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An Educational Intervention to Increase Efficacy and Interdependence in Group Work

Eva Hammar Chiriac^{1,3}, Michael Rosander^{1,3}, Karin Forslund Frykedal^{1,2,3}

¹ Department of Behavioural Sciences and Learning Linköping University

² Department of Social and Behavioural Studies, University West

Correspondence: Eva Hammar Chiriac, PhD, Associate Professor of Psychology, Linköping University, Dept. of Behavioural Sciences and Learning, Division of Psychology, SE-581 83 Linköping, Sweden. +46 (0)13 285735, eva.hammar.chiriac@liu.se. ORCID 0000-0002-7117-5620

Abstract

This study investigated whether an intervention, in the form of short educational sessions, influenced pupils' experiences of group work or cooperative learning (CL). The hypothesis tested was that an intervention for teachers and pupils would lead to pupils' increased (a) collective efficacy, (b) self-efficacy and, (c) positive interdependence, as well as (d) less negative interdependence. The participants were pupils from years 5 and 8 in three compulsory schools in Sweden, working in 22 groups divided into one intervention group and one control group (11 work groups in each condition). Data were collected through a questionnaire before and after participation in the study and analysed using a repeated measure ANOVA and 2×2 ANOVA. The results showed an increased collective efficacy, self-efficacy and positive interdependence and a reduction of negative interdependence. The conclusion is that the intervention provided for teachers and pupils did have an effect, thus promoting successful working as a group.

Keywords: Cooperative Learning, Collective Efficacy, Interdependence, Group Work, Self-Efficacy

³**Eva Hammar Chiriac**, PhD, Associate Professor of Psychology at the Department of Behavioural Sciences and Learning, Division of Psychology at Linköping University, Sweden. Her scientific activity lies within the social psychological research field with a strong focus on group research, mainly connected to groups, cooperative learning (CL), group processes, learning and education. She is currently the project manager for a research project concerning assessment of knowledge and skills in group work and CL.

Michael Rosander, PhD, Associate Professor of Psychology at the Department of Behavioural Sciences and Learning, Division of Psychology at Linköping University, Sweden. His research focusses mainly on workplace bullying from a group and organizational perspective, but also on leadership and group processes in small educational groups.

Karin Forslund Frykedal, PhD, Associate Professor of Education at the Department of Behavioural Sciences and Learning, Division of Education, Teaching and Learning at Linköping University, Sweden. Further she works as a Professor of Education at the Department of Social and Behavioural Studies, University West. Her scientific activity lies within educational research with a focus on leadership, group processes and learning in small educational groups.

1. Introduction

There is strong scientific support for group work and cooperative learning (CL) as ways to promote learning and socialisation in education (Baines, Blatchford, & Chowne, 2007; Gillies, 2016; Gillies & Boyle, 2010, 2013; Hammar Chiriatic, 2014, Johnson & Johnson, 2002, 2004; Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Roseth, Johnson & Johnson, 2008; Slavin, 1989,1996). Group work and CL are pedagogical methods for organising classroom activity, where pupils are allotted into groups and given a group assignment from the teacher, which they are supposed to work on jointly to reach a common goal. Group work is customarily defined as ‘pupils working together as a group or a team’ (Blatchford, Kutnick, Baines, & Galton, 2003, p. 155) or just ‘pupils working together in small groups’ (Lumpe & Haney, 1998, p. 123). CL is a specific interactional educational approach to group work where cooperation/collaboration with clear structures, enhanced pupil activity and common goals are the basic prerequisite for learning (Gillies, 2007). Research has not yet unequivocally found what creates high-quality group work facilitating the possibilities of pupils’ appropriating positive experiences from cooperative situations. The processes within group work probably have a great impact on the results of the groups, the quality of learning and pupils’ conception of what constitutes ‘good’ group work and what does not (Forslund Frykedal & Hammar Chiriatic, 2018; Hammar Chiriatic, 2014; Hammar Chiriatic & Granström, 2012). By focusing on university students’ experiences of group work Hammar Chiriatic (2014) noted three important factors that either facilitated or hampered students learning in and experience of group work: *learning* (e.g. academic, group knowledge, conflicts)’ *study-social function* (e.g. affiliation, support, motivation, group climate), and *organisation* (e.g. group composition, group structure, working mode).

