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Throw Them All in One Pot? Differences in Stereotypes About Subgroups of Pre-Service Teachers

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According to the stereotype content model, stereotypes can be described by using the dimensions competence and warmth. Compared to other professions, teaching is associated with a paternalistic stereotype consisting of high warmth and low competence. In four studies, stereotypes about different subgroups of pre-service teachers were compared. The aim was to understand sub-stereotypes better that could lead to different levels of stereotype threat and adverse behavioral tendencies. In Study 1 (N = 335), we compared stereotypes about elementary school pre-service teachers, grammar school pre-service teachers, computer science students, law students, and psychology students reported by pre-service teachers and psychology students. In contrast to nonteaching students, both groups of pre-service teachers corresponded to the paternalistic stereotype. In Study 2 (N = 243), pre-service teachers reported stereotypes about pre-service teachers for elementary schools, special education schools, comprehensive schools, vocational schools, and grammar schools. Elementary school pre-service teachers were stereotyped most paternalistically, while grammar school pre-service teachers matched the paternalistic stereotype the least. The ratings of other school types mostly fell between these extremes. In Studies 3a (N = 133, open-ended questions) and 3b (N = 308, closed-ended questions), students of various study programs compared pre-service teachers majoring in German and history (representing a non-STEM major combination) to pre-service teachers with the majors mathematics and physics (representing a STEM major combination). Pre-service teachers studying German and history were rated warmer but less competent than pre-service teachers with the majors mathematics and physics, confirmed by both methods of measuring stereotypes. In Studies 1, 3a, and 3b, ingroup favoritism in the ratings by pre-service teacher participants was tested and only found for competence in Study 1. The importance of our results and their implications for stereotype threat effects and possible interventions are discussed.

Keywords: stereotypes, stereotype content model, pre-service teachers, teachers, subgroups

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INTRODUCTION

Teachers are central actors in the educational system. Their teaching quality has an impact on students' achievements (Hattie, 2008), as has their image: According to the Varkey Global Teacher Index (Dolton et al., 2018), the social status of teachers and the status of teaching in relation to other professions are predictive for student outcomes at a national level. Hence, high teacher effectiveness has a direct link to increased economic value caused by aggregate student achievement (Hanushek, 2011).

Taking the findings regarding teacher competence and status into consideration, it is problematic that teachers and pre-service teachers (university students in teacher training) are stereotyped in a paternalistic way with low competence and high warmth (Ihme and Möller, 2015). Teachers and pre-service teachers seem to have internalized this paternalistic stereotype and report it themselves (Carlsson and Björklund, 2010; Ihme & Möller, 2015) although no or only small differences compared to other groups of professionals and students in characteristics such as intelligence, motivation, and personality traits were found (Roloff Henoch et al., 2015). Paternalistic stereotypes are connected to emotions like pity, sympathy, and implicit condescension and can, in turn, lead to behavioral tendencies of avoiding and psychological distancing (Cuddy et al., 2008).

Research on stereotypes about teachers found consensus in the stereotype of relatively low competence and high warmth for teachers and pre-service teachers as professional groups. An open question is whether and how subgroups of (pre-service) teachers are stereotyped in different ways. Obtaining a clearer picture of stereotypes about subgroups can be the next step in assessing possible negative consequences of stereotypes and in the development of interventions. To investigate this, we conducted four studies analyzing stereotypes presumably associated with distinctive subgroups of pre-service teachers: In Study 1, stereotypes about pre-service teachers for elementary and grammar schools and stereotypes about students of computer science, law, and psychology were compared to estimate stereotypes in the context of prevalent fellow student groups in university settings. Additionally, possible ingroup favoritism moderation effects were taken into consideration. After comparing pre-service teachers to fellow students, the aim of Study 2 was to take a closer look at one of the most important characteristics of pre-service teacher subgroups. Therefore sub-stereotypes about pre-service teachers for different school types were analyzed (elementary school, special education school, comprehensive school, vocational school, and grammar school). Study majors are another important factor differentiating between subgroups in the context of university education. In Studies 3a and 3b, stereotypes about different pre-service teachers' study major combinations (German and history compared with mathematics and physics) were examined using open-ended and closed-ended questions. As in Study 1, the moderating role of ingroup favoritism was tested in Studies 3a and 3b.

Stereotypes and Stereotype Threat

Stereotypes are over-generalized opinions on traits concerning members belonging to specific groups (Cardwell, 1999). They ignore individual differences and can either be accurate representations or independent of real group differences (Hilton and von Hippel, 1996). According to the stereotype content model (Fiske et al., 1999, Fiske et al., 2002), stereotypes can be described by the dimensions *competence* and *warmth*. Competence includes the capability of acting in an effective way towards goals, whereas warmth comprises interpersonal traits like trustworthiness and sociability (Fiske, 2018). In line with this, competence is comparable to the construct of agency, while warmth can be compared to the construct of communion (Abele and Wojciszke, 2014). In the context of the stereotype content model, combinations of high and low levels on both dimensions lead to a pattern of four stereotypes (Fiske et al., 2002): High perceived levels of competence and warmth cause *admiration* (e.g., close allies), attributions of low levels on both dimensions are categorized as *contemptuous prejudice* (e.g., people with low income), high levels of competence and low levels of warmth as *envious prejudice* (e.g., people with high income), and low levels of competence and high levels of warmth as *paternalistic prejudice* (e.g., people of older age).

The behaviors from intergroup affect and stereotypes map framework builds upon the stereotype content model and links stereotypes to emotions and behavioral tendencies (Cuddy et al., 2007; Cuddy et al., 2008). For example, paternalistic prejudice is connected with ambivalent emotions of pity and sympathy as well as with the perception of groups as having a low status and not being competitive. These emotional prejudices can lead to behavioral tendencies, including help-giving, avoiding, psychological distancing, and dismissive behaviors. The diametral combination of high competence and low warmth (envious prejudice) is connected with emotions of injustice and inferiority, leading to behavioral tendencies of passive cooperation and scapegoating during times of instability (Cuddy et al., 2008).

Stereotypes about subgroups can differ from the global stereotype about a group. For example, Fiske et al. (2002) revealed for the group of *Blacks* substantial differences of sub-stereotypes in relation to their socioeconomic status. Broadening stereotype research to subgroups can lead to interesting results with additional explanatory power. For example, Clausell and Fiske (2005) identified 10 distinct subgroups of gay men and found three clusters of sub-stereotypes that explained the overall neutral stereotype about gay men in Fiske et al. (2002).

Another aspect of the stereotype content model is the moderating role of group memberships. Fiske (2015) summarized results indicating slight ingroup favoritism, especially on the stronger dimension of the group: For higher status groups, ingroup favoritism is stronger for competence, for lower status groups for warmth.

Another potential consequence of stereotypes is stereotype threat (Steele and Aronson, 1995; Steele, 1997), which is defined as a situational threat caused by negative stereotypes about one's social group. Situations that potentially activate these stereotypes

or make them salient lead to situational pressure. Emotion regulation and the intention not to confirm the stereotype deplete cognitive resources and can lead to underperformance in cognitive tests (Johns et al., 2008; Schmader et al., 2008). Furthermore, this situational threat exerts a long-term influence. Repeated experiences of stereotype threat reduce motivation and lead to disidentification and a higher likelihood of leaving the corresponding domain (Schmader et al., 2008; Beasley and Fischer, 2012; Woodcock et al., 2012).

