Collaborative learning

The impact of differences in students' levels of extraversion on well-being and self-esteem.

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Abstract

The effects of grouping students based on different levels of extraversion yielded inconclusive research outcomes. The current shift to more online collaboration raises questions about the effect of extraversion-differences in collaborative groups in this online context. The present study, therefore, investigated the influence of students' differences in their levels of extraversion on well-being and self-esteem during online collaboration. The data were collected during three collaborative assignments, in which university students (n = 17) worked together in three different dyads. Results only indicated a significant increase in students' well-being for the first assignment and no significant differences in students' self-esteem. Further, no significant correlations between the students' differences in the levels of extraversion, well-being, and self-esteem were found, suggesting that the composition of the dyads did not affect students' psychological properties. However, considering several limitations of the study, such as the small sample size and the high dropout rate, it is advisable to further investigate the relationship between the three variables across different virtual learning environments. Overall, the findings of this study contributed to the existing research body by giving first indications of the impact of students' differences in their levels of extraversion on well-being and self-esteem in an online environment.

Keywords: Online Collaboration, Dyads, Extraversion, Well-being, Self-esteem.

Collaborating with peers with a lot of different personalities has become an integral part of students' everyday lives. Previous research indicated that collaborative learning has many psychological benefits and can enhance students' well-being and self-esteem (Felder & Brent, 1994). However, to ensure that collaborative learning reaches its potential benefits, group composition seems to be an important factor to consider (Huxham & Land, 2000). Groups that are formed with individuals with different personality types are claimed to collaborate more effectively and to generate greater achievements (Gilley, Morris, Waite, Coates, & Veliquette, 2010; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009). There is evidence that especially the personality trait of extraversion plays a crucial role in the quality of interpersonal interactions during group work (Kristof-Brown, Barrick, & Kay Stevens, 2005). Nevertheless, existing research on this topic is still inconclusive. On the one hand, Research from Barrick, Stewart, Neubert, and Mount (1998) revealed that diversity on the extraversion continuum was positively correlated with increased group satisfaction, which in turn, positively affects its members' well-being and self-esteem (Pekrun, Goetz, Frenzel, Barchfeld, & Perry, 2011). On the other hand, when personalities collide, the group is characterized by dispute and resistance to teamwork, which in turn, potentially harms the well-being and self-esteem of each group member (Bolton & Bolton, 2009; Gilley, Maycuinch, & Maycuinch, 1998). Since virtual collaboration faces additional problems, such as higher communication barriers, differences in team members' personalities may amplify obstacles in establishing a climate of trust and a positive group atmosphere (Furumo, de Pillis, & Green, 2009; Holton, 2001).

Due to these ambiguous findings and the online context, this study aimed at investigating the impact of students' differences in their levels of extraversion on well-being, and self-esteem during online collaborations.

Collaborative learning

Over the last years, collaboration has become of increasing interest to teachers around the globe (Scager, Boonstra, Peeters, Vulperhorst, & Wiegant, 2016). Collaborative learning can be defined as an instructional approach in which students work together in groups and exchange their knowledge and skills to work towards a shared goal (Kirschner, 2001). The underlying concept stresses cooperation instead of competition, teamwork instead of individuality, and community instead of independence (Leonard & Leonard, 2001).

Johnson and Johnson (1989) categorized the benefits of collaborative learning into three main categories, namely social benefits, psychological benefits, and academic benefits. Social benefits are described as forming more encouraging and committed relationships,

psychological benefits refer to an increase in students' self-esteem and well-being, whereas academic benefits are characterized by higher academic achievement and greater productivity (Johnson & Johnson, 1989). During collaboration, students are not only challenged on a social but also on an emotional level as they are confronted with a diverse range of opinions and have to communicate their own ideas (Baker, Andriessen, & Järvelä, 2013). However, a recurring finding suggests that collaborative debating of contradictory beliefs stimulates deep learning and positive social interactions (Keefer, Zeitz, & Resnick, 2000; Nussbaum, 2008; Visschers-Pleijers, Dolmans, De Leng, Wolfhagen, & Van Der Vleuten, 2006).

Online collaboration

Over the last decades, a rapid increase in the demand for online education can be observed (McPherson & Bacow, 2015). The worldwide closures of educational institutions due to the current global pandemic accelerated this trend (Sahu, 2020). It is widely known that communication between the collaborating parties is more challenging in a virtual environment since it lacks social and emotional cues as well as informal chats among students (Furumo, de Pillis, & Green, 2009; Stockleben et al., 2017). Compared to offline classes, in which social cues, body language, provision of feedback, and friend formations are directly perceivable, in online environments, people are often only recognized by their text messages (Aviv, Erlich, & Ravid, 2005; Swan, 2001). Nevertheless, for any individual, it is not only important to feel a sense of belonging to a group but also to be perceived as a valuable group member (Haythornthwaite, 2006). As online environments make this process more difficult establishing a social presence seems to be a great challenge for online classes. Social presence can be enhanced by, for instance, providing more room for active discussions, immediate feedback, and collaboration. Previously conducted research found out that an environment that enhances social presence leads to an increase in group cohesiveness and critical thinking (e.g., Aviv et al., 2005; Swan, 2001). Moreover, the increased anonymity in online settings seems to have a disturbing impact on communication and thus, might negatively influence collaboration among students (Herring, 2002; Wellman et al., 1996).

Collaboration between different personality types

Researchers found out that grouping individuals with different personalities can minimize the arising communication gap in online environments (Cockburn, 2002). Different personalities indicate individuals' diversities in the way they think, feel, and behave as well as how they make decisions, resolve conflicts, or react to stress (Bolton & Bolton, 2009). The Big Five Personality model consists of the five personality traits conscientiousness, agreeableness, neuroticism, openness, and extraversion (Barrick & Mount, 1991). Research

from Halfhill, Sundstrom, Lahner, Calderone, and Nielsen (2005) indicated that the group's personality composition based on Big Five Personality Factors significantly impacts group performance, group atmosphere, conflict, and team viability. There is evidence that the compatibility of different personality types in a group can have a positive impact on the process and the outcome of collaboration (Belbin, 2011). Instead of randomly assigning students to groups, a heterogeneous mix of students based on members' personality types is claimed to be salutary for the collaboration process (Gilley et al., 2010; Munchinsky & Monahan, 1987). Since every group member brings unique characteristics and strengths into the collaboration, this type of grouping enhances its members to interact more efficiently, which in turn, leads to better outcomes and more effective collaborations (Gilley et al., 2010; Munchinsky & Monahan, 1987). Even though a great range of personality traits have been examined, findings suggest that only a few are related to the success of collaborative learning. There is evidence that especially the personality trait of extraversion plays a crucial role in determining group performances (Barrick et al., 1998).

