Perfectionistic profiles and relations with academic wellbeing and motivation

An article-based master thesis

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Summary

Background and objective:

Based on a sample of 429 Norwegian eight-graders, the background and objective of the current thesis is to investigate the constructs perfectionism, wellbeing and motivation within the academic context. Defined as the combination of excessively high standards and evaluative concerns (Frost, Marten, Lahart & Rosenblate, 1990), perfectionism is arguably comprised of two very different dimensions (both perfectionistic strivings and perfectionistic concerns). Due to this complex definition, the findings regarding perfectionism are mixed. Operationalized and labelled in different ways, perfectionism has been linked to several indicators of wellbeing and motivation in the academic context, both adaptive and maladaptive. On the one hand perfectionism has been linked to higher self-esteem, high positive affect and higher academic achievement (Rice & Slaney; Wang, Slaney & Rice 2007), while an extensive part of the literature also argue the link between perfectionism and several adverse outcomes such as depressive symptoms, anxiety, school maladjustment and poor academic functioning (Rice & Slaney, 2012; Hanchon, 2010).

Due to these mixed findings this thesis wishes to contribute to the field by exploring the three constructs perfectionism, wellbeing and motivation, within the academic context of lower secondary school. To my knowledge, no such study has previously been conducted in Norway. The aim of the study is to answer the following research questions:

What different perfectionistic profiles can be identified among Norwegian 8th graders?
How do these profiles relate to wellbeing and achievement goal orientation?

Method

The data used in this study is part of a wider research project by Learning, Motivation and Wellbeing (LeMoWe) and the particular study "Motivation, achievement and wellbeing among lower secondary students" (MALS) by the Institute of Pedagogy and Institute of Special Education at the University of Oslo. The project is a longitudinal study with two points of data collection during lower secondary school. The data utilized in the current study is from the first data collection. A questionnaire developed within MALS was used to measure perfectionism, wellbeing and motivation respectively. Exploratory factor analysis was carried out to explore the different variables, before a Two-Step cluster analyses was

utilized to identify different perfectionistic profiles. Next, a series of ANOVAs were conducted to examine possible group differences between profiles and the independent variables constituting wellbeing and achievement goal orientations.

Results

Results from the study indicated the existence of three distinct perfectionistic profiles among the students, namely a *perfectionistic group*, an *ambitious group* and a *non-perfectionistic group* of students. The perfectionistic and ambitious group both had high scores on the positive indicator of wellbeing (school value) but the perfectionistic group scored significantly higher than the ambitious group on the negative indicator of wellbeing (emotional exhaustion). Interestingly, so did the non-perfectionistic group. This group of students reported low levels of school value along *and* high levels of emotional exhaustion. In relation to motivation, the perfectionistic group was the most motivated group overall, with the highest scores on all motivational profiles expect for work-avoidance orientation. However, the ambitious and perfectionistic group scored equally high on mastery intrinsic goal orientation. Regarding work-avoidance goal orientation, the ambitious group had the lowest score while the non-perfectionists had the highest score. The perfectionists had the middle score in this orientation, not significantly different from any of the other two.

Discussion

The results from the current study are in line with several previous studies identifying different perfectionistic profiles (Gnilka, McLaulin & Ashby; 2017; Rice & Ashby, 2007; Gilman & Ahsby, 2003; Wang et al., 2016). But in contrast to other studies a group of concerned students (with high evaluative concerns and low perfectionistic strivings) was not identified in the current study, indicating an important difference between this population and previous ones. All three profiles related significantly different to subjective wellbeing and achievement goal orientations. This has several important practical implications from the current findings, most importantly the understanding of the complex relationship between perfectionism, wellbeing and motivation in school. Further, these findings imply the importance of realizing the different needs of these different groups in order to elevate both wellbeing and motivation within the academic context.

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1   Introduction and objective of the study

The purpose of the current study is to investigate the identification of different groups of individuals based on scores on the dimensions of perfectionism. Further, the goal is to examine if these different groups of perfectionistic profiles relate differently to measurements of academic wellbeing and motivation.

In addition to perfectionism being a relatively new topic of investigation, it is also a topic of much debate in the field of psychology and educational psychology. This might be due to the complex definition stating that perfectionism is the combination of excessively high personal standards (perfectionistic strivings) and evaluative concerns (perfectionistic concerns) about meeting these standards (Frost, Marten, Lahart & Rosenblate, 1990). Although perfectionism has been proven an important factor in the understanding of both academic wellbeing and motivation, the findings are far from conclusive (Stoeber & Rambow, 2007). This may in part be a consequence of the fact that perfectionism is a relatively new area of interest, but the importance of studying it are illustrated by findings that show that perfectionism on a population basis has steadily increased for the past 30 years (Curran & Hill, 2016). However, the current knowledge base on perfectionism is mainly founded on findings related to adult samples and college students (Stoeber & Rambow, 2007). Fewer studies have investigated perfectionism and its correlates in samples of children, and even fewer within the ordinary academic context. This is despite the general consensus that the development of perfectionism originates in childhood and early adolescence (Hewitt & Flett, 2002).

The objective of the study is therefore to answer the following research questions:

What different perfectionistic profiles can be identified among Norwegian eight-graders?
How do these different profiles relate to academic wellbeing and achievement goal orientations?

1.1 The composition of the thesis

This is an article-based thesis, meaning that it consists of an article and a supplementary chapter. The article is written with the intent of being submitted to the journal "Learning and Individual Differences" and has accordingly followed the guidelines of this journal. These guidelines are given in Appendix 2. The supplementary chapter is a complement to the article, containing discussions that due to word restrictions and guidelines could not be part of the article itself. The three major components of interest in the current thesis, namely perfectionism, wellbeing, and motivation, are all rich in both theory and research, which has resulted in the need for an extensive theoretical background for the concepts used in the article. Methodological reflections and discussion concerning the study`s design and validity and reliability is also inherent in the supplementary chapter. The discussion-section has as such been divided into two separate themes, where the article discusses the findings from the study and the supplementary chapter the study`s validity and reliability. This connection requires a reading of the supplementary chapter in the context of the article.

1.1.1 The composition of the supplementary chapter

Section 2, 3 and 4 will provide the theoretical background for the concepts of interest in the current thesis, perfectionism, wellbeing and motivation respectively. Definitions, conceptualizations, previous research and existing debates on the different constructs will be presented and discussed. Each section will conclude with the current study`s understanding and conceptualization of the relevant construct.

Section 5 is dedicated to the research design and subsequent methods utilized in the current study. It also involves a section regarding the study`s ethical considerations.

Section 6 is concerned with the preliminary results from the analyses conducted in the study and therefore comprises the exploration of measurements and data. A brief presentation of the findings from the main analyses is provided, although these are presented and discussed in full within the article.

Section 7 provides a thorough discussion related to the validity and reliability of the current study.

Section 8 is comprised of some concluding thoughts relating the current study to the western society overall.

2   Perfectionism

Perfectionism is a relatively new topic of research in psychology and educational psychology. The most cited definition, which is also the guiding definition of perfectionism used in this thesis is that of Frost, Marten, Lahart & Rosenblate (1990) stating that perfectionism is a combination of excessively high personal standards and overly critical self-evaluations. This is not to say that the field of perfectionism agrees as to what the phenomenon is, the foundation for it, or how it operates. This section of the supplementary chapter therefore aims to introduce the complex phenomenon of perfectionism in a broader sense than could be done in the article itself. Where the article sometimes taps into the relevant discussions and debates, I here aim to elaborate on them. The dimensions constituting perfectionism, often referred to as perfectionistic strivings and concerns, or standards and discrepancy, seem to be widely agreed upon. But this exact agreement, of these two different dimensions comprising perfectionism, is what lays the foundation for several of the debates in the field.

2.1   Unidimensional or multidimensional?

Historically the unidimensional view of perfectionism governed the field (Hewitt & Flett, 2002). This is largely based on the work by Ellis (1962) on irrational beliefs and Burn`s (1980) work on dysfunctional attitudes (Hewitt & Flett, 2002). The unidimensional view sees perfectionism as something based on individual cognitive, behavioral and motivational factors. More recent advocates for this view is found in Shafran, Cooper & Fairburn (2002), who define what they term *clinical perfectionism* as the overdependence on self-evaluation in the determined pursuit of personally demanding, self-imposed standards. Shafran et al. (2002) go on describing how clinical perfectionism is maintained by the fact that individuals characterized as perfectionists react to failure with self-criticism, but also the harmful reaction of re-evaluating their standards as insufficient when they meet them.
Research on perfectionism in line with this unidimensional view has also identified perfectionism as a specific risk factor in the development of anorexia nervosa (Fairburn, Cooper, Doll & Welch, 1999) and bulimia nervosa (Fairburn et al., 1998). Shafran, Cooper &

Fairburn (2002) argue in their review study that perfectionism appears to play an important role in both the etiology, maintenance and course of several psychopathological conditions.

Hewitt & Flett (2002) argue that one of the most important developments in the field of perfectionism is the discovery of its multidimensionality. Already in 1991, they outlined what they argued were two important interpersonal dimensions of perfectionism, in addition to personal motivational, behavioral and cognitive components, namely other-oriented perfectionism and socially prescribed perfectionism (Hewitt & Flett, 1991). By the inclusion of this, perfectionism becomes a multidimensional construct, both in the sense that it involves two different dimensions (strivings and concerns) but also in the fundamental basis for the development of these. According to Hewitt & Flett (2002) the self-experienced perfectionism is affected by social interpersonal factors like pressure, and an individual can also impose perfectionistic tendencies on its social environment (other-oriented perfectionism). This is exemplified in several case-studies on perfectionism where individuals imposing perfectionistic standards on themselves often also hold significant others in their life to the same standard (Hewitt & Flett, 2002). The Multidimensional Perfectionistic Scale (MPS) subsequently developed by Hewitt and colleagues (1991) has since gained much support in the research on perfectionism with several studies indicating support for a distinction between three factors, namely self-oriented perfectionism, other-oriented perfectionism and socially prescribed perfectionism.

Findings related to the two main dimensions, self-oriented and socially prescribed perfectionism, suggest that socially prescribed perfectionism is the most maladaptive form of perfectionism, with consistent positive correlations with characteristics such as neuroticism, negative affect, stress, depression and anxiety (Enns & Cox, 2002; Hewitt & Flett, 2004; Einstein, Lovibond & Gaston, 2000). Self-oriented perfectionism on the other hand, has produced more mixed findings. With some studies arguing its positive correlations and contribution to motivation (Accordino et al., 2000; Einstein, Lovibond & Gaston, 2000), and other studies indicating significant correlations to psychological maladjustment (Hewitt & Flett, 2004). Self-oriented perfectionism has been linked to both higher and lower levels of anxiety in exam situations (Stoeber, Feast & Hayward, 2009).

While Hewitt & Flett (2003) argue that findings such as these support the view of perfectionism as a multidimensional phenomenon, Shafran (2003) answers to some of this

critique by referring to his clinical patients suffering from anorexia or bulimia nervosa who despite immense social pressure and in contradiction to socially prescribed standards continue with their self-chosen extreme perfectionistic behavior.

The foundation for some of this debate can be found in the relative emphasis the different authors place on either of the two dimensions. Hewitt & Flett (2002) argue that the most important dimension of perfectionism is perfectionistic strivings, as these are thought of as a more global and stable personality trait and not subject to environmental change and development which will influence evaluative concerns in a greater way. Shafran et al. (2002) on the other hand, argue that the most harmful and clinically important dimension of perfectionism is the concerns, as these operate so heavily and harmfully, especially in eating disorders, despite the social pressure to change their personal standards. Shafran et al (2002) argue against the multidimensionality because they place an emphasis on the concerns dimension, which in the clinical patients they meet, exceeds the social pressure. Hewitt and Flett (2002) on the other hand argue the strivings dimension as the most important dimension as this is thought of as more stable and more subject to social norms and subsequent internalizing. This study wishes to argue that these two views on perfectionism do not have to be mutually exclusive, one could rather view the unidimensional view on perfectionism as a consequence of the multidimensional factors creating it. By focusing on the self-prescribed perfectionism in this thesis, the numerous social factors contributing to the development of it are not ignored. Instead, the goal of this thesis is to investigate the consequences and correlations of the presence of self-oriented perfectionism.

2.1.1   Positive and negative perfectionism

The debate of perfectionisms multidimensionality is related to the question of whether there is such a thing as a positive form of perfectionism. As discussed in the previous section there is one negative (concerns) and one positive (strivings) component in the definition (Frost et al., 1990). Recently, several authors have suggested that perfectionism as a research field suffers from the same general bias that characterizes psychology in general, namely a tendency to focus on the negative aspects of a phenomena without recognizing the positive ones. Some of the first researchers to react to this negative bias was Short, Owens, Slade & Dewey (1995). During their studies carried out on almost 300 women, varying from successful athletes to

women with depression and eating disorders, they identified what they argued were both positive and negative aspects of perfectionism. Using factor analysis, they extracted three factors and named them negative perfectionism (including both personal and social items), positive personal perfectionism and positive social perfectionism. Furthermore, limiting the number of factors to two produced a clear distinction between positive and negative perfectionism (Short, Owens, Slade & Dewey, 1995). Bieling et al. (2003) conducted a study on college students and concluded that higher levels of perfectionistic strivings was related to higher grades in a mid-term exam. In another study students classified as adaptive/positive perfectionists (high in strivings, low in concerns) also demonstrated higher grade point average than their maladaptive perfectionists (high in both strivings and concerns) and non-perfectionistic counterparts (Rice & Slaney, 2002). Stoeber & Otto (2006) conclude much of their work by stating that it is the perfectionistic concerns dimension that is found to be related to the most negative outcomes, where depression and anxiety are most prominent.

This has led to new ways of conceptualizing perfectionism. Originally this idea can be traced back to Hamacheck (1978) who already in the 1970s stated that there is a distinction between normal and neurotic perfectionism. According to Hamacheck (1978) normal perfectionism would be defined as striving for reasonable and realistic standards in a way that would enhance self-satisfaction and self-esteem, whereas neurotic perfectionism would instead be characterized as a tendency to hold excessively high standards and being motivated by fears of failure and concerns about disappointing others. Later advocates for this view, such as Short, Owens, Slade & Dewey (1995) describe positive perfectionism as a function of positive reinforcement, hereby including a willingness to approach stimuli, and negative perfectionism as a function of negative reinforcement involving a desire to avoid aversive outcomes.

In line with Maslow`s theory of self-actualization (1970), advocates for a concept of positive or adaptive perfectionism argue that striving for perfection could be viewed as a sign of positive mental health and should not be viewed mutually inclusive with negative mental health outcomes (Acoordino, Accordino & Slaney, 2000). Gilman & Ashby (2000) argue that outcomes of these strivings only become negative when the setting and attainment of these standards are born out of inferiority or as a necessity for enhanced feelings of self-worth.

2.1.2 A question of interpretation of the definition

With the increasing research claiming that there is such a thing as positive perfectionism leading to higher self-esteem and greater motivation, it begs the question if these studies are using the same definition of perfectionism that for example Shafran et al. (2002) use relating perfectionism to a series of maladaptive outcomes. How can perfectionism be adaptive but maladaptive at the same time? Some of the answers to this question are already implied in the discussion above, with findings such as those by Stoeber & Otto (2006) claiming that it is the dimension of perfectionistic concerns/feeling of discrepancy, that leads to the maladaptive outcomes. A better understanding of such explanations we get when reading the extensive work of Hewitt & Flett (2002). They argue that a key issue in the field is the need to recognize both conceptually and empirically the difference between perfectionistic standards and the attainment of those. Furthermore, they argue that an important factor when measuring perfectionism is being able to measure perfectionistic standards without including references to whether these standards are being met in a satisfying way or not (Hewitt & Flett, 2002). Rice and his colleagues have solved this by including a separate measure of Discrepancy in their measurements of perfectionism in their Almost Perfect Scale (2014).