Stereotypes in the Teaching Profession

People often negatively stereotype teachers' and pre-service teachers' competence (Spinath et al., 2005). George Bernard Shaw commented on this negative stereotype with his bonmot "he who can, does; he who cannot, teaches." Even pre-service teachers stereotype pre-school in-service teachers as less competent than lawyers (Carlsson and Björklund, 2010). Ihme and Möller (2015) also found that pre-service teachers are stereotyped in a paternalistic way and that stereotype threat can lead to reduced performance in a cognitive task: In their first study, pre-service teachers associated their group in open-ended questions with characteristics indicating a low level of competence and a high level of warmth. In the second study, the same effect was revealed compared to computer science, law, and psychology students using closed-ended questions. In the third study, making their group membership salient led to reduced performance in a cognitive task. This effect was only found in pre-service teachers, not in a control group of psychology students.

Consequently, negative teacher stereotypes may reduce the attractiveness of teaching as a profession and discourage suitable students from choosing a teaching career. For example, respect for teachers was found to be directly linked to the likelihood of parents encouraging their child to choose the teaching profession (Dolton et al., 2018). More specifically, according to the behaviors from intergroup affect and stereotypes map framework paternalistic stereotypes about subgroups of pre-service teachers potentially lead to behavioral tendencies like avoiding and dismissive behaviors towards these groups by fellow students. The expression of stereotype threat effects and their consequences potentially differ for subgroups of pre-service teachers, too. These adverse consequences of possible stereotypes make it worthwhile to investigate sub-stereotypes.

Our recent studies aim to analyze sub-stereotypes to further differentiate between subgroups of pre-service teachers. Sub-stereotypes possibly diverge significantly from the global stereotype about pre-service teachers. Within the group of pre-service teachers, relevant subgroups are defined by the school type (e.g., elementary school vs. grammar school) and the study major (e.g., history vs. mathematics). We examine the influence of these subgroups on the extent of the paternalistic stereotypes about pre-service teachers. Additionally, the influence of group membership and possible ingroup favoritism is observed.

Study Overview

Based on the considerations concerning sub-stereotypes about pre-service teachers, four studies were conducted. Study 1 was an extension of the study by Ihme and Möller (2015): Instead of comparing stereotypes about the overall group of pre-service teachers with stereotypes about students of computer science, law, and psychology, we differentiated between stereotypes about pre-service teachers for elementary and grammar schools. A subsample of pre-service teacher participants allowed for the investigation of ingroup favoritism effects based on group membership. The comparison with fellow student groups in Study 1 was the foundation from which the focus shifted to subgroups of pre-service teachers in the latter studies.

The aim of Study 2 was to further differentiate between stereotypes about subgroups of pre-service teachers based on one of their most important characteristics: school type. Therefore, stereotypes about pre-service teachers for the school types elementary school, special education school, comprehensive school, vocational school, and grammar school were compared.

The influence of study majors as a very important characteristic of university education and the second possible source of differing sub-stereotypes was observed in Studies 3a and 3b. Stereotypes about pre-service teachers of German and history compared to stereotypes about pre-service teachers of mathematics and physics were investigated. Study 3a was conducted using open-ended questions to vary the question format, while close-ended questions were used in Study 3b. The moderating role of ingroup favoritism was again tested in Studies 3a and 3b, with the difference to Study 1 that only pre-service teacher subgroups were rated.

The scope of studies helped to answer questions about sub-stereotypes about pre-service teachers compared to fellow student groups, regarding school types, regarding study majors, and which role the group membership plays.

STUDY 1

In Study 1, stereotypes about pre-service teachers for elementary and grammar schools, and university students of computer science, law, and psychology were compared. In addition, the role of group membership on the ratings by pre-service teacher participants was investigated.

Stratified school systems consist of different school types based on the age or ability grouping of students. In Germany, the country our studies were conducted at, the school system encompasses various school types described in the following. After the *Vorschule* (pre-school) or directly after kindergarten, students visit the *Grundschule* (elementary school) up to grade four. Beginning in grade five, students visit different school types for secondary education, depending on their academic outcome. Non-academic tracks are represented by the *Hauptschule* (lower secondary school), ending after grade 9, focusing on vocational education and the *Realschule* (secondary school), ending after grade 10 with the option of switching into an academic track for intermediate students. The academic track is represented by the *Gymnasium* (grammar school). Students attending the *Gymnasium* can graduate after finishing grade 12 or 13, depending on the state. *Gesamt-* and *Gemeinschaftsschulen* (comprehensive schools) combine the school types *Hauptschule*, *Realschule*, and frequently *Gymnasium*. In some

states, elementary school is also included in *Gemeinschaftsschulen*. Other school types are *Förderschulen* (special education schools) for students with special educational needs, and *Berufsschulen* (vocational schools) attended part-times as part of vocational training. According to the school types, teacher education at universities is divided into study programs, reflecting varying proportions of courses on content knowledge, didactical knowledge, and pedagogical knowledge. For example, during teacher training for grammar schools, subject-related content is emphasized, whereas, during elementary school teacher training, pedagogical knowledge is prioritized stronger.

Variations of sub-stereotypes about pre-service teachers, on the one hand, could be based on differences in assumed complexity of teaching content, with higher competence requirements for teachers of older students and grammar schools. According to Knigge et al. (2016), teachers evaluated students attending a grammar school, having higher cognitive potential than students who did not visit a grammar school. On the other hand, teachers for younger or disabled students may have stronger requirements for their warmth. Retelsdorf and Möller (2012) found that a strong pedagogical interest led to the choice of an elementary school study program, whereas subject interest was related to the choice of a grammar school study program in a sample of first-semester pre-service teachers. In Germany and most other OECD countries, teachers' salaries increase with the level of education they teach (Organisation for Economic Co-operation and Development, 2019), leading to elementary school teachers earning less than grammar school teachers. These results may also influence stereotypes concerning pre-service teachers of elementary and grammar schools.

The general research question of Study 1 was how groups of students with different study programs, including subgroups of pre-service teachers, are rated on the dimensions competence and warmth and whether pre-service teacher participants exhibit ingroup favoritism.

The first question we examined was whether elementary school pre-service teachers are stereotyped more paternalistically than grammar school pre-service teachers. Based on the assertions that learning content at elementary schools is of lower complexity, the lower vocational prestige of elementary school pre-service teachers, and due to the less pronounced subject interest, Hypothesis Ia was developed: Elementary school pre-service teachers are rated as less competent in comparison with grammar school pre-service teachers. The stronger connection between pedagogical interest and the choice of an elementary school program led to the expectation of higher warmth ratings for elementary school pre-service teachers than for grammar school pre-service teachers (Hypothesis Ib).

The second question focused on whether both subgroups of pre-service teachers are stereotyped more paternalistically compared to the other groups of students (computer science, law, psychology). Ihme and Möller (2015) found for these other groups of students that all three groups were rated as more competent than pre-service teachers, while computer science and law students were rated as less warm. In Study 1, similarities and differences between these results and the stereotypes about subgroups of pre-service teachers were compared. We expected that both groups of pre-service teachers would be rated as less competent (Hypothesis IIa) but more warm (Hypothesis IIb) than the combined other groups (computer science, law, psychology).

The third question was whether pre-service teacher participants exert ingroup favoritism and rate the pre-service teacher subgroups higher on competence and warmth than psychology student participants. In line with Fiske (2015), we expected pre-service teacher participants to rate the subgroups of pre-service teachers as more competent (Hypothesis IIIa) and especially more warm (Hypothesis IIIb) than psychology student participants.

Method

Sample

The sample of Study 1 consisted of 335 students from various study programs at two universities in Germany (71.0% female, 28.4% male, 0.6% not indicated; age: $M = 29.4$, $SD = 9.2$; studied semesters: $M = 5.2$, $SD = 3.5$). 215 persons were psychology students from the FernUniversität in Hagen and 120 persons were pre-service teachers with diverse study majors from the TU Dortmund University (study program school type: 28.3% grammar school, 26.7% special school, 20.8% lower secondary school, secondary school, comprehensive school, 13.3% elementary school, 10.8% vocational school). The study was conducted as an online survey without compensation.