Extraversion

Extraversion has been an important focus of research in the prediction of social behaviour (e.g., Lucas, Diener, Grob, Suh, & Shao, 2000). It reflects the tendency to which individuals are socially engaged and seek stimulation in the external world (Shiota & Kalat, 2018). Whereas the typical extrovert is described as seeking excitement, being adventurous, sociable, talkative, assertive, and dominant, the typical introvert is a quiet, submissive, and reflective person who does not like large social events and prefers his/her own company (Kristof-Brown et al., 2005). Bradley and Hebert (1997) described the extrovert as a natural speaker and thus, communication within a group seems to be easier for the extrovert than for the introvert. In an academic environment, studies suggested that extroverts feel comfortable in both face-to-face as well as online classrooms (Amichia-Hamburger, Wainapel, & Fox, 2002). In contrast, introverts prefer the online setting, as it seems to serve as a protective frame and therefore, helps them to express themselves more freely (Amichai-Hamburger, 2005). As part of online collaboration, asynchronous communication tools such as text messages provide introverts security to be more self-assured (Amichai-Hamburger et al., 2002). Nevertheless, the use of asynchronous communication tools leaves students with increased mental effort, increased communication barriers due to the ambiguines nature of online text messages, and an overall decrease in arousal (Kock, 2005). In line with the Medium Naturalness Theory (Kock, 2005), Blau, Weiser, and Eshet-Alkalai (2017) argued that tools that provide a higher degree of naturalness like in face-to-face communication, lead

to more effective learning. Therefore, using a variety of communication tools such as writing, speaking and video conferencing is recommended to promote the learning experience (Blau & Caspi, 2010; Kock, 2005).

Research from Bradley and Hebert (1997) indicated that too many extroverts within a group may harm its atmosphere, as they tend to intrude into conversations and thus, hinder each other to fully share their thoughts. In contrast to extroverts, introverts are not as communicative and suspend judgments (Kroeger & Thuesen, 1992). Consequently, having a balanced group with diversity on the extraversion continuum is beneficial as introverts and extroverts complement each other (Kroeger & Thuesen, 1992). Whereas the introvert is not a natural communicator, the extrovert helps to establish an effective interaction (Bradley & Hebert, 1997).

Many scholars consistently found a correlation between group composition on extraversion and group outcomes (e.g., Barrick et al., 1998). Taken together, experts claimed that diversity on extraversion leads to a more effective collaboration process and improved group performance (Barrick et al., 1998). Moreover, findings revealed that variability on the Extraversion continuum was positively correlated with the groups' long-term chances of successfully working together (Barrick et al., 1998). Hoffman (1959) generated evidence that heterogeneous groups on extraversion, consisting of members with different levels of extraversion, were more efficient as well as more satisfied than homogenous ones. Nevertheless, the underlying causes of this effect remain unclear. Dominance is one of the psychological facets on the extraversion continuum that is important to consider (Kristof-Brown et al., 2005). There are indications that variability in dominance is associated with improved interpersonal interactions. Hence, a dominant person collaborates best with someone who is more submissive. Carson (1969) suggested that complementarity of dominance and submissiveness is favoured for collaboration as it creates a mutual relationship in which both parties satisfy the needs of the other. Applying this concept to the personality trait of extraversion, an extrovert's dominant behaviour evokes a submissive response from their counterpart. Whereas the introvert listens attentively, the extrovert is encouraged to share ideas, which results in a desirable interaction between the parties and more satisfaction as the needs from both sides seem to be met (Kristof-Brown et al., 2005). This phenomenon can be called complementary fit and takes place when a person's attributes compensate for someone else's deficiency (Muchinsky & Monahan, 1987).

In sum, to improve the atmosphere in a group as well the group's satisfaction, researchers recommended a complementary grouping based on different levels of extraversion

(Bradley & Hebert, 1997; Kroeger & Thuesen, 1992; Muchinsky & Monahan, 1987). Since increased group satisfaction and a pleasing working climate positively contribute to its members' psychological states (Pekrun et al., 2011), it is plausible to assume that a greater difference in students' levels of extraversion in the dyad will positively affect their well-being and self-esteem.

Well-being

A positive learning atmosphere within a group is not only essential for its academic success but also its members' emotional health (Hakanen, Schaufeli, & Ahola, 2008; Peñalver, Salanova, & Martínez, 2020; Xanthopoulou et al., 2009). Prior research demonstrated that a positive working climate and effective communication positively influence individuals' state of mind and thus, their psychological well-being (Griffin, Hart, & Wilson-Evered, 2000; Hakanen et al., 2008). Psychological well-being is a broad concept that refers to a state of happiness and welfare and to individuals' evaluation of how satisfied they are with their living conditions (Keyes, 2007). Furthermore, it describes a person's perception of their physical functionalities, emotional experiences, and social support system (Huta & Waterman, 2014).

Literature claimed that experiencing high levels of well-being within a group can help to improve its performance (Wright & Bonett, 2007). On the contrary, depending on the composition of a group, a clash of personalities might hinder groups in their performance due to arising conflicts (Chen & Ayoko, 2012). De Wit, Greer, and Jehn (2012) provided evidence that these conflicts harm the atmosphere within a group as well as group members' well-being since they might result in unhappiness. Nevertheless, collaboration can have a positive impact on the atmosphere within a group and consequently, on the individuals' well-being (Gilley et al., 2010; Pekrun et al., 2011; Xanthopoulou et al., 2009). Due to these ambiguous findings, it is interesting to investigate the effects of differences in the level of extraversion in a dyad on students' wellbeing.

Self-esteem

Next to well-being, self-esteem is another relevant construct to consider as it can be enhanced through collaboration as well (Johnson & Johnson, 1989). Self-esteem can be defined as an individual's evaluation of their worth and capabilities (Blascovich, Tomaka, Robinson, Shaver, & Wrightsman, 1991). There are two forms of self-esteem, namely personal self-esteem, which refers to the evaluation of one's self-worth (Crocker & Wolfe, 2001), and collective self-esteem, which refers to the evaluation of one's group membership (Luhtanen & Crocker, 1992).

Researchers such as Panitz (1997), as well as Felder and Brent (1994), claimed that collaborative learning has several positive psychological benefits, particularly on building and increasing students' self-esteem. Collaboration establishes an encouraging learning environment, in which students support and advise one another, which in turn, strengthens their self-esteem (Kagan, 1986).