This is where the base of the discussion between positive and negative perfectionism lies. Where authors such as Shafran (2002) claim that this discrepancy is a central aspect of perfectionism, and the key factor in determining whether it is adaptive or maladaptive. Other researchers, like Hewitt & Flett (2002) strongly claim that definitions of perfectionism should be restricted to perfectionistic strivings only, and that individual differences in perceived concerns rather should be considered a related but distinct construct that differs from perfectionistic strivings in important fundamental ways. One of the main arguments for this difference is that concerns to a larger extent relies of self-evaluations, and where perfectionism often is regarded as a relatively stable personality construct, discrepancies both can and will fluctuate as an ongoing function of development, performance feedback, experience and so on (Hewitt & Flett, 2002). On the opposite end of this, Shafran et al. (2002) claim that it is exactly this that makes perfectionism clinical and maladaptive. Shafran et al (2002) argue that it is the fact that these individuals demonstrate an overdependence on self-evaluations on the determined pursuit and achievement (of what they claim to be self-imposed) personally demanding standards of performance. They argue that the core

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psychopathology of this clinical construct that is perfectionism is the dysfunctional scheme for self-evaluation. It therefore looks like, although they claim to operate with the same definition of perfectionism, that some view the standards as the main perfectionistic criteria, and other argue the importance of the concerns dimension. This is what has led to new conceptualizations such as healthy, adaptive perfectionism (high standards, low concerns) and maladaptive unhealthy perfectionism (high in both dimensions).

This thesis wishes to argue that by returning to the introductory definition of perfectionism, which the majority of authors cited in the thesis so far have used, that perfectionism is the *combination* of high personal standards (perfectionistic strivings) *and* a tendency for concerned self-evaluations (perfectionistic concerns) (Frost et al, 1990), there are grounds to claim that conceptualizations of positive perfectionism may suffer from not taking all the parts of the definitions into account. Instead, a person with a high sense of strivings and low sense of concerns about meeting these standards could be characterized as ambitious, driven, determined or even obsessed. On the contrary, a person with low personal strivings but a high feeling of evaluative concerns might instead be characterized as depressed, worried or suffering from low self-esteem. Hence, high in strivings alone, not accompanied by concerns about meeting these standards, reflecting adaptive goals that do not provoke concerns about the unattainability of them, would reflect a healthy ambitious student. Subsequently then, this thesis wishes to argue that only an individual or a group with high scores on both dimensions would meet the requirements for being defined as perfectionistic.

Returning to the words earlier paraphrased by Hamcheck (1975), used by several authors to justify a distinction between normal and maladaptive perfectionism, normal perfectionism is characterized as striving for reasonable and realistic standards in a way that enhances self-satisfaction and self-esteem. This would, by definition then, not be perfectionistic. People defined in several studies as healthy or normal perfectionists are never described as actually seeking perfectionism, but instead as striving for reasonable flexible goals (Greenspon, 2000). Hamacheck (1978) himself also stated that normal perfectionists "could just as easily [be referred] to as skilled artists or careful workers or masters of their craft" (p. 27). Perfectionism as defined by Frost et al. (1995) would be what Hamacheck (1975) called neurotic perfectionism, characterized as a tendency to hold excessively high standards and being motivated by fears of failure and concerns about disappointing others. It is therefore grounds to claim that the field of perfectionism suffers from a major contradiction in the

conceptualization of positive perfectionism. This is not to say that the findings indicating the correlation between perfectionistic strivings and positive outcomes are not valid, there is immense empirical evidence for this, but the contradiction arises when labelling this as positive perfectionism. Greenspon (2000) provides a thorough critical review of the body of research on perfectionism, pointing out several contradictions in researchers labelling of "positive perfectionists" for individuals displaying healthy goals and adaptive self-evaluations. Healthy perfectionism could therefore be seen as what Greenspon (2000) argue, as an oxymoron.

2.1.3 A stable personality trait or context-related

A final point of discussion when it comes to perfectionism, related to the debate of its contingency on strivings versus concerns, is that of whether it should be viewed as a personality trait or context and dimension related. Hewitt & Flett (2002, 2003) highlight the view of perfectionism as a stable personality trait, but this notion is being challenged by recent research. Studies examining this have found that individuals are often higher in perfectionism within domains that are more central to themselves (Levine & Milyavskaya, 2018). In addition, students are showed to often be more perfectionistic within academic domains, whereas varsity athletes are more perfectionistic in athletic domains (Dunn, Dunn & McDonald, 2012; McArdle, 2010). These studies are limited in their generalizability due to their focus on very specific populations, but further research supports this claim by findings demonstrating that people in general often strive for higher levels of perfectionism in the domains of work, education and hygiene compared to other areas of their lives (Stoeber & Stoeber, 2009). Haase, Prapavessis & Owens (2013) found in a sample of university students that while all strove for perfectionism in the academic domain, females had more perfectionistic tendencies in appearance and relationships and males in physical activity. In a study by Levine & Milyavskaya (2018), high personal strivings varied more across different domains than what evaluative concerns did, indicating that people differ more in the relative standards they have for themselves in different life-domains than in their concerns about meeting standards in the same different domains. Studies such as these indicate that perfectionism is not necessarily a stable personality trait and highlight the importance of studying perfectionism at the specific domain or context level.

3 Wellbeing

As becomes apparent from the discussion on perfectionism, the correlations between perfectionism and wellbeing are well established, although there are differences in the field as to the potential positive or negative contribution. To further nuance this correlation a section providing a theoretical background for wellbeing is therefore needed.

The World Health Organization (2014) defines mental or psychological health as "a state of wellbeing in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community".

Based on this definition it becomes apparent that wellbeing is both multidimensional and covers multiple areas of an individual's life. One can in addition also see the theoretical link to perfectionism based on this definition. "A state in which an individual can and will realize his or her own potential... can work productively and fruitfully" refers to the positive dimension of perfectionism, whereas "coping with the normal stresses of life" refers to the discrepancy or negative dimension of perfectionism when this is not the case.

Yet, what this state of wellbeing consists of proves harder to define. The difference between a description of the construct and a definition of the construct can be vague. The question of how it should be defined is still under several debates and remains largely unsolved, resulting in many blurred and overly broad definitions of wellbeing (Forgeard, Jayawickreme, Stern & Seligman, 2011). An early attempt to define wellbeing comes from the work of Bradurn (1969), who based on his research specified that "an individual will be high in psychological well-being in the degree to which he has an excess of positive over negative affect and will be low in well-being in the degree to which negative affect predominates over positive" (Bradburn, 1969, p. 9).

Diener and Suh (1997) took this definition further by defining subjective wellbeing as consisting of three interrelated components: pleasant affect, unpleasant affect and life satisfaction. Specified in this definition is the fact that pleasant affect and unpleasant affect are distinct different dimensions, and not opposite ends of a continuum. This way of defining well-being is in line with the dominant view of wellbeing in psychology as hedonia.

3.1 Hedonic and eudaimonic wellbeing

According to Disabato, Goodman, Kashdan, Short & Jarden (2016) a common way of looking at subjective wellbeing is to distinguish between hedonic wellbeing (hedonia) and eudaimonic well-being (eudaimonia). Hedonia represents the view of wellbeing as maximization of pleasure and minimization of pain, whereas eudaimonia represents the view of subjective wellbeing as human flourishing and striving to live up to one`s full potential. It can therefore be argued that Maslow's theory of the human need of self-actualization (1970) is in line with the view of wellbeing as eudaimonia. The thought of wellbeing as something extending beyond affect can be traced back to Aristotle. He distinguished between happiness as experiencing pleasure (hedonia), and happiness as living well (eudaimonia), where eudaimonia requires the individual to engage in it`s best human capacities and actively pursue virtue or excellence (Ryan, Huta & Deci, 2006). The view of wellbeing as hedonia can be dated back to the Greek philosopher Aristippus (3rd century BC), whereas eudaimonia stems from Aristoteles's conceptualization of wellbeing as something that extends beyond this and captures the human need to be true to oneself and strive for personal growth. The theoretical link to the phenomena of perfectionism is arguably inherent in this conceptualization of wellbeing, where striving for excellence is a fundamental part of human living. An important question in this manner, given the current research on perfectionism, is therefore to what extent is striving for excellence healthy and when does it become maladaptive?

The view of wellbeing as eudaimonia has until more recently faced greater difficulty being defined and measured in psychology, maybe because measuring quality and meaning of life is harder than measuring the presence of pleasurable affect and absence of negative affect. Still, today more scholars support this view of wellbeing and argue that wellbeing cannot be reduced to immediately gratifying experiences and instead needs to be recognized as a concept where both hedonia and eudaimonia are central aspects (Huta & Waterman, 2003). Definitions of wellbeing as "a global assessment of a person's quality of life according to his own chosen criteria" (Shin & Johnson, 1978, p.487), is found in today's literature and can be said to be a step closer to the eudomonia view of wellbeing. According to Disabato et al. (2016) the research on eudaimonia is in line with the Aristotelian distinction between pleasure and the good life, where the good life is defined as living life to the individual's fullest potential with virtue or excellence. Today there is no single theory or methodological

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approach to studying eudaimonia that is agreed upon, but although they vary widely, they all include some component of personal meaning and growth and the explicit exclusion of an affect component (Disabato et al., 2016).

The question in psychology is therefore whether or not these two types of wellbeing represent different constructs. The distinction between hedonia-eudaimonia, although popular and theoretically reasonable, has faced criticism when it comes to discriminant validity, which is crucial for measurements of abstract constructs such as wellbeing (Fiske, 1982). Several studies have been conducted to investigate this distinction and the majority of them have identified large correlations between measurements of hedonia and eudaimonia, ranging from .76 to .92 (Disabato et al, 2016). Studies by Gallagher, Lopez & Preacher (2009) found a correlation of .84 in a nationally representative population of middle-aged US citizens, and a correlation of .92 among US undergraduates. This suggests substantial overlap between the two constructs (Disabato, 2016). But an important note is that substantial overlap between the two construct does not have to equal no distinction.

3.2   Measurement of global or domain-specific wellbeing

There are also different approaches as to whether one should measure wellbeing as a global construct covering overall wellbeing, or if a better indicator is contextual measures indicating specific wellbeing in one area of life. Whereas overall measuring of global wellbeing may be more difficult to measure because of the numerous factors contributing to it, both approaches have their pros and cons. Measuring specific context related wellbeing facilitates the identification of important factors contributing to wellbeing in that particular situation or domain, and by doing this in multiple areas and different situations the picture of what constitutes wellbeing will be continuously nuanced and challenged. Measuring wellbeing as an overall construct may on the other hand be particularly helpful in guiding interventions targeting overall psychological health.

3.2.1   Wellbeing in the current study

The current study is measuring school-wellbeing specifically. Based on the premise that school is an arena where young people spend most of their time, adolescents overall

psychological wellbeing and school-specific well-being are strongly correlated and affect each other (Biolcati, Palareti & Mameli, 2018; Kasen, Cohen, Chen, Johnson & Crawford, 2009). In addition, by increasing knowledge about the more specific wellbeing in different areas of life the aim is to further increase the knowledge about all factors contributing to the overall psychological wellbeing of adolescents.

Drawing on both hedonia and eudaimonia as a theoretical background for wellbeing, in an attempt to further shed light on this discussion and try to cover different aspects of the phenomena, wellbeing is in the current study measured by using a measurement of emotional exhaustion, in other words, the presence of negative affect. In addition, measures were taken of the students feeling of school value. This was designed to tap into their feeling of meaning in their existence and daily activities. By doing so, the measurement has one negative and one positive indicator of wellbeing. It can also be argued that the measurements cover both aspects of hedonia and eudaimonia.

Intuitively and theoretically there is a basis to claim that perfectionistic tendencies (perfectionistic strivings and concerns) would influence the overall and the context-specific wellbeing of students. In a study using a sample of 580 students, each choosing four specific domains in their life, Levine & Milyavskaya (2018) measured perfectionism and wellbeing both at the general and domain specific level. Using multilevel analyses, they found that perfectionism was related to wellbeing outcomes both at the general and domain-level (Levine & Milyavskaya, 2018).

4 Motivation

The article within this thesis utilizes the approach of achievement goal orientations concerning the motivational aspect. This section of the supplementary chapter therefore aims to provide the broader concept of motivation that lays the foundation for that approach. Motivational links to perfectionism will be discussed throughout as the motivational aspect of perfectionism is apparent from the definition of perfectionism itself, in that the personal standards an individual set for him or herself also include the motivational component of the need to meet those standards (Hewitt & Flett, 1991). The setting of these standards may also come from a strong sense of self-efficacy and these two are therefore strongly intertwined. It has also been argued that the ambiguous findings that are associated with self-oriented perfectionism, the dimension of interest in this thesis, suffers from the exact failure of integrating the mediating role of motivational processes in research on perfectionism and different outcomes (Miquelon, Vallerand, Grouzet, and Cardinal, 2005).

4.1 Self-efficacy and self-determination theory

A broad definition of *self-efficacy* is that it is concerned with people's belief in their ability to influence events that affect their life (Bandura, 2010). Bandura (2010) argues that unless an individual believes that he can produce some desired effect by his actions he will have little incentive to undertake any action. Self-efficacy is therefore a foundation for human motivation. Studies have found that for individuals who are committed to their goals, performance improves linearly with goal difficulty, presumably with the help of perceptions of self-efficacy (Bong et al., 2014). In other words, the belief that you can achieve, will affect motivation and consequently, actual achievement.

Further, several theories about human motivation in psychology and educational psychology, distinguish between different kinds of motivation. One of the most cited and supported are Deci and Ryan`s (2008) theory about self-determined motivation. Self-determination theory (SDT) is an empirically based theory of human motivation, development and wellness (Deci & Ryan, 2008). The theory focuses not only on the amount of motivation, but also on the different types of motivation that an individual may have. SDT differentiates between

autonomous and controlled motivation. Autonomous motivation is comprised of intrinsic motivation, but also the types of extrinsic motivation where an individual has identified with an activity's value to such a degree that they have integrated it to their sense of self (Deci & Ryan, 2008). Here we see the theoretical link and a strong foundation for why school value was measured in the current study. How much a student values school and its activities will affect their motivation. When people are autonomously motivated, Deci & Ryan (2008) claim that they will experience volition, a self-endorsement of their actions. Controlled motivation on the other hand refers to external regulation, in which a person's behavior is a function of external contingencies of reward or punishment. But controlled motivation also refers to the partial internalization of this process, in where a person has developed inner motives such as approval motives, avoidance of shame, contingent self-esteem and ego-involvements based on these originally external factors of punishment or reward (Deci & Ryan, 2008).

This distinction can be said to lay the foundation for the theories on different achievement goals.

4.2 Achievement goals

As discussed in the article in this thesis, the research on achievement goals largely stem from the work of Dweck (1986) and Nicholls (1984) who argue that based on relatively enduring knowledge structures and self-schemas, individuals differ in terms of what goals that motivate them to initiate achievement behavior. To exemplify this Dweck (1986) and her colleagues (Dweck & Leggett, 1988) argued that goal orientations are reflected in individuals' theories of the nature of intelligence. A theory of intelligence as malleable produces an orientation towards developing competence, whereas a theory of intelligence as something fixed instead will encourage the individual to demonstrate competence. This is the fundamental difference between mastery orientation (intelligence is malleable and something I can gain) and performance goal orientation (intelligence is fixed, and I must demonstrate it).

Achievement goals have received more attention than self-efficacy in the research on perfectionism and motivation within the academic domain (Bong et al., 2014). Dweck noted already in 1986 that students who adopted performance goals were more likely to manifest a helpless pattern in response to failure (Dweck, 1986). Researchers, theorists and educators have subsequently found support for the fact that students differ in terms of which goals

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motivate them for learning and achievement behavior. Investigating 50 eight-graders, Nolen (1988) found that an orientation labelled *task orientation*, (mastery goals), was positively correlated with both perceived value and the use of learning strategies requiring deep processing of information. On the contrary, *ego orientation* (performance goals), was related to the use and perceived value of surface-level processing only. In addition, the orientation named work avoidance was negatively related to both types of learning strategies, indicating a strong sense of academic alienation (Nolen, 1988).

