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Students goal orientation, self-efficacy and epistemic beliefs before and during Covid-19

A natural experiment

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ABSTRACT

As the Covid-19 pandemic has had a global impact on students such as higher stress levels and feelings of inadequacy, one of the purposes of this study is to explore the possible influence Covid-19 has had on students college self-efficacy (CSE). The method applied for this thesis was a natural experiment methodology as Covid-19 occurred as an experiment without us being able to intervene. The direct relationship between students goal orientation pre Covid-19 and their CSE during Covid-19 was also examined. Further, two competing hypotheses were also tested in order to investigate the possible mediation epistemic beliefs may have in relation to goal orientation. The opposite is also tested where goal orientation is the mediating variable. A survey among 1251 students at a university in Norway indicated a significant drop in their CSE from before to during Covid-19. Mastery orientation seemed to have a direct positive effect on CSE, whilst no such effect was found in relation to performance orientation. No support for goal orientation to mediate the relationship between epistemic beliefs and CSE was found, neither was epistemic beliefs when this was applied as the mediator between goal orientation and CSE. Despite no major findings, some indications that goal orientation partly mediates the relationship between epistemic beliefs and CSE were present. This is something future studies should clarify. Implications and suggestions for future research is also discussed.

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PREFACE

This thesis marks the end of our five-year journey together at Oslo Metropolitan University, and represents our final piece of the puzzle of the Master's Program in Public Administration and Management. It has been filled many ups- and downs, especially this last year. Writing this thesis has made us especially aware of the many feelings we have encountered during the pandemic, and how it might affect us. Thankfully, as we embark on a new journey in the work life, we will look back at this time with warmth.

We would like to take this opportunity to offer our deepest gratitude toward our wonderful advisor Christina Nerstad. She has been our rock, who has cheered us on, both when we have encountered troubles and when things have progressed. She has offered us invaluable advice and she possess a professional competence and commitment out of the ordinary. She has truly been an inspiration.

We would also like to thank our families who has cheered us on from the sidelines. Finally, we are grateful toward each other. Having a partner to rely on and who offers support, both in private and in academic settings, has been invaluable. We have been working together right from the start, thus developed a great academic and private partnership which we will treasure forever.

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INTRODUCTION

In the beginning of 2020, the world as we knew it changed. As Covid-19 rapidly spread around the world, many countries were put on lock-down, and the changes in people's lives almost occurred overnight. Norway implemented the most intrusive measures since World War II, which had a great impact on people's personal and professional freedom (Regjeringen, 2020). As a way to reduce the spread of infection many people around the globe were placed on stay-at- home-confinement, and social distancing quickly became the new normal (Granda-Vera et al., 2020). Bars, restaurants, stores, hotels amongst other businesses closed, people had to start to work from home and schools as well as colleges and universities closed (Regjeringen, 2020). The full extent of the consequences is yet unknown but are expected to be profound. As these measures were implemented many experienced sleep deprivations, isolation, anxiety, family- and work-related stress as well as other health issues (Majumdar et al., 2020). As universities and colleges changed their lectures to online classes and almost eliminated physical attendance (Majumdar et al., 2020), students around the country all experienced different challenges. The prerequisites for students varied. As the pandemic spread, not only were people's lives at stake, but it also had a great influence on people's psychological health, and students were no exception (Duan & Zhu, 2020).

In regard to this thesis the focus will be toward the student's belief in their college self-efficacy (CSE), in other words, the students beliefs in their ability to perform in college related settings (Solberg et al., 1993). More precisely, we wish to examine student's mastery- and performance orientation to goal achievements, and the predictive or mediating role of epistemic beliefs. Whilst mastery and performance orientations refers to beliefs about ability and the amount of effort an individual puts into a task (VandeWalle et al., 2001), epistemic beliefs refers to individuals beliefs and views about knowledge (Paechter et al., 2013).

We also want to explore the possible influence this may have on students perceived CSE before and during a pandemic. It can be considered necessary to possess self-efficacy (SE) during challenging conditions (Bandura, 1997). Having a high degree of SE has been argued to serve as a counteracting factor to reduce feelings of stress, anxiety and other health issues (Bandura, 1997). Self-efficacy concerns how individuals are able to assemble the motivation and cognitive resources needed to perform well in a particular domain, and believing that they are able to do so (Wood & Bandura, 1989). There can be several factors that may affect whether or not a student is able to keep up with study progression, and whether or not they are able to perform at the level as they intended during a pandemic (Smith et al., 2021). Having a high degree of SE can be beneficial during hardships, as it has been

claimed to serve as a counteracting effect of negative emotions (Bandura, 1997). A student's CSE is believed to be related to their academic performance (Yokoyama, 2019). As mentioned, CSE concerns the degree of confidence students have in their ability to successfully perform a variety of academic related tasks (Barry & Finney, 2009).

There are several scholars within the field of achievement goal theory (AGT) that claims that there is a linkage between goal orientation and SE (Huang, 2016). For example, Perry and Gully (1997) found indications that a person's goal orientation has an impact on SE. Their findings suggested that those with a mastery orientation have a higher degree of SE than those with a performance orientation (Phillips & Gully, 1997). Achievement goals concern the aspects in which individuals, in this case students, take when pursuing competence- and achievement relevant tasks and assignments (Bardach et al., 2020). There are generally two goal approaches a person can take, mastery- or performance orientation. We are aware of the 2 X 2 AGT approaches that has arisen in later times, which include mastery- and performance-avoidance (Ames & Archer, 1988; Elliot & McGregor, 2001; Elliot et al., 2005; Nicholls, 1984). However, these differ from Nicholls (1984; 1989) framework, from which we derive from. Although different scholars use different labels, Nicholls (1984; 1989) propose that achievement orientation model contains ego- and task orientation. Ego-orientation, which will hereafter be referred to as performance orientation, concerns when individuals wish to affirm their competence in relation to other individuals' abilities, which means an other-referent standard (Nicholls, 1984). Task-orientated individuals, task-orientation will hereafter be referred to as mastery orientation, will on the other hand strive to develop and improve competence in relation to their own abilities, which means a self-referenced standard (Nicholls, 1984).

It has been argued that goal orientation can influence the way individuals approach learning and knowledge (Lin & Tsai, 2017). Therefore, it can be considered important to include one´s beliefs regarding knowledge (i.e., a person's epistemic beliefs), when investigating CSE and goal orientation. Epistemic beliefs concern how people attain, shape, understand, justify, adapt, and use knowledge in different contexts (Greene et al., 2016). Scholars have not yet reached a consensus regarding if a person's epistemic beliefs affect which approach motivates them in their goal attainment (i.e., performance- or mastery oriented) or if a person's goal orientation influences to what extent a person holds a naïve or a sophisticated approach towards knowledge (i.e., epistemic beliefs) (Bråten & Strømsø, 2004; Nicholls, 1984). By examining possible linkages between the above aspects, our study intends to contribute to fill a gap in the literature of epistemic beliefs, as several scholars have

requested more studies regarding this (see e.g. Bråten & Strømsø, 2004; Greene et al., 2016; Paechter et al., 2013). Another intended contribution of our study is to clarify the impact an extraordinary situation, like the current pandemic, has on what students believe they can master, and if their goal orientation has an impact on their CSE (Granda-Vera et al., 2020; Huang, 2016; Ricco et al., 2010). In order to examine this, we will present theory of which our hypotheses are based on.

THEORY AND HYPOTHESES

Self-efficacy

It is in human nature to try to control events that may have an impact in one's life. In the course of the years the progress and enhancement of knowledge has given people the ability to affect and control events that may occur (Bandura, 1997). When important events like a pandemic happen, it is not uncommon that uncertainty follows (Granda-Vera et al., 2020). The ability, or inability, to affect different types of events has an impact in regard to how people respond (Pajares, 2006). When people experience a lack of control and predictiveness it may lead to despair, apathy, anxiety and worry (Bandura, 1986). Studies suggest that having a high degree of SE can prevent these feelings (Bandura, 1997).

Social cognitive theory (SCT) is a theoretical framework that propose that the success or failure of individuals is dependent on the interaction between one´s personal factors, the environment of which they are in, as well as one´s behavior (Bandura, 1986; Schunk & Pajares, 2002). According to SCT, SE is considered one of the most important motivational factors (Schunk et al., 2014). SE can be described as how individuals are able to assemble the motivation and cognitive resources needed to perform well in a particular domain, and believing that they are able to do so (Wood & Bandura, 1989). It does not only involve how to control one's own actions and surroundings, but also how to control what motivates oneself, the thought process and physiological emotions (Bandura, 1997). The concept of SE has received a lot of attention within different fields, higher education is no exception. In regard to higher education, SE is commonly known as college self-efficacy (CSE). CSE concerns the degree of confidence students have in their ability to successfully perform in a variety of college-related tasks (Barry & Finney, 2009). Although having a high degree of CSE is likely to be highly related to the outcome expectations, it is not always the case as there in some instances have been reported that students may very well have a high degree of CSE but a low outcome expectation (Schunk et al., 2014). This may vary based on situational circumstances such as for example perceived competence of co-students or other factors such as race, gender and ethnicity (Schunk & Pajares, 2002; Schunk et al., 2014). This was supported in a meta-

analysis performed by Huang (2012), where they sought to find if there were any differences between genders in regard to CSE. The meta-analysis included 187 studies with 247 independent studies, where the findings suggested that CSE varied between gender, age and was domain specific (Huang, 2012). Their findings indicated that men had a slightly higher overall CSE than females and that age was the most significant variable, as CSE seemed to grow with age (Huang, 2012).

There are several studies which indicate a positive relationship between CSE and academic performance (Gore, 2006; Honicke & Broadbent, 2016; Yokoyama, 2019). The higher degree of CSE a person possesses, the more likely it is that they also will perform well in academic settings (Yokoyama, 2019). This has been corroborated in a recent review and meta-analysis performed by Honicke and Broadbent (2016). Out of the 53 studies included in their meta-analysis, there were only six which had no evident correlation between CSE and academic performance (Honicke & Broadbent, 2016; Yokoyama, 2019).

According to Bandura (1997) there are four ways to develop self-efficacy beliefs, which can also be applied to CSE: (1) through *mastery experience*, as previously successful assignments or tasks can enhance perceived CSE for future situations, (2) through *vicarious experience* of observing others, by which it is possible to appraise one's capabilities by comparing to another individual or group, (3) *social persuasion* concerns how others have the ability to affect one's belief that one have the capabilities to perform or succeed in a task or domain, (4) *physiological and affective states* concerns how one is able to deal with positive as well as negative emotions, so that they can master different situations (Bandura, 1997; Solberg et al., 1993). Out of the four ways to increase and develop CSE, it is suggested that mastery experiences are the most powerful (Bandura, 1997; Joët et al., 2011). Having experienced success in academic endeavors can have a great impact in how one perceives one's CSE (Usher & Pajares, 2008). Gore (2006) found that CSE can predict student's perseverance as well as their performance, although when measuring CSE during the first semester, the students had not yet received feedback regarding their performance or their GPA. This can indicate that when CSE is measured early on, it cannot accurately predict performance or perseverance (Gore, 2006). However, when measuring CSE when students are further along in their study progression, CSE can more accurately predict student's perseverance performance (Gore Jr et al., 2005; Gore, 2006). Thus, their findings suggest that feedback, both verbal (i.e., social persuasion) and through receiving GPA (i.e., mastery experiences) may be important sources to CSE (Gore, 2006).

Being a student is demanding for most, being a student during a pandemic can be even more so (Cao et al., 2020). Research has suggested that students have a higher risk of experiencing depression, panic attacks, and anxiety during a pandemic than otherwise (Granda-Vera et al., 2020). Furthermore, this risk is even higher for those who have friends and family who have been diagnosed with the Coronavirus (Cao et al., 2020). Even though anxiety is considered to be indirectly related to academic performance, studies have suggested that it is directly related to perceived CSE (Bandura, 1986; Deer et al., 2018; Granda-Vera et al., 2020). Furthermore, a recent study suggested that experiencing a high degree of stress can affect and reduce CSE (Granda-Vera et al., 2020). Students are under constant pressure, as there are papers as well as other deadlines to uphold. Having to do these tasks with the extra pressure of a pandemic can lead to a stressful situation (Ozamiz-Etxebarria et al., 2020). This is an aspect that can contribute to a decrease in CSE. This goes in line with what Pajares (2006) wrote *"academic work should be hard enough that it energizes, not so hard that it paralyzes* (p. 344). In addition, Van Dinther and colleagues (2011) argued that negative mastery experiences are the strongest source when it comes to reducing CSE. In a study by Wang and colleagues (2020) they found that a majority of the participating students experienced some level of anxiety or depression. Some participants reported that a contributing reason for this, was the difficulty level that had arisen because of the switch to online classes and the increased worry about grades (Wang et al., 2020). These are contributing reasons as to why perceived CSE can be reduced during the pandemic (Granda-Vera et al., 2020). This goes in line with the notion that a decrease in self-efficacy can be related to mental health issues, as for example an increase in stress, worry and the feeling of inadequacy (Yıldırım & Güler, 2020). Perceived self-efficacy has an impact on if one tends to think in a negative or a positive way (Bandura, 1997). It can also affect how one endures difficult and stressful situations as well as how a person is able to motivate oneself (Benight & Bandura, 2004). It can be argued that several of the contributing aspects needed to develop a high degree of CSE has been removed during the pandemic. For example, the aspect of observing others and comparing performances has been decreased (Usher & Pajares, 2008). Also, considering the classroom setting has been moved online, the possibility to be socially persuaded of one's capabilities by teachers and peers, has also been reduced (Margolis & McCabe, 2006). Taking the above aspects into account, combined with the circumstances a pandemic brings forth, we hypothesize the following:

Hypothesis 1. Students will experience a decline in college self-efficacy (course and social) from pre Covid-19 to during Covid-19.