Prior research indicated that group composition and the atmosphere within a group can either harm or enhance its members' self-esteem (Bolton & Bolton, 2009; Gilley, Maycuinch, & Maycuinch, 1998). Dewey and Bento (2009) were able to establish a relationship between levels of conflicts within a group and its members' self-esteem. Their finding suggested that high levels of group conflicts during collaboration result in substantially lower levels of self-esteem. On the contrary, this implies that a well-harmonizing group may lead to a better atmosphere within the team and thus, contribute to an increase in members' self-esteem (Gilley et al., 2010; Wilson, De Joy, Vandenberg, Richardson, & McGrath, 2004). This adds to research from Yalom (1995) who described the importance of group cohesiveness as a crucial element for fostering personal self-esteem through an accepting and harmonic group climate. In experimental research from Akindele (2012), group members experienced an increase in their self-esteem and report feelings of belongingness and unity after completing a collaborative task. Since groups of students with different levels of extraversion are claimed to harmonize most and thus, lead to fewer conflicts and increased satisfaction among students (Barrick et al., 1998; Gilley et al., 2010), it is worthwhile to examine how the differences in students' levels of extraversion affect their self-esteem.

Current study

The present study will investigate the effect of differences in students' level of extraversion when collaborating on students' well-being, and self-esteem during online collaboration. Previous research based on face-to-face collaboration recommended grouping students with different levels of extraversion as this seemed to positively contribute to group members' well-being and self-esteem (e.g., Barrick et al., 1998; Gilley et al., 2010, Pekrun et al., 2011). Due to the online nature of this research which might change the dynamic between the students, this study might provide new insights into the collaboration between introverts and extroverts. To examine the effects of students' differences in the level of extraversion on well-being and self-esteem during online collaboration, the following research question is addressed: *"To what extent does the difference in the level of extraversion in a dyad influence students' well-being and self-esteem after an online collaborative task?"*. In order to provide an answer to this question, two different sub-questions will be examined:

Research Question 1 (R1): To what extent does online collaboration lead to an increase in students' well-being and self-esteem?
Hypothesis 1 (H1): Students, regardless of their own and their partners' level of extraversion, will report an increase in well-being after the online collaborations.
Hypothesis 2 (H2): Students, regardless of their own and their partners' level of extraversion, will report an increase in self-esteem after the online collaborations.

Research Question 2 (R2): To what extent are differences in the level of extraversion in a dyad related to students' well-being and self-esteem in an online collaborative setting?
Hypothesis 3 (H3): Students' change in well-being will be stronger for dyads with greater differences in their extraversion score than for dyads with similar levels of extraversion.
Hypothesis 4 (H4): Students' change in self-esteem will be stronger for dyads with greater differences in their extraversion score than for dyads with similar levels of extraversion.

Method

Participants

In total, 17 university students (9 female, 8 male) participated in the study. However, not all of them took part in each post-test. More specifically, 17 students participated in the pre-test, 15 in the first post-test, 13 in the second post-test, and 12 in the third post-test. One student needed to be excluded from the study because she did not participate in the pre-test and thus, no data was collected. In addition, due to changes in the course, three students had to work together as a group of three instead of in a dyad. Their responses were partially excluded from this study since no difference in the level of extraversion could be detected. All the participants were aged between 20 and 54 ($M = 27.71$, $SD = 9.50$) and enrolled in a social science program, in which the data were collected. The students participated voluntarily by giving their active consent and were allowed to withdraw at any time. The consent form can be found in Appendix A.

The data were collected during three collaborative assignments, in which each time the students were asked to choose a different partner of their choice with whom they want to work together. Hence, students' own choice of partner determined the grouping of the different dyads. The students were neither informed about their own personality type nor their fellow students.

To categorize the students into introverts and extroverts, the researcher used the same approach as Blau and Barak (2012), who proposed the use of the median scale score

(Median=67). Participants with a higher score than 67 were classified as extroverts, whereas participants with a lower score were categorized as introverts. Two participants scored exactly 67 and thus, one was categorized as an introvert and one as an extrovert. In total, eight extroverts and nine introverts took part in the study. The greatest displayed difference in the level of extraversion in the dyads was 33.00, while the smallest difference was 0. A detailed description of the instrument can be found under Extraversion scale.

Collaborative assignments

The course in which the data were collected aimed at practicing students' research and writing skills related to school-based learning. In three collaborative assignments students had to co-write (i.e., dyads) a research article focusing on the following research question: How to support pre-task planning to develop elementary students' writing skills. In the first assignment, students had to complete an existing template that represented the introduction. In the second and third assignments, students had to, respectively, complete the method and results template of a research article.

Instruments

Extraversion scale

To determine how the students scored on the extraversion continuum and thus, whether they could be classified as introverts or extroverts, the participants were asked to fill out the complete Extraversion scale from the International Personality Item Pool (IPIP). The questionnaire consisted of 20 items (DeYoung, Quilty, & Peterson, 2007) and is based on the Big Five Factors (Goldberg, 1992). As suggested by De Young, Quilty, and Peterson (2007), extraversion is measured through two subscales, namely assertiveness, and enthusiasm.

The personality score is a self-report inventory, which consists of 10 items relating to assertiveness (e.g., “I take charge.”) and 10 items relating to enthusiasm (e.g., “I laugh a lot.”). Students were asked to use a 5-point Likert Scale, ranging from 1 (strongly disagree) to 5 (strongly agree) to respond to the statements (see Appendix B). The inventory shows good reliability of $\alpha = .89$.

WHO Well-Being Index (WHO-5)

The WHO Well-Being Index intends to measure individuals’ well-being and consists of five statements that need to be rated on a 6-point Likert Scale, ranging from 0 (at no time) to 5 (all of the time) (Heun, Bonsignore, Barkow, & Jessen, 2001). To measure students’ level of well-being before and after the collaborations, two versions of the questionnaire were created. Both versions comprised similar items, however, they differed in their formulations.

To determine students' initial well-being the original questionnaire, in which students had to indicate how they have felt over the last two weeks, was used. An example item is "I have felt cheerful and in good spirits.". The pre-questionnaire displayed good reliability with α = .88.

To measure the level of well-being after the collaborative task, the formulation of the questionnaire has been altered as students were asked how they feel are right after the collaboration. Hence, the researcher changed the tense to adapt it to the current moment and reformulated the fourth statement (i.e., "I think I will wake up in a good mood tomorrow"). The first two post-questionnaires showed excellent reliability (α = .90; α = .93), whereas the third post-test displayed good reliability (α = .87).