Further research has shown that self-oriented perfectionists were more strongly correlated with strong achievement motives, and subsequently more often adopted mastery goals of learning and improving, and performance-approach goals indicating a desire to do better than others (Neumeister, 2004). However, these are studies conducted on predominantly gifted students (Neumeister, 2004).

In addition, the research on achievement goals have differed in their conceptualizations of what achievement goals are, not to mention what factors affect and contribute to the development and pursuit of them. Nicholls (1984) argued the importance of ability-beliefs, in that the goals set in motion also will produce conceptions of ability. Further, he emphasized the role of the experienced environment and specific situational cues in the interaction creating a specific goal pursuit (Nicholls, 1989/4). Elliot (1999) took these thoughts further by defining achievement goals by the aim of them, in which the focal end state or result is competence, hereby excluding the *reason* for achievement behavior and focusing on the aim of them as the goal construct.

These different conceptualizations, and inherently operationalization, of achievement goals have there made the field of research on achievement goals very heterogenous (Tuominen-Soini, Salmela-Aro & Niemivirta, 2010). The conceptualization in the current study is similar to that of Dweck (1992) and Tuomonen-Soini et al. (2010), discussed in the following section.

4.2.1 Achievement goals in the current study: Achievement goal orientations

The focus in the current study when it comes to achievement goals is on achievement goal orientations. This is in line with the view on achievement goal orientation in several previous

studies (Tuominen-Soini et al. 2008, 2010, 2012; Niemivirta, Pulkka, Tapola & Tuominen, 2019), and trails the early work of Dweck (1992) and Nicholls (1989).

Niemivirta et al. (2019) provide a comprehensive theoretical background for the conceptualization of achievement goal as orientations. They first introduce the interactive process that is the classroom, from the student's point of view. In the myriad of events unfolding in the classroom, the students are frequently asked to both perform and learn. The students will (based on prior experiences, goals, beliefs and the features of the specific situation) appraise the different events in terms of personal relevance and personal resources to cope with it (Niemivirta et al., 2019). These appraisals will result in outcomes such as emotions, motivational states and actions tendencies. In time, a general preference for an outcome in the different situations will emerge. This is the guiding view of achievement goal orientation in the current study, as the proneness to in general, favor certain goals and outcomes. Niemivirta et al. (2019) argue that these achievement goal orientations can be viewed as knowledge structures that might not always be conscious, although present, and they may become activated as both a function of the situation but also as a function of the student`s personal perception of it.

5   Method

This section of the supplementary chapter will first introduce the research design in the current study. The rationale and philosophical background for the current study will be considered. Further, the main parts of the research design, namely the data collection, measurement of variables and subsequent analyses will be gjort rede for. Ethical considerations are also discussed.

5.1   Research design

To answer the research questions put forth in this study, "What different perfectionistic profiles can be identified among Norwegian eight-graders" and "How do these different profiles relate to wellbeing and achievement goal orientation?" a quantitative, correlational cross-sectional research design was employed. Quantitative methods are employed when the goal is to collect numerical data, and the theoretical background for quantitative methods is often a deductive view of the relationship between theory and research, and an objectivistic conception of social reality (Bryman, 2016). This implies that the philosophical foundation for quantitative methods are based on scientific realism and some form of positivism. Within research today the philosophy of realism and positivism have taken many different forms, but in general they all display a commitment to two doctrines: there is a real world of which we are part of, and both the observable and non-observable features of that world can be known by the proper use of scientific methods (Haig, 2018). The methodologies following scientific realism is rich and will be found throughout this section. This will also have implications for a study`s validity and reliability that will be discussed in a later section.

The current study is also cross-sectional, sometimes also referred to as a survey design. A cross-sectional design encompasses the collection of data on a sample of cases at a single point in time in order to collect a body of quantifiable data in connection to two or more variables, which are then examined to detect patterns of associations (Bryman, 2016). The study is therefore also correlational in that it seeks to establish relationships between variables. Following this is the fact that conclusions about causality is beyond the scope of the

current study, although the goal for many cross-sectional studies still is to theoretically argue for the positions of what the dependent and independent variables are (Bryman, 2016). Bordens & Abbott (2018) argue the importance of using correlational designs in research, especially in the early stages of a field. Seeing as perfectionism is considered by many to still be a relatively new topic of research, it can be argued that correlational studies such as the current one is central to its further development. The ability to relate naturally occurring variables, in a setting where the researcher does not manipulate the situations, is an important strength of the correlational design (Bordens & Abbott, 2018).

5.1.1 Data collection

The data in the current study was collected using convenience/purposive sampling. This is a sampling strategy within non-probability sampling strategies, meaning that generalizing beyond the sample utilized is highly restricted (Langdrigde, 2006).
12 schools in the south-east of Norway participated in the study. This resulted in 429 students completing the survey. The data were collected by the same two research assistants from the University of Oslo in the time span of December 2017-February 2018. The candidate took part in the data collection at all 12 participating schools. The chosen method for data collection was self-administered questionnaires. Provided signed consent from parents, and followed by an introduction to the study and information about volunteerism and anonymity, the students completed the survey on their own computer or Ipad. They logged into the online questionnaire using a customized code-key. The completion of the survey had approximately an average time of 30 minutes. The research assistants were present during the entire period to answer potential questions and making sure the environment was suitable.

5.1.2 Measures

If a concept, like perfectionism, motivation or wellbeing in this case, is to be employed in quantitative research, a measure will have to be developed for it so that it can be quantified. To provide a measure for a concept, in the process of operationalization, indicators that will stand for the concept are created. These are often labelled as the operational definitions (Bryman, 2016).

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In this study perfectionism was operationalized to eight different items, four items to stand for the two different dimensions (strivings and concerns) respectively. The items were translated from the Short Almost Perfect Scale by Rice et al. (2014), and the wording modified to the context, language and age of the participants.

Wellbeing was operationalized to two different variables, three items to stand for emotional exhaustion, and six items to stand for school value. The items concerning emotional exhaustion were translated from the facet *emotional exhaustion at school* from the School Burnout Inventory (Salmela-Aro et al., 2009). And the six items concerning school value, developed by Niemivirta (2004), were also translated. Three of these items were negatively formulated and three positively formulated.

Five types of achievement goals were measured using items originally developed by Niemivirta (2002; see also Tuominen-Soini et al., 2008, Tuominen et al.,2011).

All items were statements measured using a Likert-type scale ranging from 1-7 which is designed to measure the intensity of feelings about the area in question (Bryman, 2016). This is based on the work by Likert (1932) who in response to the difficulty in measuring character and personality traits developed this procedure for measuring attitudinal scales. He used a series of questions/statements with 5 response alternatives (strongly agree, agree, undecided, disagree, strongly disagree), but other variations of these responses, also the use of numbers, have been proven equally valid and reliable (Boone & Boone, 2012). The current study utilized numbers ranging from 1-7 as an indication of how strongly the respondents agreed to the different statements measuring the different constructs.

All items used in the current study are illustrated in Appendix 1.

5.1.3   Statistical analyses

Several statistical analyses were carried out on the data collected. Initially, exploratory factor analyses were carried out on the items concerning perfectionism and achievement goal orientations respectively. Factor analysis is a statistical method for empirically identifying the structure underlying measured variables (Thompson, 2007). There are two major classes of factor analytical methods, *exploratory* and *confirmatory* factor analysis. Exploratory factor analysis was used in the current study. Despite having theoretical assumptions for the factoring of the items, the choice was made to not invoke these assumptions as part of the

analytical calculations, which is the case for confirmatory factor analyses (Thompson, 2007). Still, there are several decisions made in exploratory factor analyses as well, affecting the results. In the current study minimum residuals was used as extraction method, and oblimin as rotation method. Pearson's r matrix was used as a covariance matrix for association between factors. Cronbach's alphas were subsequently calculated for the different composite scores concerning perfectionism, wellbeing and achievement goal orientations respectively.

To answer the first research question put forth by the current study "What different perfectionistic profiles can be identified among Norwegian 8th graders"? a Two-Step cluster analysis was carried out based on the total population's responses to the perfectionistic measurements. There are several different types of cluster analyses. Traditional cluster analysis methods (hierarchical and k-means clustering) initially create a distance measure of dissimilarity between individuals and seek to determine the underlying subgroup structure by optimizing the within-subgroup variability of individual`s distance measure and maximize the between-group variability (Kent, Jensen & Kongsted, 2014). More recently however, newer methods for cluster analysis, like Latent Class Analysis (LCA) have emerged, which instead uses a probabilistic modeling approach to identify likely distributions within the data and the likely placement of individuals within those distributions. Subsequently, this method seeks to determine the optimal subgroup structure that explains the most variance while at the same time requiring the simplest specification of the model (Kent, Jensen & Kongsted, 2014). The Two-Step cluster analysis in SPSS, utilized in the current study, is a hybrid of these two approaches. It uses a distance measure to separate individuals, in addition to similar methods to those in LCA to choose the optimal subgroup model. Although the Two-Step method has been shown to have some difficulties when the dataset involves a mix of nominal and interval data, this approach has consistently performed better than traditional hierarchical cluster techniques (Kent, Jensen & Kongsted, 2014). The data used for the Two-Step cluster analysis in the current study were based on interval-data only.

Still, an important issue to note regarding cluster analysis is that although proven a competent method, it has no means of differentiating between relevant and irrelevant variables. This is why the choice of variables should be underpinned by theory and why the choice was made to additionally strengthen the measurements with exploratory factor analyses.

In order to answer the second research question "How do these different profiles relate to subjective wellbeing and achievement goal orientation?" a series of analysis of variance (ANOVA) was carried out. ANOVAs, as the name implies, is based on the concept of analyzing the variance that appears in the data. Variation is partitioned into sources of variance, and these are used to calculate the statistical F ratio, which is ultimately checked to determine whether the variation among means is statistically significant (Bordens & Abbott, 2018) There are several different variations of ANOVAs. In the current study we utilized a series of univariate independent analysis of variance, checking for both between-subject effects, and multiple comparisons between the different perfectionistic profiles and the numerous dependent variables. This resulted in a total of 7 individual ANOVAs relating the different perfectionistic profiles to the 7 different independent variables (emotional exhaustion, school value, mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, and work-avoidance). In addition, ANOVAs were also utilized initially to investigate the relationship between the different perfectionistic profiles and the two dimensions *strivings* and *concerns*.

5.2   Ethical considerations

The National Committee for Research Ethics in the Social Sciences and the Humanities (NESH) provides the Norwegian Guidelines for research in the social sciences in Norway. The guidelines are divided into six distinct parts dealing with research: In relation to the overall society, to the participants, to groups and institutions in particular, to the research community, concerning assigned/funded research projects and finally, the dissemination of research.

All researcher and research projects are subject to these rules and guidelines, including the current thesis. In addition, all research projects in Norway dealing with personal information of its participants need to notify and be approved by Norwegian Centre for Research Data (NSD). The current study is, as previously mentioned, part of the MALS project by Learning, Motivation and Wellbeing (LeMoWe) at the Faculty of Educational Sciences at the University of Oslo and is therefore inherent in their approval by the NSD, in addition the candidate following additional guidelines provided by the supervisors.

Because the data in this study is part of the MALS project, the ethical considerations and

guidelines underlying MALS regarding anonymity and confidentiality is also applicable to the current study. The guidelines by NESH state that the researcher is to give adequate information about the field of inquiry, the purpose, funding, access and the consequences of participating in the study. This is to be given in a neutral way as to not apply pressure to the potential participants. The information to all participating schools was written by the candidate and a researcher from The Institute of Special Education with careful consideration of these factors and the age of the participants. The information was subsequently given to all students in the same manner. The study has also followed rules of anonymity using code-keys for the participants and the use of data storage.

The current study also requires some additional attention when it comes to several aspects in ethics because the participants are children under the age of 15. In the case of children under the age of 15 the research also requires consent given from the children's parents, as they are not free to give their consent alone until the age of 18 in Norway. Therefore, only students with a signed form from their parents were able to participate in the study. The students were still informed by the research assistants before starting the survey that it was voluntary to both participate and finish the survey, meaning that they could start and end whenever they wanted to. But not all children are willing or brave enough to let the researchers know that they wish to end the survey or testing, and this puts a great deal of responsibility on the researcher or research assistants to observe and meet their needs.

In consideration of this the research assistants let the students know that if they had any questions or wanted to end the survey they could just raise their hands or exit the questionnaire on their computer and continue doing school work, as to not attract unwanted attention if they found something uncomfortable. The teachers of the different groups of students were also welcomed to attend the survey-sessions and answer potential question, based on the notion that the students might be more comfortable with their own teacher.

6 Results

This section will provide the results of the preliminary analyses concerning the items and variables in the study. It is comprised of explorations of the measurements used, and the subsequent data that were collected based on them. These are important precursors for the main analyses further utilized. The main analyses are reported and discussed within the article, but a brief summary will be given in the last portion of this section as well.

6.1 Preliminary data analyses

The first task regarding the data in the study was concerned with exploring the measurements. Exploratory factor analyses were carried out on the items constituting perfectionism and achievement goal orientation respectively. The factor loadings on perfectionism (concerns and strivings) are presented in table 1.

Table 1

Factor loadings on concerns and strivings

Items	Factor		Uniqueness
	1	2	
stand1_T1	0.774		0.411
stand2_T1	0.475		0.764
stand3_T1	0.748		0.427
stand4_T1	0.772		0.380
disc1_T1		0.620	0.615
disc2_T1		0.637	0.522
disc3_T1		0.571	0.676
disc4_T1		0.541	0.656

Note. 'Minimum residual' extraction method was used in combination with a 'oblimin' rotation.

These results indicate the support for a distinction between the two variables concerning perfectionistic strivings and perfectionistic concerns. The item stand2_T1 refers to the statement "I always try to do my best", and as seen from Table 1 the results are indicating that it does not contribute as much as the other items to the concept of perfectionistic strivings. However, based on the theoretical grounds for the development of the measurement, it was chosen to keep it for further analyses, as it still had some contribution and did not significantly load onto the other factor. The factor correlations for the two different factors concerning perfectionism showed an anticipated and low correlation ($r=.17$, $p<.001$)

The Kaiser-Meyer-Olkin Test of Sampling Adequacy (KMO) measuring the shared variance in the items yielded a value of 0.731 which is what Field (2009) labels *middling*. The Root Mean Square Error of Approximates (RMSEA) value for this matrix showed a value of 0.0874, indicating a mediocre fit (Field, 2009). MacCallum, Browne, and Sugawara (1996) used 0.01, 0.05, and 0.08 to indicate excellent, good, and mediocre fit, respectively. Bartlett`s test produced a significant test result ($p<.001$), rejecting the null hypothesis and hence providing evidence that the observed correlation matrix is statistically different from a singular matrix, confirming that linear combinations exist (Field, 2009). The choice was made to go forth with the analysis with these factors, but it is important to note that some of these values indicate less than marvelous fit which has some implications for validity and reliability discussed in later chapters.

Regarding the measurements of achievement goal orientations, the results from an exploratory factor analyses yielded support for a distinction between five different factors. These results are presented in table 2. The correlations between the different factors are presented in table 3. The factor matrix for the 5-factor solution provided a satisfactory KMO value of 0.822. The RMSEA indicated a good fit with a value of 0.0313. Bartlett`s test was also significant, providing further basis to claim a good fit with a 5-factor solution to these items.

The correlation matrix (see table 3) for the factors related to achievement goal orientations showed low and anticipated correlations, but a relatively high correlation between the two factors concerning mastery-oriented correlations ($r=.72$, $p<.001$) indicating that these two orientations have substantial overlap. Based on the theoretical background for these orientations, this is still anticipated.