Procedure

Stereotypes about the different groups of students were measured using the dimensions competence and warmth (Fiske et al., 1999, 2002). The same items that were applied by Ihme and Möller (2015) were used to build the competence and warmth scales (see *Variables and Analysis* for the items). The following text instructed participants:

> *"Our society consists of many different groups, about which one generally has certain general information. Indeed, it is the ease with which relatively well-defined impressions of individuals and social groups are created that greatly simplifies social interaction. On many occasions, either by hearsay or through direct contact, we find out what other people think about different social groups.*
> *In this survey, we want to determine how nuanced students with different study programs (elementary school teaching, grammar school teaching, computer science, law, and psychology) are perceived. We are not interested in your personal beliefs but in how you think these groups are viewed by other students."*

Asking about the opinion of other persons is an established wording to enquire about shared societal beliefs while reducing the tailoring of answers to be socially acceptable (Fiske et al., 1999). The opinions held by other students were focused because other students have the most experience with members of the

TABLE 1 | Competence and warmth ratings of pre-service teachers and other students in different study programs in Study 1.

Study program	Competence	Warmth
	M (*SD*)	*M* (*SD*)
Teaching (elementary school)	3.11 (0.69)	4.04 (0.62)
Teaching (grammar school)	3.62 (0.63)	3.36 (0.59)
Computer science	3.79 (0.57)	2.78 (0.57)
Law	4.13 (0.56)	2.55 (0.64)
Psychology	3.80 (0.66)	3.55 (0.60)
Teaching (combined)	3.37 (0.71)	3.70 (0.69)
Others (combined)	3.91 (0.62)	2.96 (0.74)

Note. N = 335 (competence and warmth ratings each include n = 335 scores for individual study programs, n = 670 for combined teaching study programs, n = 1,005 for combined other study programs). All pairwise comparisons of overall ratings of study programs were significant except for competence ratings of psychology and computer science students.

target groups and are expected to have a nuanced and clear picture of stereotypes about them. Questions regarding the groups of students followed this instruction. An exemplary question for a group of students was: *"In your opinion, how much are pre-service teachers for elementary schools perceived as . . . by other students?"* (modified from Fiske et al., 1999; Ihme & Möller, 2015). The warmth and competence adjectives were combined and rated for all groups of students by every participant. A five-point Likert scale with levels from 1 = *not at all* to 5 = *exceedingly* was used to rate the adjectives. The order of the groups of students was randomized. After answering the exemplary question for every group of students, participants answered questions about their demographic data.

Variables and Analysis

In Study 1, the independent variables were *study program* (levels: *elementary school teaching*, *grammar school teaching*, *computer science*, *law*, *psychology*) and *participant group membership* (levels: *pre-service teachers, psychology students*). The dependent variables were *competence* and *warmth*, measured as within-subject variables. The competence scale comprised the adjectives *competent*, *industrious*, *intelligent*, and *determined* (German: *kompetent, fleißig, intelligent, entschlossen*), and the warmth scale contained the adjectives *warm*, *likable*, *helpful*, *sincere*, and *kind* (German: *warm, sympathisch, hilfsbereit, ehrlich, freundlich*).

In Studies 1 to 3b, the programming language *R* (version 3.6.1) combined with the graphical integrated development environment *RStudio* (version 1.2.1335) was used for statistical analyses. An a priori power analysis for repeated measures ANOVAs was conducted using *G*Power* (version 3.1.9.7; Faul et al., 2007). Results showed that a total sample of 70 participants was required in Study 1 to achieve a power of 0.90 with a significance level of $\alpha = 0.05$ and a small effect size ($d = 0.30$) of the study program. The listwise deleted data of 16 participants with too many missing values to compute competence and warmth scale means for all groups were not included in the sample size and analyses. Listwise deletion was used because repeated measures ANOVAs require answers to all levels of the repeated measures variables. The internal consistencies of the competence scale for the different study programs ranged from $\alpha = 0.72$ to $\alpha = 0.81$, apart from computer science, for which the reliability was $\alpha = 0.63$. The internal consistencies for the warmth scale ranged from $\alpha = 0.78$ to $\alpha = 0.87$.

Results

In **Table 1**, mean competence and warmth ratings for students of different study programs are depicted. **Figure 1** shows the relationship between the study program and competence and warmth ratings by participant group membership. Additionally, medians (competence: $Mdn = 3.75$, warmth: $Mdn = 3.20$) show a possible separation of the data into the four quadrants corresponding to the stereotype content model and the behaviors from intergroup affect and stereotypes map.

Competence

A two-way ANOVA with repeated measures of the within-subject factor *study program* and the between-subject factor *participant group membership* on the dependent variable *competence* and pairwise comparisons were conducted to test Hypothesis Ia. There was a significant main effect of the study program, $F(4, 1{,}332) = 170.11$, $p < 0.001$. Pairwise comparisons with Bonferroni correction among all groups were significant except between computer science and psychology students. The effect size for the significant difference of competence between elementary school and grammar school was $d = 0.77$, indicating a medium to large effect (Cohen, 1988) with higher competence for grammar school pre-service teachers than elementary school pre-service teachers following Hypothesis Ia. There was no significant main effect of the participant group membership, $F(1, 333) = 1.26$, $p = 0.26$. This shows that the ratings of the study programs given by pre-service teacher and psychology student participants did not differ significantly. There was a significant interaction between the participant group membership and the study program, $F(4, 1{,}332) = 11.45$, $p < 0.001$. This result means that ratings of the different study programs differed based on the participant group membership. This relationship is shown in **Figure 1**.

The competence ratings of the teaching study programs (elementary and grammar school teaching) were compared with the competence ratings of the other study programs (computer science, law, psychology) to test Hypothesis IIa. In line with Hypothesis IIa, the combined teaching study programs (two scores per participant, $n = 670$, $M = 3.37$, $SD = 0.71$) were rated as significantly less competent compared to the other combined study programs (three scores per participant, $n = 1{,}005$, $M = 3.91$, $SD = 0.62$), $t(1{,}673) = -16.52$, $p < 0.001$, $d = 0.82$.

In line with Hypothesis IIIa, the competence ratings of the combined teaching study programs by the pre-service teacher participants (two scores per pre-service teacher participant, $n = 240$, $M = 3.47$, $SD = 0.68$) were higher than the ratings given by the psychology student participants (two scores per psychology student participant, $n = 430$, $M = 3.31$, $SD = 0.71$), $t(668) = 2.93$, $p = 0.001$, $d = 0.23$. Thus, we found

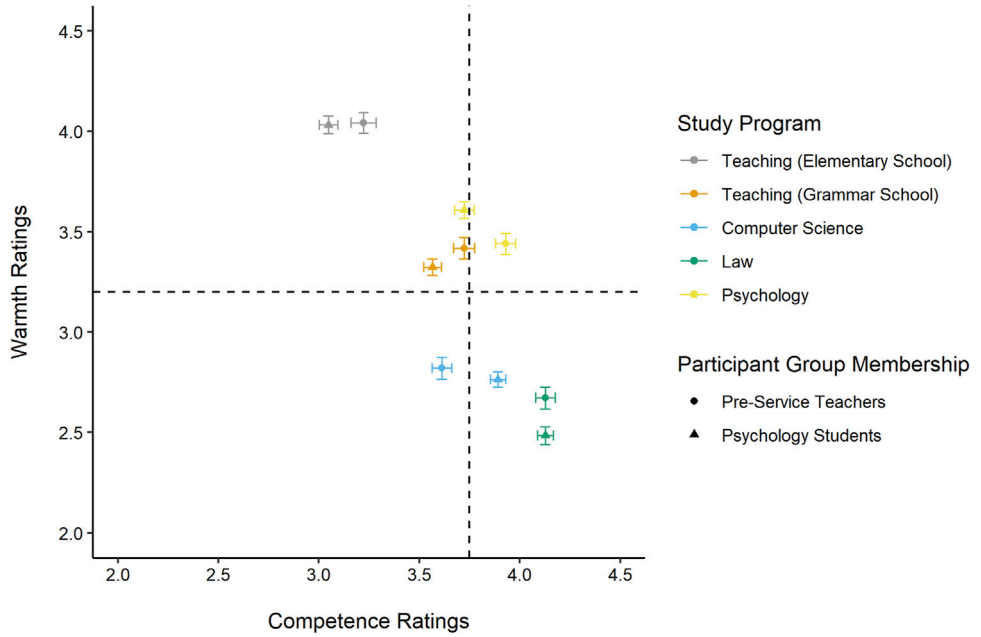

FIGURE 1 | Competence and Warmth Ratings by Study Program and Participant Group Membership in Study 1. Note. Mean competence and warmth ratings for different study programs on a scale from one to five are shown for participants belonging to the groups of pre-service teachers and psychology students. Error bars represent standard errors. Dotted lines represent the medians of the competence and warmth data.

ingroup favoritism for competence in the group of pre-service teacher participants.