Mastery- and performance orientation

Achievement goal theory (AGT) is a prominent framework that describes and provides an understanding of personal achievement goals (Bardach et al., 2020). According to AGT, individuals have developed a predisposition in regard to if they are mainly performance- or mastery oriented, as they have different goals and purposes when they engage in different achievement situations (Ames & Archer, 1988; Nicholls, 1984). Goal orientations should not, however, be perceived as traits or dependent on needs (Nerstad et al., 2018; Roberts, 2012). Still, they are viewed to be somewhat stable over time (Nerstad et al., 2018). Mastery orientation can be described as the willingness to develop one's competence by doing the best to acquire new skills and knowledge (Duda, 1989; Nicholls, 1984). On the other hand, performance orientation is associated with behaviors where people seek to show their superiority by displaying their knowledge and abilities over others (Janssen & Van Yperen, 2004; Nicholls, 1984).

It is believed that goal orientations vary depending on the situation in which a person is in, and it can also vary across individuals (Ames & Archer, 1988). Research suggests that this also pertains to students in classroom situations (Ames, 1992). There are several factors that can affect whether a student is mastery- or performance oriented, for example the students background, previous experiences, or unequal treatment by teachers (Ames & Archer, 1988). There are several factors that are viewed as related to goal orientation, CSE is one of them (Smith et al., 2002). For example, Anderman and Maehr (1994) argues that one´s self-efficacy is dependent on which goal orientation is dominant. In addition, Schunk and colleagues suggests that those who value learning (i.e., are mastery oriented) will also increase their self-efficacy (Schunk et al., 2014).

Being mastery oriented can, according to several studies, be beneficial in several ways (Ames & Archer, 1988). For example, students may view challenging assignments as a positive way to develop and it can make them more willing to seek out challenging tasks (Ames & Archer, 1988). On the other hand, taking on challenging assignments increases the risk of failure, and if failure occurs this could affect how students view their mastery experiences, which in turn could decrease their perceived CSE (Covington, 1984; Schunk et al., 2014). Tuominen- Soini and colleagues (2008) found that a person's goal orientation could affect other aspects of an individual's life. For example, those who were mainly mastery oriented seemed to be generally more satisfied and experienced more commitment towards tasks and assignments (Tuominen-Soini et al., 2008). In a meta-analysis, which included over 100 research reports and 16.000 participants, they found strong indications that when a person

is in an achievement context, as it can be argued that students are in, mastery orientation can be considered to be more beneficial than those who are performance oriented (Cellar et al., 2011). This is likely because of the many positive self-reactions that elicits from having mastery orientation (Cellar et al., 2011). In another meta-analysis by Huang (2016), it was suggested that there is a moderate to strong mean correlation between mastery orientation and SE. Also, students who are mainly mastery oriented are more likely to maintain a high degree of CSE when challenging assignments and tasks occur, than do those who are mainly performance oriented (Niemivirta et al., 2019). Cellar and colleagues (2011) performed a meta-analysis in which they found that a mastery orientation influences the frequency of, amongst others, SE (Cellar et al., 2011). In addition, a mastery orientation is believed to be positively related to perseverance, self-regulated learning, positive affect, coping and deep-level learning strategies (Kaplan & Maehr, 2007). Furthermore, qualitative research has suggested that those who are mastery oriented are more inclined to cooperate with others (Levy et al., 2004). Dunlap (2005) suggests that collaborating with peers can increase CSE as it can be considered to be a vicarious experience. It can therefore be argued that mastery oriented students are more likely to cooperate with their peers during for example a pandemic, which in turn can help them persevere. A meta-analysis performed by Payne and colleagues (2007) indicated that mastery orientation could be beneficial during organizational changes, as this could bring an opportunity to develop and learn new skills. This is corroborated in a study by Ahearne and colleagues (2010) as they found mastery-oriented individuals to be more adaptive to change, because of their innate will to learn and conform. Taking above arguments into account and the fact that a global pandemic is considered to be an upheaval in people's life, and has a profound effect on everyone's way of living, where students are not excepted (International Labour Organization, 2021), we propose the following hypothesis:

> *Hypothesis 2a: There is a positive direct relationship between student's mastery orientation pre Covid-19 and their college self-efficacy (course and social) during Covid-19.*

In the previously mentioned study by Touminen-Soini and colleagues (2008), they suggested that performance oriented individuals may persevere and put in an extra effort during assignments in the short run. However, they were also more inclined to suffer from stress, fatigue and could have a more negative attitude (Tuominen-Soini et al., 2008). Elliott and colleagues (2005) performed an experiment, wherein their findings indicated that performance orientation can be beneficial in situations where for example an assignment is considered to be dull or when an external source provides feedback (Elliot et al., 2005). In

addition, a study by Meyer and colleagues (1997) suggested that when for example performing repetitive tasks and assignments, performance orientation could be more beneficial than mastery orientation (Pulkka & Niemivirta, 2013). Being performance oriented, has by some researchers been indicated to be related to positive achievement emotions (Barron & Harackiewicz, 2001). Benefits of having a performance orientation can be an increase in task focus, pride and effort intensity (Senko & Dawson, 2017). Still, the influence of this orientation can be contradictory, as it can lead to self-handicapping, shallow learning strategies and effort withdrawal (Senko & Dawson, 2017). In addition, performance orientation is believed to cultivate an external focus on evaluative surroundings and on what is needed to acquire competence (Ames, 1992; Kaplan & Maehr, 2007). However, the positive impact of being performance oriented is an ongoing debate amongst scholars (Kaplan & Maehr, 2007).

Dweck & Leggett (1988) argued that there does not seem to be a noticeable difference between individuals who are performance oriented and those who are mastery oriented when they conduct tasks and assignments that are going well. However, when the same people experience difficulties while executing tasks, and this elicited disbeliefs regarding their competence, those who were mastery oriented were more adamant than those who scored higher on performance orientation in the pursuit of finishing the assignment (Vandewalle et al., 2019). In the study by Huang (2016) the findings indicated not only a moderate to strong correlation between mastery orientation and SE, but also a positive, but weak, relation between performance orientation and SE (Huang, 2016). When students perceive themselves to be in challenging conditions, performance oriented individuals seem to be less able to adapt to the psychological demands being elicited from the situation (Niemivirta et al., 2019). Furthermore, performance oriented students and students with a low degree of CSE are considered more sensitive to achievement worry and seem to be more inclined to avoid taking on difficult assignments (Bandura, 1993; Tuominen-Soini et al., 2008). Therefore, it is possible that they will tackle a crisis like a pandemic worse than those with a high degree of perceived CSE, as well as those with a mastery oriented approach. In addition, as performance oriented students are concerned with other people viewing them as smart and successful in order to feel superior (Kaplan & Maehr, 2007; Schunk et al., 2014), and this aspect is likely to be reduced because of the pandemic and less interaction with other people, it may lead to a decrease in CSE. Finally, Ahearne and colleagues (2010) found that performance oriented individuals are less adaptive to change. A possible explanation for this could be that performance oriented individuals focuses on shallow learning and routines

(Ahearne et al., 2010). During a pandemic, routines can be hard to follow as changes can occur more frequently (Granda-Vera et al., 2020). Based on the above arguments we hypothesize the following:

> *Hypothesis 2b: There is a negative direct relationship between students' performance orientation pre Covid-19 and their college self-efficacy (course and social) during Covid-19.*

The predictive or mediating role of epistemic beliefs

Epistemic beliefs concern how people attain, shape, understand, justify, adapt, and use knowledge in different contexts (Greene et al., 2016). The groundwork for the development of epistemic beliefs in students was conducted by Perry (1970). His research suggested that when students started higher education, they had a conception that knowledge was certain, simple and handed down by professors and other authority figures (Schommer, 1990). The tradition in the domain of educational psychology was continued by Schommer, her focus was not only on beliefs about learning and ability, but also on beliefs about knowledge (Schommer, 1990). Further, in her research she hypothesized that there are five dimensions to epistemic beliefs; (1) the structure of knowledge, which refers to whether or not knowledge is simple or complex, (2) the certainty of knowledge, which refers to whether or not knowledge is stable or a constant process, (3) the source of knowledge, which refers to where the knowledge is acquired from, (4) the control of knowledge, which refers to a continuum ranging from where a person considers the capability to learn is fixed or that it can be developed over time, and (5) speed of knowledge acquisition, which refers to a continuum where a person considers learning must happen fast or not at all, to gradually and over time (Paechter et al., 2013; Schommer, 1990). In most models of epistemic beliefs, the dimensions, structure, stability and source are considered the foundation of epistemic beliefs (Paechter et al., 2013). However, Greene and colleagues (2008) argue that stability and structure should not be seen as two separate dimensions. Even though it does not seem as scholars have reached a consensus, epistemic beliefs can at least contain the following four dimensions; *structure*, *speed*, *control* and *source* (Paechter et al., 2013). In regard to this article, it is these dimensions of which the questionnaire that has been used is based on. It has been argued that in addition to epistemic beliefs, an individual's goal orientation also influences the nature of learning (Bråten & Strømsø, 2004; Pintrich, 2000b). Therefore, this thesis will present two competing hypotheses in the following section.

Epistemic beliefs and goal orientation. According to Greene and colleagues (2008), the research that supports Schommers (1990) framework suggests that epistemic beliefs have

a positive relationship with motivation (Chen & Barger, 2016). Previous studies indicate that when students develop a sophisticated epistemic belief, it can also lead to an increase in students' motivation (Chen & Barger, 2016). Sophisticated epistemic beliefs refer to having highly developed and advanced epistemic thinking (Elby & Hammer, 2001). This could for example be when an individual is able to question what is being taught by authorities, believe that learning is a process which in fact can take time, and that it is possible to develop learning skills, and finally, that knowledge is complex, - in many instances there is no wrong or right answer (Lunn Brownlee et al., 2017). It is considered possible to change epistemic beliefs (Schommer, 1990). In situations where an individual has adopted a performance orientation and has a high degree of sophisticated epistemic beliefs, but fails on a task or assignment, this can lead to a change in their epistemic beliefs wherein they can start to question their knowledge and abilities (Lin & Tsai, 2017; Nicholls, 1984). In other words, one's epistemic belief may be determined on which goal-orientation one has.

There are studies that suggest that factors such as for example age and educational level can increase the level of sophistication in regard to epistemic beliefs (Kienhues et al., 2016; Paechter et al., 2013). Further, in Bråten and Strømsøs (2004) research, they found indications that students who held naïve epistemic beliefs (i.e. those who view knowledge as simple, certain and handed down by authority (Schommer, 1990), were less inclined to be mastery oriented in their academic endeavors (Bråten & Strømsø, 2004). They also found indications that those who believed that knowledge must happen quickly, otherwise they will never learn, were less likely to adopt a mastery orientation (Bråten & Strømsø, 2004). In addition, their findings suggested that epistemic beliefs had a greater influence in regard to students' goal adoption, than implicit theories of intelligence (Bråten & Strømsø, 2004). Implicit theory of intelligence refers to the notion that it is possible to develop and improve one's intelligence by working hard and making an effort (Dweck & Leggett, 1988). In Muis and colleagues (2009) research, they also found indications that epistemic beliefs can impact which goal orientation an individual adopts. Based on the notion that epistemic beliefs can affect which goal orientation an individual adopts, we propose the following hypothesis:

> *Hypothesis 3a: An individual's goal orientation (mastery and performance) mediates the relationship between epistemic beliefs (speed, control, structure and source) pre Covid-19 and college self-efficacy (course and social) during Covid-19* (see Figure 1).