Table 2

Factor loadings on items measuring achievement goal orientations

Items	Factor					Uniqueness
	1	2	3	4	5	
mint1_T1		0.614				0.474
mint2_T1		0.907				0.215
mint3_T1		0.552				0.466
mext1_T1	0.842					0.233
mext2_T1	0.493					0.575
mext3_T1	0.763					0.361
papp1_T1				0.726		0.515
papp2_T1				0.441		0.622
papp3_T1				0.616		0.442
pav1_T1			0.699			0.528
pav2_T1			0.782			0.405
pav3_T1			0.578			0.563
wav1_T1					0.705	0.480
wav2_T1					0.469	0.618
wav3_T1					0.687	0.515

Note. 'Minimum residual' extraction method was used in combination with a 'oblimin' rotation

Table 3

Correlation matrix for the five-factor solution on achievement goal orientation

	1	2	3	4	5
1	—	0.729	0.1450	0.445	-0.260
2		—	-0.0139	0.261	-0.390
3			—	0.428	0.182
4				—	0.198
5					—

Next, composite scores were created for the variables constituting perfectionism, wellbeing and achievement goal orientation. Reliability analyses were carried out on all variables. Table 4 (replicated from the article) illustrate these, in addition to the important measures of kurtosis and skewness.

Table 4

Descriptive statistics for all variables, including reliability measurements

Variable	N	M	SD	Skew	Kurtosis	α
Strivings	427	5.23	1.13	-.604	.166	.77
Concerns	427	3.94	1.28	.108	-.221	.67
Mastery-intrinsic orientation	425	5.24	1.32	-.672	.037	.80
Mastery-extrinsic orientation	425	6.01	1.10	-1.39	1.86	.79
Performance-approach orientation	426	4.43	1.39	-.222	-.536	.69
Performance-avoidance orientation	426	4.56	1.47	-.324	-.552	.73
Work avoidance orientation	427	4.36	1.39	.007	-.600	.67
Emotional exhaustion	425	3.75	1.56	.303	-.842	.69
School value	427	4.69	1.36	.638	2.51	.87

Note. α = Cronbach`s alpha

As seen in table 4 all variables produce satisfactory Cronbach`s alpha values. An acceptable value is often considered as one above .70 (Tavakol & Dennick, 2011), and these results show 4 items below this value. Still, these 4 items are above .65 indicating mediocre internal consistency. This will be further discussed in the next section.

Illustrated in table 4 is also skewness, a measurement of asymmetry in the distribution of a variable, and kurtosis, a measure of peakedness. A skew value of zero implies a symmetric distribution and a kurtosis value (as obtained from SPSS) of zero would indicate a perfectly normal distribution (Kim, 2013). The values for the variables in the current study show satisfactory low levels of skewness and kurtosis, with only the measurement of mastery-intrinsic goal orientation providing values greater than 1, indicating elevated levels of skewness and kurtosis for this variable in particular.

6.2   Main analyses

A Two-Step cluster analysis showed support for a distinction between three profiles, namely a perfectionistic, ambitious and non-perfectionistic group of students. Using a series of ANOVAs comparing these different groups on wellbeing and motivation, they all showed significant relationships with both concepts, although not always statistically significant from each other.

The perfectionists and non-perfectionists both scored equally high on emotional exhaustion, but the non-perfectionistic group scored significantly lower on school value. This posits a notion that these groups might experience emotional exhaustion due to different reasons. The group labelled as perfectionists scored highest in all achievement goal orientations, except for the orientation labelled work avoidance. This suggests a strong correlation between perfectionism and high motivation, both extrinsically and intrinsically, mastery oriented and performance oriented. This and further main findings from the study are discussed in the article.

7 Discussion

The goal of the current study was to identify different perfectionistic profiles in a sample of 8th graders and see how those profiles relate to wellbeing and motivation. This section of the supplementary chapter will focus on discussing the current study in relation to validity and reliability. These are crucial elements of research, especially in psychology and educational psychology, because the measurement of concepts in these areas differs considerably from the measurement of phenomena in, for instance, chemistry and physics. Realistically we do not know if we are measuring personality traits in the same way we know we are measuring electrical tension (Langdridge, 2006). Still, there are several ways in which psychologists and researchers try and increase the validity and reliability of their work, but it should always be regarded as exactly this, ways in which we want to increase the validity, not guarantee it.

7.1 Validity

Validity in research is concerned with whether the research truly measures what it states and intends to measure and how truthful the subsequent conclusions based on the research are (Golafshani, 2003). In order to understand validity in quantitative research it is first important to note that the golden standard in this paradigm often is regarded as the randomized double-blind experiment. In such a study the sample is completely randomly chosen to represent the overall population. It is double blind in the sense that neither the researchers or participants know who is in what condition (randomly assigned to either the control or experimental group) and it is an experiment, meaning that the researchers have full manipulative control over the independent variables affecting the dependent variables (e.g., administering a new medicine to only one group controlling for all other possible effects other than the effect of that particular drug). Hence, an experiment is deemed valid to the degree of the establishment of a cause-effect relationship, produced only due to manipulation in the independent variable (internal validity) and the results can be generalized to groups, environments and contexts outside the experimental setting (external validity) (Onwuegbuzie, 2000). It therefore becomes clear that the traditional criteria for validity have their roots in a positivistic tradition. Subsequent research using quantitative methods may not all strive for this particular

goal, as will be discussed in the following.

Still, the most used reference when it comes to validity in quantitative research is Cook and Campbell`s validity system (Bryman, 2015). Based on what was originally two categories for validity, namely external and internal, the system today is a taxonomy containing four distinct categories comprising several threats to validity, namely *construct, statistical, internal* and *external* validity (Cooper & Hedges, 1993). These different categories affect the validity of research conclusions in different ways, which will be discussed in the following.

7.1.1   Construct validity

Construct validity is concerned with the truthfulness of generalizations about higher order constructs based on research operations (Cooper & Hedges, 1993). In other words, how legitimate is our conclusions about the phenomena of interest based on the instruments and methods we have used to measure said phenomena. In involves the process of generalizing from your measure to the concept of your measure (Trochim, 2006). There are several ways in which a researcher can investigate the construct validity of a measurement.
Face validity refers to whether the operationalization of the phenomena "on its face" seem to measure what you want it to (Trochim, 2006). This is probably the weakest form of trying to demonstrate construct validity, but it can be improved simply by using the statements from experts in the relevant field. The current study utilizes already established operationalizations of the concepts of interest. The Short Almost Perfect Scale (SAPS; Rice et al.2014), for perfectionism, a facet of the School Burnout Inventory (SBI) developed by Salmela-Aro and colleagues (Salmela-Aro, 2009) for emotional exhaustion, school value based on the measurements developed by Niemivirta (2004) and the achievement goal variables developed by Niemivirta (2002). These have been found valid in several studies, and it can therefore be argued that the measurements utilized in the current study, in the opinion of experts, have demonstrated face validity. It is still also important to note that Niemivirta being the leader of the current project both contributes to the argument of face validity but is also a potential source of bias.

Content validity is another way to demonstrate construct validity and refers to checking the operationalization against relevant content in the domain of the relevant construct

(Langdridge, 2006). In other words, based on theories and current research findings in the field, how well does your operationalization cover the construct? Based on an extensive literature review of the relevant topics of interest in this thesis and discussions related to them, the goal is to have established content validity. This is also further supported by the similarity between the current findings and previous findings using measurements claiming to measure the same concepts of perfectionism, motivation and wellbeing.

Predictive validity refers to the predictive ability of an operationalization (Trochim, 2006). If an operationalization claims to measure motivation and motivation theoretically is said to predict achievement, then checking how well a measurement of motivation correctly predicts achievement, will add predictive validity to a measurement. In a sense, it can be argued that the correlations between perfectionism, motivation and wellbeing is indicative of predictive validity because the theoretical background argues for their correlations and they were found to correlate in the current study. On the other hand, the current study is as previously stated a correlational study, meaning that data on all variables were collected at one point in time. Implying causality is therefore beyond the scope of the current study and the study cannot establish a direction for the correlations between perfectionism, wellbeing and motivation. But based on a theoretical argument and the findings in the literature this process is most likely an interactive and complex circular process in which all concepts affect and are affected by each other continuously.

7.1.2 Statistical conclusion validity

Statistical conclusion validity refers to the validity of the statistical conclusions. The observed failure of mentioning and discussing threats to statistical validity in the social sciences may come from the fact that many pure positivistic quantitative researchers argue the objective nature of statistical analyses, overlooking the many subjective decisions that are made throughout this process (Onwuegbuzie, 2000). This is already implied in section 5 of the supplementary chapter, where several decisions made in the statistical analyses are described.

When doing statistical analyses, one of the first things to be aware of are biases in the data, often in the form of assumptions that affect the statistical conclusions that can be drawn (Field, 2014). An assumption then, is a condition that ensures that what you are attempting to

do actually can be done correctly. If the assumptions are true, we can interpret the statistics and p-values at face value, but if they are not, we have to be careful. Field (2014) argues that although it is often presented as if different statistical analyses have their own set of assumptions, many of the tests actually have the same assumptions, and they relate to the quality of the model itself and the statistics used to assess it. Therefore, one can sum up the main assumptions in parametric tests (utilized in the current study) as assumptions concerning additivity and linearity, normality in some form, homoscedasticity/homogeneity of variance and independence.

Additivity and linearity is concerned with a linear relationship between variables. This assumption is underpinned in the current study by an extensive literature review relating the different variables to each other, in addition to the calculation and inclusion of effect sizes (partial eta squared) as seen in Table 4 in the Results section. By further exploring the relationship between the dependent variables (perfectionistic profiles) and independent variables (wellbeing measures and achievement goal orientation) in the form of effect sizes, there was in addition to a relationship, also established a measure of how strong this relationship is. In other words, how much variance in the dependent variables could be explained by the independent variables. The results provided in the previous section regarding model fit of the factor analyses also showed support for a linear relationship.

When it comes to normality, the central limit theorem proposes that if a sample is big enough (above 30), the data will be a normal distribution regardless of the shape of the population (Field, 2014). In other words, given a big enough sample (*N*=429 in the current study), the average of your sample means will be the true population mean, and normally distributed. The data does not have to be normally distributed, but the sampling distribution of means (or differences between means) does (Field, 2014). Therefore, Field (2014) argues that given a large enough sample, a bigger threat to normality are extreme outliers, which can drastically reduce the power of significance testing. The most extreme outliers (0,2% of the sample) were removed from the analyses in the current study in SPSS. In addition, skewness and kurtosis for all variable measures were checked.

In relation to homoscedasticity/homogeneity of variance, the assumption of equality of variance is especially relevant in the ANOVAs utilized in the current study. When running

ANOVAs there are multiple assumptions that have to be met in order to produce valid results. When using these types of tests there are especially two types of error that needs attention, per-comparison error and familywise error (Bordens & Abbott, 2018). In relation to the assumption of homogeneity of variance Levene`s test for equality of variance was used in all comparisons between the different perfectionistic profiles and independent variables. Subsequent adequate corrections were made based on this. If equal variance was found Bonferroni was used as parallel-comparisons correction and if equal variance was not found Games-Howell was used as correction.

By exploring our measurements with exploratory factor analyses the goal was to establish independence between the different factors constituting the different variables. This is also a way to establish that the different observations did not affect each other. Some of the factor loadings were lower than ideal, indicating a smaller effect then anticipated, and some factor correlations were also above the ideal value, indicating substantial factor correlations. The factor correlation between the two mastery-oriented goal orientations, with a factor correlation of above 0.7, is a threat to statistical conclusion validity as it suggests that these two goal orientations might not be extremely independent of each other.

Another way to demonstrate statistical conclusion validity is by utilizing Cronbach`s alpha. Cronbach`s alpha is a measure of internal consistency of a test or scale and is expressed with a number between 0-1 (Tavakol & Dennick, 2011). In other words, is the items that aimed to measure the same concept are in fact correlated (measure the same), the value of alpha is increased. However, it is important to note that the alpha is a property of the population the data is collected from, so researchers should not rely on previously calculated alphas for internal consistency as a precursor for statistical conclusion validity in their own studies. Tavakol & Dennick (2011) therefore argue the importance of calculating the alpha for all measures used, although it has been established previously. In addition, they highlight the importance of calculating alpha separately for each concept, because a large number of questions inevitably will inflate the value of alpha, so to calculate an alpha for an entire survey will not be considered very valid or reliable (Tavakol & Dennick, 2011).

As for acceptable alpha values there are different reports as to what an acceptable value is, but there is a general consensus that an acceptable value is above 0.70. In the current study, 4 variables indicated a value below this (although all still above 0.67), and this might be due to these variables being comprised of too few items (three of four items each), or because the

inter-relatedness is not ideal, which the results from the exploratory factor analysis also indicated in some instances. This proposes a threat to statistical conclusion validity. However, viewing these assumptions checks and analyses together, there are grounds to claim that the analyses conducted in the current study, and the subsequent conclusions drawn based on them, have established a relatively good statistical conclusion validity.

7.1.3 Internal validity

The ability of the research design to adequately test its hypotheses is referred to as its internal validity (Bordens & Abbott, 2018). In a correlational study as the present one, this means showing that changes in the values in the independent variable relate solely to changes in the value of the dependent value and not other variables or factors. Bordens & Abbott (2018) list several factors that threaten the internal validity of a study, and most important for the current study are confounding variables, measurement of variables, and the test situation. Bordens & Abbott (2018) argue that the time to be concerned with internal validity is in the design phase of the study, when you can carefully plan which variables you want to measure, how you want to measure them and identify threats and minimize them.

When it comes to confounding variables (variables that operate as mediators) planning in advance helped eliminate some threats in the current study. In Norway the norm is to have three different classes (A, B and C) at each grade level, so when inviting the schools to participate in the study they were consequently asked that only class A and B would participate so that the schools were not free to choose, for example, the two most high achieving or motivated classes. But the 12 participating schools also differed in numerous ways, as in size, the social economic status of the neighborhood, student ethnicity, parent`s educational level and so on. This can be seen as positive in the sense that it contributes to external validity (generalizing beyond the sample), but all these factors are also potential confounding variables, affecting the results obtained. Maybe most of all, the variable of actual achievement, in the form of grades, is a potential confounding variable. Grades were obtained from the participating students but were not available for analyses at the time of this thesis. These would not only have been interesting potential covariates but also a potential confounding variable for the results obtained in this study, and hence this proposes a threat to the internal validity of the study.

When it comes to the internal validity of measurements used, the previous sections describe how they met satisfactory Cronbach`s alphas, indicating that it is a reliable measure, thus increasing internal validity. But other important factors to consider in this respect is also the distribution of the data. The distribution of results can also affect the conclusions drawn. All three profiles were relative equal in size, and normally distributed, as seen in section 6. This also help strengthen the conclusions based on the measurements.

Still, another important factor deserving of attention in this respect is the use of the Likert type-scale that measured all variables in the current study. Research has shown, in English speaking respondents, that when this scale is reversed, that is when the scales start with the high positive indicators to the left as opposed to the negative indicators, that slightly higher results are obtained (Hartley & Betts, 2013). The measuring of the variables in the current study might therefore be subject to response-bias in this matter. When using these types of scales Hartley (2013) also draw attention to the responsibility of formulating good items, not measuring more than one thing at the time. Finally, an important aspect of note concerning the measurements utilized in the current study when it comes to internal validity is the use of self-reports. Self-reports are subject to several biases, such as social desirability bias, the tendency to overly agree or disagree to statements, dishonesty, fear, and other characteristics of the sample that might affect the answer they give (Langdridge, 2006). Using self-report with children may heighten all these risks as well. This is why several actions were taken to use measures and a test situation that would not invoke such biases. The choice of using self-reports from children, although often times risky, is also an important addition to the field of research on perfectionism, wellbeing and motivation. Because, although it is possible to gain much knowledge and insight into these phenomena using third party reporting or measurements not relying on self-report, the dimension of students own perceptions of self-oriented perfectionism, personal wellbeing and motivation, remain of immense importance.

When it comes to the test situation as a threat to internal validity, several actions were taken to increase internal validity. The same research assistants went to all 12 schools, gave the same information in the same manner to all students and were present during the entire session. Hence, the test situation, although different for the different classes, were an arguably equally new experience, in a familiar setting for all students. Because the test situation was a familiar setting, the goal is to minimize configuration bias which is a consequence of an

experimental setup unknowingly creating a stronger/weaker effect than would happen in the general case (Edgar & Manz, 2017). This is not to say the study is without bias, such as selection bias and experimenter bias, which are bias that can affect the data because of how participants were chosen or how the experimenter interacts with the participants (Edgar & Manz, 2017). The fact that the participants in the study were chosen based of convenience and the research assistants were present and interacted with the participants can have an influence on the subsequent results although actions were taken to minimize this effect.