Rosenberg's Self-Esteem Scale (RSE)

The RSE scale aims at measuring students' levels of self-esteem (Rosenberg, 1965). It consists of ten items that need to be rated on a 4-point Likert scale, ranging from 0 (strongly disagree) to 3 (strongly agree). An example statement is "I feel that I have a number of good qualities.". Reliability analyses suggested good reliability for the pre-test and the first post-test (α = .88; α = .83), excellent reliability for the second post-test (α = .93) and acceptable reliability for the third post-test (α = .74). An overview of the questionnaire can be found in Appendix B.

Procedure

The data of this study was collected over three weeks, with one collaborative assignment per week. Prior to the first collaborative assignment, students were asked to fill in an online questionnaire, measuring their level of extraversion and their initial level of well-being and self-esteem. The personality questionnaire was only asked once before the first assignment. After filling in the questionnaire the students were allowed to pair up in dyads with a partner of their choice to work on the first assignment. From then, students had five days to collaboratively finish the assignment. After these five days when they handed in their collaborative work, students were asked to fill in a post-questionnaire, measuring again their level of well-being self-esteem. In the next two weeks, students had to work on two other collaborative assignments and had to pair up in dyads again. Even though students were allowed to choose their partners themselves, they had to choose a different partner for each assignment. After handing in both, the second and third collaborative assignments, students filled in the post-questionnaire again to indicate their well-being and self-esteem.

Data analysis

Extraversion scale analysis

From the 20-item personality questionnaire, nine items were negatively phrased and thus, had to be recoded. An example item is "I keep others at a distance". The students' levels of extraversion were determined by the overall sum scores of their ratings. As a five-point Likert scale was used to respond to the items, students were able to obtain a minimum score of 20 (least extroverted) and a maximum score of 100 (most extroverted).

WHO-5 analysis

To examine students' pre- and post-levels of well-being they rated five items on a 6-point Likert Scale with a minimum score of 0 and a maximum score of 25. To determine the final well-being score, the raw score is multiplied by four (Topp, Østergaard, Søndergaard, & Bech, 2015). Overall, students were able to obtain a score between 0 (worst imaginable well-being) and 100 (best imaginable well-being). To investigate patterns of well-being and self-esteem over the course of the study, students' post-well-beings after the collaborations will be compared to their initial measurements in the pre-test.

RSE analysis

From the 10-item Rosenberg's Self-esteem inventory, five items were negatively formulated and thus, were recoded for analysis purposes (e.g., "All in all, I am inclined to feel that I am a failure"). Overall, students were able to obtain a minimum score of 0 and a maximum score of 30. Scores between 15 and 25 are considered to lie within a normal range, whereas scores below 15 suggest low self-esteem (Rosenberg, 1965).

Results

To examine the relationship between the differences in the level of extraversion in the dyads, well-being, and self-esteem in the small sample, several non-parametric were performed. First, the compositions of the dyads were reported, assessing the differences in the level of extraversion for each of the three assignments. A Friedman's test was conducted to evaluate whether these differences were statistically significant. To investigate to what extent online collaboration led to an increase in students' well-being and self-esteem, descriptive statistics and Wilcoxon Signed Rank Tests were executed. Lastly, Spearman Rank Correlations were performed to examine the relationship between students' differences in their level of extraversion, well-being, and self-esteem.

Composition of the dyads

To assess the composition of the dyads, means and standard deviations of the differences in the level of extraversion in the dyads were calculated (see Table 1). The results indicated that the difference in the level of extraversion in the dyads seemed to be decreasing from the first to the last assignment. However, a non-parametric Friedman's test did not

indicate a significant difference between the median levels of extraversion for the three different post-tests, χ 2 (2, N = 8) = 1.75, p = .417.

Table 1

Differences in the level of extraversion in the dyads per test

	M	SD
Pre-test	-	-
Post-test 1	12.00	9.04
Post-test 2	10.54	6.85
Post-test 3	9.15	6.26

Descriptive statistics

Means and standard deviations of students' well-being and self-esteem were calculated (see Table 2). The calculations were administered for each test separately.

Table 2

Means and standard deviations for students' well-being and self-esteem after the pre-test and the three post-tests

	Well-being		Self-esteem	
	M	SD	M	SD
Pre-test	56.47	21.44	21.88	4.91
Post-test 1	67.20	19.84	21.87	3.83
Post-test 2	59.54	22.81	21.69	5.34
Post-test 3	55.67	21.27	19.50	4.50

Changes in well-being and self-esteem

To examine whether the students' changes in well-being and self-esteem were statistically significant, six non-parametric Wilcoxon Signed Rank tests were conducted. First, three Wilcoxon Signed Rank Tests assessed students' changes in well-being for all three post-tests compared to their initial measurements in the pre-test. Next, three Wilcoxon Signed Rank Tests were conducted and examined the students' changes in self-esteem. The analyses were administered for each post-test separately.

Changes in well-being

The results of Wilcoxon Signed Rank tests suggested that the median post-test well-being for the first collaborative assignment was significantly higher than the median pre-test well-being ($Z = -2.01$, $p = .044$). However, the analyses of the second and third collaborative assignment did not show a statistically significant difference between the pre-and post-measurements of well-being ($Z = -.713$, $p = .476$; $Z = -.867$, $p = .386$).

Changes in self-esteem

The findings of the first Wilcoxon Signed Rank test did not reveal significant differences between students' initial level of self-esteem and their self-esteem after the first collaborative assignment ($Z = -.350$, $p = .726$). The same results were found for assignment two and three since the differences in pre-and post-measurements were not significant ($Z = -.972$, $p = .331$; $Z = -.830$, $p = .406$).

Correlational analyses

To explore the correlation between the differences in the level of extraversion, well-being, and self-esteem, two two-tailed correlational analyses per post-test were performed. The first analysis examined the relationship between the dyads' differences in their level of extraversion and students' level of well-being and self-esteem after each collaborative assignment. The second correlational analysis focused on the differences in the level of extraversion and students' changes in well-being and self-esteem compared to their initial measurements in the pre-test.

The results of the first Spearman correlation showed that the differences in the level of extraversion in the dyads were not significantly correlated with students' level of well-being and self-esteem after the first post-test. Similar results were found in the second analysis as no correlations between the differences in the level of extraversion and students' changes in well-being and self-esteem were found. Moreover, neither students' well-being and self-esteem after the first assignment nor their changes in well-being and self-esteem seemed to be statistically correlated. An overview of both analyses can be found in Tables 3 and 4.