When epistemic beliefs are developed is not clear, however a conservative estimate regarding its developmental phase has proposed that it starts during early adolescence (Ricco et al., 2010). Although scholars do not seem to agree whether epistemic beliefs or goal

orientations comes first, they do agree that epistemic beliefs have a relationship with students' learning behaviors (Paechter et al., 2013). For example, it has been proposed that when individuals hold a mastery orientation, they are more inclined to develop sophisticated epistemic beliefs (Muis et al., 2006; Ricco et al., 2010). Further, a Japanese study was able to predict the epistemic beliefs of Japanese university students in regard to English learning, based on which type of achievement goal they had adopted (Nakayama et al., 2012). Also, Lin and Tsai (2017) wrote in their article: *"Pintrich (2000a) pointed out that achievement goals considerably influence the nature of learning, as students with a mastery goal in an area are more likely to engage with material as they seek new information to further their understanding"* (p. 2383). Although it is not apparent how to interpret Pintrich (2000a) article regarding if goal orientations influence epistemic beliefs or if it is the other way around, Lin and Tsai (2017) seemed to interpret his article if goal orientation influences the nature of learning (i.e., epistemic beliefs). In addition, Schommer-Aikins and colleagues (2000) proposed that achievement goals seem to emerge earlier in the developmental phase than epistemic beliefs. This goes in line with how we interpret Nicholls (1979) proposition, where he mentions that goal orientation comes before the nature of learning. Finally, Nicholls (1979) argues that goal orientation appears early in development and is considered an important part of intellectual development. Based on the above, we propose the following hypothesis:

> *Hypothesis 3b: Epistemic beliefs (speed, control, structure and source) mediate the relationship between individual goal orientation (mastery and performance) pre Covid-19 and college self-efficacy (course and social) during Covid-19* (see Figure 2).

Figure 1. *Goal Orientation as a mediator*

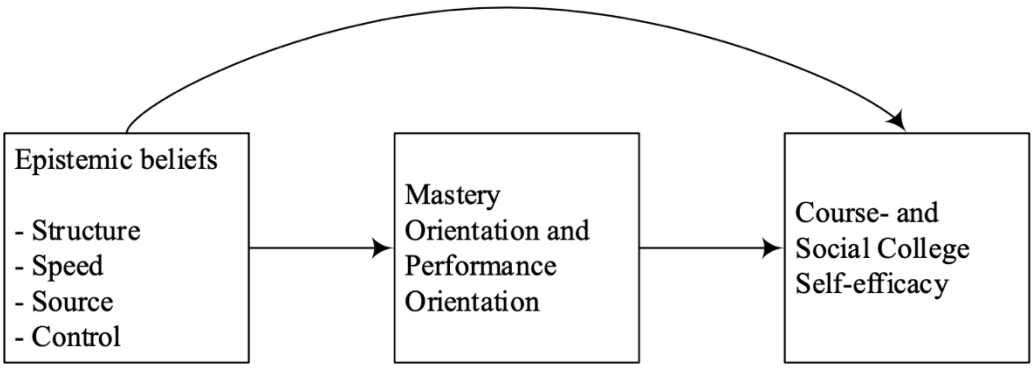
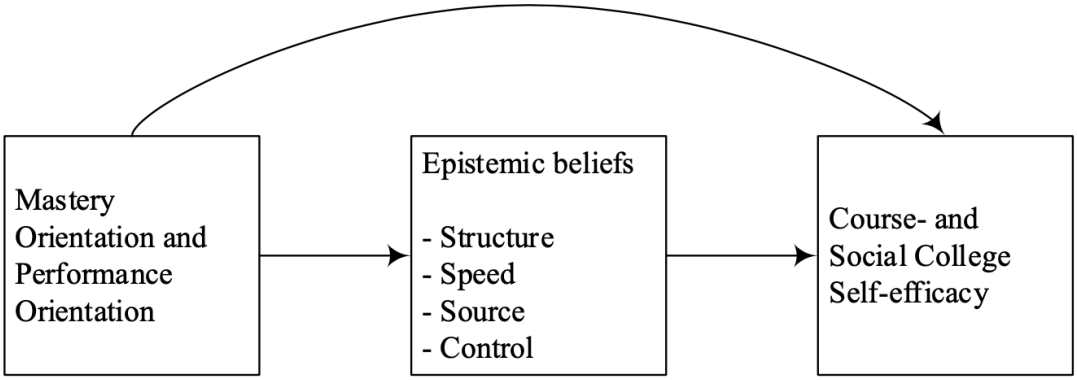


Figure 2. *Epistemic Beliefs as a mediator*



METHOD

Natural experiment

In this chapter we will account for and discuss the methodological choices we have made to address our hypotheses. We got access to data that were collected in a research project where we worked as research assistants. This was before the Covid-19 pandemic spread around the world. We continued to collect data during the pandemic, which made a natural experiment a suiting design methodology. A natural experiment can be used under situations where a researcher does not control the intervention on the population but is able to observe and hopefully explain the phenomena (Leatherdale, 2019). Also, the researchers can only observe what happens without the ability to manipulate it (Remler & Van Ryzin, 2014). Considering we had access to data which were collected before the pandemic, we had what is called a pretest or a before measure. This is needed in order to make comparisons with the data collected after the natural intervention took place (i.e., a posttest) in a natural experiment (Remler & Van Ryzin, 2014). This is also known as difference-in-differences (DiD) (Yang et al., 2020). In terms of this thesis, the students who completed the questionnaire prior to the pandemic are considered the pre-intervention group (Time 1) for the natural experiment. The same group of people were later asked to participate in the study twice during the pandemic (Time 2 and Time 3). Hence, they are viewed as the post-intervention group. Taking into account that we are comparing the differences between Time 1, Time 2 and Time 3, this is a strong suitable design (Leatherdale, 2019). Naturally, we cannot affect a pandemic, but we can try to understand how the pandemic has influenced students.

Participants and procedure

The data collection started in the fall of 2019. The project was evaluated and approved by Norwegian Social Science Data Services (NSD) to make sure that ethical standards were preserved (see Appendix G). In the application it was described how the collection process would precede, and what the planned sample, procedure and questionnaire would look like. The project was evaluated and approved. Participants were recruited from different fields of study of the student population at a university after getting approval and access from the administration. Hereafter, a questionnaire was distributed to the students via email. Most students got the opportunity to respond to the questionnaire during teaching sessions. This approach was chosen to increase the response rate. It was emphasized by the research assistants who went around to each class that the participation was voluntary. First year students from various study programs were invited to participate in the study (see Appendix H). By using the web-based tool Qualtrics, the Time 1 questionnaire was sent out to 1983 students, out of which 1190 completed the questionnaire. The study was repeated 3 times with a time gap of five months between each timepoint. By including a time gap, it was possible to detect differences in the respondents' answers. Also, doing this would reduce possible common method bias (Podsakoff et al., 2012). Method bias refers to the possible bias that may occur when different constructs are measured with the same method, as it may create some degree of covariation (Podsakoff et al., 2012). At Time 1 we received a response rate of 60 %, which entails 1190 individual responses. At Time 2 the response rate was 55 %, which sums up to 692 individual responses. At Time 3 which was during the pandemic, the response rate was 17 %, which sums up to 218 individual responses. Out of the 1251 students who participated in the current study, 72 % were females whereas 27 % were male, whereas 1 % identified as other. The age of the respondents varied from 20 to 55 years with a mean age of 24.5 (*SD*=4.75).

Measures

All variables included in this thesis were measured at each measurement occasion. All questions included in the questionnaire was translated from English to Norwegian with the translation-back-translation approach, which is used to control the quality of the translation (Tyupa, 2011).

College Self-Efficacy

We measured CSE by using Solberg et al. (1993) College Student Self-Efficacy Inventory (CSEI), validated and modified by Barry and Finney (2009). This inventory measures self-efficacy for the college endeavor as a whole, and not only specific college-related task. It was originally developed to include three factors, course, roommate and social

(Barry & Finney, 2009). However, the roommate aspect of the measurement inventory has been excluded in this questionnaire, thus leaving an 11-item measurement instrument. Course CSE entails how confident the students are in their ability related to course performance issues (Solberg et al., 1993). The respondents were for example asked, "how confident are you as a student that you could successfully complete the following tasks" where they were presented with different statements such as for example "research a term paper" or "keep up to date with your schoolwork". Social CSE involves the social interactions that takes plays in an academic setting (Barry & Finney, 2009). Questions related to this factor was for example, "ask a professor a question". The respondents answered on a 10-point Likert scale ranging from 1 "not at all confident" to 10 "extremely confident".

Goal orientation

To measure goal orientation we used the measurement instrument developed and validated by VandeWalle (1997). Based on the notion that we follow Nicholls´(1989) theoretical framework, we have excluded the five items measuring avoidance. Hence, the questionnaire included four items measuring mastery orientation, such as for example "I truly enjoy learning for the sake of learning". It also included four items measuring performance orientation such as for example "It is important that others know that I am a good student". To answer these statements the respondents were asked to indicate the extent to which they agree using a 7-point Likert Scale, ranging from 1 "strongly disagree" to 7 "strongly agree".

Epistemic beliefs

Students' epistemic beliefs were measured using the Oldenburg Epistemic beliefs questionnaire (OLEQ). The questionnaire is validated by Paechter and colleagues (2013), which is based on the Epistemic Beliefs Inventory (EBI) developed by Schraw and colleagues (2002). EBI is based on the Schommer Epistemological Questionnaire (SEQ) first developed by Schommer (1990). However, Nerstad et al. (2020) modified the questionnaire by developing new questions and adding original questions from SEQ. In terms of this thesis, we draw on Greene and colleagues (2008) as well as Paechters (2013) notion that epistemic beliefs are represented by the four dimensions speed, structure, control and source. Hence, the dimension "stability" from the Schommers framework is excluded. To measure each dimension, the respondents were asked to indicate how strongly they agree with different statements on a 7-point Likert-scale ranging from 1 "strongly disagree" to 7 "strongly agree". Structure was measured by three items as for example" too many theories just complicate things". Speed was measured by six items, as for example "if you don't learn something quickly, you won't ever learn it.". To measure control, we used four items such as for

example “smart people are born that way”. Finally, source was measured using five items as for example “usually you can rely on the knowledge of instructors”.

Control variables

To rule out alternative explanations for the observed findings, we controlled for demographic variables such as age and gender. Age was estimated in years since birth, whilst the dichotomous variable gender was coded 2 for male and 1 for female. Previous studies suggests that age and gender can influence the level of sophistication in regard to epistemic beliefs (Kienhues et al., 2016). However, scholars have not yet reached a consensus regarding this, and it has also been argued that for example gender can play an undetectable role in epistemic beliefs (Chen & Pajares, 2010). Furthermore, in a meta-analysis by Huang (2012) it was suggested that gender differences in the level of CSE can vary with age. It is therefore important to control for these variables as they may influence our results. It has been proposed that younger children are more inclined to be mastery oriented and that mastery orientation can decline with age (Schunk et al., 2014; Shim et al., 2008). However, research has also suggested that individuals might change from performance orientation to mastery orientation the older they get, as they can learn to appreciate and take advantage of new knowledge and abilities (Burley et al., 1999). Also, Nicholls (1990) argues that younger adults are more sensitive to social comparison than older adults which can make them more vulnerable to performance related cues (Bardach et al., 2020). Therefore, it is reasonable to include age as a control variable. In addition, it has been argued that having a performance- or mastery orientation to some degree is gender related (Bardach et al., 2020; Kenney-Benson et al., 2006). We therefore included gender as a control variable.

Pre-test, Post-test and Experimental conditions

For this thesis we base our analyses on data from three time points, that is before and twice during the pandemic. Time 1 occurred before the pandemic, hence the students were unaffected by the natural experiment condition. The students completed the pre- and post-test of CSEI scale developed by Barry and Finney (2009). This was done in order to capture the participants confidence in college related tasks. Sample items included how confident they felt to “Do well on exams”, “Ask a professor a question”. The estimated reliability of the pre-test of course CSE was $\alpha = .86$ and $\alpha = .89$ for social CSE, post-test reliability was estimated to $\alpha = .89$ for course CSE, whilst social CSE was estimated to $\alpha = .91$. To capture the students goal orientation, participants also completed the pre- and post-test of goal orientation scale developed by VandeWalle (1997). Sample items included “I prefer challenging and difficult classes so that I’ll learn a great deal” and “I think that it’s important to get good grades to

show how intelligent you are". Reliability for pre-test of mastery orientation was estimated to α=.72, whilst post-test reliability was estimated to α=.84. Reliability for pre-test of performance orientation was estimated to α=.73, whilst post-test reliability was estimated to α=.84. Finally, in order to measure the student's beliefs about knowledge (i.e. epistemic beliefs), they completed the pre- and post-test of the OLEQ validated by Paechter and colleagues (2013). Sample items included "Even if you learn slowly, you can understand the essence of a topic" and "Most things in textbooks are trustworthy". However, as only Time 1 and Time 2 of epistemic beliefs was included in this study, the results of the reliability of pre- and post-test is only accounted for in Table 1. The experimental conditions in regard to this thesis is the Covid-19 pandemic that spread after data was collected after Time 1. When events like a pandemic occurs, no one will be unaffected (International Labour Organization, 2021). The experimental conditions offers the ability to capture the surrounding conditions as it is, and how it might affect the variables (Leatherdale, 2019).