In a classic Australian study, Gillies and Ashman (Ashman & Gillies, 1997; Gillies & Ashman, 1996) examined whether efficiency and productivity in group work in compulsory school improved through interventions. They investigated whether teaching pupils how to work in a group could improve pupils’ ability to use the group’s potential, as well as pupils’ experiences of CL. Half of the class (pupils 11–12 years) received an educational intervention, while the other half served as a control group. The intervention consisted of two lessons in which the pupils were taught more about how to work in groups and how to relate to each other (in terms of attitude) during a group project. The results indicated that a relatively small educational intervention could yield a positive outcome in both the efficiency and productivity of group work, as well as causing a more democratic approach when working in cooperative settings. The study concluded that a relatively simple effort (i.e. two lessons about that working in groups) could give positive effects for efficiency and productivity, as well as providing a more positive experience overall.

In a British study, Black, Harrison, Lee, Marshall, and William (2003) investigated a different educational intervention. They studied changes in teachers’ attitudes when implementing formative assessment (i.e. on-going information about the pupils’ progress with the purpose of supporting continuous learning) and whether an intervention promoted students’ learning and goal achievement. The study was conducted in cooperation between researchers and teachers from different schools. The teachers, together with the researchers, created a project team to develop strategies for the implementation of formative assessment. A focus in the study was on if and how researchers, together with teachers, could develop and implement practically applicable strategies for formative assessment using an intervention consisting of education in formative assessment. The intervention yielded positive outcomes in terms of significant improvement in students’ achievements, and the teachers became convinced of the benefits of formative assessment. One interpretation is that the cooperation between researchers and teachers was a necessary prerequisite for these changes.

Intervention studies in connection with CL have primarily focused on implementing CL in specific modules and/or courses and have studied the effects on skills development (Healy, Doran, & McCutcheon, 2018). A key purpose of the research has been to identify factors explaining why some group work turns out successfully, while other group work does not. Research on CL has reported positive outcomes in several aspects (see e.g. Gillies, 2016; Gillies & Boyle, 2010, 2013; Johnson & Johnson, 1994, 2002; Roseth et al., 2008). Comparing groups who received an intervention with control groups showed that CL as a pedagogical approach could: a) promote academic knowledge, skills and understanding (Gillies, 2016; Johnson & Johnson, 1994, 2002; Slavin,

1989, 1996); b) enhance students' achievement, socialisation, motivation and personal development (Roseth, Johnson & Johnson, 2008; Slavin, 1989, 1996); and c) increase cooperative learning achievement compared to individualistic and competitive learning (Johnson et al., 1981; Johnson & Johnson 1994, 2002).

Although most studies on CL have emphasised the positive outcomes from employing CL, there is also research highlighting disagreements on or criticism about CL as an application and/or method (Opdecam & Everaert, 2018). Low-quality group work and negative experiences of cooperative situations may come from students' and teachers' perceptions of and beliefs about CL. If students, for instance, think that CL and peer assessment is used foremost to reduce the teacher's grading time or that negative group processes are inevitable, learning based on cooperation will not occur. Further, it may also be problematic if teachers believe that assigning students into groups will automatically lead to learning based on cooperation, peer assessment solves the group work assessment problem, or CL is easy to organise and guide.

2. Theoretical framework

2.1 Social Interdependence Theory

Social Interdependence Theory (SIT), one of the dominant influences on CL (Deutsch, 1949; Johnson & Johnson, 2002, 2013; Lewin, 1948), was the theoretical framework for this study. According to this theory, group members develop a degree of *interdependence* when it occurs to them that working together on an assignment can enhance the probability that they will achieve their joint goals. The interdependence can be *positive*, which creates opportunities for cooperation and encourages group members to help each other. Positive interdependence also causes conditions for increased individual accountability (see below). The interdependence might also be *negative*, which creates competition with the others in the group. Negative interdependence also creates conditions for lowered individual accountability and can lead to a pupil's lowered perception of responsibility for his/her share of the workload, as well as decreased willingness to help the group fulfil its task. There might also be an *absence* of interdependence, signifying that individuals may reach their goals independently of others in the group, which does not provide opportunities for interaction and cooperation between the group members or a means for CL (Johnson & Johnson, 2002, 2013). We argue that the different types of interdependence should be considered as different constructs and not as a continuum of the same concept, nor can positive and negative interdependence be perceived at the same time. Johnson and Johnson (2002, 2013) proposed the following five elements necessary to maximise the cooperative potential of groups:

1. *Positive interdependence* is the perception of being linked to other group members and the psychological realisation that is achieved through the pursuit of common goals and joint rewards.
2. *Individual accountability* is when each group member is responsible for his or her share of the work and is willing to help other group members. Individual accountability can also be seen as a precondition for creating positive interdependence.
3. *Promotive interaction* is when group members encourage each other's efforts through discussions and explanations and, in general, show a willingness to throw in their lot with their peers.
4. *Interpersonal and small group skills* are the skills that enhance the degree of trust among group members and improve their communication skills and their ability to resolve conflicts when differences occur.
5. *Group processing* involves group members discussing and evaluating their work; this is crucial for promoting, affirming and maintaining effective working relationships among group members.