Table 3

Correlation Matrix –Differences in the level of extraversion and well-being and self-esteem for post-test 1

	1.	2.	3.
1. Differences in extraversion level	-		

2. Well-being	-.323 (.241)	-	
3. Self-esteem	-.034 (.903)	.004 (.990)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

Table 4

Correlation Matrix –Differences in the level of extraversion and changes in well-being and self-esteem for post-test 1

	1.	2.	3.
1. Differences in extraversion level	-		
2. Changes in well-being	-.078 (.783)	-	
3. Changes in self-esteem	.309 (.263)	-.348 (.203)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

The analyses of the second post-test could not substantiate a statistically significant correlation between the differences in the level of extraversion and students' well-being and self-esteem after the second collaboration (see Table 5). In congruence with this, the results indicated that the differences in the level of extraversion were neither correlated with students' changes in well-being nor with their changes in self-esteem (see Table 6). Further, no correlation between students' well-being and self-esteem after the second collaboration was prominent. The same results were displayed in the correlational analysis of students' changes in well-being and self-esteem.

Table 5

Correlation Matrix –Differences in the level of extraversion and well-being and self-esteem for post-test 2

	1.	2.	3.

1. Differences in extraversion level	-		
2. Well-being	.119 (.743)	-	
3. Self-esteem	.329 (353)	-2.35 (.439)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

Table 6

Correlation Matrix –Differences in the level of extraversion and changes in well-being and self-esteem for post-test 2

	1.	2.	3.
1. Differences in extraversion level	-		
2. Changes in well-being	.006 (.986)	-	
3. Changes in self-esteem	.003 (.993)	.180 (.556)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

The findings for the third post-test were in line with the results of the previous post-tests (see Tables 7 and 8). Accordingly, no significant correlations between the differences in the level of extraversion and students' well-being and self-esteem were found. Additionally, the results of the second analysis displayed that the differences in the level of extraversion in the dyads and students' changes in well-being and self-esteem were not statistically correlated. In consonance with this, no correlation between students' well-being and self-esteem after the third post-test was evident. Lastly, the results showed no statistically significant correlation between students' changes in well-being and self-esteem.

Table 7

Correlation Matrix –Differences in the level of extraversion and well-being and self-esteem for post-test 3

	1.	2.	3.
1. Differences in extraversion level	-		
2. Well-being	-.017 (.965)	-	
3. Self-esteem	-.150 (.701)	.407 (.189)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

Table 8

Correlation Matrix –Differences in the level of extraversion and changes in well-being and self-esteem for post-test 3

	1.	2.	3.
1. Differences in extraversion level	-		
2. Changes in well-being	.448 (.226)	-	
3. Changes in self-esteem	-.064 (.870)	.057 (.861)	-

Note. ** correlation is significant at the .01 level (2-tailed), * correlation is significant at the .05 level (2-tailed), p-values are reported in parentheses

Discussion

The present study aimed at investigating whether differences in the levels of extraversion between collaborative partners influenced their well-being and self-esteem in an online collaborative setting. Until now, research focused on face-to-face collaboration and thus, little is known about the effects in an online environment.

On the one hand, researchers such as Johnson and Johnson (1989) found that collaboration has several psychological benefits and leads, among other things, to an increase in students' well-being and self-esteem. On the other hand, Aviv et al. (2005) claimed that virtual collaboration faces higher communication barriers as social cues and body language are not directly observable. However, facilitating the establishment of social presence by using several communication methods including speaking and video conferencing, might

positively influence the collaboration process (Blau & Caspi, 2010; Kock, 2005; Herring, 2002; Wellman et al., 1996). Therefore, it was expected to find a significant increase in both, students' well-being and self-esteem after the online collaborations. Contrary to expectations, students' well-being only significantly increased for the first collaborative assignment. However, it is plausible that the students did not know what to expect before the first assignment. Research from Zea, Reisen, Poppen, Bianchi, and Echeverry (2005) was able to substantiate a correlation between feelings of relief and an increase in well-being. Hence, students might have felt relieved after the first collaboration and approached the second and third assignments more relaxed. As a result, only a significant increase in well-being in the first assignment was found. Another potential explanation for this single effect might be the timing of the study. As the data was collected in a time of social distancing during a global pandemic, students might have appreciated the social contact in the first assignment more extensively. As the collaborations progressed, this effect might have diminished as students got used to the social interactions. Further, as opposed to the expectations, the results of this study did not show any significant differences in students' level of self-esteem after the three collaborations. A possible explanation for these contrasting findings might be students' academic backgrounds. Since they did not have any prior experiences in academic writing before, three collaborative assignments might have been too little practice to significantly influence their self-esteem.

Contrary to expectations, this study was not able to substantiate a correlation between students' differences in the levels of extraversion on the one hand and their levels of well-being and self-esteem in an online setting on the other hand. Experts claimed that groups whose members largely differ in their levels of extraversion reported a more harmonizing group atmosphere and an increase in the level of satisfaction (Barrick et al., 1998; Gilley et al., 2010). Since prior research findings indicated that a well-harmonizing group experiences a more positive working climate, which in turn, positively affects its members' well-being and self-esteem (Gilley et al., 2010; Peñalver et al., 2020; Xanthopoulou et al., 200), it was hypothesized that students' change in these psychological constructs will be stronger for dyads with greater differences in their extraversion scores. As a prerequisite for this, positive correlations between the differences in the level of extraversion and changes in well-being and self-esteem were expected. The present study disproved these assumptions and could not replicate previous research findings. A plausible explanation could be the influence of third variables on the relationship between students' differences in the level of extraversion and their well-being and self-esteem. Factors such as the acquaintance level of students in a dyad,

cultural differences, or language barriers due to insufficient English skills might have affected the results. Moreover, the correlational analyses could not find significant correlations between students' level of extraversion and their absolute scores in well-being and self-esteem. Due to this, and the fact that the data was collected over several days, it is reasonable to presume that external factors, such as the changing COVID-19 measures or personal circumstances might have affected students' well-being and self-esteem.

The analysis of the composition of the dyads revealed a small decreasing trend from more heterogenous dyads in the first assignment towards more heterogeneous dyads in the last one. However, the analysis displayed no significant differences between the dyads' median levels of extraversion. Yet, examining this trend of students' working preference and its influence on their well-being and self-esteem might be interesting to investigate in the future.

Limitations and Future Research

The first limitation that should be considered when interpreting the results pertains to the small sample size and the high drop-out rate of the study. The initial sample consisted of 17 students, however, since the data was collected over three weeks, some students did not participate in all questionnaires. Due to unforeseen reasons, three students worked together as a group and therefore, needed to be excluded from parts of the study. Consequently, the sample decreased from the first to the last assignment. Despite controlling for the small sample with non-parametric tests, it is still questionable whether the results are representative. To increase the generalizability of the results, future research should continue to investigate the benefits of online collaboration as well as the influence of differences in students' level of extraversion with a larger and more representative sample.