Statistical analyses

To test the hypotheses, IBM SPSS 27 was used to conduct the analyses. The dataset was screened before conducting the analyses in order to detect missing values and outliers. We did find some outliers, however, when reviewing them we did not view them as having a tremendous impact on our results. Usually when outliers are detected and believed to influence the mean score, when it is possible that they are a procedural error such as a typing error, the outliers can be removed (Hair et al., 2010; Thrane, 2017). However, when uncertain about whether it is a typing error or not, they can be accommodated by inserting the mean score of their respective categories. This can be done in order to not reduce the generalizability of the results (Hair et al., 2013). The decision was made to keep the outliers, as they might offer valuable information that can be part of the study area (Hair et al., 2013).

Exploratory Factor Analysis

To make sure the items measured what they were supposed to measure and to establish discriminant and convergent validity, an Exploratory Factor Analysis (EFA) was performed (Farrell, 2010). Although factor loadings higher than .40 is usually applied as a criterion (Kiffin-Petersen & Cordery, 2003), we applied a somewhat stricter criterion of .50 (Nunnally & Bernstein, 1994). Thus, excluding all items with a factor loading below the threshold of .50 (Field, 2013). This is in accordance with what is considered a meaningful factor loading (Sass, 2010). To decide how many factors to include, only those with eigenvalue one or higher were retained (Larsen & Warne, 2010). This is in accordance with the Guttman rule (Guttman, 1954). In order to test for internal consistency reliability, Cronbach's alpha was the

chosen measure. As a rule of thumb, the lower limit should not go below .70 (Tufte, 2018). Although some of our factors had low reliability we still chose to move forward, and also adding extra items. This led to a somewhat acceptable reliability. Still, the results connected to these items should be interpreted accordingly. Even though the measurement instruments have been validated, future studies should clarify this further. Further, a Principal Component Analysis (PCA) with a promax rotation was conducted with the remaining epistemic beliefs factors at Time 1. Performing a promax rotation is preferable when checking correlated factors (Dien, 2010; Osborne, 2015). For the remaining analyses we conducted a Principal Axis Factoring. This was done in order to recover weak factors (De Winter & Dodou, 2012).

ANOVA

In order to test Hypothesis 1, we performed an ANOVA analysis. Taking into account that the data was collected from the same group of people on different occasions, but under different conditions this approach was appropriate. This is a fitting technique when having data collected before and after the participants are exposed to experimental conditions (Pallant, 2016). By performing an ANOVA-analysis, it was possible to detect if the pandemic had an influence on the students CSE and if there was a statistically significant difference between Time 1, Time 2 and Time 3 (Pallant, 2016).

Multiple Regression Analysis

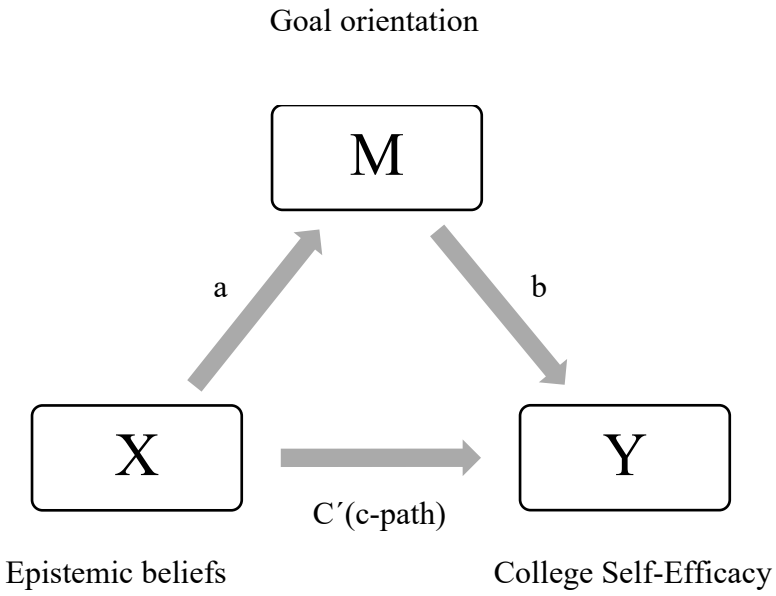
To test the direct relationship between goal orientation and CSE, we performed a Multiple Regression Analysis. This was done to test Hypotheses 2a and 2b. This approach made it possible to detect the linear relationship between the independent variable, in this case the students' goal orientation, and the dependent variable CSE (Hayes, 2017; Pallant, 2016). Note that the direct relationship between epistemic beliefs and CSE was not further examined in this thesis because previous research has already established this connection (Tsai et al., 2011).

Mediation analyses with Process

To test Hypothesis 3a the analyses were based on a simple meditating model in PROCESS macro, where the bootstrapping method was included (Hayes, 2017). Using this approach, it was possible to test and evaluate the evidence collected from the study, where first goal orientation was hypothesized to be a mediator in the epistemic beliefs - CSE relationship. This made it possible to detect how the causal variable epistemic beliefs (X) transmits its effect on the consequent variable CSE (Y) mediated by goal orientation (M) (Hayes, 2017). By doing this it is possible to detect if the pathway leads directly from X to Y without passing M (i.e., direct effect of X on Y), or if the pathway leads from X to Y through

M (i.e., indirect effect of X on Y) (see Model 3) (Hayes, 2012). By also applying the bootstrapping method, we achieved a 95 % confidence interval (Preacher & Hayes, 2004). Confidence interval refers to what degree of certainty we can say that the interval contains the population value (Tufte, 2018). By doing this, we were able to consider the variation in the sample. Bootstrapping refers to the use of random sampling that generates new datasets which is then resampled 5000 times (Hayes, 2012). This will provide estimates of the confidence interval, which allows us to examine how stable the results are (Hayes, 2017). When the confidence interval goes from minus to plus it suggests that the results is not significant (Hair et al., 2013).

Model 3. *Simple mediating model*

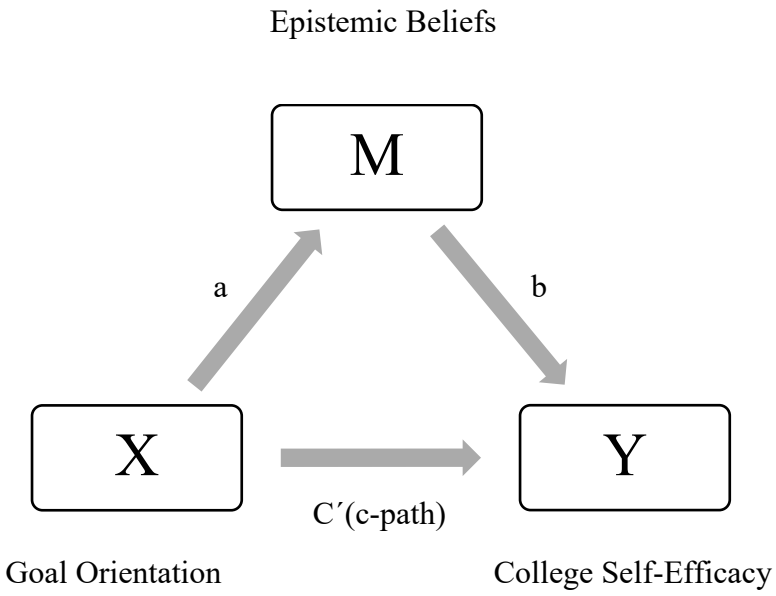


Note: A simplified presentation of our reversed model, wherein epistemic beliefs contain four dimensions, goal orientation contains two dimensions, and CSE consists of two dimensions.

Test of reversed causality. As the literature regarding epistemic beliefs is two-folded, we then tested a model where epistemic beliefs were used as the mediator. The same procedure as presented above was applied to test Hypothesis 3b. This made it possible to detect how the causal variable goal orientation (X) transmits its effect on the consequent variable CSE (Y) mediated by epistemic beliefs (M) (Hayes, 2017). By doing this it is possible to detect if the pathway leads directly from X to Y without passing M (i.e., direct effect of X on Y), or if the pathway leads from X to Y through M (i.e., indirect effect of X on Y) (see Model 4) (Hayes, 2012). The reason for this is that no consensus has been reached

amongst scholars regarding if epistemic beliefs or goal orientation comes first (see e.g.,Bråten & Strømsø, 2004; Muis & Franco, 2009; Nicholls, 1979). By testing for both models, it helped check the robustness of our model (Sieweke & Santoni, 2020).

Model 4. *Simple mediating model*



Note: A simplified presentation of our model, wherein goal orientation contains two dimensions, epistemic beliefs contain four, and CSE consists of two dimensions.

RESULTS

Given the challenges met so far with respect to measuring epistemic beliefs, and the fact that we applied a recently validated German scale of epistemic beliefs, the Time 1 data were applied to test the rigor of the epistemic belief's items. The validation study also states that it is important to develop additional items for some of the sub dimensions (Paechter et al., 2013). We therefore had to use the Time 1 data collection to find out which dimensions would need further development (DeBacker et al., 2008; Greene et al., 2016).

When performing an EFA (principal components) with promax rotation at Time 1, items 2, 4 and 5 measuring the dimension speed from epistemic beliefs were found to be negatively framed, these were therefore recoded. Thereafter, another EFA was performed with the inclusion criteria .50, thus excluding speed items 1, 7, 9, control item 3, structure item 3 as well as source item 3 from further analysis at Time 1 (see Appendix A). The means for each factor was calculated based on the items that had a factor loading above .50. When testing the factor structure of course- and social CSE, mastery orientation and performance

orientation, we excluded item mastery orientation 2 from Time 1 because the factor loading was below.50 (see Appendix B).

Based on the EFA from Time 1 it was necessary to follow the recommendations from Paechter and collegues (2013) and develop additional items for two of the epistemic beliefs sub-dimensions. The additional items were developed by the research group led by Nerstad. Three items were added to the dimension source (source 3,4 and 5), and one item was added to the dimension structure (structure 3). Taking into account that this thesis contains several analyzes based on different timepoints, we performed principal axis factoring EFA with promax rotation at Time 2 to be able to check factor loadings and discriminant validity. In order to recover weak factors, we changed from principal components to principal axis factoring EFA (De Winter & Dodou, 2012). The EFA showed that some of the items were negatively loaded, thus it was necessary to recode. After recoding the speed variables 2, 4 and 5 and adding all items from goal orientation as well as social- and course CSE, we found support for discriminant validity, given that each item loaded onto separate factors (see Appendix C, D and E). Afterwards we were able to perform a new EFA analysis including all variables from Time 3. The results showed that each variable loaded on separate factors, thus indicating support for discriminant validity (see Appendix F) (Farrell, 2010).

To detect if there is common method variance present (CMV), Harman´s single factor test was conducted at Time 1, Time 2 and Time 3 (Chang et al., 2010). CMV is concluded if a single, or general factor emerges which then accounts for the covariance amongst measures (Podsakoff, 2003). We conducted an EFA in order to perform the Harman´s single factor test. After performing the EFA with promax rotation, nine factors contained eigenvalue higher than 1. Thus, CMV did not seem to be present.

Descriptive statistics

As presented in Table 1, all multiple items scales are reported, this includes Cronbach´s Alpha values, bivariate correlations, standard deviation and means. The Cronbach´s Alpha values varied from .55 to .91, indicating that removal of six items would have been beneficial (see Table 1) (Nunnally & Bernstein, 1994). However, taking into account removal of these would leave us with few items and their value was somewhat close to our cut-off criterion, we decided to keep them. Therefore, the results related to these items should be interpreted accordingly. The correlation matrix was reviewed in order to detect possible multicollinearity conditions. Based on the critical value of .70 none of the independent variables seemed to be correlated (Meyers et al., 2016).