Warmth

Another two-way ANOVA with repeated measures of the within-subject factor *study program* and the between-subject factor *participant group membership* on the dependent variable *warmth* and pairwise comparisons were conducted to test Hypothesis Ib. On the qualitative level, the ANOVA effects on the warmth dimension are equal to those found on the competence dimension. As expected, there was a significant main effect of the study program, $F(4, 1{,}332) = 440.92$, $p < 0.001$. Bonferroni corrected pairwise comparisons of warmth ratings between all groups reached significance. The effect size for the significant differences in warmth between elementary school and grammar school was $d = 1.12$, indicating a large effect (Cohen, 1988) favoring elementary school pre-service teachers as stated in Hypothesis Ib. There was no significant main effect of the participant group membership on warmth, $F(1, 333) = 0.69$, $p = 0.41$. The interaction between the group membership and the study program reached significance, $F(4, 1{,}332) = 4.94$, $p < 0.001$, again visualized in **Figure 1**.

Analogous to the competence dimension, combined warmth ratings were compared to test Hypothesis IIb. As expected, the combined teaching study programs ($n = 670$, $M = 3.70$, $SD = 0.69$) were rated as significantly warmer compared to the other combined study programs ($n = 1{,}005$, $M = 2.96$, $SD = 0.74$), $t(1{,}673) = 20.49$, $p < 0.001$, $d = 1.03$. Falsifying Hypothesis IIIb and in contrast to the results on competence, the warmth ratings of the combined teaching study programs given by the pre-service teacher participants (two scores per pre-service teacher participant, $n = 240$, $M = 3.73$, $SD = 0.66$) were not significantly higher than the ratings given by the psychology student participants (two scores per psychology student participant, $n = 430$, $M = 3.68$, $SD = 0.71$), $t(668) = 0.94$, $p = 0.17$, $d = 0.07$.

Discussion

Compared to other academic professions, people generally hold paternalistic stereotypes about teachers. The conducted study was the first to be dealing with sub-stereotypes about different groups of pre-service teachers. First and most importantly, we found differing sub-stereotypes about elementary school pre-service teachers by contrast with grammar school pre-service teachers. Thus, elementary school pre-service teachers were rated less competent and warmer than grammar school pre-service teachers, which coincides with our hypotheses.

Second, we replicated paternalistic stereotypes about pre-service teachers compared to other groups of students. We found pre-service teachers to be rated as less competent but warmer than the other combined student groups. Furthermore, elementary school pre-service teachers were rated warmer than psychology students, while grammar school pre-service teachers were rated less warm than psychology students. The differentiation of both subgroups of pre-service teachers leads to a more detailed picture, where Ihme and Möller (2015) found no difference in the warmth ratings of pre-service teachers and psychology students. That psychology students were rated warmer than grammar school pre-service teachers is plausible in light of the strong focus of

a psychology study program on social abilities later needed to work as clinical psychologists.

Third, we found ingroup favoritism in the pre-service teacher participants rating competence of pre-service teachers higher compared to psychology student participants. However, on the warmth dimension, this effect was not statistically significant. This result is especially surprising in light of findings that ingroup favoritism has a stronger effect on the groups' stronger dimension (Cuddy et al., 2008), implying that the effect should be even stronger for pre-service teachers.

To sum up, both groups of pre-service teachers were associated with a paternalistic stereotype. Nevertheless, the paternalistic stereotype is more applicable to elementary school pre-service teachers than to grammar school pre-service teachers. Pre-service teacher participants rated the competence of pre-service teachers higher than psychology student participants. In Study 2, the comparison of school types was extended by including additional school types.

STUDY 2

The second study aimed to present a more precise identification of sub-stereotypes about pre-service teachers of different school types in Germany. The included school types, which have already been described in the Procedure section of Study 1 (2.1.2), were *elementary school*, *special education school*, *comprehensive school*, *vocational school*, and *grammar school* (German: *Grundschule*, *Förderschule, Gesamtschule*, *Berufsschule*, *Gymnasium*). In contrast to Study 1, Study 2 focused stronger on the subgroups of pre-service teachers and less on the comparison to other groups of students.

The research question of Study 2 was how subgroups of pre-service teachers based on their studied school type are rated on the dimensions competence and warmth (dependent variables) and which group conforms strongest to the paternalistic stereotype. Our general prediction was that stereotypes about subgroups of pre-service teachers correspond to the ratio of subject-related content in proportion to pedagogical knowledge during teacher training. With the highest proportion of subject-related content during teacher training and the highest complexity of teaching content, grammar school pre-service teachers were expected to receive the highest competence ratings, whereas elementary school students should receive the lowest (Hypothesis I). Moreover, elementary school pre-service teachers with more pronounced pedagogical interest (Retelsdorf and Möller, 2012) were expected to receive the highest warmth ratings and the grammar school pre-service teachers should receive the lowest (Hypothesis II). Pre-service teachers of other school types were supposed to fall between elementary and grammar school pre-service teachers on both dimensions.

Method

Sample

The sample of Study 2 consisted of 243 pre-service teachers from the TU Dortmund University in Germany (70.4% female, 27.2% male, 2.5% not indicated; age: M = 22.2, SD = 3.5; studied semesters: M = 3.1, SD = 1.9; study program school type: 29.2% grammar school, 28.4% special school, 19.3% vocational school, 14.0% lower secondary school, secondary school, comprehensive school, 8.6% elementary school, 0.4% not indicated). The study was conducted during a lecture and participants received no compensation.

TABLE 2 | Competence and warmth ratings of pre-service teachers for different school types in Study 2.

	Competence	Warmth
School type	***M* (*SD*)**	***M* (*SD*)**
Elementary school	3.23 (0.65)^{A}	4.19 (0.56)^{C}
Special education school	3.44 (0.71)^{B}	4.19 (0.63)^{C}
Comprehensive school	3.36 (0.57)^{A,B}	3.58 (0.58)
Vocational school	3.37 (0.67)^{A,B}	3.35 (0.64)
Grammar school	3.95 (0.56)	3.08 (0.67)

Note. N = 243. All pairwise comparisons were significant except for school types denoted with identical superscript letters.

Procedure

The general procedure of Study 1 was replicated with some adaptations described in the following: The investigated groups were pre-service teachers differentiated by the independent variable *school type* (levels: *elementary school, special education school, comprehensive school, vocational school, and grammar school*). Instead of the short scales used in Study 1, participants were asked to rate 34 adjectives for every group of pre-service teachers. The reasoning and adjectives are explained in the *Analysis* section.

Analysis

The results of an a priori power analysis for repeated measures ANOVAs using G*Power (Faul et al., 2007) showed that a total sample of 70 participants was required to achieve a power of 0.90 with a significance level of $\alpha = 0.05$ and a small effect size (d = 0.30). The listwise deleted data of 13 participants with too many missing values to compute competence and warmth scale means for all groups were not included in the sample size and analyses.

