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Efficacy beliefs and interdependence when being assessed working in a group

Karin Forslund Frykedal, Eva Hammar Chiriac and Michael Rosander

ABSTRACT
The aim of this study was to investigate factors that can predict collective efficacy in student work groups year 5 and 8 at compulsory school and to see if there are gender and year differences for efficacy beliefs and aspects of interdependence. A total of 283 completed questionnaires were analysed. Hierarchical multiple regression was used to predict collective efficacy and 2 × 2 ANOVA was used to analyse gender and year differences and interactions for following five factors: collective efficacy, self-efficacy, negative interdependence, positive interdependence and importance of good assessment and marks. The result showed that independent of gender, year and school, self-efficacy, positive and negative interdependence predicted collective efficacy in connection with group work assessment. The result also showed that there were better conditions for cooperation in year 5 compared to year 8. Additionally, it was significantly more important for girls than boys to achieve good assessment and marks.

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Collective-efficacy; self-efficacy; interdependence; group work; gender; group work assessment

Introduction
The main focus of this study concerns students in Swedish compulsory school working in mixed and single-gender groups. More specifically, the study examined students’ perceptions about their own and the group’s abilities to perform a task and their perceptions of interdependence to other students when being assessed in the group. Working together in a group could create feelings of both inspiration and frustration among students, depending on different ideas about what is to be done and the level of trust of one’s own and other group members’ abilities to perform a task ([Removed to maintain integrity for the review process]). Additionally, being assessed as part of a group could increase either the desire to cooperate or compete with other group members for good marks (Orr 2010). To investigate and understand students’ perceptions when working in groups this study emphasises students’ self- and collective efficacy and interdependence when being assessed together with others in a group.
**Self-efficacy and collective efficacy**

According to Bandura (1982), *self-efficacy* is an individual’s belief that they possess all the necessary abilities to perform a task. The corresponding concept on a group level is *collective efficacy* (Bandura 1982, 2000, 2002). A group’s shared beliefs about what the group collectively is capable of influences the group’s performance (Bandura 2000). When members perceive interdependence in a group, they create better conditions for developing high collective efficacy (Alavi and McCormick 2008). Collective efficacy influences group performance when a highly interdependent task requires group members to cooperate and coordinate their efforts (Katz-Navon and Erez 2005). Collective efficacy is, according to Lent, Schmidt, and Schmidt (2006), also related to group cohesion and is a stronger predictor of group performance than group members’ perceptions of their individual *self-efficacy* when interdependence is high (Katz-Navon and Erez 2005). Instead, self-efficacy explains individual performance under low task interdependence.

**Gender, year, and assessment**

In Swedish compulsory schools, students receive marks from years 6 to 9 (Skolverket 2011). For approximately 30 years, girls have had higher marks than boys in Swedish compulsory schools (SOU 2010). A number of comparable countries have shown similar results (OECD 2017). There are various explanations for why girls outperform boys in school achievement. Some of the occurring explanations are: (a) educational methods (Sinnes 2006; Wernersson 2006); (b) motivation and learning strategies (Jakobsson 2000; Meece, Glieneke, and Burg 2006; Muller, Stage, and Kinzie 2001; Pearce 2006); (c) social changes and gender equality (Björnsson 2005; Weiner and Öhrn 2009); (d) gender differences in structure in the classroom/school (Bergström, Eidevald, and Westberg Boström 2016; Holm 2008; Warin and Dempster 2007); (e) girls’ strategies to distance themselves from traditional gender roles by striving for high marks, thus generating possibilities to enter a future in higher education (Wilhsson 2017); (f) girls and boys use their abilities differently rather than have different abilities (Brunner, Kraussa, and Kuntera 2008; Johnson and Bouchard 2007; Reynolds et al. 2008); and (g) “anti-school culture” or “effortless achievement culture” (Jackson 2006; Phoenix 2004; Zimmerman 2018).