Table 1

Descriptive Statistics, Correlations and Scale Reliabilities

	Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1.	Gender	1.28	.46	-								.	.		
2.	Age	24.51	4.75	.10**	-										
3.	Speed T1	5.98	.69	-.05	.05	**(.75)**									
4.	Speed T2	5.93	.73	-.12**	.11**	.46**	**(.77)**								
5.	Speed T3	6.01	.65	-.05	.05	.60**	.65**	**(.74)**							
6.	Source T1	4.92	1.01	.03	-.12**	.13**	.02	-.04	**(.57)**						
7.	Source T2	4.98	.77	.03	-.07	.11*	.29**	.24**	.47**	**(.77)**					
8.	Source T3	5.24	.72	.15*	-.13	.16*	.27**	.26**	.51**	.59**	**(.81)**				
9.	Structure T1	4.08	.95	-.03	-.20**	-.21**	-.19**	-.19*	.05	-.09*	-.14	**(.55)**			
10.	Structure T2	4.37	1.00	-.01	-.12**	-.28**	-.13**	-.02	.08	.02	-.05	.46**	**(.67)**		
11.	Structure T3	4.24	.97	-.09	-.20**	-.16*	-.09	-.10	.11	-.10	-.05	.50**	.61**	**(.64)**	
12.	Control T1	2.87	1.04	.07*	-.04	-.44**	-.21**	-.26**	.07*	.08	-.08	.25**	.21**	.15	**(.67)**
13.	Control T2	3.01	1.17	.07	-.07	-.32**	-.40**	-.24**	.08	.01	-.14	.15**	.25**	.13	.58**
14.	Control T3	2.87	1.04	.07*	-.04	-.44**	-.21**	-.26**	.07*	.08	-.08	.25**	.21**	.15	1.00**
15.	Mastery Orientation T1	4.61	1.03	.16**	.21**	.21**	.15**	.14	-.01	.01	.11	-.21**	-.18**	-.21**	-.16**
16.	Mastery Orientation T2	4.49	1.09	.06	.29**	.16**	.22**	.13	-.06	.09*	.02	-.25**	-.17**	-.30**	-.09*
17.	Mastery Orientation T3	4.64	1.06	.06	.28**	.15	.15	.15*	.01	.03	.08	-.35**	-.29**	-.31**	-.22**
18.	Performance Orientation T1	3.47	1.15	.01	-.03	-.10**	-.08	.04	.13**	.06	.14	.10**	.05	.04	.19**
19.	Performance Orientation T2	3.40	1.22	.07	.05	-.09*	-.22**	-.13	.11*	.08	-.06	.00	.03	-.09	.23**
20.	Performance Orientation T3	3.48	1.27	.07	-.11	-.06	-.17*	-.14	.09	-.01	.03	.04	-.01	-.06	.01
21.	Course College Self-Efficacy T1	6.85	1.30	-.07*	.06	.17**	.09*	.16*	.06*	.09	.06	-.14**	-.13**	-.19*	-.15**
22.	Course College Self-Efficacy T2	6.76	1.38	-.10*	.09*	.15**	.16**	.03	.07	.16**	.02	-.17**	-.19**	-.16*	-.17**
23.	Course College Self-Efficacy T3	6.46	1.62	-.04	.21**	.16*	.22**	.25**	.09	.15	.16*	-.19*	-.15	-.15*	-.28**
24.	Social College Self-Efficacy T1	6.30	2.05	.06	.13**	.20**	.11*	.20**	.03	.05	.06	-.16**	-.11*	-.15*	-.15**
25.	Social College Self-Efficacy T2	6.30	2.05	.06	.13**	.20**	.11*	.20**	.03	.05	.06	-.16**	-.11*	-.15*	-.15**
26.	Social College Self-Efficacy T3	5.48	2.42	.07	.17*	.05	.08	.02	-.01	.08	.08	-.16*	-.23**	-.18*	-.19**

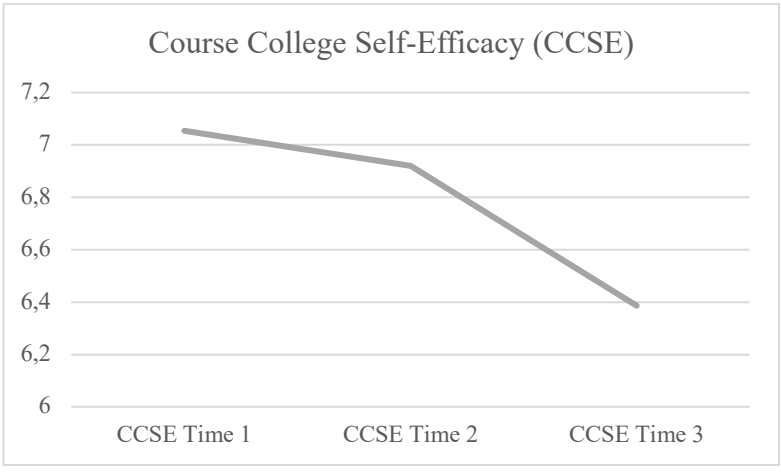
	Variable	13	14	15	16	17	18	19	20	21	22	23	24	25	26
13.	Control T2	**(.73)**													
14.	Control T3	.58**	**(.67)**												
15.	Mastery Orientation T1	-.12**	-.16**	**(.72)**											
16.	Mastery Orientation T2	-.09*	-.09*	.58**	**(.82)**										
17.	Mastery Orientation T3	-.15	-.22**	.63**	.77**	**(.84)**									
18.	Performance Orientation T1	.26**	.19**	.12**	.08	.00	**(.73)**								
19.	Performance Orientation T2	.39**	.23**	.13**	.21**	.12	.59**	**(.81)**							
20.	Performance Orientation T3	.34**	.01	-.05	-.00	.16*	.54**	.64**	**(.84)**						
21.	Course College Self-Efficacy T1	-.12**	-.15**	.36**	.34**	.34**	.08**	.10*	-.02	**(.86)**					
22.	Course College Self-Efficacy T2	-.15**	-.17**	.32**	.47**	.36**	.03	.14**	-.08	.58**	**(.86)**				
23.	Course College Self-Efficacy T3	-.19*	-.28**	.30**	.33**	.40**	-.04	-.01	-.10	.48**	.62**	**(.89)**			
24.	Social College Self-Efficacy T1	-.09*	-.15**	.31**	.26**	.18*	.08**	.04	-.06	.52**	.34**	.36**	**(.89)**		
25.	Social College Self-Efficacy T2	-.09*	-.15**	.31**	.26**	.18*	.08**	.04	-.06	.52**	.34**	.361**	1.00**	**(.89)**	
26.	Social College Self-Efficacy T3	-.10	-.19**	.18*	.32**	.29**	-.02	-.03	.00	.33**	.51**	.63**	.53**	.53**	**(.91)**

Note: T1= Time point 1; T2= Time point 2; T3=Time point 3.

Hypothesis testing

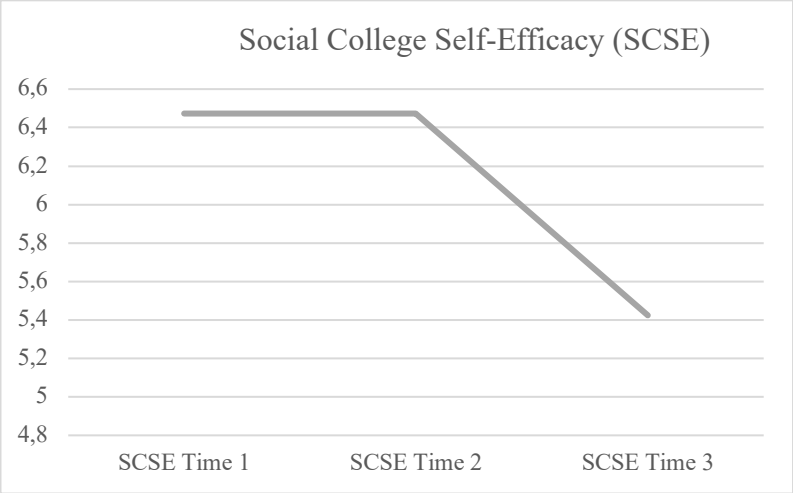
College Self-Efficacy. In Hypothesis 1 we proposed that the students would experience a decline in CSE between Time 1, Time 2 and Time 3, due to the experimental conditions that is Covid-19. To be able to test this, we conducted a one-way repeated measures ANOVA-test where we compared the post-test scores of Time 2 and Time 3 to that of pre-test scores before Covid-19 at Time 1 (within subjects). By doing this it was possible to detect if there was a statistically significant difference in the mean score on the dependent variable course CSE. By comparing each time point, Time 1 (M=7.05, SD=1.25) to Time 2 (M=6.91, SD=1.36) to Time 3 (M=6.39, SD=1.53) the results indicated a decrease in course CSE at each time point, with a distinct reduction between Time 2 and Time 3 (see Figure 3). There was a statistically significant main effect of time [F(1.872, 308.924)=27.032, p=0.000]. Considering the epsilon had a value of .94 which is below 1 but higher than .75, the Huynh-Feldt correction is appropriate (Huynh & Feldt, 1976; Leech et al., 2014). With respect to the dependent variable social CSE there was no decrease from Time 1(M=6.47, SD=1.96) to Time 2 (M=6.47, SD=1.96), however a distinct reduction between Time 2 and Time 3 appeared (M=5.42, SD=2.41) (see Figure 4). Thus, a statistically significant main effect of time appeared with [F(1, 200)=47.69, p=0.000]. We therefore found support for Hypothesis 1, that students in fact experienced a decline in both course- and social CSE from pre-Covid 19 to during Covid 19.

Figure 3. *The development of course CSE from each time point*



Note: ANOVA analysis with mean scores of course CSE from each time point.

Figure 4. *The development of social CSE from each time point*



Note: ANOVA analysis with mean scores of social CSE from each time point.

Relationship between goal orientation and CSE. A multiple linear regression analysis was conducted to test Hypothesis 2a and 2b, and the results are shown in Table 2. In the first step, the control variables gender and age were entered. Both demographical variables predicted a modest amount of the variance in course CSE as well as in social CSE, where age was shown to be significantly related to both course- and social CSE. In step two mastery and performance orientation were included. The results suggest that mastery orientation at Time 1 predicts CSE at Time 3. This finding indicates support for Hypothesis 2a, predicting that there is a positive relationship between mastery orientation at Time 1 and CSE at Time 3. It was only mastery orientation at Time 1 which was found to significantly predict CSE at Time 3. These results do not indicate support for Hypothesis 2b, that there is a negative relationship between performance orientation at Time 1 and CSE at Time 3. However, it should be noted that the beta value is negative, as expected in our hypothesis.

Table 2
Regression Results Testing the Direct Relationship Goal Orientation and College Self-Efficacy

	Course College Self-Efficacy		Social College Self-Efficacy	
Variable	Step 1	Step 2	Step 1	Step 2
Age	.19**	.10	.14*	.09
Gender	-.04	-.06	.04	.03
T1 MO		.27***		.15*
T1 PO		-.03		-.01
Adjusted R^2	.03	.08	.01	.02

ΔR^2	.04*	.07***	.02	.02
F	3.50*	5.28***	2.35	2.13
ΔF	3.50	6.83	2.35	1.89

Note. N = 1251; Standardized regression coefficients are shown. T1= Time point 1; MO= Mastery Orientation; PO= Performance Orientation.

*p < .05 **p < .01 ***p < .001

Mediating effects. To be able to test our mediation model in Hypothesis 3a and 3b we used the PROCESS macro developed by Hayes (2012). This approach uses a bootstrapping method which determines 95% bias corrected intervals for the indirect and direct effect of the mediators. In current analysis, 5000 resamples were made. This is an alternative approach to test mediation, which is an accepted method in a variety of literature (Preacher & Hayes, 2004; Shrout & Bolger, 2002). This approach reduces the risk of type 1 errors, and provides a powerful method of obtaining confidence limits for indirect effects (Preacher & Hayes, 2008). Type 1 error refers to discarding of a null hypothesis when it should have been kept (Tufte, 2018).

To test Hypothesis 3a we first entered epistemic beliefs at Time 1 as the independent variable (IV), mastery- and performance orientation at Time 2 as the mediating variables (M) and course CSE at Time 3 as the dependent variable (DV). We performed the same tests for each of the dimensions belonging to epistemic beliefs that is control, speed, source, and structure. Considering CSE is divided into two factors, we repeated the above analysis once more only changing the DV to social CSE. Based on the sampling distribution of IV on M (a path) and M on DV (b path), an empirical approximation is created to establish a confidence interval for the indirect effect (ab). See Table 3 and 4 for the results.

In order to interpret the bootstrap data, we determined whether zero appears within the 95 % CI. If this occurs, it indicates a lack of significance. When zero does not appear within the CI, the indirect effects are considered as significant, thus indicating support for mediation (Preacher & Hayes, 2004).

In Hypothesis 3a we proposed that an individuals goal orientation mediates the relationship between epistemic beliefs at Time 2 and CSE at Time 3. Our results indicated partial support for Hypothesis 3a; however, when examining the results, there are indications of an indirect effect between the epistemic belief dimension *structure* at Time 1 and course- and social CSE at Time 3 via mastery orientation at Time 2. This indicates partial mediation because the 95 % CI did not include zero (see Table 3) (Hayes, 2017, p. 114). Furthermore,

there was also indications that structure at Time 1 was negatively and significant related to mastery orientation at Time 2. In addition, mastery orientation at Time 2 was positively and significantly related to course- and social CSE at Time 3. These findings may indicate that those who have naïve epistemic beliefs in regard to the dimension structure at Time 1, are less likely to be mastery oriented at Time 2. However, those who are mastery oriented at Time 2 seem to be more likely to have a higher degree of both course- and social CSE at Time 3. This might explain the partial mediation (Hayes, 2017), when taking into account that mastery orientation may only explain some of the relationship between epistemic beliefs dimension structure and CSE.

We also found a reduction of the direct effect (C′). However, this was also not significant or zero, therefore no indication of full mediation was present. In addition, as illustrated in Table 3 there are indications of a significant direct effect between mastery orientation at Time 2 and course CSE at Time 3. Also, the epistemic beliefs dimensions control and speed were also significantly and directly related to course CSE at Time 3. Further, mastery orientation at Time 2 was significantly related to both course- and social CSE at Time 3. Interestingly, no such results emerged between performance orientation and CSE. The control variable age was positively significant when epistemic beliefs dimensions speed, source and structure at Time 1 was the independent variable and mastery orientation at Time 2 was the mediating variable and course CSE at Time 3 was the dependent variable. This may indicate that the older a person get, the higher degree of sophisticated epistemic beliefs in the dimensions speed, source and structure the individual may hold. This also seemed to apply for social CSE at Time 3 as age was also positively significant when the epistemic beliefs dimensions structure, control and speed at Time 1 was the independent variable. Gender did not appear to be significant.