In light of the internal consistency problems of the competence scale in Study 1 for computer science students, we decided to reevaluate the used adjectives. German translations of the 27 adjectives by Fiske et al. (1999) and seven additional German adjectives (*begabt, ehrgeizig, ehrlich, fachkundig, leistungsbereit, leistungsfähig, wohlmeinend*) were used in the questionnaires of Study 2. After analyzing the main components for each school type, *ambitious* (German: *ehrgeizig*) was identified as the consistently highest loading additional adjective for the competence factor. The nine adjectives of Study 1 and *ambitious* all register factor loadings of over |0.40| for all school types.

The resulting competence scale consisted of the adjectives *competent*, *industrious*, *intelligent*, *determined*, and *ambitious*. The warmth scale was composed of the adjectives *warm*, *likable*, *helpful*, *sincere*, and *kind*. The internal consistencies of the competence scale for the different school types ranged from $\alpha = 0.75$ to $\alpha = .85$[1] and for the warmth scale from $\alpha = 0.80$ to $\alpha = 0.84$.

[1]The overall results of Study 2 did not differ for both competence scales. For the data of Study 2, the internal consistency of the new competence scale increased compared to the competence scale used in Study 1 ($0.69 \leq \alpha \leq 82$).

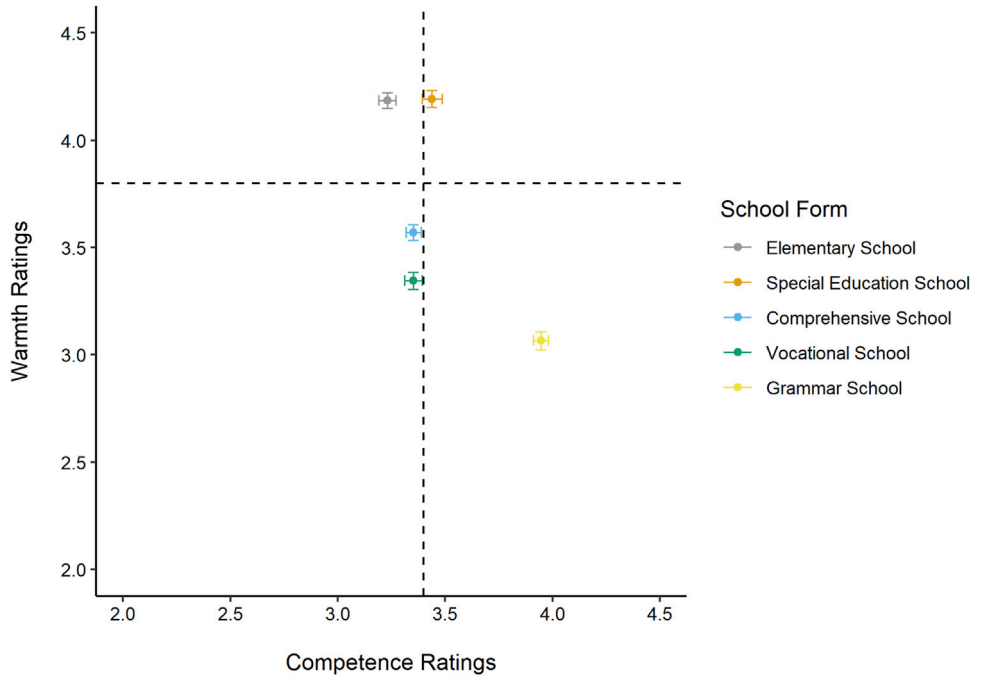

FIGURE 2 | Competence and Warmth Ratings by School Type in Study 2. Note. Mean competence and warmth ratings for different school types on a scale from one to five are shown. Error bars represent standard errors. Dotted lines represent the medians of the competence and warmth data.

Results

Table 2 shows mean competence and warmth ratings for pre-service teachers of different school types. **Figure 2** visualizes the competence and warmth ratings of the different school types. Medians (competence: $Mdn = 3.60$, warmth: $Mdn = 2.67$) show a possible separation of the competence and warmth data into the four quadrants of the stereotype content model and the behaviors from intergroup affect and stereotypes map.

Competence

A one-way repeated measures ANOVA with the within-subject factor *school type* on the dependent variable *competence* was conducted to test Hypothesis I. The results show a significant main effect of the school type, $F(4, 968) = 68.82$, $p < 0.001$, which means that the competence differed for pre-service teachers of different school types. Pairwise comparisons with Bonferroni correction showed higher competence ratings for grammar school pre-service teachers than for all other groups. Additionally, elementary school pre-service teachers were rated as less competent than special education school pre-service teachers. The effect size for the difference of competence between pre-service teachers of grammar schools and elementary schools was $d = 1.19$, indicating a large effect (Cohen, 1988). In general, these results confirm Hypothesis I.

Warmth

A one-way repeated measures ANOVA revealed a significant main effect of the school type, $F(4, 968) = 196.40$, $p < 0.001$. Pairwise comparisons with Bonferroni correction between all school types, except between elementary and special education schools, were significant. The effect size for the difference in warmth between elementary and grammar schools was $d = 1.80$, indicating a large effect (Cohen, 1988) favoring elementary school pre-service teachers. These results support Hypothesis II: Elementary school (and special education school) pre-service teachers were classified as the warmest group, whereas grammar school pre-service teachers were rated as the least warm.

Discussion

In line with the results of Study 1 and our hypotheses, elementary school pre-service teachers were mostly associated with the paternalistic stereotype. This result is thus in accord with findings on different expressions of the subject and the pedagogical interest (Retelsdorf and Möller, 2012), different foci during teacher training, and differences in the complexity of teaching content. Hence, the derived hypotheses that elementary school pre-service teachers get lower competence ratings (Hypothesis I) and higher warmth ratings than grammar school pre-service teachers (Hypothesis II) were supported again. Grammar school pre-service teachers correspond the strongest to the envious stereotype (Fiske et al., 2002), consisting of high levels of competence and low levels of warmth. Elementary, comprehensive, and vocational school pre-service teachers did not differ statistically in competence, while elementary and special education school pre-service teachers did not differ in warmth. As to the rest, other observed school types

fell between elementary and grammar school pre-service teachers.

The effect of study majors was investigated in Studies 3a and 3b to investigate the second defining characteristic of pre-service teacher subgroups.

STUDIES 3A AND 3B

In Studies 3a and 3b, sub-stereotypes about pre-service teachers with different study majors were observed as another important trigger of sub-stereotypes about groups of pre-service teachers. Again, as in Study 1, ingroup favoritism was investigated.

A distinctive feature of the teacher education curriculum in Germany is that pre-service teachers are obligated to study at least two study majors. Roloff Henoch et al. (2015) ascertain pre-service teachers with STEM (science, technology, engineering, and mathematics) study majors to demonstrate higher cognitive abilities, investigative interests, as well as realistic interests, compared to pre-service teachers with non-STEM study majors (e.g., languages, arts, social sciences). Kaub et al. (2005) also found pre-service teachers exclusively studying STEM-related study majors to show higher cognitive abilities and lower social orientation than pre-service teachers who were not studying STEM study majors. Beyond that, Studies 3a and 3b focused on two possible combinations of two study majors each. Two prototypical combinations of study majors were used: German and history for a non-STEM study major combination and mathematics and physics as a representative STEM study major combination.