With these factors taken together the conclusion that follows is that although some internal validity both can and should be argued, there are some important threats to be aware of as well.

7.1.4 External validity

External validity refers to the degree the results from a present study can be generalized beyond the limited research setting and sample in which they were obtained (Bordens & Abbott, 2018). Building on the work of Campbell & Stanley (1963), Smith & Glass (1987) classified threats to external validity into three areas: population validity, ecological validity and external validity of operations. These reflect the questions of how well the sample represent the population, how well the test situations represent the natural world and how well the operations used in the study translates to the real world.

Bordens & Abbott (2018) nuance the idea that all studies always should be conducted in such a way that the findings immediately translate to either a real-world setting or all other settings in general. For example, that studies conducted on women should translate to all women. This is rarely neither the case nor the purpose in most research, although sometimes misunderstood by the media. In the current study, the goal of the findings is not to generalize them to all children in all settings, but the academic setting in particular, and 8th grade especially. The goal is to say something about this population with good enough measurements and statistical analyses so that the findings could be generalized to other similar contexts. In order to do so, several actions were taken. The research assistants travelled to the different schools to that the students could take the survey in a familiar setting, hoping that this would help the students feel comfortable and not feel as if they were being tested in any way, and thereby increasing the probability of honest answers. It was also made that all students were given information

about their anonymity and make it clear that it was completely voluntary to participate. By the presence of the research assistants in all data-collections it was also possible to identify and note potential disturbing effects in the time it took to complete the survey that could influence the measurements. By collecting the data in their classroom the ecological validity of the study increases, and this strengthens the external validity. The sample in the current study is also large (*N*=429), contributing to the external validity and possibility of generalizing the findings to similar populations.

In summary of the discussions on validity, this thesis wishes to highlight the fact that discussing threats to external and internal validity within a study is often neglected in research, especially in the social and educational sciences (Onwuegbuzie, 2000). Onwuegbuzie (2000) posits that this may be due to a misperception that these threats are only applicable to experiments, or due to an uncompromising positivistic stance. A possible reason can also be that it is more complicated due to the fact that evaluating quasi experimental, descriptive and correlational quantitative studies do not have an equally robust framework for these evaluations in the same sense that the true experiment does. But explicitly because of this more, studies should report threats to validity. Not only will such discussions let the reader place the research findings in the right context and limit false impressions but if such discussions become common it would enable validity meta analyses to be conducted, helping determine what the most prevalent threats are for a given hypotheses and from there minimizing these would become easier (Onwuegbuzie, 2000). Such discussions are also the prominent guide for future research.

7.2 Reliability

Reliability in short has to do with the quality of the measurements used in a study. Reliability is the consistency or repeatability of the used measurements (Trochim, 2006). When we discuss reliability of the conclusions made based on a study what we first and foremost talk about is the reproducibility of it, to what degree can another researcher, in another time, produce the same findings? This is related to the requirement in research called verifiability, the mandate that other researchers should be able to replicate the studies based on the information they get from study reports and articles. This concerns the sources claimed to be used, the methods that are used and the subsequent conclusions drawn. This is why

transparency is also important in research, and why studies, including this one, have provided sections about methods and reference-lists.

A simple way to explain what reliability is and why it is important to consider in research is to examine the true score theory of measurement. According to this simple theory, every measurement or score on a variable is composite of two components: true score (or true level) and random error (Trochim, 2006). All we can measure is the combination of these. Therefore, we cannot calculate reliability, we can only estimate it (Trochim, 2006). An important part of understanding and estimating reliability is also to understand its close link to validity. We want both a valid and reliable measure of the concepts we are interested in, but where measurement validity refers to the question if we have measured the concept we wished to measure, the reliability refers to the stability of this measurement.

7.2.1 Stability and equivalence

Reliability estimates can be divided into two major classes: estimates of *stability*, hereunder including inter-rater reliability and test-retest reliability, and measures of *equivalence,* hereunder parallel-reliability and internal reliability.
Inter-rater reliability and test-retest reliability estimates have the same goal, but inter-rater reliability refers to the agreement between different observers on the same phenomenon and test-retest to the agreement between a measure or test taken several times (Langdridge, 2006). These estimates can help strengthen the reliability of a measurement, but it is important to note that especially test-retest measures will be subject to several unwanted effects like learning, maturing and boredom for the participants completing a measure several times (Trochim, 2006). It can therefore be argued that a good form of test-retest reliability instead is replication of studies. This can be argued to have been done in the current study, because by using measurements similar to that in previous research where they have been found reliable, the current study contributes to this by replicating the same findings.

Parallel-reliability and internal reliability is based on measures of comparisons to estimate reliability, where parallel-reliability refers to the process of comparing your current measure to another measure claiming to measure the same phenomenon and internal consistency reliability to the process of checking if the different items you have claiming to measure the

same construct actually measure (load) onto the same construct (Trochim, 2006). Parallel reliability has not been established in the current study because we have not conducted measurements using other instruments but because the findings strongly resemble other findings by numerous other researchers using other measures one can argue that the study has established some form of parallel reliability. When it comes to internal consistency, however, we have devoted several analyses trying to achieve this. The use of exploratory factor analysis is based on the investigation of what items load onto what factors, and this was done on the items constituting perfectionism and achievement goal orientation with satisfactory results as seen in table 1 and 2 in the Results section. In addition, Cronbach`s alphas, a measure of internal consistency was calculated for all variables.

In conclusion, and as apparent from these discussion, validity and reliability strongly affect each other and are dependent of each other. This section has highlighted both strengths and weaknesses of the current study, resulting in an overall basis to claim that the current identification of three different profiles and subsequent different relations to wellbeing and motivation is both valid and reliable. Still, there are some threats to these conclusions, which hopefully will guide and inspire future research on these topics.

8 Concluding thoughts

In conclusion, the current study had the goal of expanding the knowledge of perfectionism, wellbeing and motivation in the lower secondary school context. By identifying different groups of students based on measurements of perfectionism, the study has been able to relate perfectionism to both academic wellbeing and different achievement goal orientations. These findings have several important practical implications for both instruction in school and future important research. By identifying different groups of students with distinct relations to perfectionistic tendencies and subsequent relations to wellbeing and motivation, this study has highlighted the importance of fundamental different needs for different groups of individuals. As this is discussed further in the article itself, the following concluding section wishes to point to the overall phenomenon of perfectionism, beyond the context of academia.

8.1 Self-actualizing or detrimental?

Based on the discussions regarding perfectionism, and the current findings suggesting the identification of a perfectionistic group with high motivation and low wellbeing, this thesis wishes to conclude with some thoughts regarding why. The study in this thesis was a cross-sectional examination of the correlates of perfectionism, but a point deserving of some final thoughts is still the lingering question of why perfectionism is a phenomenon, and not only that, but why is it increasing? Is perfectionism a symptom of self-actualization or mental illness? And why has it been found to be increasing over the past 30 years? (Curran & Hill, 2019).

Some possible answers to this are found in the extensive body of research on happiness and wellbeing. In what now is considered seminal research, Easterlin (1974, 1995, 2001) suggested that happiness is relative. Based on studying the reported levels of happiness in the US over time, he proposed that individual wellbeing would be the same, relatively, across both rich and poor countries, because people compare themselves to others close to themselves (Easterlin, 1974).
Based on the immense growth of social media the last decades, this might have influenced

this process. Young generations today have access to much more information about a lot more people, not having to be in physical proximity of them to feel as though they might know them or at least, feel like they can compare themselves to them and their life. This explosion of social media might have changed the parameters for who they can compare themselves with. In addition, not only has social media and the internet made the foundation for social comparisons bigger, but the changes in society the previous decades have also made the structures, roles, domains and possibilities in which accomplishments (and hence social comparisons) can be made, a lot more. This is illustrated by the fact that more people than ever are going to school and universities today (OECD, 2018).

Has this in combination with the rise of social media made humans more self-aware and inclined to self-actualize? Given this expansion of opportunities and possibilities in life, the young generations growing up today might have greater notions to self-actualize, in line with Maslow's (1975) theory of human needs.

But this might also make the younger generations subjects to the tyranny of choice. Roets, Schwartz & Guan (2012) investigated the relationship between individual differences in maximizing versus satisficing and well-being. Maximizing refers to the seeking of making the single best choice, instead of a choice that is considered good enough, labelled satisficing. Using data from three characteristically different cultures (Western Europe, U.S and China), they found that in cultures where choice is abundant (US and Western Europe), maximizers reported less wellbeing than satisficers, mediated by experienced regret (Roets, Schwarts & Guan, 2012). This was not the case in more collectivistic cultures like China. It is therefore argued by the authors that in societies where options are close to unlimited, individuals who tends to want to maximize (making the single best choice) seem to be more dissatisfied and experience more regret over imperfect choices (Roets, Schwarts & Guan, 2012).

A theoretical line can be drawn from this to the perfectionistic students identified in the current study. The individuals seeking to maximize resemble these students who set excessively high standards for themselves. And similar to this group experiencing regrets this group of students experience emotional exhaustion. As introduced in the discussions related to perfectionism in section 2 of this supplementary chapter, there is a debate in the field as to whether perfectionism is in line with self-actualization or if it rather bears a resemblance to symptoms of mental illness and should be treated as maladaptive. But beyond the theoretical discussion of whether there is a distinction between positive and negative perfectionism based

on interpretation of definition, there is an agreement in the field that the *combination* of high strivings *and* evaluative concerns produce several maladaptive outcomes. Some of the most severe of these adverse outcomes are symptoms of depression, anxiety, lower self-efficacy, lower self-esteem, and maybe most severe, the links to eating disorders (Kanten & Yesiltas, 2015; Miquelon et al., 2005; Rice & Slaney, 2002; Shafran et al., 2000; Stoeber & Otto, 2006). Based on this, a conclusion can be drawn that while the ambitious students in the current study might be characterized more in the lines of self-actualizing, the perfectionistic group reveal more signs of vulnerability to detrimental outcomes.

Although caution is advised in interpreting these findings that are based mainly on western societies, it points to an unfortunate development for the younger generation concerning the combination of perfectionism, wellbeing and motivation.

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Perfectionistic profiles and their relations with academic well-being and motivation

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Abstract

The purpose of the current study was to investigate the identification of different perfectionistic profiles among Norwegian eight-graders (N = 429) and to further examine these different groups in relation to wellbeing (i.e., emotional exhaustion and school value) and motivation (i.e., achievement goal orientations). TwoStep cluster analysis on the two dimensions of perfectionism, strivings and concerns, resulted in three groups, which were labelled *perfectionistic, ambitious* and *non-perfectionistic* based on their mean scores. A series of ANOVAs revealed that while both the perfectionistic and non-perfectionistic group reported high levels of emotional exhaustion, the perfectionistic and ambitious groups reported higher levels of school value. The group of non-perfectionists reported lower levels of school value in addition to elevated levels of emotional exhaustion.

The perfectionistic group revealed high scores in both mastery and performance goal orientations, together with the ambitious group. The non-perfectionistic group had the highest scores in goal orientations related to work-avoidance. These findings and practical implications are discussed.

Keywords: achievement goal orientation, motivation, perfectionism, self-oriented perfectionism, wellbeing.

Perfectionistic profiles and their relations with well-being and motivation.

1. Introduction

Perfectionism is defined as the striving for excessively high standards, hoping for flawlessness, and accompanied by stress and discomfort when these unattainable standards are not met (Flett & Hewitt, 2002). Stoeber & Otto (2006) concluded in their review study on perfectionism that perfectionism is comprised of two distinct dimensions, perfectionistic strivings on one hand, and perfectionistic concerns on the other.

A recent meta-analysis revealed that perfectionism has increased on a population basis during the past 30 years (Curran & Hill, 2019). The conclusion from this meta-analysis stated that young people today are more demanding of others, perceive others as more demanding of themselves, and are more demanding of themselves (Curran & Hill, 2019).

The field of research on perfectionism is relatively new, and the majority of the existing literature has focused on clinical groups (Shafran, 2000), adults (Gnilka, Mclaulin, Ashby & Allen, 2017) college students (Rice & Ashby, 2007), or particularly talented groups of individuals (Parker, 1997). Fewer studies have looked at perfectionism in the ordinary academic setting of adolescents. Findings from the available studies indicate that the dimension of perfectionistic concerns are related to higher depression in school students in grades 10-12, while perfectionistic strivings in contrast correlate with higher motivation (Accordino, Accordino & Slaney, 2000). Other studies investigating perfectionism and school engagement in middle school students have suggested similar results, relating high perfectionistic strivings to a higher grade-point average (Vandiver & Worrell, 2002). High levels of perfectionistic strivings in combination with perfectionistic concerns have been linked to falling short of personal goals, and the experience of more negative affect regardless if personal goals are achieved of not (Bieling, Israeli, Smith & Antony, 2003).

This postulates a thought-provoking question, whether perfectionism leads to high motivation and higher grades at the cost of emotional wellbeing. Several of the studies indicating that students who strive for perfection are more motivated than their non-perfectionistic peers, do not differentiate between motivation to achieve success or avoid failure. These different goals have been shown to have contrary effects on student`s achievement and task engagement and emotional wellbeing (Frost & Henderson, 1991; Slade & Owens, 1998).

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1.1 Perfectionism

An extensive review of the literature concerning perfectionism reveals that one of the most cited definitions is that of Frost, Marten, Lahart & Rosenblate (1990), stating that perfectionism is the combination of excessively high personal standards and a critical sense of self-evaluations. This is in line with the findings from a review study by Stoeber & Otto (2006) that outlined two key characteristics of perfectionism: perfectionistic strivings and perfectionistic concerns. Thus, it becomes apparent that the phenomenon of perfectionism is comprised of two very different and arguably independent dimensions, a rather positive component, *strivings*, and a negative component, *concerns.* Increasing the complexity of perfectionism, research has also shown that perfectionism is best conceptualized as a multidimensional construct (Enns & Cox, 2002). Largely based on the work by Hewitt & Flett (2002), who argue that this is one of the most important developments in the field, two different forms of perfectionism have been widely accepted, namely socially prescribed perfectionism (SPP), and self-oriented perfectionism (SOP). Self-oriented perfectionism refers to an individual's own desire to strive for perfectionism whereas socially prescribed perfectionism refers to the feeling of other imposing perfectionistic standards to oneself. One can therefore argue that self-oriented perfectionism is mainly internally motivated and socially prescribed perfectionism more externally motivated (Stoeber, Feast, Hayward, 2009).

The scope of the current study is related to self-oriented perfectionism, and following this dimension, subsequent research on self-oriented perfectionism can be divided into a dimensional and group-based approach. The dimensional approach considers the two different dimensions constituting perfectionism (strivings and concerns) as fundamentally independent and examine the different dimensions and its correlates into greater depth. The previously mentioned review study by Stoeber & Otto (2006) conclude much of the findings on the two different dimensions. While perfectionistic strivings have been linked to several positive characteristics such as endurance, positive affect, conscientiousness and satisfaction with life, perfectionistic concerns have been linked to negative characteristics only, the most prominent of these being depression and anxiety (Stoeber & Otto, 2006). Several other studies have found similar results. While high perfectionistic strivings were correlated with high academic achievement, motivation for school and high self-esteem, evaluative concerns correlated more with depressive symptoms, low self-esteem and fear of failure (Accordino, Accordino & Slaney, 2000; Stoeber & Rambow, 2007).

Findings such as these have led to a debate in the field when it comes to a potential divide in the concept of perfectionism into a healthy, adaptive form of perfectionism and a maladaptive, unhealthy form of perfectionism. Several studies label individuals high in strivings and low in concerns as adaptive perfectionists and individuals high in both dimensions as maladaptive perfectionisits (Bieling et al. 2003; Slade & Owens, 1998).