Table 3

Influence of Epistemic Beliefs on College Self-Efficacy through Goal Orientation

											BCa 95% CI	
	Independent variable (IV)		Mediating variable (M)		Dependent variable (DV)	Influence of IV on M (*a*)	Influence of M on DV (*b*)	Total influence (*c*)	Direct influence (*c'*)	Point estimate/ Indirect influence (*a x b*)	SE	Lower	Upper
1.	T1 Control	→	T2 MO	→	T3 Course CSE	-0.16	0.49***	-0.34**	-0.26*	-0.08	0.05	-0.19	0.02
2.	T1 Control	→	T2 PO	→	T3 Course CSE	0.12	0.02	-0.34**	-0.26*	0.00	0.02	-0.04	0.04
3.	T1 Speed	→	T2 MO	→	T3 Course CSE	0.13	0.52***	0.52*	0.45*	0.07	0.08	-0.08	0.23
4.	T1 Speed	→	T2 PO	→	T3 Course CSE	-0.07	-0.00	0.52*	0.45*	0.00	0.02	-0.04	0.05
5.	T1 Source	→	T2 MO	→	T3 Course CSE	0.01	0.54***	0.23	0.23	0.00	0.06	-0.13	0.11
6.	T1 Source	→	T2 PO	→	T3 Course CSE	0.19	-0.04	0.23	0.23	-0.01	0.02	-0.06	0.04
7.	T1 Structure	→	T2 MO	→	T3 Course CSE	-0.32***	0.51***	-0.29*	-0.13	-0.16	0.06	-0.29	-0.04
8.	T1 Structure	→	T2 PO	→	T3 Course CSE	-0.00	-0.01	-0.29*	-0.13	0.00	0.01	-0.03	0.03
9.	T1 Control	→	T2 MO	→	T3 Social CSE	-0.16	0.59***	-0.45*	-0.34	-0.09	0.07	-0.24	0.01
10.	T1 Control	→	T2 PO	→	T3 Social CSE	0.12	-0.07	-0.45	-0.34	-0.01	0.03	-0.08	0.04
11.	T1 Speed	→	T2 MO	→	T3 Social CSE	0.13	0.64***	0.19	0.10	0.08	0.10	-0.09	0.29
12.	T1 Speed	→	T2 PO	→	T3 Social CSE	-0.07	-0.10	0.19	0.10	0.01	0.03	-0.06	0.09
13.	T1 Source	→	T2 MO	→	T3 Social CSE	0.01	0.65***	0.05	0.07	0.00	0.07	-0.15	0.14

14.	T1 Source	→	T2 PO	→	T3 Social CSE	0.19	-0.11	0.05	0.07	-0.02	0.04	-0.11	0.05
15.	T1 Structure	→	T2 MO	→	T3 Social CSE	-0.32***	0.63***	-0.28	-0.08	-0.20	0.09	-0.40	-0.04
16.	T1 Structure	→	T2 PO	→	T3 Social CSE	-0.00	-0.10	-0.28	-0.08	0.00	0.03	-0.05	0.06

N = 1251; BCa = Bias Corrected and accelerated; 5000 bootstrap samples; Unstandardized coefficients reported; Control Variables: age and gender; T1= Time point 1; T2= Time point 2; T3 Time point 3; MO= Mastery Orientation; PO= Performance Orientation; Course CSE= Course College Self-Efficacy; Social CSE= Social College Self-Efficacy.

*p < .05 **p < .01 ***p < .001

When testing the competing Hypothesis 3b, we proposed that epistemic beliefs at Time 2 would mediate the relationship between goal orientation at Time 1 and CSE at Time 3. There was no indication of support for this hypothesis in our results (see Table 4). Although the results did not support mediation, we found that individual performance orientation at Time 1 was significantly related to epistemic beliefs dimension control at Time 2. This may indicate that individual performance orientation contributes to foster naïve epistemic beliefs in regard to the dimension control over time. The results also indicate a direct relationship between mastery orientation at Time 1 and course CSE at Time 3. In addition, control variable age was positively significant both when performance- and mastery orientation was the independent variable, epistemic belief dimension structure was the mediating variable, and on both course- and social CSE. This may indicate that an individual may develop more sophisticated epistemic beliefs in mentioned dimensions with age. Gender did not appear to be significant.

Table 4

Influence of Goal Orientation on College Self-Efficacy through Epistemic Beliefs

										BCa 95% CI	
	Independent variable (IV)		Mediating variable (M)	Dependent variable (DV)	Influence of IV on M (*a*)	Influence of M on DV (*b*)	Total influence (*c*)	Direct influence (*c'*)	Point estimate/ Indirect influence (*a x b*)	SE	Lower	Upper
1.	T1 MO	→	T2 Source	→ T3 Course CSE	.02	.29	0.48***	0.45***	0.01	0.02	-0.03	0.05
2.	T1 MO	→	T2 Structure	→ T3 Course CSE	-0.15	-.04	0.48***	0.45***	0.01	0.02	-0.05	0.05
3.	T1 MO	→	T2 Control	→ T3 Course CSE	-0.04	-0.24	0.48***	0.45***	0.01	0.02	-0.04	0.06
4.	T1 MO	→	T2 Speed	→ T3 Course CSE	0.09	0.19	0.48***	0.45***	0.02	0.02	-0.02	0.07
5.	T1 MO	→	T2 Source	→ T3 Social CSE	0.02	0.38	0.28	0.22	0.01	0.03	-0.05	0.07
6.	T1 MO	→	T2 Structure	→ T3 Social CSE	-0.15	-0.38	0.28	0.22	0.06	0.05	-0.02	0.17
7.	T1 MO	→	T2 Control	→ T3 Social CSE	-0.04	-0.17	0.28	0.22	0.01	0.02	-0.04	0.06
8.	T1 MO	→	T2 Speed	→ T3 Social CSE	0.09	-0.15	0.28	0.22	-0.01	0.04	-0.10	0.06
9.	T1 PO	→	T2 Source	→ T3 Course CSE	0.08	0.28	-0.02	-0.01	0.02	.02	-0.01	0.07
10.	T1 PO	→	T2 Structure	→ T3 Course CSE	-0.04	-0.11	-0.02	-0.01	0.00	0.02	-0.03	0.03
11.	T1 PO	→	T2 Control	→ T3 Course CSE	0.25***	-0.22	-0.02	-0.01	-0.05	0.03	-0.12	0.01
12.	T1 PO	→	T2 Speed	→ T3 Course CSE	0.05	0.27	-0.02	-0.01	0.01	0.02	-0.02	0.06
13.	T1 PO	→	T2 Source	→ T3 Social CSE	0.08	0.40	-0.13	-0.14	0.03	0.03	-0.02	0.11

14.	T1 PO	→ T2 Structure	→ T3 Social CSE	-0.04	-0.43	-0.13	-0.14	0.02	0.04	-0.07	0.09
15.	T1 PO	→ T2 Control	→ T3 Social CSE	0.25	-0.11	-0.13	-0.14	-0.03	0.05	-0.13	0.08
16.	T1 PO	→ T2 Speed	→ T3 Social CSE	0.05	-0.08	-0.13	-0.14	-0.00	0.02	-0.06	0.04

N = 1251; BCa = Bias Corrected and accelerated; 5000 bootstrap samples; Unstandardized coefficients reported; Control Variables: age and gender; T1= Time point 1; T2= Time point 2; T3 Time point 3; MO= Mastery Orientation; PO= Performance Orientation; Course CSE= Course College Self-Efficacy; Social CSE= Social College Self-Efficacy.

*p < .05 **p < .01 ***p < .001

DISCUSSION

The purpose of this study was to examine students goal orientation, self-efficacy and epistemic beliefs before and during Covid-19. More precisely we wanted to clarify the potential influence an extraordinary situation, like a pandemic, can have on student's college self-efficacy, and if their goal orientation has affected their CSE.

As students, the main focus is to develop learning abilities, skills and dispositions that are needed to contribute to society in work life (Greene et al., 2016). It has been argued that students with sophisticated epistemic beliefs are more engaged in their studies and have a higher completion intention (Greene et al., 2018). The amount of effort and persistence students put into their studies during hardships and when they encounter difficult tasks is influenced by epistemic beliefs (Schommer, 1994), and their goal orientation (Nicholls, 1984). Therefore, we wanted to explore this connection by investigate if goal orientations mediate the relationship between epistemic beliefs and CSE or if it rather is the other way around, that epistemic beliefs mediate the relationship between goal orientations and CSE. By applying a natural experiment as a methodology, it was possible to capture the effect of the pandemic without us being able to intervene (Craig et al., 2017).

As we predicted in our first hypothesis, our results indicated support for students to have a decline in CSE from before Covid-19 (Time 1) to during Covid-19 (Time 3). This goes in line with Granda-Vera and colleagues' studies (2020), as they proposed that the psychological demands that elicits from being in lock-down, as well as new study methods due to the switch of online classes, may contribute to a decline in CSE. As the collection of data at Time 2 occurred at the very beginning of the pandemic it is interesting to see that the student's course CSE had a decline early on, whilst students did not experience a decline in their social CSE until between Time 2 and Time 3. Although it is not clear as to why this occurred, it might be possible that the full extent of the pandemic had not yet been revealed, as universities, amongst other institutions, was open for a while longer before lockdown in March 2020 took place (Regjeringen, 2020). A possible reason as to why a decline in the course CSE occurred so early on, may be the growing worry about the virus, considering a pandemic is unprecedented in contemporary times (Yıldırım & Güler, 2020). Cao et al. (2020) argued that protective factors towards experiencing anxiety during the pandemic was, amongst others, financial stability and living at home with parents. Although their research revolved around anxiety, it is contiguous to assume that this applies to CSE as well, as it is not uncommon that students move away from home for the first time when starting higher education (Cao et al., 2020). Also, Gonzalez-Ramirez and colleagues (2021) found

indications that students perceive online learning as less effective than face-to-face lectures as it for example may be harder to research a term paper from home. This could potentially explain why a drop in students' course CSE occurred. Albeit their study was performed on a small private university and it is likely that this also applies to larger universities (Gonzalez-Ramirez et al., 2021).

As to why a decrease in students social CSE occurred, many potential explanations may exist. After the lectures were moved to an online setting, it might have contributed to a hindrance for the students to ask questions. Approaching a professor face-to-face in the pause can for some be less intimidating than requesting the word in an online setting where everyone can hear or see (Adnan & Anwar, 2020). There may also be other barriers as to why it might be difficult to ask a question or participate in class discussions. Not having stable enough wi-fi, or a good enough software to actually be heard in an online setting might influence the level of participation, which in turn may reduce the possibility to receive feedback from professors and peers, thus reducing students social CSE (Gonzalez-Ramirez et al., 2021; Margolis & McCabe, 2006). Also, when students do send an email with questions, the feedback often comes with a delay, thus reducing the possibility to ask in depth questions regarding the matter which might increase the difficulty level of the task (Adnan & Anwar, 2020; Wang et al., 2020). Not being able to receive a rapid response to a pressing matter, might lead to a higher degree of stress which also may reduce CSE (Bandura, 1986; Granda-Vera et al., 2020)

Receiving feedback through social persuasion is according to Bandura (1997) one of four ways to increase self-efficacy, when this aspect was reduced by the pandemic situation, a decline in CSE is not surprising. Taking into account that feedback, when given face-to-face, is easier to interpret and make sense of and thus maybe even easier to absorb, the persuasive element might be lessened when provided through other channels (Lo, 2008). In addition, students who experience technological difficulties with the online learning devices might not achieve academic success, which in turn may decrease the possibility of having mastery experiences (Yokoyama, 2019). Under normal circumstances those who have technological difficulties, might go to the library and ask for help, or ask their co students, but this threshold might be higher when they have to go through other channels (Gonzalez-Ramirez et al., 2021).

By examining students CSE from before to during a pandemic, this might illuminate the importance of maintaining students CSE, because of its positive relationship in terms of academic performance and coping mechanism (Yokoyama, 2019). Bandura (1997) suggested

that those with a high degree of self-efficacy will tackle feelings of despair, apathy, anxiety and worry better than those with a low degree of self-efficacy. Therefore, it may be considered highly worrying that students in our sample report have such a significant drop in their CSE, which again underlines the importance of self-efficacy as it is considered one of the most essential motivational factors (Schunk et al., 2014) This is relevant as it has been argued that high degrees of self-efficacy can prevent negative mental state of minds (Bandura, 1986, 1997).