Lundahl et al. (2015) showed in a review that age and experience of grading seems to matter for how students’ learning, motivation for learning, and performance are influenced by assessment. There are two overall models used to explain why grading influences students’ achievement and learning: (a) students are influenced by assessment and grading in a way that, regardless of their prerequisites, make them motivated to perform better and learn more (e.g. Azmat and Iriberri 2010; Prendergast 1999); and (b) assessment and grading influence students in different ways depending on their prerequisites and background. Feedback in the form of assessments and marks could either be positive or negative for students and may influence self-efficacy, motivation, learning, and performance (e.g. Black and Wiliam 1998; Hattie 2009).
Aim

The aim of this study was to investigate factors that can predict collective efficacy in student work groups in years 5 and 8 in compulsory school and to see if there are gender and year differences for efficacy beliefs and aspects of interdependence.

Theory and theoretical concepts

Social interdependence theory

The theoretical framework for this study was rooted in the social interdependence theory (Deutsch 1949; Johnson and Johnson 2002, 2013; Lewin 1948). Group members develop a degree of interdependence when members experience that working together on a task will enhance the probability for them to achieve their joint goals. Interdependence can be positive, which creates opportunities for cooperation among group members. Interdependence might also be negative, which creates competition among group members. There might also be an absence of interdependence, signifying that individuals may reach their goals independent of others in the group, which does not provide opportunities for interaction and cooperation between group members (Johnson and Johnson 2002, 2013). Johnson and Johnson proposed the following five elements necessary to increase the cooperative potential of groups: (a) positive interdependence – the perception of being linked to other group members and the realisation that is achieved through the pursuit of common goals; (b) individual accountability – each group member is responsible for their share of the work and has a willingness to help other group members; (c) face-to-face promotive interaction – group members encourage each other’s efforts through discussions and explanations; (d) interpersonal and small-group skills – enhance the degree of trust among group members and their ability to resolve conflicts when differences occur; and (e) group processing – group members discuss and evaluate their work (this is crucial for promoting and maintaining effective working relationships among members).

Working in a group or working as a group

Additional approaches to group work are working in a group and working as a group (Underwood 2003). It is important to differentiate between in and as a group, even if Blatchford et al.’s (2003) definition of group work (“students working together as a group or a team”; p. 155) is often used. Working in a group involves situations where group members are typically working individually on separate parts of a task and not using the potential of the group. At the end of the group project, students put their separate contributions together into a joint product. Learning is an effect of social facilitation rather than cooperation. Working as a group involves cooperation and utilisation of group members’ competence, knowledge, and abilities and is characterised by interdependence and a joint effort to achieve a common goal. In this case, learning is an effect of cooperation.
Method

Context of the study

The study is part of a larger research project title *Assessment of knowledge and skills in group work – an intervention study in the classroom everyday practice* ([Removed to maintain integrity for the review process]; [Removed to maintain integrity for the review process]). The overarching objective of the research project was to increase knowledge concerning teachers’ and students’ assessment practices in connection with group work in education.

Participants

Data for the study were collected using a questionnaire. A total of 283 completed questionnaires from 135 girls and 148 boys in compulsory school were analysed (year 5: 78 girls and 74 boys; year 8: 57 girls and 74 boys). The participants came from five different schools in five different cities in Sweden. The students were divided into 38 different work groups.

The questionnaire

The questionnaire had four main areas: (a) one’s own effort during group work, (b) working with others, (c) feelings of being assessed and marked with others, and (d) the importance of group work. In a previous study ([Removed to maintain integrity for the review process]), the questionnaire was factor analysed resulting in five factors: collective efficacy, self-efficacy, negative interdependence, positive interdependence, and importance of a good assessment and mark. *Collective efficacy* captures beliefs of what the group collectively is capable of when working on tasks (Cronbach’s α = .920). *Self-efficacy* involves beliefs about what one as an individual is capable of when working on a task (Cronbach’s α = .839). *Negative interdependence* involves negative issues when working in a group by doing things on one’s own with no regard to group decisions and feeling frustrated by the group (Cronbach’s α = .800). *Positive interdependence* deals with feelings of positive interdependence from working together as a group and looking upon being assessed as a group as something positive (Cronbach’s α = .823). Finally, *importance of a good assessment and mark* deals with the importance for the individual of getting a good assessment and mark on the group task (Cronbach’s α = .806).