2.2 Self-Efficacy and Collective Efficacy

In addition to SIT, self- and collective efficacy are used as theoretical concepts in this study. *Self-efficacy* (Bandura, 1982) is the individual belief that one possesses the necessary resources and abilities to accomplish a given task, and it plays an important part in shaping the perception of behavioural control (Ajzen, 1991) and can be related to students' ability to perform a task in the group work. While self-efficacy may explain individual contributions in group work, it might not be sufficient to explain the group's performance (Katz-Navon & Erez, 2005). *Collective efficacy* is the corresponding construct on a group level (Bandura, 1982), and a shift from 'what I think' to what 'we think about us' (Katz-Navon & Erez, 2005, p. 440). According to Parker (1994), self-efficacy and collective efficacy should be considered independent but related constructs. The group level of the

concept is relevant in terms of getting optimal cooperative learning in groups. Success in group work will then depend on the group's confidence that they collectively have the resources and abilities to perform the task (Bandura 1982, 2000, 2002). Both self- and collective efficacy are influenced by past experiences, for example, but can also be influenced by other important factors, particularly if a significant part of one's self-definition depends on being part of an important group (Terry, Hogg, & White, 1999).

Previous research in educational settings has shown that both pupils' and teachers' self-efficacy beliefs have an effect on pupils' achievements and behaviours (see e.g. Bandura, 1997; Betoret, 2009; Klassen, Tze, Betts, & Gordon, 2011; Tschannen-Moran & Barr, 2004). Khong, Liem and Klassen (2017) have shown that collective efficacy beliefs in pupil work groups were a better predictor of performance than self-efficacy, although self-efficacy and type of task moderated the relationship. A reasonable interpretation would be that both self-efficacy (an individual construct) and collective efficacy (a group-level construct) might be useful for understanding the essence behind successful group work and working as a group.

2.3 Working in a Group or Working as a Group

Additional important concepts regarding approaches to group work include working *in a group* and working *as a group* (Hammar Chiriac & Granström, 2012; Hammar Chiriac & Hempel, 2013; Underwood, 2003). Although group work is often defined as 'pupils working together as a group or a team' (Blatchford et al., 2003, p. 155), it is important to differentiate between these two concepts. *Working in a group* describes situations where pupils are sitting together in a group, but mostly working individually on separate parts of a group assignment, without using the potential of the group. This is not an uncommon situation within an educational setting. At the end of the group work, pupils put their separate contributions together into a joint product. Learning is an effect of social facilitation rather than cooperation. *Working as a group* is often referred to as 'real group work' or 'meaningful group work' (Bennet & Dunne, 1992; Galton & Williamson, 1992; Hammar Chiriac & Granström, 2012; Steiner, 1972, 1976; Webb & Palincsar, 1996), and presupposes cooperation and utilisation of group members' competence, knowledge and abilities: this is characterised by interdependence and joint efforts to achieve a common goal. Working as a group is a more uncommon activity in an educational setting. Learning is, in this case, an effect of cooperation.

The aim of this study was to add to the current knowledge and understanding of what contributes to successful group work in compulsory school. We examined whether an intervention in the form of a short educational session could yield a positive outcome; that is, if the intervention could influence pupils' perception of collective efficacy, self-efficacy and interdependence. To our knowledge this has not been a focus in previous studies. Based on the presented theoretical framework and the research on educational interventions, we have reason to assume that an intervention in the form of a short educational session could influence pupils' beliefs regarding efficacy and interdependence. We therefore proposed the following hypothesis:

H1. An intervention with teachers and pupils will lead to pupils' increased (a) collective efficacy, (b) self-efficacy and (c) positive interdependence, as well as less (d) negative interdependence.

3. Method

The hypothesis was investigated through questionnaires distributed to all pupils before and after participating in the study. This included pupils from years 5 and 8 from three different schools in Sweden. The study included an intervention in the form of a short educational session, which was randomly assigned to the classes included in the study. All groups worked on the same task.