There is an ongoing debate amongst scholars wherein mastery- and performance orientation are often put up against each other (DeShon & Gillespie, 2005; Van Yperen et al., 2015). Given that earlier research involving educational studies has emphasized the potential price a performance orientation might have (Nerstad et al., 2018), we conducted a regression analysis where we examined the relationship between performance- and mastery orientation at Time 1 and social- and course CSE at Time 3 Previous research has generally found that mastery orientation is positively associated with self-efficacy (e.g, Covington, 1984; Huang, 2016; Niemivirta et al., 2019; Schunk et al., 2014). For example Schunk and collegues (2014) suggests that those who are mastery oriented are also more inclined to increase their self-efficacy, and Ames and Archer (1988) indicated that mastery oriented students are more enduring during challenges. Also, a review article by Vandewalle et al. (2019) suggested that those who are mastery oriented and in search of a new job are more perservering in the application process, thus enhancing their reemployment rate. Our findings related to Hypotheis 2a are in line with this reseach, as our results indicate that mastery orientation can provide a higher degree of CSE during a pandemic, which may be interpreted as they are more persevering. It can also seem as mastery oriented students may be well equipped to tackle a crisis like a pandemic. This is in line with previous research as mastery oriented individuals seem to be more adaptive to change (Ahearne et al., 2010; Payne et al., 2007). According to Ames and Archer (1988) it is possible that goal orientation can change depending on what type of situation a person is in, and it is also influenced by the students background, previous experiences and unequal treatment by teachers and professors. Our findings suggests that the importance of being mastery oriented through hardships like a pandemic, considering mastery orientation at Time 1 had a significant and positive effect on CSE at Time 3. This can be beneficial in terms of helping the students to uphold the belief in their ability to perform during challenging times. This is an interesting finding, as it may illustrates the advantage of facilitating mastery orientation in academic settings. However, it can be considered equally relevant in a career context as mastery oriented individuals seem to

persevere during hardships, which can be argued to apply in an organizational settings as well (Vandewalle et al., 2019). Partly in line with previous research (Huang, 2016; Tuominen-Soini et al., 2012), our findings suggest that primarily mastery oriented students experience a higher degree of both social- and course CSE. It should however be noted that the significance level was stronger for course CSE than social CSE. It should be pointed out that our result related to the performance orientation-CSE relationship was negative but not significant. However, other studies have shown that those who are mainly mastery oriented are more likely to maintain a high degree of CSE when challenging assignments and tasks occur, than do those who are mainly performance oriented (Niemivirta et al., 2019). In addition, when controlling for age there was a significant positive relationship between age and CSE. This implies that with age, the level of CSE will increase. However, this effect seemed to have disappeared at step 2 in our model when adding goal orientation (see Table 2).

One of the aims of this thesis were to clarify whether goal orientation affects a person's epistemic beliefs or if it is the other way around. This was the reason for why we applied a competitive hypothesis approach. Several scholars have found a connection between epistemic beliefs and goal orientation, where they have argued that epistemic beliefs influence whether an individual develops a mastery- or performance orientation (Bråten & Strømsø, 2004; Chen & Barger, 2016; Greene et al., 2008). However, in line with theory (Muis et al., 2006; Nicholls, 1979; Schommer-Aikins et al., 2000), goal orientations may also affect the development of epistemic beliefs. We therefore aimed at testing this. Although we did not find support for Hypothesis 3a, our results did however suggest that those who view the structure of knowledge as complex may be more inclined to be mastery oriented, which in turn may provide a higher degree of CSE. This is partly in line with what Bråten and Strømsø (2004) suggested in their research.

It should be noted that our results did not indicate support for the prediction that epistemic beliefs mediate the relationship between goal orientation at Time 1 and CSE at Time 3 as proposed in Hypothesis 3b. However, when controlling for age there were indications that the older an individual gets, it will reduce the naïve attitudes towards the epistemic belief dimension structure. There were also indications that those who are performance oriented to a higher degree keep naïve control beliefs. Both these findings are in line with theory as it has been argued that epistemic beliefs develop with age and that those who are performance oriented are more inclined to adopt naïve epistemic beliefs (Kienhues et al., 2016; Muis & Franco, 2009). However, an interesting finding when testing if epistemic

beliefs mediate the relationship between goal orientation (mastery and performance) and CSE (course and social) is that performance orientation is positively related to the dimensions control. This was not the case when testing the opposite in Hypothesis 3a, where goal orientation (mastery and performance) was applied as a mediator between epistemic beliefs (structure, source, speed and control) and CSE (course and social). This points in the direction that goal orientation may influence epistemic beliefs, which may be an interesting aspect to take into consideration as several studies have proposed the opposite (Bråten & Strømsø, 2004; Greene et al., 2016). This is something that's should be further examined as there is a paucity of research on the linkage between goal orientation and epistemic beliefs (Bråten & Strømsø, 2004). Although some researchers have found support for the notion that epistemic beliefs are antecedents of goal orientation (see e.g., Garrett-Ingram, 1997; Neber & Schommer-Aikins, 2002; Schutz et al., 1993) this is not something that we found clear support for in this thesis. After conducting the PROCESS analysis, we also saw in these results that mastery orientation at Time 2 is significant on both course- and social CSE at Time 3. This further confirms our Hypothesis 2 where we found that CSE is significantly related to mastery orientation. It is highly interesting that performance orientation is not significantly related to neither course- nor social CSE. This goes in line with previous research (Huang, 2016).

Although no clear findings have been found for Hypotheses 3a and 3b in our research, we found limited indications that mastery orientation may predict the epistemic beliefs dimension structure. This is not something we can conclude with, as the result is not clear. However, this may indicate a reciprocal relationship between the two, which is something future studies can clarify.

Implications

Our results provide interesting implications for both educational institutions as well as organizations. Firstly, an important finding in this thesis is the decline of students CSE during a pandemic. This is interesting because having a high degree of self-efficacy has been argued to have preventative effects on negative emotions (Bandura, 1986, 1997). This is something both educational institutions and organizations should be aware of, as experiencing a high degree of stress can influence and reduce self-efficacy (Granda-Vera et al., 2020). There are several ways to develop self-efficacy, for example through mastery experiences or social persuasion (Bandura, 1997). Therefore, we suggest facilitating situations where students and employees can thrive and experience success. By putting a focus on how influential self-

efficacy can be on a person's well-being, it might provide a better starting point during hardships, which potentially could be beneficial for society as a whole.

Secondly, another finding is the impact mastery orientation can have in relation to CSE. By putting a focus on increasing mastery orientation, it may not only be beneficial for the individual, but it may also be something that can benefit organizations, as a plethora of research suggest that having a high degree of self-efficacy also enhances performance (see e.g., Cellar et al., 2011; Huang, 2016; Phillips & Gully, 1997). Although not examined in this thesis, previous research has suggested that goal orientations are influenced by motivational climate (Nerstad et al., 2018). A mastery climate can be described as a surrounding where it is encouraged to develop, learn, cooperate and support each other (Pensgaard & Roberts, 2000). Therefore, we propose an increased focus of building mastery climate (see Nerstad et al., 2018 for a review).

Finally, despite slim findings in our mediation model, there were indications that those who are mainly performance oriented are more inclined to have a naïve belief regarding the epistemic belief dimension control. This relationship did not appear when we tested reversed causality and examined a possible relationship between control and performance orientation. This can be considered an interesting finding and a theoretical implication as some scholars has proposed that goal orientation can influence epistemic beliefs (Muis et al., 2006; Ricco et al., 2010).

Strengths, limitations and future research

An important strength of this study is the natural experiment design. This design is especially useful as it takes advantage of the natural occurring change, in order to establish the impact an event has on outcome of interest (Craig et al., 2017). Considering we had valuable data before and during the experimental conditions took place, we were able to apply the DiD strategy, which refers to making comparisons of data collected from different timepoints (Remler & Van Ryzin, 2014). Another strengths of this design is that the methodology is quite flexible and intuitive (Craig et al., 2017). Further, when a study involves theories that is applicable in many settings, like goal orientation and self-efficacy can be argued to be, the findings can be somewhat generalizable (Nerstad et al., 2018; Pensgaard & Roberts, 2000). Also, epistemic beliefs can be applied to other purposes as well, considering how one's beliefs about knowledge can affect how one acquire knowledge in different phases and settings of one's life (Greene et al., 2016).

When it comes to research, all studies have limitations, and the current study is no exception. Because of the limitations of this study, some revelations may appear which may

provide others with ideas and better ways to conduct studies in the future on the topics that have been discussed in this study.

The measurement instrument that measures epistemic beliefs is not uncomplicated to use. As mentioned, the original article regarding the development of the OLEQ is written in German. This may have contributed to some misunderstandings regarding which items that should be reversed. Also, taking into account that several items had a factor loading below .50 which led to exclusion, some dimensions had few items remaining. Thus, we propose that the measurement instrument should be further developed adding more items. Also, the Cronbach´s alpha value was lower than desired for six items which provides a limitation for our results. At the beginning of the study, we approached the students in their classes when collecting data, thus increasing the response rate. Due to lock-down, this was not possible during the data collection of Time 3. This may be a potential explanation for why the response rate went down. The data collection was conducted in one university in Norway, which might undermine the generalizability of the findings, we propose that future studies include several universities from different parts of the country. This approach might strengthen the external validity of the results (Johannessen et al., 2016).

As self-efficacy is considered one of the most important motivational factors (Schunk et al., 2014), and we found a decrease in CSE due to the pandemic, it could be interesting to see the impact this might have on the student's future academic endeavors and how long the decrease might last. Therefore, we suggest that future studies may clarify this, and see if there has been any permanent impairment or if CSE will go back to past levels over time. A longitudinal study could be suitable for such a purpose. Also, performing in-depth interviews with a selection of those who have experienced a decline in CSE due to the pandemic, could provide important insight. This could make it easier for HR-departments and universities to implement measures in order to prevent such a decline in self-efficacy in the future. As no support was detected in our mediating model where epistemic beliefs were used as a mediator, we propose that future studies test a moderating model instead. By doing this, potentially epistemic beliefs may either strengthen or reduce the relationship between goal orientation and CSE. When testing a moderating model, it may change the direction or proportion of the relationship between the two variables (Jose, 2013). Future studies could also include the work of Lazarus (2006) and whether the stress that comes forth during a pandemic is perceived as a negative hindrance or if it is considered to be positive but challenging. This is relevant considering how an individual perceives stress, can increase or decrease their motivation and it can influence their ability to perform (Travis et al., 2020).

This could be interesting to explore in context with goal orientation and CSE. It has been argued that introverts are better equipped to work from home than extroverts (Spreitzer et al., 2017), it could therefore be interesting to examine whether there are any difference in CSE in students during a pandemic, depending on if they are introverts or extroverts. Finally, there seem to be a notably need for more research regarding the relationship between goals orientations and epistemic beliefs, and as mentioned the possible reciprocal relationship between the two.

CONCLUSION

We presented a study on how students experienced a decline in their college self-efficacy and where mastery orientation seemed to be positively related to students CSE. We leveraged the natural experiment happening during Covid-19 which provided interesting findings. The results of this study have underlined the importance of having a high degree of CSE, as it can prevent negative emotions. The most important finding has been that mastery orientation may seem to function as a buffer from having a decline in CSE during trying times. Both teachers and leaders can benefit from these findings as they can facilitate a mastery climate in order to increase mastery orientation with employees and students. Our lack of findings in regard to our mediation models may provide an important implication as it highlights the complex relationship between epistemic beliefs and goal orientation.

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APPENDIX

Appendix A

Pattern Matrix[a]

	Speed	Control	Structure	Source	Mixed factors
Time 1 Speed 3	.69				
Time 1 Speed 2 Reversed	.65				
Time 1 Speed 4 Reversed	.65				
Time 1 Speed 6	.62				
Time 1 Speed 8	.58				
Time 1 Speed 5 Reversed	.56				
Time 1 Speed 7	.46				.45
Time 1 Speed 1	-.41				
Time 1 Control 1		.86			
Time 1 Control 2		.76			
Time 1 Control 4		.54			
Time 1 Control 3		.49			
Time 1 Structure 1			.75		
Time 1 Structure 2			.74		
Time 1 Source 2				.79	
Time 1 Source 1				.76	
Time 1 Source 3				.45	.42
Time 1 Speed 9	-.42				.57
Time 1 Structure 3					.50
Time 1 Structure 4					.44
Eigenvalues	4.10	2.16	1.41	1.24	1.08
% of Variance	20.52	10.80	7.07	6.21	5.38

Appendix B

Pattern Matrix[a]

	cCSE	sCSE	MO	PO
Time 1 Course College Self efficacy 6	.74			
Time 1 Course College Self efficacy 2	.73			
Time 1 Course College Self efficacy 4	.73			
Time 1 Course College Self efficacy 1	.72			
Time 1 Course College Self efficacy 7	.69			
Time 1 Course College Self efficacy 5	.59			
Time 1 Course College Self efficacy 3	.58			

Time 1 Social College Self efficacy 10		.98		
Time 1 Social College Self efficacy 11		.83		
Time 1 Social College Self efficacy 8		.75		
Time 1 Social College Self efficacy 9		.66		
Time 1 Mastery performance 3			.77	
Time 1 Mastery performance 1			.71	
Time 1 Mastery performance 4			.56	
Time 1 Mastery performance 2			.42	
Time 1 Performance Orientation 3				.73
Time 1 Performance Orientation 4				.65
Time 1 Performance Orientation 1				.62
Time 1 Performance Orientation 2				.56
Eigenvalues	5.89	2.23	1.65	1.60
% of Variance	30.98	11.74	8.66	8.44

Note: cCSE=Course College self-efficacy; sCSE=Social College self-efficacy; MO=Mastery Orientation; PO=Performance Orientation.