In contrast to the dimensional approach to perfectionism, the group-based approach utilizes measurements on both dimensions (strivings and concerns) to create different groups of individuals within a population. Based on such an approach, knowledge on perfectionism as a whole and its correlates can be further examined and understood. In line with the introductory definition by Frost et al. (1990), defining perfectionism as the combination of high strivings and high concerns, the current study therefore wishes to argue that perfectionism should be limited to categorize individuals reporting this combination. This implies that groups of individuals with high scores in perfectionistic strivings, not accompanied by high scores on perfectionistic concerns, instead should be considered as ambitious.

Previous research based on the group-based approach, has identified different groups of individuals with relatively consistent patterns. High scores on both dimensions has been linked to both positive outcomes such as self-regulation and high self-efficacy beliefs (Sironic & Reeve, 2012), but also maladaptive outcomes such as low self-esteem, negative affect and anxiety (Rice & Slaney, 2002). High scores on perfectionistic strivings in combination with low levels of concerns has been linked to high academic achievement, high positive affect and low anxiety and depression symptoms (Rice & Slaney; Wang, Slaney & Rice 2007). Groups with low scores on both dimensions have been linked to school maladjustment, anxiety and social stress, and moderate achievement (Gilman & Ashby, 2003, Grzegorek, Slaney, France & Rice, 2004; Rice & Slaney, 2002, Wang et al., 2007). These three groups have been relatively consistent findings with the group-based approach, but this are mainly studies conducted within the Western parts of the world. Studies on perfectionism in other cultures have identified another group, namely a group of individuals with high scores on perfectionistic concerns accompanied by relatively low scores in perfectionistic strivings (Wang et al., 2007). Further, this group appears to be the most maladaptive with high correlations to negative affect, anxiety and academic dissatisfaction (Wang et al, 2007). This illustrates the importance of conducting research on perfectionism in different contextual and cultural aspects.

1.2 Perfectionism and wellbeing

As noted, perfectionism has consistently been linked to various aspects of wellbeing, either in a positive or negative way. Subjective wellbeing is often defined as being comprised of three distinct components: pleasant affect, negative affect and life satisfaction (Diener and Suh 1997). Wellbeing is therefore a comprehensive category, including emotional responses and judgements of both domain and global satisfaction. Each of these constructs, despite demonstrating substantial correlates, need to be understood as distinct contributing factors (Diener, Suh, Lucas & Smith, 1999). When it comes to the two affective components, several studies have argued for their independence. Positive and negative affect are therefore not opposites of the same continuum but two separate constructs. Research have subsequently found that high reported positive affect predicts higher subjective wellbeing, while the contrary is shown with high reports of negative affect (Diener et al, 1999). In addition, it has been suggested that it is not the intensity of the affect itself but the frequency of the experienced affect that determine how people report they feel about their life (Diener, Sandvik & Pavot, 2009).

In addition to the importance of studying affective reactions, the component of evaluating domain satisfaction and overall life satisfaction is also given an increased amount of attention. A possible reason for this is that the bottom up approach, investigating how factors like age, income, gender and marital status affect wellbeing, has given small effect sizes (Diener et al., 1999). Top-down approaches looking at personality characteristics and individual cognitive differences have in the recent years therefore become more popular (Diener et al, 1999). The concept of experiencing meaning in life has for the past 50 years gained an increase in psychological research (Cohen & Cairns, 2012). This reflects another important part of the research on wellbeing, namely the attempt to identify factors that aid and enhance wellbeing, expanding the focus on investigating deficits and gaps. Several studies have argued for the positive relationship between reported sense of meaning and elevated levels of wellbeing. Individuals who report possessing meaning in life have reported greater happiness, greater life satisfaction and reduced health anxiety (Steger, Frazier, Oishi & Kaler, 2006). Zika & Chamberlain (1992) found strong associations between meaning in life and wellbeing, further strengthened by a stronger association to positive than negative well-being dimensions. This demonstrates the value of a salutogenic rather than pathologic approach to wellbeing.

The current study seeks to contribute to this field by investigating the relationship between perfectionism and two different indicators of wellbeing relevant in the educational context. By utilizing both a negative (emotional exhaustion) and a positive (school value) indicator of academic wellbeing, the goal is to investigate how perfectionism relates to the different aspects of wellbeing. In line with the findings on the relationship between the experience of meaning and wellbeing, the goal of the current study is to measure student`s school value. School value is defined by Eccles and colleagues (Eccles et al.,1983; Wigfield & Eccles, 2000) as the perceived meaningfulness of schooling in general. This construct draws on both attainment value, intrinsic value and utility value to reflect school value as an overall construct (Niemivirta, 2004). The negative indicator of wellbeing utilized in the current study is a facet of school burnout, namely emotional exhaustion. School burnout is defined as exhaustion due to school demands, and cynical and detached attitudes towards school and feelings of inadequacy (Salmela-Aro, Kiuru, Leskinen & Nurmi, 2009). The facet of emotional exhaustion is used as an initial predictor of feelings of inadequacy.

According to Diener et al. (1999) some of the future steps for the field of wellbeing will be to comprehend the interaction of psychological factors that together with life circumstances produce subjective wellbeing. Although several environmental factors, like social and economic status, have proved relevant to the discussion of wellbeing, people react differently to the same circumstances. How these underlying individual cognitive differences operate in the adaption to events is therefore an important field to understand. Individuals evaluate conditions based on their unique experience, expectations, values and goals (Diener et al, 1999). This points to the intertwined factor of perfectionism in wellbeing, and also another the important factor of what motivation and goals the individuals has.

1.3 Motivation in the form of different achievement goals.
Motivation is a vast field both theoretically and empirically and has been conceptualized and operationalized in numerous ways. A prominent and growing approach to motivation, and the basis for this study, is the research on motivation in the form of different achievement goal orientations.
The theories on achievement goals originally stem from the work of Dweck (1986) and Nicholls (1984) who both define achievement goals as the purpose for which individuals engage in achievement behavior. Achievement behavior is defined as behavior directed at

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developing or demonstrating competence or ability (Nicholls, 1984). Further, this perspective suggests that differences in specific individual self-schemas and relatively enduring knowledge structures lay the foundation for different goal orientations. An early distinction was made between mastery-oriented and performance-oriented goals, differentiating between the motivation to learn and develop competence (mastery goal) and the motivation to demonstrate competence (performance goal) (Dweck, 1986; Nicholls, 1984). The research on these different achievement goals have revealed that what type of achievement goal an individual has strongly affect several outcomes in the academic setting. Mastery goals have been linked to the favoring of deep processing in different tasks, where performance goals have been linked to surface processing (Nolen, 1988; Darnon & Butera, 2005). In addition, it has been shown that mastery-oriented students explain failure in terms of lack of effort, while performance-oriented students instead attribute this to lack of abilities (Dweck & Leggett, 1988). This has important consequences based on findings suggesting that this leads mastery-oriented students to work harder in the face of failure, and performance-oriented students to be vulnerable to helplessness (Ames & Archer, 1988; Dweck & Leggett, 1988).

Further research on achievement goals have challenged the original dichotomous distinction between mastery and performance goals. Based on an early assumption that not all students are positively motivated in the classroom, a third type of achievement goal was identified, namely work avoidance goals (Nicholls, Patashnick & Nolen, 1985; Nolen, 1988). This goal reflects the motivation to reduce effort and avoid challenging tasks and is considered a separate independent goal. Still, this recognition of a more general approach and avoidance preference can be seen as the background for the 2x2 model by Midgley et al. (1998). This model makes a distinction between performance-approach and -avoidance and mastery approach and -avoidance (Midgley, 1998). This 2 x 2 model of achievement goals was tested in three studies by Elliot & McGregor (2001) and results from factor analyses indicated strong support for the independence of the four achievement goal constructs, although the avoidance component of mastery goals still remain somewhat undefined theoretically and operationally (e.g., Elliot & McGregor, 2001; Pintrich, 2000). Further, Niemivirta (2002) differentiated between mastery-extrinsic and mastery-intrinsic goal orientation, based on the tendency of some students to use external criteria for evaluating whether mastery has been attained (mastery-extrinsic), and other students the internal value of learning for the sake of valuing the mastery of learning in itself (mastery-intrinsic).

Relating perfectionism to achievement goals have revealed that perfectionism predicts individual differences in adolescent school student's preference in achievement goals (Damian, Stoeber, Negru-Subtirica & Baban, 2014). Using the multidimensional approach to perfectionism, self-oriented perfectionism has been linked to mastery-oriented goals whereas socially prescribed perfectionism more often relates to performance-oriented goals (Damian et al., 2014). Self-oriented perfectionism has also been positively associated with self-efficacy for learning and performance, effective resource management, intrinsic goal orientations, reports of high task value and the use of critical thinking (Blankstein & Mills, 2000). However, further exploring self-oriented perfectionism produce some other findings. Hanchon (2010) found that individuals labelled as adaptive perfectionists (low in concerns, high in strivings) more often endorsed mastery goals and showed higher levels of academic functioning, whereas maladaptive perfectionists (high in both dimensions), showed equally high levels of mastery and performance goal orientations, in addition to a poorer academic functioning. These results suggest that the positive effects related to mastery orientations are negated when perfectionists simultaneously endorse performance orientation, and experience high concerns (Hanchon, 2010).

1.4 The present study: Perfectionism, wellbeing and achievement goals

In the current study the scope of perfectionism is restricted to self-oriented perfectionism. Not disregarding the numerous interpersonal factors contributing to the potential development of this, the scope of the current study is to investigate what the consequences and correlates of experienced self-oriented perfectionism are, not what factors create it. The findings related to self-oriented perfectionism also suffer from being the most ambiguous in the existing literature. Due to the increasing research arguing the importance of studying domain-specific perfectionism (Dunn, Gotwals & Dunn, 2005; Levine & Milyavskava, 2018), perfectionism in this study is also restricted to the academic context.

As previously mentioned, few studies have investigated perfectionism in the academic context of adolescents, and fewer have investigated its relation to both wellbeing and achievement goal orientations within the same study. Findings from the few numbers of studies that have, indicate that feeling of discrepancy, a facet of perfectionistic concerns, are related to elevated symptoms of depression in school students (Accordino et al, 2000), while perfectionistic strivings relates to mastery-orientations and better grades (Nounopoulos et al., 2006; Vandiver & Worrell, 2002). In a sample of Korean 7th graders, self-oriented perfectionism

was found to be related to academic achievement, and negatively related to acceptability of cheating and academic procrastination (Bong, Hwang, Noh & Kim, 2014). Moreover, self-oriented perfectionism related to higher self-efficacy and both mastery and performance approach goals in the academic setting (Bong et al., 2014). Another study investigating 9th graders measurements of perfectionism, wellbeing, motivation and school achievement indicated that negative reactions to imperfections (perfectionistic concerns) was significantly correlated with fear of failure and depressive symptoms, whereas striving for perfectionism was related to hope of success, motivation for school and school achievement (Stoeber & Rambow, 2007). Striving for perfectionism also showed a negative correlation with depressive symptoms once the influence of negative reactions to imperfections was partialled out (Stoeber & Rambow, 2007).

Based on the definition of achievement goal orientation as something structurally underlying the self-schemes and knowledge base guiding motivation, the link to perfectionism becomes theoretically apparent. Individual self-schemas and knowledge structures that are influenced by perfectionistic tendencies will influence what type of achievement goal orientation an individual will have. Hence, enhancing the understanding of the relationship between achievement goal and perfectionism will enhance the understanding of the different constructs individually as well. Together this also relates to student wellbeing, seeing as goals related to self-improvement and growth (mastery-related goals) are linked to more positive self-evaluations and emotional functioning, whereas goals related to demonstrating competence (performance-related goals) have been linked to more adjustment problems and emotional vulnerability (Kaplan & Maehr, 1999, Tuominen-Soini et al. 2008)

The current study therefore wishes to contribute to the understanding of the complex interaction of perfectionism, wellbeing and motivation. By employing a group-based approach to individual differences in perfectionism, including both positive and negative indicators of wellbeing, and measurements of various qualitatively different types of achievement goal orientations, the objective of the current study is to further shed light on this complex interaction in an important stage of perfectionisms development. Because despite the majority of research being based on adult samples, there is a general agreement in the field that perfectionism has its roots in childhood (see Flett, Hewitt, Oliver & MacDonald, 2002, for a review). Investigating perfectionism in childhood and early adolescents is therefore of

importance, both to further the knowledge of the concept but also the foundation and development of it. Consequently, an area of importance is the academic setting, as this is a context in which children spend the majority of their days.

Accordingly, the research questions in this study are:
1. What different perfectionistic profiles can be identified among Norwegian 8th graders?
2. How do these profiles relate to academic wellbeing and achievement goal orientation?

2. Method

2.1 Participants and procedure
Participants were eight-graders (N=429, 52% girls, M_{age}=13.10 years), from 12 different lower secondary schools in the southeast of Norway. Participating students completed a self-report online questionnaire measuring perfectionism, wellbeing and motivation during whole class sessions led by research assistants. All participants were informed about anonymity, confidentiality and volunteerism. The project was approved by the Norwegian Centre for Research Data (NSD) and consent was required from parents.

2.2 Measurements

2.2.1 Perfectionism
The two facets of the Short Almost Perfect Scale (SAPS; Rice, Richardson & Tueller, 2014) were translated to Norwegian and the wording modified to the academic context, age and language of the participants. Perfectionistic strivings were measured using 4 items (e.g., "*I have high expectations for myself*" and "*I usually set high goals and standards for myself*"), and perfectionistic concerns (originally discrepancy) using an additional 4 items (e.g., "*I am hardly ever satisfied with my performance*" and "*I often feel I have not done my best*") Responses to all items were given on a 7-point Likert-type scale ranging from 1 (not true at all) to 7 (completely true).

An exploratory factor analysis was carried out in Jamovi 0.9.6.7 using minimum residual as extraction method and oblimin rotation on the total of 8 items constituting perfectionism. Results indicated support for the two-factor solution, Strivings and Concerns respectively. The Strivings consisted of the 4 respective items with factor loading ranging from 0.475-

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0.774, the Concerns factor consisted of the remaining 4 respective items with factor loadings ranging from 0.541-0.637. The factor correlation was relatively low, as anticipated ($r=.17$, $p <.001$). Next, composite scores based on the factors were created, for strivings and concerns respectively, and reliability measures of internal consistency yielded satisfactory results, as illustrated in Table 1.

2.2.2 Subjective wellbeing

Emotional exhaustion was measured using the facet *exhaustion at school* from the School Burnout Inventory (SBI) developed by Salmela-Aro and colleagues (2009). This was comprised of three items (e.g *"I worry about schoolwork, even in my spare time"*). The variable labelled school value (Niemivirta, 2004) comprised six items, three positive and three negatively phrased (e.g., "*I feel that what you learn in school is useful*" and "*I feel like it is pointless going to school*"). Response was given on the same type Likert-scale ranging from 1-7.

The negatively formulated statements for school value were reversed, before composite scores were created for emotional exhaustion and school value respectively. Descriptive statistics, including reliability measures, for these variables are illustrated in Table 1.

2.2.3 Achievement goal orientation

Five types of achievement goals were measured using items originally developed by Niemivirta (2002; see also Tuominen-Soini et al., 2008, Tuominen et al.,2011). The different orientations contained three items each, and response was given on the same type Likert-scale as described above in relation to: mastery-intrinsic (e.g., "*An important goal for me in my studies is to learn as much as possible*"), mastery-extrinsic (e.g., *"An important goal for me is to do well in my studies*"), performance-approach (e.g., "*An important goal for me in my studies is to do better than the other students*"), performance-avoidance (e.g., *"I try to avoid situations where I might fail or make mistakes*"), and work-avoidance (e.g., *"I try to get away with as little effort as possible in my schoolwork*").

Exploratory factor analysis was carried out in Jamovi 0.9.6.7 using minimum residual extraction method and oblimin rotation on the total of 15 items comprising achievement goal orientations. Results showed support for the five-factor solution with *mastery-intrinsic* (factor loadings ranging from 0.614-0.907), *mastery-extrinsic* (factor loadings ranging from 0.493-0.824), *performance-approach* (factor loadings ranging from 0.441-0.726), *performance-*

avoidance (factor loadings ranging from 0.578-0.782) and *work-avoidance* (factor loadings ranging from 0.469-0.705) respectively. The factor correlations between the different factors were low and anticipated, with the exception of a relatively high correlation between the two mastery-oriented orientations ($r=.72$, $p<.001$).