3.1 Context of the Study

This study is part of a larger research project entitled, *Assessment of knowledge and skills in group work – an intervention study in the classroom everyday practice* (Hammar Chiriac & Forslund Frykedal, 2018). The

overarching objective of the research project was to increase knowledge concerning teachers' and pupils' assessment practices in connection with group work and/or CL in education.

3.2 Participants

The participants were from either year 5 or year 8 in compulsory school. There were four classes from three schools in different parts of Sweden. Two classes were randomly selected to receive an intervention and two were the control group. In total there were 22 work groups (i.e. groups of pupils working together on the same assignment), where 11 groups received the intervention and 11 were part of the control group. In most cases, there were three to four pupils in each work group. In Table 1, the frequencies of answers before and after, as well as for gender, year and study condition are presented. Because of limitations based on the research ethics for this study, we were not allowed to track information for individuals between measurements (before and after the intervention), only which work group he or she was part of. This allowed for repeated measures only on a group level.

Table 1. Frequency of Answers from Girls/Boys, Years 5/8, and Intervention/Control Group.

	Before	After	Girls	Boys	Year 5	Year 8	Total
Girls	42	39	–	–	–	–	81
Boys	44	45	–	–	–	–	89
Year 5	38	36	39	35	–	–	74
Year 8	48	48	42	54	–	–	96
Intervention	43	38	46	43	40	49	89
Control	43	46	35	46	34	47	81

3.3 Intervention

An intervention in the form of a short educational session and a workshop was directed at both teachers and pupils. For the teachers, the intervention consisted of education and training on how to work in groups and how to make assessments suitable for cooperative situations. This part of the intervention took place at the university for two days. The first day was devoted to the theoretical aspects of the teacher's role and tasks regarding group work and group work assessment. Some aspects of group work before (e.g. the task, organising group work, group contract), during (e.g. information, proactive and reactive roles, formative assessment), and after (e.g. summative assessment, self- and peer assessment, documentation) were problematised. The second day was more of an 'applied workshop day'; where the teachers together produced common materials for the forthcoming group work (e.g. creating the task description and matrices for group contracts) and group work assessment (e.g. matrices for observations, different types of teacher assessments, as well as self- and peer assessment and related tests). The teachers belonging to the control groups received the same training after the project was completed.

The intervention for the pupils addressed how to work in groups and consisted of a two-hour lecture/workshop led by the researchers. Based on a short film clip, cooperation, helping behaviour, participation, contribution, accountability and conflicts were discussed. After a short break, the pupils tried out matrices for a group contract, oral assessment and written self- and peer assessment, which alternated with the discussion of each matrix. All groups included in the study—whether they received an intervention or belonged to the control group—used the same set-up for accomplishing the group work, as well as the same group task. All groups worked with the task the teachers jointly produced during the intervention, so the control group received and used a predetermined design and task for the cooperative assignment.

3.4 The Questionnaire

The questionnaire constructed for this study was divided into the following four areas: (a) own effort during group work, (b) working with others, (c) feelings of being graded with others and (d) the importance of the group work. The wording of the questions was slightly altered for comparing the before and after items, but the content remained the same (e.g. 'When thinking about being graded, as a group I feel frustrated' and 'Being graded as a group made me feel frustrated'). Although there was a theoretical idea behind the construction, a factor analysis was conducted to identify empirical factors to be used in further analyses. Four items were

removed from this analysis: three, because the wording before and after differed too greatly, making them separate questions focussing on different things before and after; and one item because its content was so different from all of the other items. A principal axis factor analysis conducted on the remaining 30 items resulted in five factors, explaining 55.4% of the variation. The five factors represented the simplest and most interpretable content of the factors. In Table 2, the factor solution with factor loadings and measures of internal consistency (Cronbach's alpha) is presented. The internal consistency for all factors was high (.78–.92). The analysis also resulted in factors corresponding to the theoretical framework, indicating good content validity.

Table 2. Principal Axis Factor Analysis, Factors, Factor Loadings, and Internal Consistency.