The general research question of Studies 3a and 3b was how subgroups of pre-service teachers with these prototypical study major combinations (independent variable, levels: *German/history*, *mathematics/physics*) are rated on the dimensions competence and warmth (dependent variables). The hypothesis concerning the paternalistic stereotype is that pre-service teachers with a study major combination of German and history are stereotyped more paternalistically than pre-service teachers studying mathematics and physics. This expectation was based on the difference found between students majoring in STEM and non-STEM study majors. STEM study majors such as mathematics and physics are connected to higher cognitive abilities (Kaub et al., 2005; Roloff Henoch et al., 2015), whereas non-STEM study majors like German and history were found to be connected with lower cognitive abilities, but a stronger social orientation (Kaub et al., 2005). Thus, Hypothesis I proposes that STEM study majors receive higher competence ratings, while non-STEM study majors receive higher warmth ratings (Hypothesis II). As in Ihme and Möller (2015), our hypotheses were examined using two different measurements of stereotypes: one using open-ended questions (Study 3a) and the other one using closed-ended questions (Study 3b). The aim of additionally invoking open-ended questions was to use a different form of measurement so that measurement artifacts as an explanation of effects could be ruled out.

Regarding ingroup favoritism, we hypothesized that pre-service teacher participants would rate pre-service teachers with both study major combinations higher on competence (Hypothesis III) and warmth (Hypothesis IV) than other participants. In contrast to Study 1, in Studies 3a and 3b no other groups than pre-service teachers were the target of the competence and warmth ratings. So possible ingroup favoritism effect would be independent of other reference groups.

TABLE 3 | Competence and warmth ratings of pre-service teachers with different study major combinations in Study 3a (open-ended questions).

Study major combination	Competence	Warmth
	M (*SD*)	*M* (*SD*)
German and history	3.33 (0.59)	3.15 (0.54)
Mathematics and physics	3.80 (0.41)	2.30 (0.43)

Note. N = 133. For participant scores, their statements were rated for competence and warmth and subsequently averaged. A total number of 1,302 statements were rated.

Study 3a: Open-Ended Questions

Method

Sample

The sample consisted of N = 133 students from the Kiel University in Germany (65.4% female, 33.1% male, 1.5% not indicated; age: M = 23.5, SD = 3.9; studied semesters: M = 5.3, SD = 3.6; 51.9% grammar school pre-service teachers, 48.1% students with other study programs). The study was conducted as a paper and pencil survey in university buildings without compensation.

Procedure

The general procedure of Study 1 was replicated. However, instead of participants rating lists of adjectives, they were asked to list at least five characteristics per study major combination (*German/history*, *mathematics/physics)* with the following exemplary instruction: *"In your opinion, what characteristics do other students associate with the 'typical pre-service teacher' with the study major combination mathematics and physics?"*.

Analysis

The results of an a priori power analysis for repeated measures ANOVAs using G*Power (Faul et al., 2007) showed that a total sample of 120 participants was required in Studies 3a and 3b to achieve a power of 0.90 with a significance level of $\alpha = 0.05$ and a small effect size (d = 0.30) for the study major combination.

Overall, we received 1,302 statements about typical characteristics of pre-service teachers of both study major combinations: 634 for German and history, 668 for mathematics and physics. Following the procedure used by Ihme and Möller (2015), answers were coded based on the stereotype content model on the dimensions of competence and warmth (Fiske et al., 1999, Fiske et al., 2002). Every characteristic was rated on both dimensions by two raters using five-point Likert scales with levels ranging from *not competent* to *competent* and *not warm* to *warm*. Characteristics like *smart, intelligent,* and *ambitious* were rated with five points on the competence scale and neutral three points on

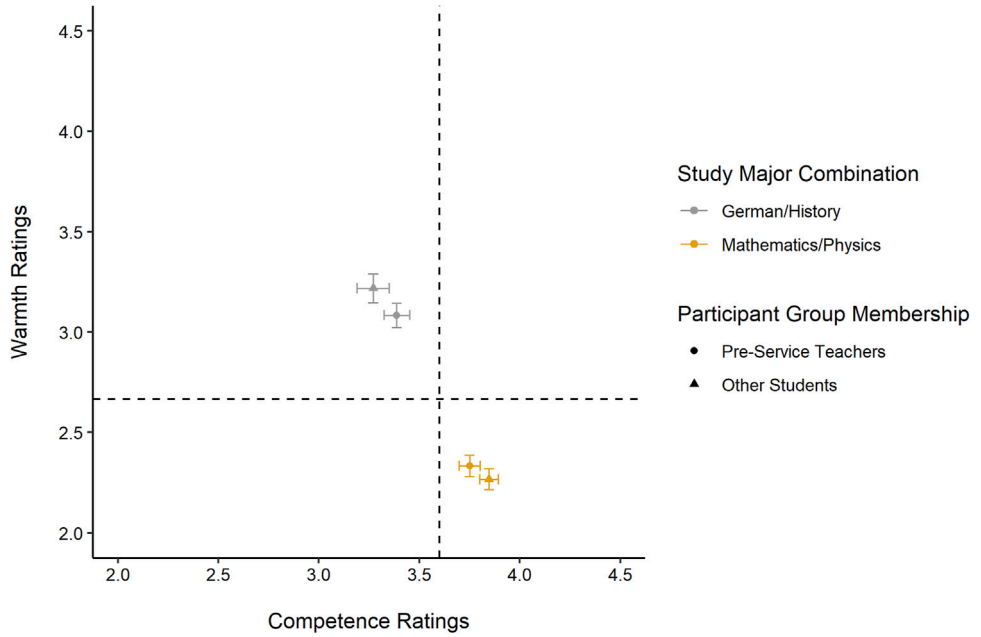

FIGURE 3 | Competence and Warmth Ratings by Study Major Combination and Participant Group Membership in Study 3a (Open-Ended Questions). Note. Mean competence and warmth in open-ended questions for different study major combinations rated on a scale from one to five are shown for participants belonging to the groups of pre-service teachers and other students. Error bars represent standard errors. Dotted lines represent the medians of the competence and warmth data.

the warmth scale. *Helpful, friendly,* and *likable* are examples of characteristics receiving five points on the warmth scale and neutral three points on the competence scale. Neutral characteristics as *male, female,* and *alternative* were rated as neutral three points on both scales. Overall, 114 characteristics (18.0%) were rated as neutral on both scales for the study major combination German and history and 68 (10.2%) for mathematics and physics. The raters had an initial inter-rater reliability from $\kappa = 0.55$ to $\kappa = 0.64$, indicating a moderate to substantial agreement (Landis and Koch, 1977). For analyses, differing ratings between both raters were resolved by discussing them and coming to an agreement on their ratings. For every participant, a mean value of the competence and the warmth codings of their given characteristics was calculated.

Results

Table 3 shows mean competence and warmth ratings for pre-service teachers with different study major combinations in Study 3a (open-ended questions). **Figure 3** shows the relationship between the study major combination and competence and warmth ratings by participant group membership. Additionally, medians (competence: $Mdn = 3.6$, warmth: $Mdn = 2.67$) for both dimensions are visualized to show a possible separation of the data into the four quadrants of the stereotype content model and the behaviors from intergroup affect and stereotypes map.

Competence

A two-way ANOVA with the repeated measures of the within-subject factor *study major combination* and the between-subject factor *participant group membership* on the dependent variable *competence* was conducted to test Hypotheses I and III. There was a significant main effect of the study major combination, $F(1, 131) = 54.18$, $p < 0.001$. Competence differed for pre-service teachers with different combinations of study majors. The effect size for the difference in competence between pre-service teachers with different study major combinations was $d = 0.93$, indicating a large effect (Cohen, 1988) with higher levels of competence for pre-service teachers studying a study major combination of mathematics and physics supporting Hypothesis I. There was no significant main effect of the participant group membership, $F(1, 131) = 0.03$, $p = 0.87$. In combination with only pre-service teacher groups being rated, this finding falsified Hypothesis III and negated ingroup favoritism on competence. There was no significant interaction between study major combination and participant group membership, $F(1, 131) = 2.87$, $p = 0.09$. The ratings of the different study programs did not differ based on the participant group membership.