Data collection

The questionnaires were distributed by one of the researchers in the classroom at ordinary lecture time (40–60 min). During the entire period of time when students completed the questionnaires, both the teacher and the researcher stayed in the classroom to clarify or interpret as needed the meaning of some of the words in the questionnaires. The questionnaires were completed in 20 to 30 min, and all students were finished before the lecture ended. Researchers collected all questionnaires on location. As
the students finished the questionnaires, they turned to an ordinary task assigned by their teachers while waiting for the whole group to complete the questionnaires.

All non-participating students were requested to put an X in the upper corner on the first page of the questionnaire. This diminished singling out these students so that it appeared all students completed the questionnaire. After all, questionnaires were collected, the researcher omitted the non-participant questionnaires and they were not used in the study.

**Analyses**

Data were analysed using IBM SPSS version 24. A hierarchical multiple regression was used to predict collective efficacy and 2 × 2 ANOVA was used to analyse gender and year differences and interaction for the five factors presented above. Gender was dummy coded with boys as 1 and girls as 0. The schools were also dummy coded with School A as the base.

**Ethics**

The ethical principles provided by the British Psychological Society guidelines (BPS 2014), which emphasise concern for participants’ interests, were applied throughout the study.

All participating teachers and students signed an informed consent to be involved in the study. The study was approved by the regional Research and Ethics Committee [Removed to maintain integrity for the review process].

**Results**

In Table 1, descriptive statistics and correlations between the variables of the study are presented. The results showed negative correlations for year and both collective efficacy (r = −.26) and positive interdependence (r = −.32). For the schools, there were mostly no or very small correlations for the independent variables with one exception: for School D there was a significant correlation for collective efficacy (r = −.36) and negative interdependence (r = .23), meaning that belonging to School D corresponded to lower collective efficacy and higher negative interdependence. The analysis of the data shows that there were significant correlations in the .40-ies for collective efficacy and self-efficacy (r = .46) and positive interdependence (r = .48), and for self-efficacy and importance of a good assessment and mark (r = .46).