F1. Collective efficacy ($\alpha = .922$)				
The group is good at writing	.868			
Together we did a good job	.852			
The group is good at searching for information	.808			
Together we studied enough for a good assessment	.722			
The group is good at presenting our results	.705			
Together we planned and used out time well enough for a good assessment	.630			
F2. Negative interdependence ($\alpha = .784$)				
I changed things in the group report without clearing it with the others	.730			
I felt desperate about being assessed with others in the group	.702			
I did not join the others in the group when they worked on the task	.686			
I did things my own way even though it was clear no one else agreed	.655			
I felt frustrated about being assessed with others in the group	.628			
I did a lot of the group work alone	.487			
I felt nervous about being assessed with others in the group	.458			
F3. Positive interdependence ($\alpha = .822$)				
I felt relieved about being assessed with others in the group	.777			
I felt joy about being assessed with others in the group	.729			
I felt hopeful being assessed with others in the group	.683			
I feel dependent on others for a good assessment	.662			
I felt [negative – positive] being assessed with others in the group	.457			
The assessment was dependent on the others in the group	.379			
F4. Self-efficacy ($\alpha = .835$)				
I'm good at writing		-.823		
I'm good at presenting results		-.812		
I did a good job		-.595		
I planned my own time and used my time well enough for a good assessment		-.569		
I'm good at searching for information		-.588		
I could lead the group work		-.507	-.341	
I could influence others		-.385	-.337	
Even if working alone I could get a good assessment		-.387	-.364	
I could influence the group work		-.362		
F5. Importance of a good assessment and grade ($\alpha = .809$)				
It is important to me to get an assessment I am satisfied with	.433		-.626	
It is important to me to get a good grade			-.312	-.481

Note. Loadings < 0.30 are not presented for clarity.

Collective efficacy. The items of the first factor all concerned the beliefs of the group and what the group collectively was capable of doing when working with tasks: that is, collective efficacy beliefs. The internal consistency of the factor was very high ($\alpha = .922$).

Negative interdependence. The content of this factor dealt with negative issues concerning working in a group (e.g. feeling frustrated by having to be assessed as a group and doing things on one's own with no regard to group decisions). The internal consistency of this factor was adequate ($\alpha = .784$).

Positive interdependence. The third factor involved feelings of positive interdependence resulting from working together as a group. Being assessed as a group was looked upon as something positive. The internal consistency of the factor was high ($\alpha = .822$).

Self-efficacy. In opposition to the first factor, this factor focused on individual beliefs about what one as an individual was capable of when working on the tasks: that is, self-efficacy beliefs. The internal consistency of the factor was high ($\alpha = .835$).

The fifth factor will not be used in the coming analyses, as it did not help in testing the hypothesis presented above. The factor concerned the importance for the individual of getting a good assessment and grade.

3.5 Data Collection

The empirical material was collected through structured questionnaires answered before and after participating in the study. The 'before' questionnaire was administered as the absolutely first thing that happened for pupils participating in the study. The pupils in the intervention group received the intervention and, in the 3–6 weeks that followed, all pupils (intervention and control groups) worked with a study-specific task in work groups formed for this study. The 'after' questionnaire was distributed as the last activity of the study. At both times the questionnaires were distributed by one of the researchers in the classroom at ordinary lecture time (40–60 minutes). During the whole time the pupils answered the questionnaires, both the teacher and the researcher stayed in the classroom to be able to clarify the interpretation and meaning of some of the words in the questionnaires. The questionnaires were completed in 20–30 minutes and all pupils were finished before the lecture ended. The researchers collected all questionnaires in the classroom. As the pupils finished the questionnaires, they turned to an ordinary task assigned by the teachers while waiting for the rest of the group to complete the questionnaires.

All pupils in the classes answered the questionnaires, so as not to risk singling out pupils who had declined to participate in the study. The non-participating pupils were requested to put an X in the upper corner on the first page of the questionnaire. After all of the questionnaires were collected, the researcher omitted the non-participant questionnaires and they were not used further.

3.6 Analyses

Data analyses were performed using IBM SPSS version 24. As we were not allowed to follow individuals before and after the intervention, the next best thing was to follow groups and use the group means for the factors as the unit of analysis: that is, the mean of individual perceptions of the variables of the study within each work group. A repeated measures ANOVA was used for the 22 groups for which this dependence was established. As this procedure reduced the data considerably, we also used the individual scores with an ordinary 2×2 ANOVA, comparing before and after scores; for this analysis, each individual was treated as a representative for her or his condition (i.e. control or intervention). In the analysis, gender, year and proportion of boys and girls in the groups were used as covariates to control for their effect.

3.7 Ethics

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

All participating teachers and pupils in the study gave their written informed consent to be involved in the study. All pupils partook in answering the questionnaires, but the researcher omitted the five non-participant questionnaires (as described above), which were not used further. The study was approved by the regional Research and Ethics Committee at Linköping University, Sweden (Dnr 2013/401-31 & Dnr 2014/134-32).