Warmth

Another two-way ANOVA with repeated measures of the within-subject factor *study major combination* and the between-subject factor *participant group membership* on the dependent variable *warmth* was conducted to test Hypotheses II and IV. There was a significant main effect of the study major combination, $F(1, 131) = 214.47$, $p < 0.001$. Warmth differed depending on the study major combination with an effect size of $d = 1.74$, indicating a large effect (Cohen, 1988) with higher levels of warmth for pre-service teachers with a

TABLE 4 | Competence and warmth ratings of pre-service teachers with different study major combinations in Study 3b (closed-ended questions).

Study major combination	Competence	Warmth
	M (*SD*)	*M* (*SD*)
German and history	3.11 (0.71)	3.70 (0.55)
Mathematics and physics	4.24 (0.54)	2.85 (0.57)

Note. N = 308.

combination of German and history. This result supported Hypothesis II. There was no significant main effect of the participant group membership, $F(1, 131) = 0.29$, $p = 0.59$, again contradicting ingroup favoritism and Hypothesis IV. There was no significant interaction between the study major combination and the participant group membership, $F(1, 131) = 3.03$, $p = 0.08$.

Study 3b: Closed-Ended Questions

Method

Sample

The sample consisted of 308 students from the Kiel University in Germany (56.8% female, 39.0% male, 4.2% not indicated; age: $M = 24.5$, $SD = 3.8$; studied semesters: $M = 7.0$, $SD = 3.9$; 59.7% grammar school pre-service teachers, 40.3% students with other study programs). The study was conducted as a paper and pencil survey in university buildings without compensation.

Procedure

The general procedure of Study 1 was replicated with some adaptations described in the following: The investigated groups were pre-service teachers with the study major combinations *German with history* and *mathematics with physics*. The used adjectives correspond to the short scales for competence and warmth supplemented with *ambitious* analogous to the scales described in the *Analysis* section of Study 2. Furthermore, to not only focus on the opinions about other students, the instruction and questions in Study 3b asked how participants thought the groups of pre-service teachers are viewed by other persons (as opposed to other students).

Analysis

The listwise deleted data of four participants with too many missing values to compute competence and warmth scale means for all groups were not included in the sample size and analyses. The internal consistencies of the competence scale (*competent*, *industrious*, *intelligent*, *determined*, *ambitious*) for the different study major combinations ranged from $\alpha = 0.72$ to $\alpha = 0.81$ and for the warmth scale (*warm*, *likable*, *helpful*, *sincere*, *kind*) from $\alpha = 0.74$ to $\alpha = 0.81$.

Results

Table 4 shows mean competence and warmth ratings for pre-service teachers with different study major combinations in Study 3b (closed-ended questions). **Figure 4** shows the relationship between the study major combination for competence and warmth ratings by participant group membership in Study 3b. Additionally, median splits (competence: $Mdn = 3.40$, warmth: $Mdn = 3.80$) show a possible separation of the data into the four quadrants of

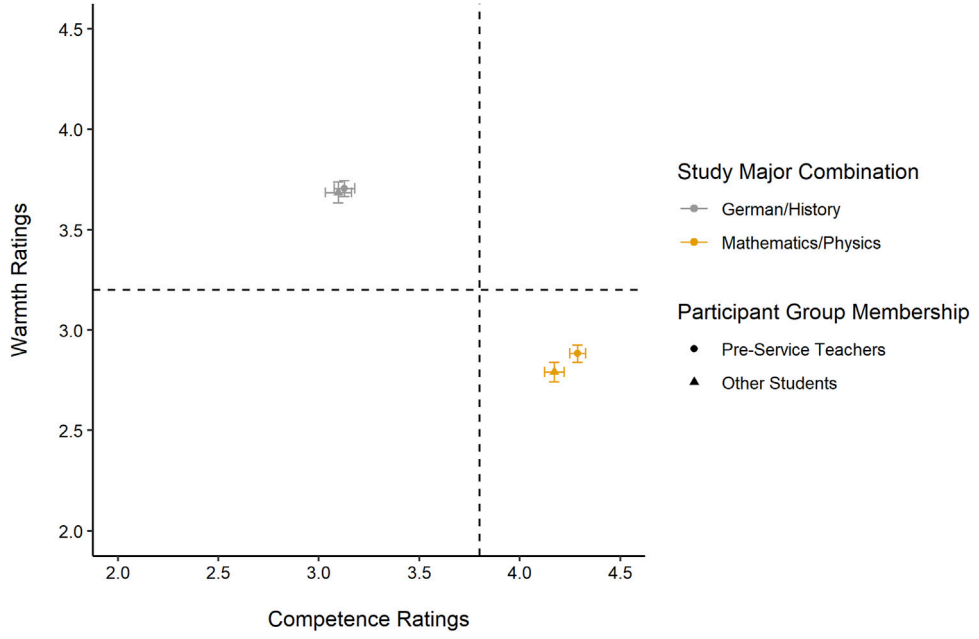

FIGURE 4 | Competence and Warmth Ratings by Study Major Combination and Participant Group Membership in Study 3b (Closed-Ended Questions). Note. Mean competence and warmth ratings in closed-ended questions for different study major combinations on a scale from one to five are shown for participants belonging to the groups of pre-service teachers and other students. Error bars represent standard errors. Dotted lines represent the medians of the competence and warmth data.

the stereotype content model and the behaviors from intergroup affect and stereotypes map.

Competence

A two-way ANOVA with repeated measures of the within-subject factor *study major combination* and the between-subject factor *group membership* on the dependent variable *competence* was conducted to test Hypotheses I and III. There was a significant main effect of the study major combination, $F(1, 306) = 507.79$, $p < 0.001$, so competence differed for pre-service teachers with different study majors. The effect size for the difference in competence between pre-service teachers with different study major combinations was $d = 1.79$, indicating a large effect (Cohen, 1988) with higher levels of competence for pre-service teachers studying a combination of mathematics and physics in line with Hypothesis I and the results of the open-ended questions. In contrast to the ingroup favoritism Hypothesis III, there was no significant main effect of the participant group membership, $F(1, 306) = 1.97$, $p = 0.16$. Also, there was no significant interaction between the study major combination and the participant group membership, $F(1, 306) = 0.73$, $p = 0.40$. Thus, the ratings of the different study programs did not differ based on the participants' group membership.

Warmth

Another two-way ANOVA with repeated measures of the within-subject variable *study major combination* and between-subject variable *participant group membership* on the dependent variable *warmth* was conducted to test Hypotheses II and IV. There was a significant main effect of the study major combination, $F(1, 306) = 369.69$, $p < 0.001$. Warmth differed depending on the study major combination. The effect size for the differences in warmth between the study major combinations was $d = 1.52$, indicating a large effect (Cohen, 1988) with higher levels of warmth for pre-service teachers with a combination of German and history, which supports Hypothesis II. In contrast to Hypothesis IV, we again found no significant main effect of the participant group membership, $F(1, 306) = 1.43$, $p = 0.23$. In addition, there was no significant interaction between the study major combination and the participant group membership, $F(1, 306) = 0.65$, $p = 0.42$.

SUMMARY AND CONCLUDING DISCUSSION

Our studies were conducted to generate a more detailed overview of stereotypes about pre-service teachers by investigating sub-stereotypes. In Study 1, subgroups of pre-service teachers were compared with computer science, law, and psychology students. We found that both pre-service teachers for elementary and grammar schools are stereotyped with a paternalistic stereotype. However, the results show that the paternalistic stereotype applies particularly to elementary school pre-service teachers and less to grammar school pre-service teachers. Additionally, we found ingroup favoritism within pre-service teachers for competence ratings about the pre-service teacher groups, but not for warmth ratings.