Another limitation concerns the design of the study. Since the dyads worked together over several days, third variables, such as personal circumstances or the changing COVID-19 measures might have affected students' well-being and self-esteem. Additionally, factors such as students' acquaintance level in the dyad, cultural differences, or potential language barriers might have influenced the relationship between students' differences in their level of extraversion, well-being, and self-esteem. Follow-up research should control for potential third variables by considering factors that might have influenced the collaborations in the dyads in the analyses. Rather than investigating students' general emotional states, it is advised to focus on task-related measurements of self-esteem and well-being. Moreover, to minimize the influence of third variables on students' well-being and self-esteem, future research should collect the data over a shorter period.

Lastly, since prior research recommended the use of a variety of communication media during online collaborations (Blau & Caspi, 2010; Kock, 2005), it would be interesting to investigate whether the used communication tools varied between the dyads in the three different assignments. Whereas the use of asynchronous communication tools leads to more anonymity and greater communication barriers, video conferencing and speaking are claimed to enhance collaborative learning (Blau et al., 2017; Kock, 2005). To examine how the students interacted with each other, future research should focus on the implementation of a virtual learning environment that monitors the collaboration processes.

Conclusion

To conclude, the findings of the present study revealed only a significant increase in students' well-being for the first online collaboration. Since no significant differences in students' levels of self-esteem were found, it is reasonable to assume that the psychological benefits of collaboration are not prominent in the studied context. Further, this study could not substantiate a correlation between students' differences in the level of extraversion, well-being, and self-esteem. Accordingly, these findings suggest that group composition based on students' differences in their levels of extraversion does not seem to be an important factor to consider in the context of this research. However, due to several limitations of the study, it is advised to further investigate the topic in different virtual learning environments, controlling for third variables and monitoring students' collaborative processes. Teachers could profoundly profit from these findings and consider the insights when assigning students into groups. This would not only increase the group satisfaction but also students' well-being and self-esteem, which in turn, positively contribute to their learning effectiveness.

References

Akindele, D. O. (2012). Enhancing teamwork and communication skills among first year students at the University of Botswana. *TESOL Journal*, *6*(1), 2-15. Retrieved from https://tesol-international-journal.com/wp-content/uploads/2013/11/A1_V6.pdf

Amichai–Hamburger, Y. (2005). *Understanding Human Behavior in Cyberspace*. New York: Oxford University Press.

Amichai-Hamburger, Y., Wainapel, G., & Fox, S. (2002). " On the Internet no one knows I'm an introvert": Extroversion, neuroticism, and Internet interaction. *Cyberpsychology & behavior*, *5*(2), 125-128. https://doi.org/10.1089/109493102753770507

Aviv, R., Erlich, Z., & Ravid, G. (2005). Response neighborhoods in online learning networks: A quantitative analysis. *Journal of Educational Technology & Society*, *8*(4), 90-99. https://doi.org/10.1.1.97.5402

Baker, M., Andriessen, J., & Järvelä, S. (2013). *Affective learning together: Social and emotional dimensions of collaborative learning*. Retrieved from https://books.google.de/books?id=ZZNbBAAAQBAJ&printsec=frontcover#v=onepage&q&f=false

Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: a meta-analysis. *Personnel psychology*, *44*(1), 1-26. https://doi.org/10.1111/j.1744-6570.1991.tb00688.x

Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Relating member ability and personality to work-team processes and team effectiveness. *Journal of applied psychology*, *83*(3), 377. https://doi.org/10.1037/0021-9010.83.3.377

Belbin, R. M. (2011). Management teams: Why they succeed or fail. *Human Resource Management International Digest, 19*(3). https://doi.org/10.1108/hrmid.2011.04419cae.002

Blascovich, J., Tomaka, J., Robinson, J. P., Shaver, P. R., & Wrightsman, L. S. (1991). Measures of self-esteem. *Measures of personality and social psychological attitudes*, *1*, 115-160. https://doi.org/10.1016/B978-0-12-590241-0.50008-3

Blau, I., & Barak, A. (2012). How do personality, synchronous media, and discussion topic affect participation?. *Journal of Educational Technology & Society*, *15*(2), 12-24. Retrieved from https://www.jstor.org/stable/pdf/jeductechsoci.15.2.12.pdf

Blau, I., & Caspi, A. (2010). Studying invisibly: Media naturalness and learning. In *Evolutionary psychology and information systems research* (pp. 193-216). Springer, Boston, MA. https://doi.org/10.1007/978-1-4419-6139-6_9

Blau, I., Weiser, O., & Eshet-Alkalai, Y. (2017). How do medium naturalness and personality traits shape academic achievement and perceived learning? An experimental study of face-to-face and synchronous e-learning. *Research in Learning Technology*, *25*. https://doi.org/10.25304/rlt.v25.1974

Bolton, R., & Bolton, D. G. (2009). *People Styles at Work--and Beyond: Making Bad Relationships Good and Good Relationships Better*. Amacom Books.

Bradley, J. H., & Hebert, F. J. (1997). The effect of personality type on team performance. *Journal of Management Development, 16*(5), 337-353. https://doi.org/10.1108/02621719710174525

Carson, R. C. (1969). Interaction Concepts of Personality. Chicago (Aldine) 1969.

Chen, M., & Ayoko, O. (2012). Conflict and trust: The mediating effects of emotional arousal and self-conscious emotions. *International Journal of Conflict Management, 23*(1), 19-56. https://doi.org/10.1108/10444061211199313

Cockburn, A. (2002). *Agile Software*. Addison Wesley.

Crocker, J., & Wolfe, C. T. (2001). Contingencies of self-worth. *Psychological Review, 108*(3), 593-623. https://doi.org/10.1037/0033-295X.108.3.593

Dewey, J., & Bento, J. (2009). Activating children's thinking skills (ACTS): The effects of an infusion approach to teaching thinking in primary schools. *British journal of educational psychology*, *79*(2), 329-351. https://doi.org/10.1348/000709908X344754

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of personality and social psychology*, *93*(5), 880. https://doi.org/10.1037/0022-3514.93.5.880

De Wit, F. R., Greer, L. L., & Jehn, K. A. (2012). The paradox of intragroup conflict: a meta-analysis. *Journal of applied psychology*, *97*(2), 360. https://doi.org/10.1037/a0024844

Felder, R. M., & Brent, R. (1994). Cooperative learning in technical courses: Procedures, pitfalls, and payoffs. Retrieved 2021, February 24, from https://eric.ed.gov/?id=ED377038

Furumo, K., de Pillis, E., & Green, D. (2009). Personality influences trust differently in virtual and face-to-face teams. *International Journal of Human Resources Development and Management*, *9*(1), 36-58. https://doi.org/10.1504/IJHRDM.2009.021554

Gilley, J. W., Maycunich, A., & Maycuinch, A. (1998). *Strategically integrated HRD: Partnering to maximize organizational performance*. Reading, MA: Addison-Wesley.