4. Results

Using repeated measures analysis on the group level data, there were significant or close-to-significant interactions for all four factors. In Table 3, the test statistics for the four factors are presented. In the analysis, year and proportion boys and girls in each group were added as covariates.

Table 3. Repeated Measures ANOVA for the Interaction and Time \times Intervention for the Four Factors.

		Before	After	Interaction	
		Mean (SD)	Mean (SD)	F	P
Collective efficacy	<i>Control</i>	5.59 (0.58)	5.61 (0.75)	5.170	.035
	<i>Intervention</i>	5.04 (0.47)	5.85 (0.79)		
Self-efficacy	<i>Control</i>	5.14 (0.47)	5.11 (0.69)	4.563	.047
	<i>Intervention</i>	4.42 (0.37)	5.17 (0.57)		
Negative interdependence	<i>Control</i>	2.36 (0.49)	2.19 (0.43)	2.622	.123
	<i>Intervention</i>	2.57 (0.53)	2.06 (0.63)		
Positive interdependence	<i>Control</i>	3.94 (0.94)	3.65 (0.60)	3.183	.091
	<i>Intervention</i>	3.84 (0.48)	4.01 (0.71)		

There was a significant interaction for both collective efficacy and self-efficacy when comparing the control and intervention group before and after the intervention. In both cases, the direction of the changes was positive, supporting Hypotheses 1a and 1b. For the two other factors, the interactions were not significant, but the direction of the changes for the intervention group was in the expected direction, in line with Hypotheses 1c and 1d, with an increase in positive interdependence and a reduction in negative interdependence. In Figure 1, the differences between the groups for the four factors are presented.