The subsequent composite scores based on the 5 different factors with 3 items each showed satisfactory reliability using Cronbach`s alpha as seen in Table 1.

2.3 Data analyses

To answer the first research question concerning the identification of perfectionistic profiles, a Two-Step cluster analysis was carried out in IBM SPSS 24 to identify students with similar patterns of perfectionistic tendencies (Kent, Jensen & Kongsted, 2014). As criteria for best fitting model the Bayesian information criterion (BIC) was used, in addition to the exploration of alternative cluster solutions.

To answer the second research question on the links between different profiles and academic wellbeing and achievement goal orientation, a series of ANOVAs was conducted with perfectionistic profiles as the independent variable, and emotional exhaustion, school value, and achievement goal orientations as the dependent variables. The assumption of equality of variance was tested in all analyses, and appropriate corrections for pairwise comparisons using Bonferroni or Games Howell were applied.

3. Results

3.1. Preliminary analyses

The composite scores formed based on the exploratory factor analyses on perfectionism and achievement goal orientations, as well as the composite scores on the two variables measuring wellbeing based on the inventories used, indicated all satisfactory reliability. These indices and other descriptive statistics are reported in Table 1.

Table 1

Descriptive statistics and internal consistencies for all variables

Variable	*n*	*M*	*SD*	Skew	Kurtosis	A
Strivings	427	5.23	1.13	-.604	.166	.77
Concerns	427	3.94	1.28	.108	-.221	.67
Emotional exhaustion	425	3.75	1.56	.303	-.842	.69
School value	427	4.69	1.36	.638	2.51	.87
Mastery-intrinsic orientation	425	5.24	1.32	-.672	.037	.80
Mastery-extrinsic orientation	425	6.01	1.10	-1.39	1.86	.79
Performance-approach orientation	426	4.43	1.39	-.222	-.536	.69
Performance-avoidance orientation	426	4.56	1.47	-.324	-.552	.73
Work avoidance orientation	427	4.36	1.39	.007	-.600	.67

Note. α = Cronbach`s alpha

3.1.2 Grouping of perfectionistic profiles

Results from a series of Two-Step cluster analysis showed that a three-group solution had the best fit to the data (see Table 2). As indicated by the small BIC-change from a three to a four-cluster solution, the more parsimonious three cluster solution was favored. This decision was further strengthened by exploring the compositions of both solutions, which indicated that the four-group solution did not seem to describe the data any better, thus exhibiting no added value. Excluding two outliers (0,2%), Group 1 (31,4 % of the students) reported high scores on both strivings and concerns, group 2 (36,5%) scored high on strivings and low on concerns, while group 3 (31,4%) had relatively lower scores on both strivings and concerns. The groups were subsequently labelled according to their mean score profiles as *perfectionistic* (group 1), *ambitious* (group 2) and *non-perfectionistic* (group 3). Table 3 report the group differences and Figure 1 illustrate the different profiles.

Table 2

Information Criterion Values for Different Clustering Solutions

Number of clusters	BIC	BIC Change[a]	Ratio of distance measure[b]
1	305.706		
2	233.416	-72.289	1.766
3	202.202	-31.215	2.353
4	201.817	-.385	1.224
5	205.603	3.787	1.309
6	213.784	8.181	1.046

Note. BIC = Bayesian information criterion (smaller value indicates better fit)

[a] = Changes from the previous number of clusters in the table

[b] = Ratios of distance measures based on the current number of clusters against previous number of clusters.

Table 3

Mean Differences in Perfectionism Dimensions Between Perfectionistic Groups

Variable	Ambitious $n = 157$		Perfectionistic $n = 135$		Non-perfectionistic $n = 135$				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F* (2, 426)	*p*	n^2
Strivings	5.59	.72	6.09	.61	3.97	.78	327.728	<.001	.60
Concerns	2.81	.79	5.13	.91	4.06	.86	266.625	<.001	.55

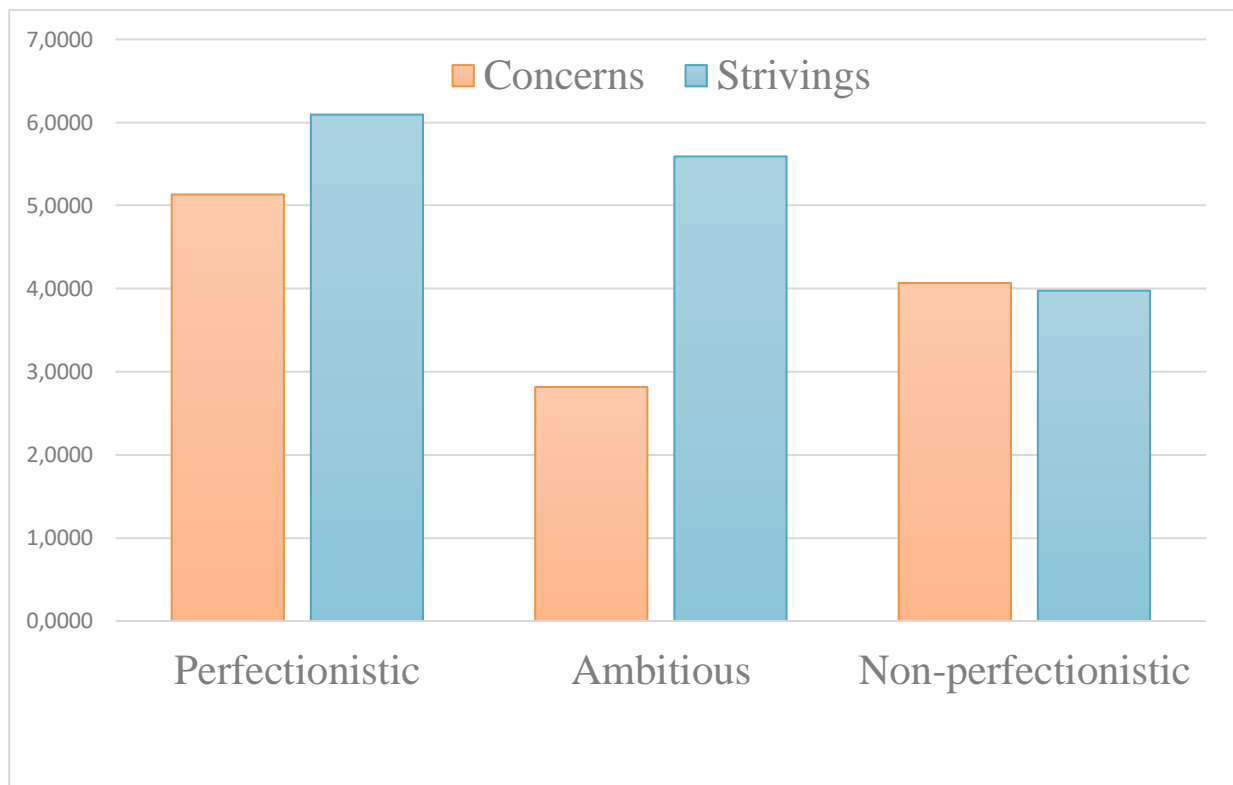*Note.* Range is 1-7. All groups differ from each other.

Figure 1. *Raw means for Strivings and Concerns for the three-group solution.*

3.3 Group differences in wellbeing and achievement goal orientations

A series of ANOVAs indicated significant differences between almost all groups on measurements of emotional exhaustion and school value (see Table 4). The perfectionistic group and non-perfectionistic group both scored high on emotional exhaustion, with only the ambitious group scoring significantly lower. The variable emotional exhaustion accounted 12,5% of the variance between the groups. Explaining 5% of the variance between the groups, school value was the highest among the perfectionistic and ambitious group, with only the non-perfectionistic group scoring significantly lower.

Further ANOVAs on achievement goal orientations indicated that the groups differed significantly on almost all achievement goal orientations (see Table 4). These multiple comparisons revealed that although the *perfectionists* scored the highest on all achievement goal orientations except for on the work avoidance orientation, the *perfectionists* and *ambitious* group did not significantly differ from each other on scores related to mastery-intrinsic and performance-avoidance goal orientation. On work avoidance goals only the *ambitious* and *non-perfectionistic* group differed significantly from each other, with the

perfectionistic group scoring in the middle of the other two groups, not significantly differing from any of them. Further, the *perfectionists* had the highest scores on both mastery-extrinsic and performance-approach goal orientations. The different achievement goal orientations varied in terms of explained variance, with the highest being the orientation mastery-extrinsic explaining 19,6% of the variance, and work-avoidance with the lowest value of 3.9%.

Table 4

Mean Differences in Achievement Goal Orientation, Emotional Exhaustion and School Value Between Perfectionistic Profiles

							ANOVA				
	Sample mean $n = 425$		Perfectionist $n = 135$		Ambitious $n = 157$		Non-perfectionist $n = 133$				
	M	SD	M	SD	M	SD	M	SD	F (2,424)	p	n²
Emotional exhaustion[1]	3.75	1.56	3.99ª	1.67	3.28	1.45	4.08ª	1.44	12.38	<.001	.125
School value	4.69	1.36	4.93ª	1.29	5.09ª	1.22	3.99	1.33	30.16	<.001	.055
Mastery-intrinsic	5.25	1.32	5.69ª	1.09	5.57ª	1.16	4.40	1.31	48.17	<.001	.186
Mastery-extrinsic[1]	6.01	1.10	6.45	0.80	6.22	0.91	5.30	1.22	51.43	<.001	.196
Performance-approach	4.43	1.39	5.08	1.41	4.43	1.23	3.79	1.23	33.40	<.001	.136
Performance-avoidance	4.56	1.47	5.05ª	1.47	4.20ª	1.36	4.49	1.47	13.17	<.001	.059
Work-avoidance	4.36	1.39	4.43ab	1.39	4.02ª	1.42	4.68ᵇ	1.28	8.58	<.001	.039

Note. Range is 1-7. Means within a row with the same subscripts are not significantly different at the p < .05 level (with Bonferroni correction, [1] Games Howell correction).

4. Discussion

The goal for the current study was do identify different perfectionistic profiles among Norwegian 8th graders, and further see how these different profiles relate to academic wellbeing and achievement goal orientations. The results provide support for both the existence and distinction between perfectionistic and non-perfectionistic students, in addition to supporting a correlational relationship between perfectionism, academic wellbeing and different achievement goal orientations.

4.1 Different perfectionistic profiles

First, the examination of identification of different perfectionistic profiles among Norwegian adolescents suggested three distinct profiles: namely a *perfectionistic* profile combined of high scores on both dimensions, a profile combined of high standards and low concerns named *ambitious* and a third group of students scoring relatively in the middle on both

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dimensions called *non-perfectionists*. These findings are in line with several other studies, although sometimes referred to by different names, such as the adaptive perfectionists (high strivings, low concerns), maladaptive perfectionists (high in both dimensions) and non-perfectionists (low strivings) (Grzegorek, Slaney, Franze, & Rice, 2004; Rice & Slaney, 2002). The group of students with high scores on standards and low scores on concerns, named the ambitious group, resembles other findings in research on perfectionism (Gnilka, McLaulin & Ashby; 2017; Rice & Ashby, 2007), which is also the case for the identification of the perfectionistic group, with high scores on both dimensions (Gilman & Ahsby, 2003; Wang et al., 2016).

Furthermore, these findings indicate some support for the 2x2 model by Gaudreau & Thompson (2010) who postulate the existence of four subtypes of perfectionism based on different combinations of high and low levels of concerns and strivings: non perfectionism (low in both), pure concerns perfectionism, pure strivings perfectionism and mixed perfectionism (high in both). Studies investigating this model (Franche, Gaudreau, Miranda, 2012; Crocker, Gaudreau, Mosewich & Kljajic, 2014) have found support for this model, but these studies have used samples of university students or college athletes. In the current study, based on a sample of 429 lower secondary students, the findings did not indicate the existence of a group of pure concerns perfectionists, but found support for pure strivings perfectionists (ambitious), non-perfectionists and perfectionists. This may be due to the development of high concerns and low strivings happening later in the academic course, or other characteristics differentiating university students from eight-graders, like the academic setting, maturation or social influence.

A deeper investigation of the different profiles reveal that although distinct, all three profiles scored relatively high on both dimensions. With the maximum score being 7, the mean score for the total sample was 5.23 on strivings and 3.94 on concerns. This indicates that all the students experience relatively high strivings and average concerns. A possible explanation for this is the fact that the 8th grade is the first year in which students in Norway receive grades on their academic work. This is highly possibly a contributing factor to the total population reporting high strivings and the lack of identification of a group with low strivings and high concerns. This is further supported by the finding that the ambitious group is the biggest group in the sample. The ambitious group consisted of 157 students, while the perfectionistic and non-perfectionistic group was comprised of 135 students respectively, again indicating an

overall tendency for high strivings.

These results can be viewed as a double edged sword, where on one side having high standards might indicate that school is important to most of the students and that they care about doing well, and on the other it can be the result of a competition based culture putting pressure on the students and guiding them towards performance goals rather then mastery goals.

4.2 Perfectionism and wellbeing

The results from the analyses investigating the relationship between perfectionist profile and indicators of wellbeing showed that overall the total population of students experienced a high school value (*M*=4.69, total score of 7) but also a degree of emotional exhaustion (*M*=3.75, total score of 7). The two groups perfectionists and non-perfectionists did not significantly differ from each other in scores on emotional exhaustion (*M*= 3.99 and 4.08 respectively) but only the ambitious group scoring significantly lower (*M*=3.28). This indicates that it is the concerns dimensions that relates most strongly to emotional exhaustion, in line with previous research indicating that the perfectionistic group characterized by high concerns is most closely linked to maladaptive psychological outcomes (Gaudreau & Thompson, 2010). In this study both the perfectionists and non-perfectionists experienced more emotional exhaustion than the ambitious students. These findings are also in line with previous research on perfectionism and wellbeing that have found self-oriented perfectionism to be related to stress (Einstein, Lovibond & Gaston, 2000). It is therefore noteworthy to argue that these two groups might experience emotional exhaustion due to different reasons.

The perfectionistic group might experience emotional exhaustion due to stress associated with concerns about not meeting their own personal standards, while the non-perfectionistic group might experience more emotional exhaustion due to the structure of school and its activities being mandatory, despite them not having the same high standards for achievement as their perfectionistic counterpart. One could argue that because of the high standards the perfectionists report they then raise the bar for experiencing positive affect and in turn set themselves up for negative affect and emotional exhaustion. The multiple discrepancy theory of satisfaction by Michalos (1985), with ideas that can be traced back to the ancient Greeks, states that an individual's happiness and satisfaction will be functions of perceived discrepancy between their comparisons of themselves and several other factors, including

their personal wants and needs. These can be downward comparisons (where the standards are lower) which would result in greater satisfaction and happiness, or upward comparisons (where the standard is higher) which would result in dissatisfaction and unhappiness (Diener et al, 1999). It therefore looks like this group of students are comparing themselves to their ideal standard and experience emotional exhaustion due to not meeting them.

In light of the findings by Diener et al. (2009) arguing the fact that it is frequency and not intensity of affect that influence how people evaluate their life, this has some crucial consequences seeing as these students spend the majority of their days at school. They are therefore subject to the feeling of stress and exhaustion on virtually a daily basis.

This picture is utterly highlighted when viewing these differences in relation to the scores on school value. In the case of experienced value of school and its activities the perfectionistic group and the ambitious group both have a high score (M=4.99 and M=5.09, highest score 7) and do not significantly differ from each other, whereas the non-perfectionistic group has a significantly lower score (M= 3.99). This indicates that the group of non-perfectionistic students do not experience school and schoolwork as meaningful or rewarding as their perfectionistic and ambitious classmates do, and therefore might account for why they are experiencing more emotional exhaustion in the academic context. The perfectionistic group on the other hand revealed a high score on both school value and emotional exhaustion indicating that they value school but experience more emotional exhaustion while trying to achieve the results they wish to attain in the academic setting. Lastly, the ambitious group had a high score on school value combined with a lower score on emotional exhaustion indicating that they experience meaning in their daily activities and not much emotional exhaustion. The findings therefore indicate that strivings are the dimension most closely linked to experienced school value. This might be due to the notion that valuing something would make you want to achieve it, or that being put in a situation where you must achieve something you start valuing it. An indicator of how this operates we get from the results on the different groups relation to achievement goal orientations.