Gilley, J. W., Morris, M. L., Waite, A. M., Coates, T., & Veliquette, A. (2010). Integrated theoretical model for building effective teams. *Advances in Developing Human Resources*, *12*(1), 7-28. https://doi.org/10.1177/1523422310365309

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological assessment*, *4*(1), 26-42. https://doi.org/10.1037/1040-3590.4.1.26

Griffin, M.A., Hart, P.M., & Wilson-Evered, E. (2000). Using employee opinion surveys to improve organizational health. In L.R. Murphy, & C.L. Cooper (Eds.), *Health and productive work: an international perspective* (pp. 15–36). London: Taylor & Francis.

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*(3), 224-241. https://doi.org/10.1080/02678370802379432

Halfhill, T., Sundstrom, E., Lahner, J., Calderone, W., & Nielsen, T. M. (2005). Group personality composition and group effectiveness: An integrative review of empirical research. *Small group research*, *36*(1), 83-105. https://doi.org/10.1177/1046496404268538

Haythornthwaite, C. (2006). Facilitating collaboration in online learning. *Journal of Asynchronous Learning Networks*, *10*(1), 7-24. https://doi.org/10.24059/olj.v10i1.1769

Herring, S. C. (2002). Computer-mediated communication on the Internet. *Annual review of information science and technology*, *36*(1), 109-168. https://doi.org/10.1002/aris.1440360104

Heun, R., Bonsignore, M., Barkow, K., & Jessen, F. (2001). Validity of the five-item WHO Well-Being Index (WHO-5) in an elderly population. *European archives of psychiatry and clinical neuroscience*, *251*(2), 27-31. https://doi.org/10.1007/BF03035123

Hoffman, L. R. (1959). Homogeneity of member personality and its effect on group problem-solving. *The Journal of Abnormal and Social Psychology*, *58*(1), 27. https://doi.org/10.1037/h0043499

Holton, J. A. (2001). Building trust and collaboration in a virtual team. *Team performance management:an international journal*, *7*(3), 36-47. http://dx.doi.org/10.1108/13527590110395621

Huta, V., & Waterman, A. S. (2014). Eudaimonia and its distinction from hedonia: Developing a classification and terminology for understanding conceptual and

operational definitions. *Journal of Happiness Studies*, *15*(6), 1425-1456. https://doi.org/10.1007/s10902-013-9485-0

Huxham, M., & Land, R. (2000). Assigning students in group work projects. Can we do better than random?. *Innovations in Education and Training International*, *37*(1), 17-22. https://doi.org/10.1080/135580000362043

Johnson, D. W., & Johnson, R. T. (1989). *Cooperation and competition: Theory and research*. Interaction Book Company.

Kagan, S. (1986). Cooperative learning and sociological factors in schooling, In Beyond language: Social and cultural factors in schooling language minority students (pp. 231-98). Los Angeles, CA, USA: Evaluation, Dissemination, and Assessment Center, California State University Publishing.

Keefer, M. W., Zeitz, C. M., & Resnick, L. B. (2000). Judging the quality of peer-led student dialogues. *Cognition and instruction*, *18*(1), 53-81. https://doi.org/10.1207/S1532690XCI1801_03

Keyes, C. L. M. (2007). "Psychological Well-Being," in Encyclopedia of Gerontology, 2nd Edn, ed. J. E. Birren (New York, NY: Elsevier), 399-406. https://doi.org/10.1016/B0-12-370870-2/00156-6

Kirschner, P. A. (2001). Using integrated electronic environments for collaborative teaching/learning. *Learning and Instruction*, *10*, 1-9. https://doi.org/10.1016/S0959-4752(00)00021-9

Kock, N. (2005). Media richness or media naturalness? The evolution of our biological communication apparatus and its influence on our behavior toward e-communication tools. *IEEE transactions on professional communication*, *48*(2), 117-130. https://doi.org/10.1109/TPC.2005.849649

Kristof-Brown, A., Barrick, M. R., & Kay Stevens, C. (2005). When opposites attract: a multi-sample demonstration of complementary person-team fit on extraversion. *Journal of personality*, *73*(4), 935-958. https://doi.org/10.1111/j.1467-6494.2005.00334.x

Kroeger, O., & Thuesen, J. M. (1992). *Type talk at work*. New York, N.Y: Delacorte Press.

Leonard, P. E., & Leonard, L. J. (2001). The collaborative prescription: Remedy or reverie? *International Journal of Leadership in education*, *4*(4), 383-399. https://doi.org/10.1080/13603120110078016

Lucas, R. E., Diener, E., Grob, A., Suh, E. M., & Shao, L. (2000). Cross-cultural evidence for the fundamental features of extraversion. *Journal of personality and social psychology*, *79*(3), 452. https://doi.org/10.1037/0022-3514.79.3.452

Luhtanen, R., & Crocker, J. (1992). A collective self-esteem scale: Self-evaluation of one's social identity. *Personality and social psychology bulletin*, *18*(3), 302-318. https://doi.org/10.1177/0146167292183006

McPherson, M. S., & Bacow, L. S. (2015). Online higher education: Beyond the hype cycle. *Journal of Economic Perspectives*, *29*(4), 135-54. https://doi.org/10.1257/jep.29.4.135

Muchinsky, P. M., & Monahan, C. J. (1987). What is person-environment congruence? Supplementary versus complementary models of fit. *Journal of vocational behavior*, *31*(3), 268-277. https://doi.org/10.1016/0001-8791(87)90043-1

Nussbaum, E. M. (2008). Collaborative discourse, argumentation, and learning: Preface and literature review. *Contemporary Educational Psychology*, *33*(3), 345-359. https://doi.org/10.1016/j.cedpsych.2008.06.001

Panitz, T. (1997). Collaborative versus cooperative learning: Comparing the two definitions helps understand the nature of interactive learning. *Cooperative learning and college teaching*, *8*(2), 5. Retrieved 2021, February 24, from http://www.capecod.net/~TPanitz/Tedspage

