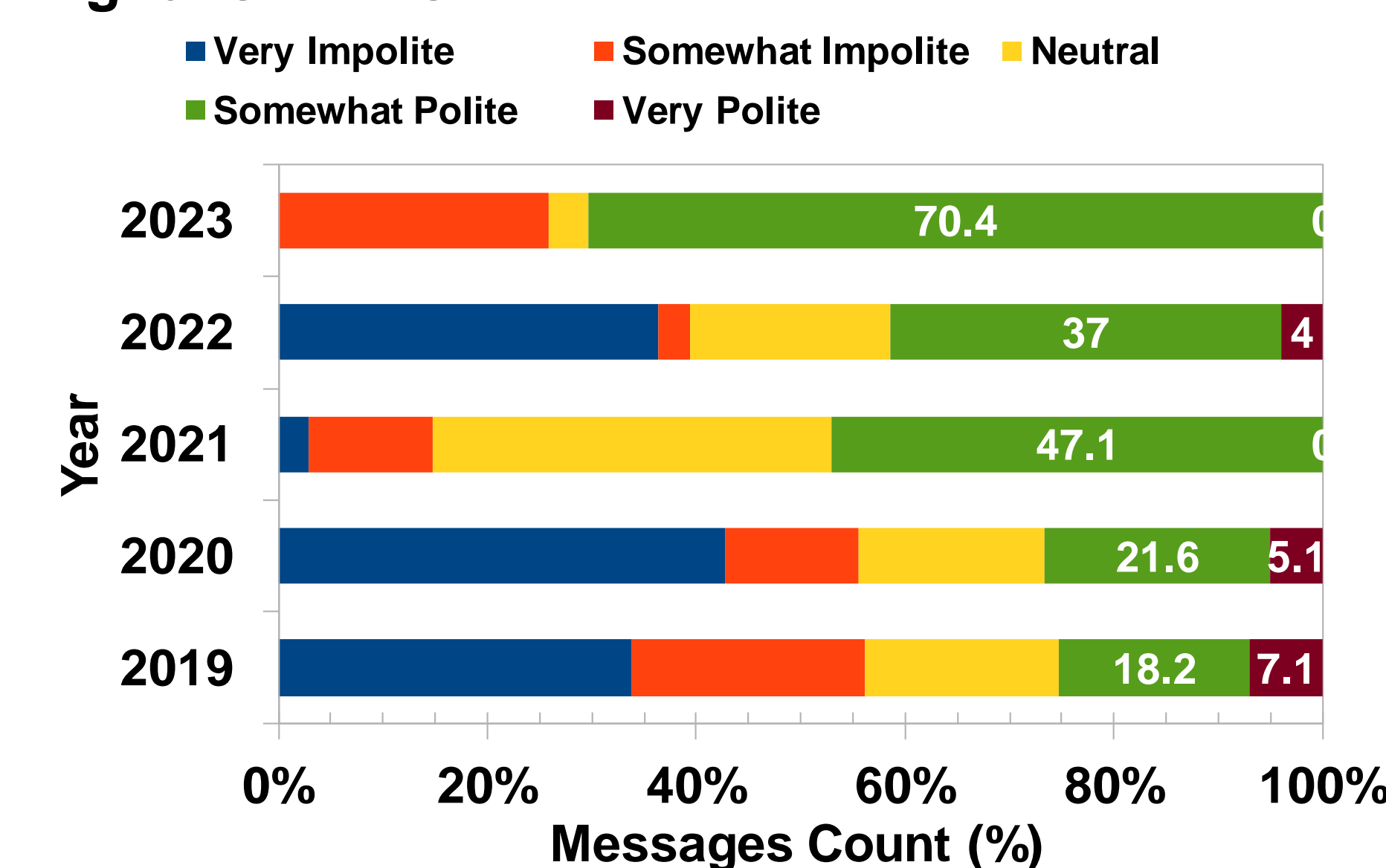
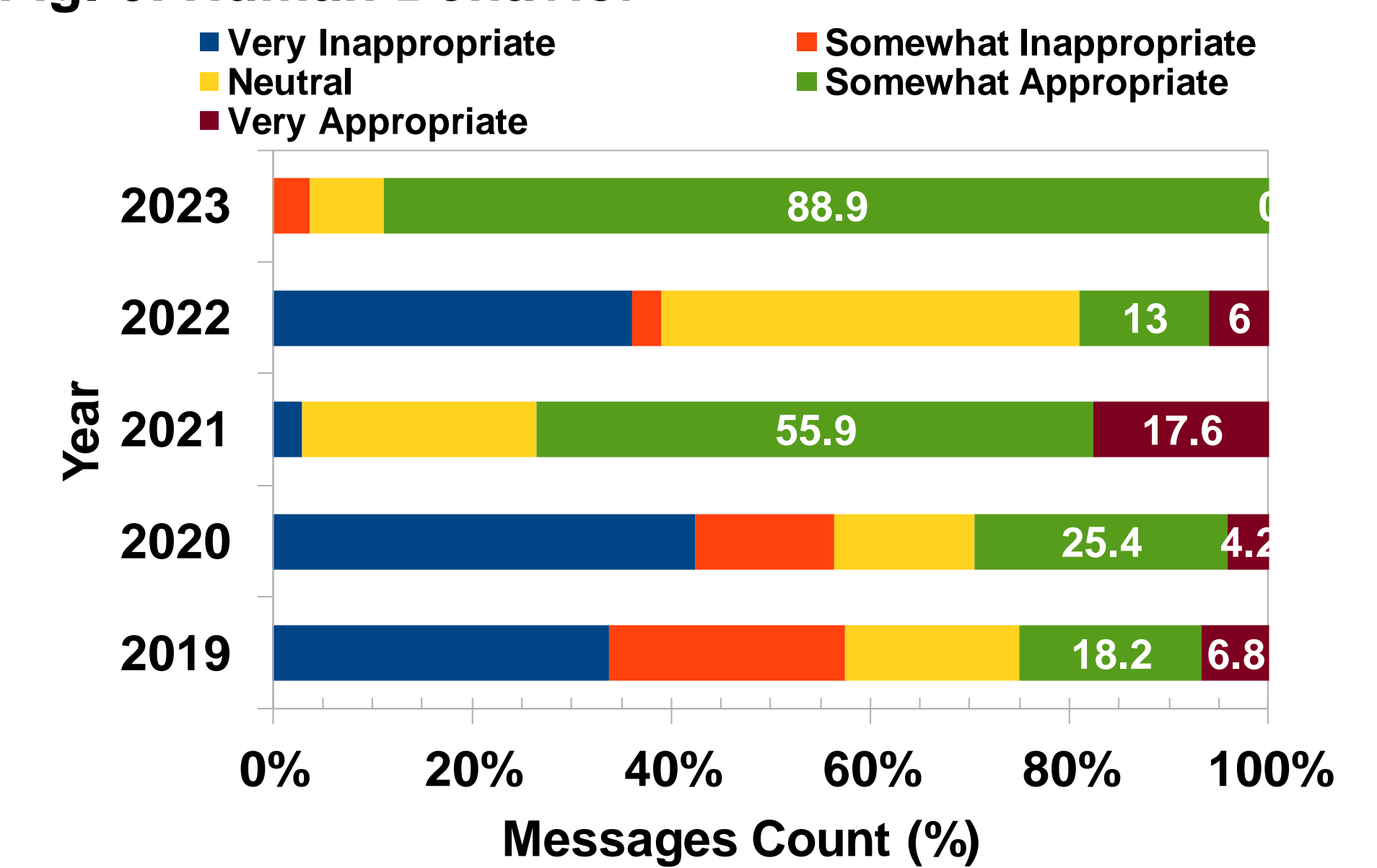


Fig. 6: Human Behavior



## CONCLUSION

This study underscores the crucial relevance of addressing Homefront factors in education, especially when dealing with pandemics, which can dramatically influence student-instructor interaction and academic performance. There is, therefore, a great need to focus more on the Homefront factors to support services and the delivery of education among other inherent community activities so as to improve student success [4,6,7]. Future work include integrating public datasets that address Homefront factors in communities

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