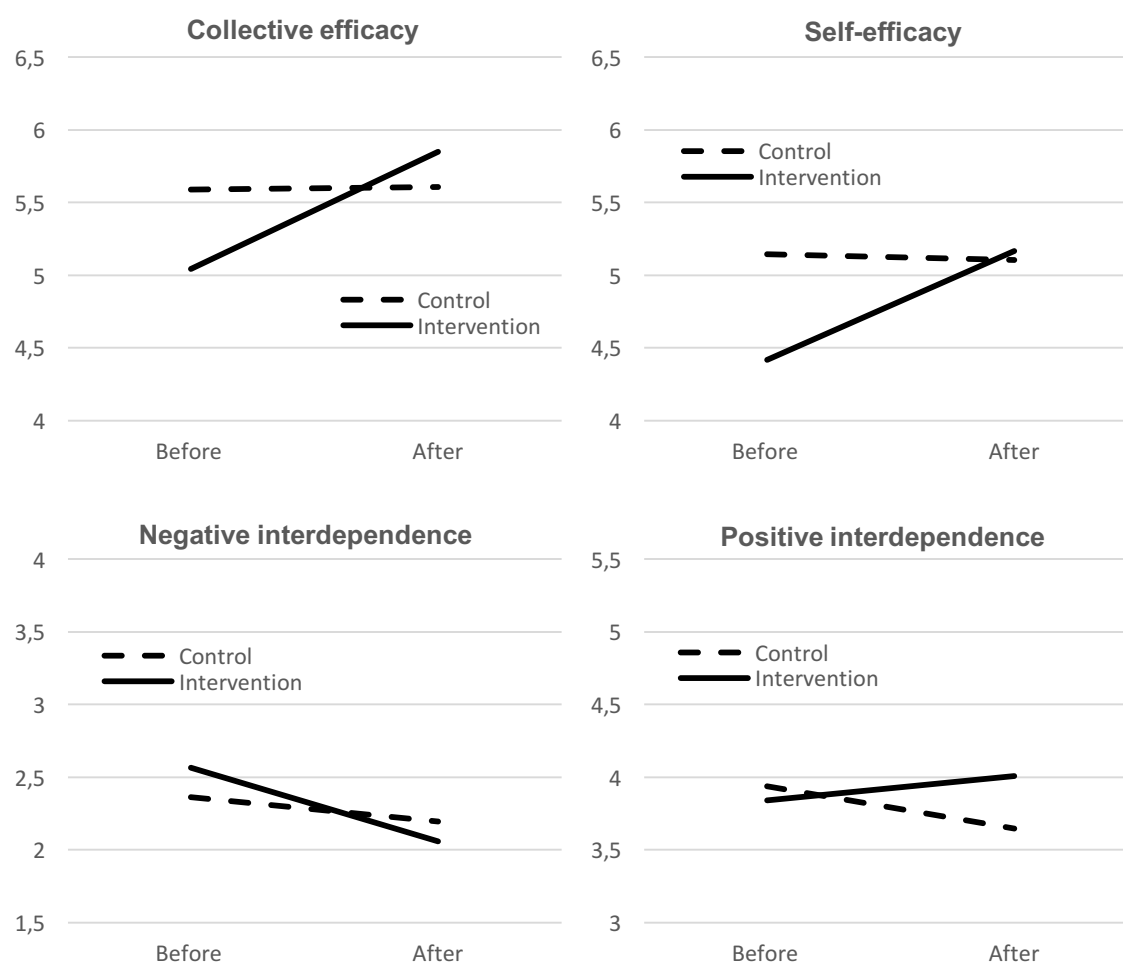


Figure 1. Differences between control and intervention groups before and after the intervention for the four factors.

When comparing control and intervention groups before and after using individual level data, in which each pupil is a representative of her or his condition (i.e. control or intervention and before or after measures), a similar pattern is apparent. The only interaction that was significant is for self-efficacy, and there was a close-to-significant interaction for collective efficacy. The direction of the changes for all four factors was in the expected direction, as in the repeated measures analysis. In Table 4, the results from the 2×2 ANOVA are presented. In the analysis, gender, year and the proportion boys and girls in each group were added as covariates.

Table 4. Results for the Interaction and Time × Intervention for the Four Factors, Showing Mean, SD, F and p-values.

		Before		After		Interaction	
		<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>F</i>	<i>p</i>
Collective efficacy	<i>Control</i>	41	5.60 (0.87)	46	5.70 (1.28)	3.863	.051
	<i>Intervention</i>	43	5.00 (1.12)	38	5.77 (1.25)		
Self-efficacy	<i>Control</i>	41	5.15 (0.97)	46	5.17 (0.93)	5.561	.020
	<i>Intervention</i>	43	4.39 (1.00)	38	5.14 (1.20)		
Negative interdependence	<i>Control</i>	41	2.44 (0.76)	46	2.21 (0.94)	0.309	.579
	<i>Intervention</i>	41	2.57 (1.28)	38	2.14 (1.29)		
Positive interdependence	<i>Control</i>	41	3.93 (1.18)	46	3.79 (1.16)	1.281	.259
	<i>Intervention</i>	42	4.10 (1.32)	38	4.39 (1.32)		

5. Discussion

Previous research has shown that using educational interventions to enhance or implement pedagogical changes in the classroom can produce a positive outcome, including, for example, students' productivity, experience and goal achievement in group work (Ashman & Gillies, 1997; Black et al., 2003; Gillies & Ashman, 1996) and teachers' attitudes towards using formative assessment (Black et al., 2003). Intervention studies focusing on group work in general and specifically on CL confirm this result (Gillies, 2016; Gillies & Boyle, 2010, 2013; Johnson & Johnson, 1994, 2002; Roseth et al., 2008). By comparing groups who participated in an intervention with control groups, a clear pattern of group work and CL as promoting both academic (Gillies, 2016; Johnson & Johnson, 1994, 2002; Slavin, 1989, 1996) and social skills (Roseth et al., 2008) emerges. Inspired by the research showing that an intervention can enhance group performance (e.g. Ashman & Gillies, 1997; Gillies & Ashman, 1996) and the theoretical framework including SIT (Johnson & Johnson, 2002, 2013), as well as the theoretical constructs of self-efficacy and collective-efficacy (Bandura, 1982, 2000, 2002) and working in or as a group (Hammar Chiriac & Granström, 2012; Underwood 2003), this study investigated whether an intervention could positively influence pupils' experience of group work. This study tested the hypothesis that an intervention in the form of a short educational session for teachers and pupils would lead to pupils' increased collective efficacy, self-efficacy and positive interdependence, as well as less negative interdependence.