In Study 2, sub-stereotypes about pre-service teachers for different school types were compared. Pre-service teachers for elementary schools are most associated with a paternalistic stereotype. Compared to other school types, grammar school pre-service teachers fit the envious stereotype the best. Warmth and competence ratings for special education school, comprehensive school, and vocational school pre-service teachers mostly fall between these school types.

Some possible explanations for the varying stereotypes about pre-service teachers of different school types observed in Studies 1 and 2 were discussed in the corresponding *Discussion* section: differences in individual subject and pedagogical interest (Retelsdorf and Möller, 2012), different contents during teacher training, differences in the complexity of teaching content, and differences in vocational prestige. Furthermore, the dimensional compensation model states that when one group is rated higher on competence or warmth, the other group is rated more positively on the other dimension (Kervyn et al., 2010; Yzerbyt, 2018). Yzerbyt et al. (2005) initially found this compensation pattern for the national groups of the French-speaking Belgians and the French. For example, both groups agreed that the French were more competent but less warm than the Belgians. The compensation model is a possible explanation for the contrasting ratings of high competence for grammar school pre-service teachers and compensatory high warmth ratings for elementary school pre-service teachers.

In Studies 3a and 3b, stereotypes about pre-service teachers with prototypical combinations of study majors were observed using two studies with open-ended and closed-ended questions. Compared to pre-service teachers with a non-STEM study major combination of German and history, pre-service teachers with a STEM study major combination of mathematics and physics were rated more competent and less warm. Additionally, we asked participants in Study 3b to rate the opinion held by others and not only by other students. This variation, in combination with the conforming results of Study 3a and Study 3b suggests, that the results of the other studies can be extrapolated from an academic setting to the general public. No ingroup favoritism effects were found in Studies 3a and 3b.

There are two possible explanations for the results in Study 3a and 3b. First, different sub-stereotypes about pre-service teachers based on study majors are possibly influenced by stronger connections between STEM study majors and higher cognitive abilities on the one hand and between non-STEM study majors and higher social orientation on the other hand (Kaub et al., 2005; Roloff Henoch et al., 2015). This assumption is in line with the higher competence ratings of pre-service teachers studying mathematics and physics (STEM study majors) and the higher warmth ratings of pre-service teachers studying German and history (non-STEM study majors). Second,

we again observe a compensation effect (Kervyn et al., 2010): The higher competence ratings for pre-service teachers with mathematics and physics are compensated by higher warmth ratings for pre-service teachers with German and history. We did not find ingroup favoritism effects in Studies 3a and 3b. This could be explained by target groups exclusively being pre-service teachers. In Study 1, the competence ingroup favoritism may be due to the presence of student groups other than pre-service teachers.

To sum up, we found different stereotypes for subgroups of pre-service teachers based on school types and study majors. Our findings extended sub-stereotype research to pre-service teachers, using the stereotype content model. By doing so, more complex sub-stereotypes about pre-service teachers were observed, a group that is itself linked to the paternalistic stereotype at a global level. Interestingly, we did not find ingroup favoritism effects for our pre-service teacher participants besides in Study 1 on competence. This result is especially surprising for the warmth ratings in Study 1 because the stronger dimension of a stereotyped group is more prone to ingroup favoritism effects (Fiske, 2015). Indeed, it is a hint that pre-service teachers may accurately assess the stereotypes about their ingroup.

Our tables give an overview of the means and standard deviations of competence and warmth ratings using closed-ended questions in our Studies 1, 2, and 3b. The ranges of competence and warmth ratings for pre-service teachers slightly differ among the studies, depending on the comparison groups. These differences are explainable by the shifting standards model (Biernat and Manis, 1994): Persons often systematically adjust their frame of reference for subjective ratings of social groups. By way of example, the ratings for grammar school pre-service teachers were influenced by the relative standing within the groups: In Study 1, law students were the group strongest associated with an envious stereotype (Fiske et al., 2002) and in Study 2, that role was filled by grammar school pre-service teachers themselves, leading to higher competence and lower warmth ratings in Study 2 than in Study 1. For the individual studies, the figures and the behaviors from intergroup affect and stereotypes map quadrants (Cuddy et al., 2007, 2008) defined by medians corresponded to the hypotheses and results.

One limitation of our studies is that we have only investigated sub-stereotypes about students provided by a sample of students. On the one hand, these specific research objects and samples do not allow for generalizations of our findings on sub-stereotypes about in-service teachers by the general public without further research. On the other hand, a sample of other students might be seen as truly important in the lives of pre-service teachers. Furthermore, the school type and taught subjects are characteristics that are important defining aspects of in-service teachers. Therefore, results should not deviate too strongly from our findings. Another limitation of our studies is that we used reactive measures in contrast to other modes of measurement (e.g., implicit measures as used in Carlsson and Björklund, 2010). Open-ended questions were solely invoked in Study 3a.

For future sub-stereotype research on pre-service teachers, gender-related considerations regarding subgroups of pre-service teachers are a possible object of focus. The gender of pre-service teachers is another variable that can lead to sub-stereotypes, in turn interacting with teacher gender ratios of different school types and study majors. For example, Ebert et al. (2014) found stronger warmth stereotypes about women and strong associations of the raters' gender and competence in a German sample. Further interesting questions are how pre-service teachers are rated compared to student groups other than those used in our studies and whether effects can be replicated for in-service teachers. The inclusion of further study majors like physical education or arts and comparisons to students with the same study majors not in teacher training are possible extensions of Studies 3a and 3b. Two slightly different methodological approaches could be asking participants directly how they rate the target groups and measuring implicit stereotypes about different subgroups of pre-service teachers.

The findings of our studies lead to practical implications regarding teacher training. Based on the differences in subject and pedagogical interest found in first-semester pre-service teachers for different school types (Retelsdorf and Möller, 2012), sub-stereotypes about different school types and study majors can potentially further influence persons considering teacher training. For example, persons may decide against teacher training for elementary schools or non-STEM study majors to avoid being confronted with negative competence-related stereotypes and connected emotions and behavioral tendencies. Imparting knowledge about existing stereotypes and increasing awareness that stereotypes are, in fact, stereotypes and do not necessarily reflect reality are possible interventions that universities, in-service teachers, and university teachers could use to reduce their impact. Study counseling for prospective students could be a fruitful setting for these interventions.

For pre-service teachers already in teacher training, different sub-stereotypes potentially lead to different levels and expressions of stereotype threat (Steele and Aronson, 1995; Steele, 1997) and adverse behavioral tendencies by their peer groups (e.g., avoiding and dismissive behavior, Cuddy et al., 2008). Stronger paternalistic sub-stereotypes about pre-service teachers of some school types or study majors can lead to stronger stereotype threat effects ranging from disidentification with the ingroup, reduced cognitive performance to ultimately dropping-out of teacher training (Johns et al., 2008; Schmader et al., 2008; Woodcock et al., 2012). The results of Studies 1 and 2, for instance, suggest that pre-service teachers for elementary schools might be in greater need of interventions than pre-service teachers for grammar schools. Possible means to fight the effects of stereotype threat include psychoeducative interventions (Johns et al., 2005). Teacher training programs could include psychoeducation in their curriculum covering the mechanisms of stereotype threat, nuanced sub-stereotypes about pre-service teachers, and research results contrasting these stereotypes. Early action could go a long way.

Our studies contribute important findings of stereotypes concerning subgroups of pre-service teachers. Knowledge

about these sub-stereotypes constitutes an essential factor of developing precise, effective psychoeducative interventions against the impact on the choice of a study program and the effects of stereotype threat.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusion of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

MS: Formal Analysis, Data Curation, Writing - Original Draft, Writing - Review and Editing, Visualization. TI: Conceptualization, Methodology, Investigation, Writing - Review and Editing. AS: Investigation, Writing - Review and Editing. JM: Conceptualization, Methodology, Resources, Writing - Review and Editing, Supervision, Project administration, Funding acquisition.

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