**Collective efficacy**

In Table 2, a hierarchical regression controlling for gender, year, and school with self-efficacy, positive and negative interdependence, and the importance of getting a good assessment and mark as independent variables is presented. The analysis showed that independent of gender, year, and school, self-efficacy (b = 0.42) as well as positive (b = 0.42) and negative interdependence (b = −0.28) predicted collective efficacy, F(7, 264) = 28.23, p < .001, where self-efficacy and positive interdependence explained most of the variance in collective efficacy.
Table 1. Descriptive statistics and correlation between the variables of the study.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Gender</td>
<td>0.52 (0.50)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Year</td>
<td>6.39 (1.50)</td>
<td>.08</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. School A</td>
<td>0.31 (0.46)</td>
<td>−.05</td>
<td>.12*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. School B</td>
<td>0.24 (0.43)</td>
<td>.02</td>
<td>−.53**</td>
<td>−.38**</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>5. School C</td>
<td>0.15 (0.36)</td>
<td>−.07</td>
<td>−.40**</td>
<td>−.29**</td>
<td>−.24**</td>
<td></td>
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</tr>
<tr>
<td>6. School D</td>
<td>0.13 (0.33)</td>
<td>.04</td>
<td>.41**</td>
<td>−.26**</td>
<td>−.22**</td>
<td>−.16**</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>7. School E</td>
<td>0.16 (0.37)</td>
<td>.08</td>
<td>.48**</td>
<td>−.30**</td>
<td>−.25**</td>
<td>−.19**</td>
<td>−.17**</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8. Collective efficacy</td>
<td>5.38 (1.26)</td>
<td>−.01</td>
<td>−.26**</td>
<td>.14*</td>
<td>.09</td>
<td>.13*</td>
<td>−.36**</td>
<td>−.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Self-efficacy</td>
<td>4.89 (1.07)</td>
<td>.04</td>
<td>−.04</td>
<td>.16**</td>
<td>−.11</td>
<td>.12*</td>
<td>−.11</td>
<td>−.09</td>
<td>.46**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Negative interdep.</td>
<td>2.45 (1.17)</td>
<td>.11</td>
<td>.16**</td>
<td>−.08</td>
<td>−.08</td>
<td>.00</td>
<td>.23**</td>
<td>−.00</td>
<td>−.16**</td>
<td>.16**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Positive interdep.</td>
<td>3.88 (1.18)</td>
<td>.03</td>
<td>−.32**</td>
<td>−.01</td>
<td>.14*</td>
<td>.10</td>
<td>−.16**</td>
<td>−.12</td>
<td>.48**</td>
<td>.28**</td>
<td>.16**</td>
<td></td>
</tr>
<tr>
<td>12. Importance of a good assessment and mark</td>
<td>5.71 (1.22)</td>
<td>−.20**</td>
<td>.01</td>
<td>.19**</td>
<td>−.19**</td>
<td>.10</td>
<td>−.06</td>
<td>−.07</td>
<td>.27**</td>
<td>.46**</td>
<td>−.04</td>
<td>.21**</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01
Year, gender, and assessment

There were significant differences comparing years 5 and 8 for collective efficacy, F(1, 278) = 22.02, p < .001 (year 5: M = 5.68, SD = 1.17; year 8: M = 5.01, SD = 1.28), negative interdependence, F(1, 272) = 6.22, p = .013 (year 5: M = 2.28, SD = 1.01; year 8: M = 2.62, SD = 1.25), and positive interdependence, F(1, 275) = 37.78, p < .001 (year 5: M = 4.24, SD = 1.10; year 8: M = 3.44, SD = 1.10). For both collective efficacy and positive interdependence, there were significantly lower scores for year 8 compared to year 5, and for negative interdependence, there was a significantly higher score. There were no gender differences for efficacy beliefs or aspects of interdependence; however, girls found it significantly more important to get a good assessment and mark than boys, F(1, 272) = 11.27, p = .001 (girls: M = 5.97, SD = 1.07; boys: M = 5.48, SD = 1.29).

The analysis showed a significant interaction for gender and year on negative interdependence, F(1, 272) = 5.119, p = .024; see Figure 1. Girls in year 5 had a significantly lower level of negative interdependence (M = 2.04, SD = 0.82) than boys (M = 2.52, SD = 1.13), t (148) = 3.133, p = .002. In year 8, there were no gender differences (girls: M = 2.68, SD = 1.10; boys: M = 2.57, SD = 1.37).

Discussion

The present study showed that independent of gender, year, and school, self-efficacy as well as positive and negative interdependence predicted collective efficacy. Self-efficacy and positive interdependence explained most of the variance in collective efficacy. This is in line with Alavi and McCormick (2008) study showing that members in a group perceiving
themselves to be interdependent in a group have greater conditions to develop a high level of collective efficacy. To create conditions for the group to work as a group ([Removed to maintain integrity for the review process]; [Removed to maintain integrity for the review process]; Underwood 2003), characterised by interdependence and a joint effort to achieve a common goal, it is, therefore, essential to develop both self- and collective efficacy within a group and its members. According to Katz-Navon and Erez (2005), this could be done by constructing a task that makes the group members interdependent and requires them to cooperate and coordinate their efforts.