Appendix C

Pattern Matrix[a]

	Factor			
	Source	Speed	Control	Structure
Time 2 Source 1	.81			
Time 2 Source 3NY	.66			
Time 2 Source 4NY	.59			
Time 2 Source 5NY	.57			
Time 2 Source 2	.53			
Time 2 Speed 6		.71		
Time 2 Speed 3		.62		
Time 2 Speed 4		-.58		
Time 2 Speed 8		.52		
Time 2 Speed 2		-.51		
Time 2 Speed 5		-.42		
Time 2 Structure 4NY				
Time 2 Control 2			.79	
Time 2 Control 1			.76	
Time 2 Control 3			.61	
Time 2 Control 4				
Time 2 Structure 2				.77
Time 2 Structure 1				.63
Time 2 Structure 3NY				.53
Time 2 Structure 4				.44

Note: NY=New item.

Appendix D

Pattern Matrix[a]

	Factor			
	Source	Speed	Control	Structure
Time 2 Source 1	.81			
Time 2 Source 3NY	.66			
Time 2 Source 4NY	.59			
Time 2 Source 5NY	.57			
Time 2 Source 2	.53			
Tme 2 Speed 6		.71		
Tme 2 Speed 3		.62		
Tme 2 Speed 4 Reversed		.58		
Tme 2 Speed 8		.52		
Tme 2 Speed 2 Reversed		.51		
Tme 2 Speed 5 Reversed		.42		
Time 2 Structure 4NY				
Time 2 Control 2			.79	
Time 2 Control 1			.76	
Time 2 Control 3			.61	
Time 2 Control 4				
Time 2 Structure 2				.77
Time 2 Structure 1				.63
Time 2 Structure 3NY				.53
Time 2 Structure 4				.44
Eigenvalues	4.46	3.02	1.83	1.20
% of Variance	22.32	15.09	9.16	5.98

Note: NY=New item.

Appendix E

Pattern Matrix[a]

	cCSE	sCSE	EPspeed	PO	EPSource	MO	EPcont	EPstruc
T2 College Self Efficacy 6	.76							
T2 College Self Efficacy 1	.75							
T2 College Self Efficacy 7	.75							
T2 College Self Efficacy 2	.67							
T2 College Self Efficacy 4	.65							
T2 College Self Efficacy 3	.57							
T2 College Self Efficacy 5	.55							

T2 College Self Efficacy 10	1.0							
T2 College Self Efficacy 11	.86							
T2 College Self Efficacy 8	.69							
T2 College Self Efficacy 9	.69							
T2 Speed 6		.70						
T2 Speed 3		.67						
T2 Speed 8		.53						
T2 Speed 4 Reversed		.52						
T2 Speed 2 Reversed		.50						
T2 Speed 5 Reversed		.41						
T2 Structure 4NY								
T2 Performance Orientation 3			.84					
T2 Performance Orientation 4			.71					
T2 Performance Orientation 1			.71					
T2 Performance Orientation 2			.57					
T2 Source 1				.80				
T2 Source 3NY				.68				
T2 Source 4NY				.58				
T2 Source 2				.57				
T2 Source 5NY				.53				
T2 Mastery Orientation 3					.79			
T2 Mastery Orientation 1					.76			
T2 Mastery Orientation 4					.67			
T2 Mastery Orientation 2					.55			
T2 Control 1						.76		
T2 Control 2						.75		
T2 Control 3						.53		
T2 Control 4								
T2 Structure 2								.81
T2 Structure 1								.60
T2 Structure 3NY								.52
T2 Structure 4								.44
Eigenvalues	7.07	4.60	3.22	2.17	1.87	1.67	1.38	1.21
% of Variance	18.13	11.80	8.26	5.56	4.79	4.26	3.55	2.88

Note: cCSE=Course College self-efficacy; MO=Mastery Orientation; EPsource= Epistemic beliefs dimension source; sCSE=Social College self-efficacy; PO=Performance Orientation; EPspeed= Epistemic beliefs dimensions speed; EPstruc= Epistemic beliefs dimension structure; EPcont= Epistemic beliefs dimension control; T2= Time point 2; NY=New item.

Appendix F

Pattern Matrix[a]

	cCSE	MO	EPsource	sCSE	PO	EPspeed	EPstruc	EPcont	EPcont
T3 Course College Self Efficacy 4	.85								
T3 Course College Self Efficacy 3	.74								
T3 Course College Self Efficacy 7	.70								
T3 Course College Self Efficacy 6	.68								
T3 Course College Self Efficacy 2	.63								
T3 Course College Self Efficacy 1	.58								
T3 Course College Self Efficacy 5	.51								
T3 Mastery Orientation 3		.93							
T3 Mastery Orientation 1		.79							
T3 Mastery Orientation 4		.72							
T3 Mastery Orientation 2		.58							
T3 Source 1			.86						
T3 Source 2			.71						
T3 Source 3NY			.68						
T3 Source 4NY			.67						
T3 Source 5NY			.55						
T3 Social College Self Efficacy 10				.96					
T3 Social College Self Efficacy 11				.78					
T3 Social College Self Efficacy 8				.74					
T3 Social College Self Efficacy 9				.63					
T3 Performance Orientation 3					.84				
T3 Performance Orientation 1					.80				
T3 Performance Orientation 4					.71				
T3 Performance Orientation 2					.69				
T3 Speed 2 Reversed						.66			

T3 Speed 5 Reversed					.63			
T3 Speed 3					.60			
T3 Speed 6					.55			
T3 Speed 8					.53			
T3 Speed 4 Reversed					.48			
T3 Structure 2						.72		
T3 Structure 1						.68		
T3 Structure 3NY						.49		
T3 Structure 4NY								
T3 Structure 4								
T3 Control 4							.60	
T3 Control 3							.57	
T3 Control 2								.73
T3 Control 1								.53
Eigenvalues	7.77	3.64	3.34	2.74	2.08	1.77	1.55	1.21	1.09
% of Variance	19.93	9.32	8.55	7.03	5.33	4.54	3.98	3.11	2.80

Note: cCSE=Course College self-efficacy; MO=Mastery Orientation; EPsource= Epistemic beliefs dimension source; sCSE=Social College self-efficacy; PO=Performance Orientation; EPspeed= Epistemic beliefs dimensions speed; EPstruc= Epistemic beliefs dimension structure; EPcont= Epistemic beliefs dimension control; T3= Time point 3; NY=New item.

Appendix G

Det innsendte meldeskjemaet med referansekode 675851 er nå vurdert av NSD. Følgende vurdering er gitt: Det er vår vurdering at behandlingen vil være i samsvar med personvernlovgivningen, så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet den 06.05.2019 med vedlegg, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER

Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde: nsd.no/personvernombud/meld_prosjekt/meld_endringer.html Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET

Prosjektet vil behandle særlige kategorier av personopplysninger om helse, og alminnelige personopplysninger frem til 01.12.2022. LOVLIG GRUNNLAG Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 nr. 11 og art. 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse, som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes uttrykkelige samtykke, jf. personvernforordningen art. 6 nr. 1 a), jf. art. 9 nr. 2 bokstav a, jf. personopplysningsloven § 10, jf. § 9 (2).

PERSONVERNPRINSIPPER

NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om: - lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om og samtykker til behandlingen - formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte og berettigede formål, og ikke viderebehandles til nye uforenlige formål - dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante og nødvendige for formålet med prosjektet - lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for å oppfylle formålet

DE REGISTRERTES RETTIGHETER

Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20). NSD vurderer at informasjonen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art. 12.1 og art. 13. Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned. FØLG DIN I

INSTITUSJONS RETNINGSLINJER

NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32). For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

Appendix H

Vil du delta i forskningsprosjektet *"Motivasjon og tilhørighet i studiene ved OsloMet"*?

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å undersøke hva som bidrar til bachelor- og årsstudiestudenters motivasjon, læringsglede og videre studier ved OsloMet–storbyuniversitetet. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål
I dette forskningsprosjektet er formålet å kartlegge hvilke faktorer som bidrar til at bachelor- og årsstudiestudenter ved OsloMet opplever motivasjon, læringsglede og lyst til å fortsette studiene ved OsloMet. Forskningsspørsmålene vi ønsker å belyse gjennom prosjektet er:
Hvilken betydning har bachelor- og årsstudiestudenters studiehverdag ved OsloMet for deres motivasjon, læringsglede, prestasjonsutvikling, opplevelse av tilhørighet og gjennomføring av studiene?
Hvordan kan OsloMet på best mulig måte tilrettelegge for disse faktorene?

Hvem er ansvarlig for forskningsprosjektet?
Handelshøyskolen ved OsloMet er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?
Vi spør deg om å delta i studien fordi du er bachelor- eller årsstudiestudent ved OsloMet. Din deltagelse er avgjørende for å sikre best og mest mulig informasjon om hva som skal til for å skape en best mulig studiehverdag for studenter.
Vi har fått din kontaktinformasjon fra studieadministrasjonen ved OsloMet.

Hva innebærer det for deg å delta?
Denne studien består av flere deler. Du mottar i dag første del (Del 1) av undersøkelsen som har til hensikt å kartlegge dine grunnleggende forventinger, opplevelser og motivasjon i forbindelse med studiene. Det vil ta omtrent 20 minutter å svare på dette spørreskjemaet. Dine svar fra spørreskjemaet blir registrert elektronisk gjennom et system som heter Qualtrics.

Hvis du velger å delta i prosjektet vil du i prosjektperioden bli invitert til å svare på ulike spørreskjemaer relatert til dine opplevelser i forbindelse med studiene omtrent to ganger per semester. Vi ønsker å følge din utvikling som student over tid for å kunne kartlegge hvordan dine opplevelser i forbindelse med studiene utvikler seg. For å styrke kvaliteten på studien ber vi om samtykke til å koble alle deltagernes svar opp mot deres bakgrunnsinformasjon (alder, kjønn, nasjonalitet, gjennomsnittlig karakter fra videregående), karakterer, studiegjennomføring og kursevalueringer.

Det er frivillig å delta
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykke tilbake uten å oppgi noen grunn. Alle opplysninger om deg vil da bli anonymisert. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Det vil ikke påvirke ditt forhold til OsloMet om du velger å delta i studien eller ikke.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Prosjektgruppen (Christina Nerstad, Karoline Kopperud og Dominique Kost) ved OsloMet vil ha tilgang til dataene. Det vil ikke være mulig for ledelsen, ansatte eller studenter ved OsloMet å få tilgang til datamaterialet. **Det presiseres at det ikke vil bli gitt noen rapporter til OsloMet på individnivå.**
Ditt student-ID-nummer vil bli brukt til å koble dataene som innhentes i forbindelse med de ulike delene av studien. Dataene vil bli oppbevart i krypterte mapper. Navnet og kontaktopplysningene dine vil prosjektgruppen erstatte med en kode som lagres på egen navneliste adskilt fra øvrige data. Dataene vil bli anonymisert i etterkant av at datainnsamling er avsluttet og senest innen 1. desember, 2022.

Deltakerne i studien vil ikke kunne gjenkjennes i vitenskapelige publikasjoner på bakgrunn av datamaterialet.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?
Prosjektet skal etter planen avsluttes senest innen 1. desember 2022. Alle personopplysninger vil da bli anonymisert.

Dine rettigheter
Så lenge du kan identifiseres i datamaterialet, har du rett til:
innsyn i hvilke personopplysninger som er registrert om deg,
å få rettet personopplysninger om deg,
få slettet personopplysninger om deg,
få utlevert en kopi av dine personopplysninger (dataportabilitet), og
å sende klage til personvernombudet eller Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke.
På oppdrag fra OsloMet har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:
OsloMet ved *Christina Nerstad, e-post: chrner@oslomet.no eller Karoline Kopperud, e-post: karoko@oslomet.no.*
Vårt personvernombud: Ingrid Jacobsen (ingrid.jacobsen@oslomet.no).
NSD – Norsk senter for forskningsdata AS, på epost (personverntjenester@nsd.no) eller telefon: 55 58 21 17.

Med vennlig hilsen

Prosjektansvarlig

Christina Nerstad

Første side i undersøkelsen: Samtykke til deltakelse i studien
Jeg samtykker til å delta i studien, jeg gir tillatelse til at de overnevnte dataene kan kobles sammen og at opplysninger mine behandles frem til prosjektet er avsluttet, ca. 1. desember 2022.

Ja Nei