The results supported Hypotheses 1a and 1b, while Hypotheses 1c and 1d were close to being significant and the changes between before and after for the intervention group were in the expected direction. The results are in line with previous research (Ashman & Gillies, 1997; Gillies, 2016; Gillies & Ashman, 1996; Gillies & Boyle, 2010, 2013; Johnson & Johnson, 1994, 2002; Roseth, Johnson & Johnson, 2008), suggesting that a short education session can yield a positive outcome for pupils' experience of group work and/or CL and promote working as a group (Hammar Chiriac & Granström, 2012; Hammar Chiriac & Hempel, 2013; Underwood, 2003). The close cooperation between researchers and teachers—and also between the participating teachers in this study—in creating and using the group work assignment to be carried out in their respective classrooms, was probably an important prerequisite for the positive outcome of the intervention (Black et al., 2003). Black and colleagues (2003) have also shown that an intervention for teachers could yield a significant improvement in the pupils' achievement. Another teacher feature that can influence pupils' accomplishment is teachers' efficacy beliefs (Bandura, 1997; Betoret, 2009; Klassen et al., 2011; Tschannen-Moran & Barr, 2004). Both teachers' individual (self-efficacy) and group-level (group efficacy) construct seemed to play a part in influencing pupils' achievements. The question remained, however: what about the pupils' efficacy beliefs?

The result of this study clearly indicated a significant interaction for pupils' collective efficacy and self-efficacy. Both were increased by participating in the intervention, presenting an enhanced belief in the group and the individual and thus promoting working as a group (Hammar Chiriac & Granström, 2012; Hammar Chiriac & Hempel, 2013; Underwood, 2003). The intervention strengthened both the individual student's belief in him- or herself (Ajzen, 1991) and the confidence in the group's potential (Spears, 2010) for having greater opportunities to succeed with the group task. The belief in the group as resource enhanced the preparedness for acting on difficulties and, if necessary, helped retain focus (Bandura, 1982). The experience of being in a select group together with classmates, getting attention and new tools for approaching group work during the intervention, could have strengthened group identification (Terry et al., 1999) and could be one probable explanation for the results. The same could be argued for the teachers' cooperation before, during and after the intervention was carried out (Black et al., 2003). Again, the importance of both individual and collective constructs might be useful for understanding the essence behind successful group work and working *as a* group.

Although the interaction for positive and negative interdependence was not significant, both were close to significance and were pointing in the expected direction. We proposed that the intervention enhanced positive interdependence and individual accountability and the perception of being linked to each other as something positive, while reducing negative interdependence. The result was in alignment with SIT, where interdependence and individual accountability was emphasised as essential for the cooperative potential of a group (Johnson & Johnson, 2002, 2013). Strengthening the individual and the group through the intervention promoted positive

interdependence, as well as individual accountability, and thereby promoted the effort to achieve both individual and common goals working as a group (Hammar Chiriac & Granström, 2012; Hammar Chiriac & Hempel, 2013; Underwood, 2003).

In sum, all group measures were in the expected direction for the intervention group, but not for the control group, which emphasised that the educational intervention increased efficacy and interdependence in group work.

5.1 Limitations

One limitation of this study was not having repeated measures data on an individual level. This limitation was due to a research ethics restriction for this particular study, but using the group level repeated measures data was possible. This did mean, however, a reduction in data from 170 individuals (in total before and after) to 22 groups. Another issue involved the random assignment of the control group, which led to a class from a high-performance school becoming the control. This could help explain the high initial levels of both collective and self-efficacy for the control group (see Figure 1). Relevant to this study, however, was that the control remained at the same level throughout the group work, while the intervention group improved.

6. Conclusion

The short intervention to teachers and pupils did have an effect on the groups. The pupils increased their collective efficacy, meaning they would be more likely to retain focus if difficulties arose and would have greater opportunities to succeed with their tasks. Self-efficacy was also increased, meaning each pupil felt strengthened by the intervention. Even if there were no direct relationship between well-functioning groups and the high self-efficacy of the group members, this could contribute to a group's ability to work. Although less clear, the results also indicated increased positive interdependence and individual accountability and a reduction of negative interdependence in the groups due to the intervention; thus, these appeared to be linked to each other as something positive. As all group measures were pointing in the expected direction, the conclusion is that the intervention provided to teachers and students enhanced the chances for well-functioning group work and working as a group.

Accordingly, the belief of having the capability—both on the individual and group levels (i.e. a high self- and collective efficacy)—to carry out an assignment with positive learning outcomes is probably an important prerequisite for what constitutes 'good' group work. The result of this intervention, consisting of an applied training session for the teachers and pupils in this study, shed new information on what creates high-quality group work that earlier research did not appear to have uncovered. Similarly, the result from the study of enhanced positive interdependence and decreased negative interdependence after participating in the intervention points in the same direction.

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Declaration of Conflict Interests

The authors declare no potential conflict of interest with respect to the research, authorship and/or publication of this article.

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