The results also showed significant differences comparing years 5 and 8 for collective efficacy, negative interdependence, and positive interdependence. For both collective efficacy and positive interdependence, there were significantly lower scores for year 8 compared to year 5, but for negative interdependence, there was a significantly higher score. One feasible explanation could be that in Swedish compulsory school, students receive marks from year 6 on (Skolverket 2011). This means that in the current study, the students in year 5 did not receive marks, but the students in year 8 did receive them. Being assessed as part of a group could create collaboration or competition for good marks among group members (Orr 2010), depending on different ideas about what is to be done and the level of trust of one’s own and other group members’ abilities to perform a task ([Removed to maintain integrity for the review process]). Age and experience of grading seems to matter for how assessment and grading influenced students (Lundahl et al. 2015), could either be positive or negative for students depending on their prerequisites and background, and have an influence on self-efficacy and performance (Black and Wiliam 1998; Hattie 2009). If the intention is to create collaboration and not competition for good marks (Orr 2010), it becomes important to explore how assessment and grading are managed in group work, both for students’ efficacy beliefs and for the group’s performance in and managing of a task.

Additionally, the results showed that girls found it significantly more important to get a good assessment and high marks than boys. Those results were no surprise, since for approximately 30 year girls have had higher marks than boys in Swedish compulsory school (SOU 2010); additionally, a number of comparable countries have shown similar results (OECD 2017). There are explanations at both the individual and structural levels for these differences. In the specific context of this study, we found no obvious explanation, but it could be that girls are more motivated and strive for high marks to ensure a future in higher education (Wilhsson 2017) and that girls use their abilities in the group to get a good

Figure 1. The interaction between gender and year for negative interdependence.
assessment (Brunner, Kraussa, and Kuntera 2008; Johnson and Bouchard 2007; Reynolds et al. 2008). As mentioned above, students receive marks from year 6 on (Skolverket 2011). This could explain the result that girls in year 5 in the study had a significantly lower level of negative interdependence than boys, that is, girls were less likely to compete than boys, but in year 8 there were no gender differences. Possibly, girls in year 5 still want to cooperate and do not care about their marks as much as the girls in year 8 do.

**Limitations**

A limitation of the study is that in all schools, except for School D, the results showed that self-efficacy, as well as positive and negative interdependence, predicted collective efficacy. However, belonging to School D corresponded to lower collective efficacy and higher negative interdependence. One explanation could be the way the task was presented for students in School D, which gave them different conditions to address or tackle the task. In the other schools, teachers presented the task in more a thorough and structured way. Students also received supervision and support continuously in their work. This differed in School D, where the students had to work more on their own and received the task with a more limited presentation from the teacher. Besides, this gives a basis for further results showing that how the task is presented and how the work is supported by the teacher matter for students’ perception about the group’s abilities to perform a task and their perceptions of interdependence.

**Conclusions**

This study showed that individual perceptions about one’s own and the group’s ability to perform when working together on a task, together with experiences of positive or negative interdependence, create different conditions for cooperation or competition within the group. In year 5, there were better conditions for cooperation compared to year 8, in which the circumstances probably created more competition in groups. Additionally, it was significantly more important for girls than boys to get a good assessment and marks. The results highlight the question of how appropriate it is to assess and give marks if the goal is to make students cooperate and work as a group when using group work in education. Since assessment and marking are obligatory at compulsory schools in Sweden, as in other countries, the question is hypothetical. It is more important to develop conditions for cooperation in groups and prevent competition among students. Based on the social interdependence theory, establishing positive interdependence, individual accountability, and promotive interaction in a group constitutes important conditions for the development of cooperation in groups. In addition, group discussions and evaluations of the group’s work are crucial for promoting, affirming, and maintaining effective working relationships among members in order to be able to manage with well-functioning group work.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Ethical

The study was approved by the regional Research and Ethics Committee at Linköping University, Sweden (Dnr 2013/401-31 & Dnr 2014/134-32).

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