Pekrun, R., Goetz, T., Frenzel, A. C., Barchfeld, P., & Perry, R. P. (2011). Measuring emotions in students' learning and performance: The Achievement Emotions Questionnaire (AEQ). *Contemporary educational psychology*, *36*(1), 36-48. https://doi.org/10.1016/j.cedpsych.2010.10.002

Peñalver, J., Salanova, M., & Martínez, I. M. (2020). Group Positive Affect and Beyond: An Integrative Review and Future Research Agenda. *International Journal of Environmental Research and Public Health*, *17*(20), 7499. https://doi.org/10.3390/ijerph17207499

Rosenberg, M. (1965). Rosenberg self-esteem scale (RSE). *Acceptance and commitment therapy. Measures package*, *61*(52), 18. Retrieved from http://www.integrativehealthpartners.org/downloads/ACTmeasures.pdf#page=61

Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus*, *12*(4). https://doi.org/10.7759/cureus.7541

Scager, K., Boonstra, J., Peeters, T., Vulperhorst, J., & Wiegant, F. (2016). Collaborative learning in higher education: Evoking positive interdependence. *CBE - Life Sciences Education*, *15*(4). https://doi.org/10.1187/cbe.16-07-0219

Shiota, M. N., & Kalat, J. W. (2018). *Emotion*. Oxford University Press.

Srinivas, H. (n.d.). *What is collaborative learning?* The Global Development Research Center. Retrieved 2021, February 21, from: https://www.gdrc.org/kmgmt/c-learn/what-is-cl.html

Stockleben, B., Thayne, M., Jäminki, S., Haukijärvi, I., Mavengere, N. B., Demirbilek, M., & Ruohonen, M. (2017). Towards a framework for creative online collaboration: A research on challenges and context. *Education and Information Technologies*, *22*(2), 575-597. https://doi.org/10.1007/s10639-016-9483-z

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance education*, *22*(2), 306-331. https://doi.org/10.1080/0158791010220208

Topp, C. W., Østergaard, S. D., Søndergaard, S., & Bech, P. (2015). The WHO-5 Well-Being Index: a systematic review of the literature. *Psychotherapy and psychosomatics*, *84*(3), 167-176. https://doi.org/10.1159/000376585

Visschers-Pleijers, A. J., Dolmans, D. H., De Leng, B. A., Wolfhagen, I. H., & Van Der Vleuten, C. P. (2006). Analysis of verbal interactions in tutorial groups: A process study. *Medical Education*, *40*(2), 129-137. https://doi.org/10.1111/j.1365-2929.2005.02368.x

Webb, N. M., & Palincsar, A. S. (1996). Group processes in the classroom. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 841–873). New York: Simon & Schuster.

Wellman, B., Salaff, J., Dimitrova, D., Garton, L., Gulia, M., & Haythornthwaite, C. (1996). Computer networks as social networks: Collaborative work, telework, and virtual community. *Annual review of sociology*, *22*(1), 213-238. https://doi.org/10.1146/annurev.soc.22.1.213

Wilson, M. G., De Joy, D. M., Vandenberg, R. J., Richardson, H. A., & McGrath, A. L. (2004). Work characteristics and employee health and well-being: Test of a model of healthy work organization. *Journal of occupational and organizational psychology*, *77*(4), 565-588. https://doi.org/10.1348/0963179042596522

Wright, T. A., & Bonett, D. G. (2007). Job satisfaction and psychological well-being as nonadditive predictors of workplace turnover. *Journal of Management*, *33*(2), 141-160. https://doi.org/10.1177/0149206306297582

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Work engagement and financial returns: A diary study on the role of job and personal resources. *Journal of occupational and organizational psychology*, *82*(1), 183-200. https://doi.org/10.1348/096317908X285633

Yalom, I. D. (1995). *The theory and practice of group psychotherapy.* 4th ed. New York: Basic Books.

Zea, M. C., Reisen, C. A., Poppen, P. J., Bianchi, F. T., & Echeverry, J. J. (2005). Disclosure of HIV status and psychological well-being among Latino gay and bisexual men. *AIDS and Behavior*, *9*(1), 15-26. https://doi.org/10.1007/s10461-005-1678-z

Appendix A

Consent form

Opening Statement for an Online Survey/Questionnaire

You are being invited to participate in a research study titled Collaborative learning – measuring the effects of a heterogeneous grouping of students. This study is being done by Jana Sowinski from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

The purpose of this research study is to investigate the effects of a heterogeneous grouping on well-being and self-esteem during online collaboration and will take you approximately 5 minutes to complete before and after each collaborative assignment. The data will be used for research purposes of a psychology student's bachelor thesis.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any question.

I believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of my ability your answers in this study will remain confidential. I will minimize any risks by anonymizing any shared data.

Study contact details for further information: Jana Sowinski (j.sowinski@student.utwente.nl)

Appendix B

Questionnaires

Rosenberg's Self-Esteem Scale (4-point Likert scale)

Please answer honestly to what extent the statement applies to you on the scale.

1. I feel that I am a person of worth, at least on an equal plane with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of.
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times.
10. At times I think I am no good at all.

WHO-5: Pre-questionnaire

Please indicate for each of the 5 statements which is closest to how you have been feeling over the past 2 weeks. Over the past 2 weeks…

- I have felt cheerful and in good spirits
- I have felt calm and relaxed
- I have felt active and vigorous
- I woke up feeling fresh and rested
- my daily life has been filled with things that interest me

WHO-5: Post-questionnaire

Please indicate for each of the 5 statements which is closest to how you are feeling right now. After the collaboration…

- I feel cheerful and in good spirits
- I feel calm and relaxed
- I feel active and vigorous
- I think I will wake up in a good mood tomorrow
- my daily life is filled with things that interest me

Extraversion scale from International Personality item Pool (IPIP)

How much do you agree or disagree with the following statements? Please answer as honest as possible.

- Enthusiasm
    - I make friends easily
    - I am hard to get to know
    - I keep others at a distance.
    - I reveal little about myself
    - I warm up quickly to others
    - I rarely get caught up in the excitement
    - I am not a very enthusiastic person
    - I show my feelings when I'm happy
    - I have a lot of fun
    - I laugh a lot

- Assertiveness
    - I take charge
    - I have a strong personality
    - I lack the talent for influencing people
    - I know how to captivate people
    - I wait for others to lead the way
    - I see myself as a good leader
    - I can talk others into doing things
    - I hold back my opinions.
    - I am the first to act
    - I do not have an assertive personality