4.2 Perfectionism and achievement goal orientation
The overall most popular achievement goal orientation was *mastery extrinsic*, followed by *mastery intrinsic*. This demonstrates a general tendency in the population as being driven by goals of mastery, in other words, a striving towards goals implying self-improvement and

growth. The general population places a greater emphasis on learning and developing competence above goals of demonstrating competence. This is an uplifting finding based on previous research linking mastery orientations to several adaptive outcomes such as critical thinking, deep processing learning strategies, higher academic functioning, and higher grade-point averages (Blankstein & Mills, 2000; Dweck & Leggett, 1988; Nolen, 1988; Nounopolos et al., 2006).

When it comes to the different groups and relation to the different achievement goal orientations the *perfectionistic* group had the highest score on all achievement goal orientations except for the avoidance orientation. In relation to mastery intrinsic achievement goals the *ambitious* and *perfectionistic* group did not differ significantly, as they both had high scores, and only the *non-perfectionistic* group scored significantly lower. This indicates that it is the perfectionistic strivings dimension that relates to a mastery-intrinsic orientation. This is further supported by the finding that both the perfectionistic group and the ambitious group had high scores on measurements of school value. This is in line with previous findings on perfectionism and motivation. Einstein, Lovibond & Gaston (2000) found that self-oriented perfectionism was related to self-reported motivation for upcoming exams and number of hours spent studying per week, indicating that students who strive for perfectionism are more motivated and engaged at school. In this study this finding is utterly nuanced as the findings here point to the important fact that these students are not only more motivated, but they seem to be more internally motivated.

When it comes to the extrinsic goal orientation the perfectionistic group scored significantly higher than the other two groups. This suggests that although they are similar to the ambitious group when it comes to internal motivation for school, they are also significantly more externally motivated than their ambitious and non-perfectionistic counterparts. Being externally motivated indicates placing a great value on external rewarding factors like good grades, achieving success in school and doing well. These results might therefore account for why the perfectionistic group experiences more emotional exhaustion, because they are stressed about meeting these external criteria as a measurement of success, in contrast to an inner satisfaction of achieved learning. The non-perfectionistic group was the lowest scoring group on this orientation, indicating a more carefree attitude towards such achievements. This demonstrates why this group of students have been labelled "indifferent" in other studies, and referred to as the typical student, who does acknowledge the goals of learning and doing well

in school, while at the same time wanting minimizing effort (Tuominen-Soini et al., 2008).

On performance goal orientations, the perfectionistic group scored significantly higher than the other two groups on *performance approach* and equally high as the ambitious group on *performance avoidance* goal orientations. This indicates a possible stronger correlation between perfectionistic concerns and performance-approach, seeing as the perfectionistic group has higher scores on this dimension than the ambitious group. This is an interesting finding in the sense that one might expect the perfectionistic group to score lower on performance-approach due to perfectionistic concerns. But seeing as they score significantly higher than any other group on this orientation, it might actually rather account for the concerns. This orientation is based on items measuring the importance of outperforming other students, demonstrating competence and valuing others viewing oneself as competent. In line with the high standards perfectionists set for themselves, this motivation orientation might account for why they experience high levels of perfectionistic concerns.

This notion is further supported by the findings indicating that the perfectionistic group and ambitious group (both high in standards) do not differ from each other on the measurement of performance-avoidance. This orientation might therefore be more associated with the strivings dimension. By measuring attempts to avoid risky situations and looking incompetent in front of others (performance avoidance), both students labelled perfectionists and ambitious show a high score, indicating that the setting of high standards for achievement also motivate you to avoid situations when this is being put at risk. This tendency may be explained in terms of self-preservation. Several impressions management strategies are identified in social psychology, and these can present themselves both as avoidance and as self-promotion, in which one attempts to be seen as competent (Alock & Sadava, 2014, p.99). By avoiding performance these groups will not risk looking incompetent.

These findings are similar to those of Hanchon (2010), suggesting that any positive effects that would otherwise be correlated with the mastery orientations, which the perfectionistic group in this study also had high scores in, will be negated when they also have high scores on performance orientations.

Another interesting finding, although not statistically significant, is that the perfectionistic group scored higher than the ambitious group in performance-avoidance. This might point to the fact that the perfectionistic group are more inclined to avoid these situations, and hence

possibly might explain some of the reasons why this group experiences more emotional exhaustion as well. Viewing this notion together with the significant findings of the perfectionists scoring high on both mastery and performance goal orientations, it can be interpreted as though the perfectionistic students experience a bigger inner struggle. It appears that perfectionistic students both have an intense desire and motivation to achieve and master learning situations *and* demonstrate that they are competent. This leads to an inclination to avoid performance situations as well. This struggle will inevitably lead to emotional exhaustion.

The non-perfectionists scored significantly lower than the other two groups, both on performance approach and performance-avoidance goal orientations, again indicating a more carefree attitude towards performance situations. This is in line with the finding that this group also scored lower than the other two on school value.

Finally, the orientation labelled work-avoidance was most popular among the non-perfectionistic group. Again, illustrating that this group does not have an equally high motivation to participate in schoolwork and school activities as their ambitious and perfectionistic peers, and therefore wish to avoid it. The ambitious group had a significantly lower score on this dimension indicating that these students to not have a desire to avoid school work. However, the perfectionistic group scored in between these two groups, not significantly differing from any of them. This points to the complex relationship that is found throughout the current study's findings, between perfectionism and performance and achievement. The group labelled as perfectionists are both highly motivated to attend performance situation and aim to master learning in school, while at the same time being highly concerned and torn between avoiding and attempting to try, in fear of not mastering. This is in line with previous findings indicating no moderating role of strivings in performance, but a significant relationship between perfectionistic concerns and performance (Altstøtter-Gleich, Gerstenberg, Brand, 2012).

4.3 Limitations and future directions

The goal of the present research was to investigate the relationships between perfectionism, wellbeing and achievement goal orientations among students in the context of the lower secondary classroom in Norway. Although several significant findings are discussed, there are important limitations to note. First and foremost, this is a cross-sectional study, meaning that

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implying causality is beyond the scope of the current investigation, although it has been able to imply strong evidence for important correlations between the different constructs. Second, the population in the current study are students from schools in and in proximity to Oslo, Norway. Subsequent research should try and replicate the current findings in other areas of Norway and in other countries. In line with this it would also be interesting to look at potential differences between grades 8, 9 and 10. As previously discussed 8th grade is the year Norwegian students start receiving grades and it would be interesting to see if the current findings change during lower secondary school. Furthermore, attempts to replicate this study in lower grades and more vocationally oriented educations would also be of importance.

The measurements in the current study are based on self-report, and other instruments measuring perfectionism, including other procedures of self-report could also be applied in future research. The measurements used are also all for the first time translated to Norwegian and used in the same study, affecting validity and reliability although measures were taken to reduce threats and establish this throughout the research process. An important note for future research would therefore be to replicate these findings, and hopefully include other covariates and maybe most importantly, control variables. An important possible confounding variable in the current study are actual achievements of the different groups of students. Grades from the current population were collected but not available for analyses at the time of this study. This would be both interesting and important to control for in future studies, in addition to numerous factors inside and outside the classroom influencing perfectionism, wellbeing and motivation.

4.3 Practical implications and concluding thoughts

Still, the choice of investigating these constructs in isolation in the context of lower secondary school in the current study, is not only done to further the understanding of the concepts and their relationships themselves, but also to point to a context in which the overall society can make an impact on these constructs. Independently of social and economic status or parenting, the school has a huge role in shaping who children and teenagers become and is therefore one of the most important areas in an individual's life in the shaping of good self-esteem, confidence, motivation and wellbeing in students preparing for their future lives and careers.

The current study therefore has several important practical implications. As becomes apparent from this study, a group of 429 individual students, and inherent a class with only 25 students, will differ substantially from each other in important ways regarding perfectionism, wellbeing and motivation. The question therefore arises, how do we help nurture an academic setting in which students are motivated to learn and achieve, and are happy while doing so?

Based on findings the findings of the current study it becomes apparent that different groups of students have fundamentally different needs. Some students, like the ambitious group, seem to be both motivated, satisfied and happy with their life at school, not experiencing much concern or emotional exhaustion.

The non-perfectionistic group on the other hand, scoring relatively low on wellbeing, (high on emotional exhaustion and low on school value) and high on motivational profiles related to avoiding schoolwork, would need interventions aimed at increasing inner motivation and pleasure with school. This group did not have particularly high standards for themselves and did not report valuing school as much as their ambitious and perfectionistic peers. There are grounds to claim that this group would benefit from schools facilitating activities and schoolwork that increases their motivation. In line with Self-Determination Theory (Deci & Ryan, 2017), the experience of autonomy, competence and a sense of belonging are important antecedents for motivation. In other words, for students in general, and this group of students in particular, schools and teachers would have to have a focus on giving the students a sense of participation in decision making, develop assignments that would increase their sense of competence, and focus on facilitating a culture in the classroom that makes the students feel a sense of community and importance.

The perfectionistic group may be the most complex group in the current study. This group had high scores on perfectionistic strivings and concerns, combined with high scores on both emotional exhaustion and school value. In addition, this group indicated both high motivation for gaining competence in school, but also demonstrating it. These results therefore propose a compelling answer to the question of whether perfectionistic students perform well at the expense of feeling well. The practical goal here would be to help these students keep their high strivings and motivation but feel better while trying to attain it. This is in line with the findings by Stoeber & Rambow (2007), indicating that striving for perfectionism was negatively correlated with depressive symptoms, if the influence of negative reactions to imperfections was partialled out.

Interventions for this purpose would therefore have to include a focus on mental health and strategies for dealing with failure as part of the learning process. The overall academic setting, including teachers and class culture would have to enhance the focus on learning above the focus on performance. This group will also need aid in shaping their goals in a flexible and attainable manner. By reducing social comparisons within a given class, some of the emotional stress this group experiences might also be reduced.

The importance of these implications is highlighted by a vast portion of research revealing how important a good education is for future success in the labor market, and good physical and mental health (Chevalier & Feinstein, 2006). But maybe more important, happiness and wellbeing in childhood is also being proven similarly correlated with economic and emotional wellbeing later in life (Kaestner, 2009).

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Appendix 1

Construct	Dimension		Item
Achievement goal orientations	Mastery-intrinsic	1	Jeg går på skolen for å lære nye ting.
		2	For meg er et viktig mål med skolearbeidet å lære ny kunnskap.
		3	For meg er et viktig mål med skolearbeidet å lære så mye som mulig.
	Mastery-extrinsic	4	Et viktig mål for meg er å gjøre det bra på skolen.
		5	Det er viktig for meg å få gode karakterer.
		6	Målet mitt er å lykkes med skolen.
	Performance-approach	7	For meg er det et viktig mål å gjøre det bedre på skolen enn andre elever.
		8	Det føles bra hvis jeg klarer å demonstrere overfor andre at jeg er dyktig.
		9	Det er viktig for meg at andre synes at jeg er dyktig.
	Performance-avoidance	10	Jeg prøver å unngå situasjoner der jeg kan virke dum eller udugelig.
		11	Jeg prøver å unngå situasjoner der jeg kan mislykkes eller gjøre feil.
		12	Det er viktig for meg at jeg ikke gjør feil foran andre elever.
	Avoidance	13	Jeg er veldig fornøyd hvis jeg ikke trenger å jobbe så mye med skolearbeid.
		14	Jeg forsøker å gjøre unna skolearbeidet med minst mulig arbeid.
		15	Jeg gjør ikke mer skolearbeid enn akkurat det som kreves.
School value		1	Jeg føler at det er meninsgsløst å gå på skolen.
		2	Jeg syns at det man lærer på skolen er nyttig.
		3	Jeg syns at det man lærer på skolen er interessant.
		4	Skolearbeid er kjedelig.
		5	Jeg synes at det er bortkastet tid å gå på skolen.
		6	Jeg mener at det man lærer på skolen er viktig.
Emotional exhaustion		1	Jeg føler at jeg drukner i skolearbeid.
		2	Jeg sover ofte dårlig på grunn av skolearbeid.
		3	Jeg bekymrer meg for skolearbeid til og med på fritiden.
Perfectionism	Standards	1	Jeg har klare og høye mål (for eksempel på skolen).
		2	Jeg prøver alltid å gjøre mitt beste.
		3	Jeg har høye forventninger til meg selv.
		4	Jeg setter som regel høye mål og standarder for det jeg gjør.
	Discrepancy	5	Jeg er sjelden fornøyd med mine prestasjoner.
		6	Jeg føler ofte at selv ikke mine beste prestasjoner er bra nok - jeg kan alltid gjøre ting enda bedre.
		7	Jeg føler ofte (for eksempel på skolen) at jeg ikke har gjort mitt beste.
		8	Jeg setter ofte høyere mål enn det jeg klarer å prestere.

Appendix 2

Learning and Individual Differences is a research journal devoted to publishing articles that make a substantial contribution to an understanding of individual differences within an educational context.

<u>Advice for Authors on Submissions</u>: The following advice is intended to help authors ascertain the suitability of their manuscript for publication in Learning and Individual Differences (LID), and to give the best chance for a successful submission. LID receives many submissions, only a fraction of which can be published. Therefore, we look for submissions with the highest potential to make a significant contribution in the domain of learning and individual differences.

What do we look for in manuscripts? The journal looks to publish studies that are focused on learning in an educational context. Our aim is to publish work that makes a substantial empirical contribution to the research base. There is a strong preference for studies that directly measure learning outcomes; when self- or other-ratings or survey responses are utilized, these should typically be combined with direct measurement. We look for work which reflects current theory and provides strong rationale for not only what is examined, but for why it is important to do so. This also applies to the selection of particular models from among alternative and/or competing models. The journal prefers studies that have clearly stated a-priori directional hypotheses based on prior empirical work and theory. Methodologically, statistical techniques should follow from hypotheses, relevant factors, should be controlled, and effect sizes should also be included and discussed.

Article structure

Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to "the text." Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Introduction
State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Material and methods
Provide sufficient details to allow the work to be reproduced by an independent researcher. Methods that are already published should be summarized, and indicated by a reference. If quoting directly from a previously published method, use quotation marks and also cite the source. Any modifications to existing methods should also be described.

Results
Results should be clear and concise.

90

Discussion
This should explore the significance of the results of the work, not repeat them. A combined Results and Discussion section is often appropriate. Avoid extensive citations and discussion of published literature.

Conclusions
The main conclusions of the study may be presented in a short Conclusions section, which may stand alone or form a subsection of a Discussion or Results and Discussion section.

Appendices
If there is more than one appendix, they should be identified as A, B, etc.

Essential title page information

• *Title.* Concise and informative. Titles are often used in information-retrieval systems. Avoid abbreviations and formulae where possible.
• *Author names and affiliations.* Please clearly indicate the given name(s) and family name(s) of each author and check that all names are accurately spelled. You can add your name between parentheses in your own script behind the English transliteration. Present the authors' affiliation addresses (where the actual work was done) below the names. Indicate all affiliations with a lower-case superscript letter immediately after the author's name and in front of the appropriate address. Provide the full postal address of each affiliation, including the country name and, if available, the e-mail address of each author.
• *Corresponding author.* Clearly indicate who will handle correspondence at all stages of refereeing and publication, also post-publication. This responsibility includes answering any future queries about Methodology and Materials. **Ensure that the e-mail address is given and that contact details are kept up to date by the corresponding author.**
• *Present/permanent address.* If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Highlights

Highlights are mandatory for this journal. They consist of a short collection of bullet points that convey the core findings of the article and should be submitted in a separate editable file in the online submission system. Please use 'Highlights' in the file name and include 3 to 5 bullet points (maximum 85 characters, including spaces, per bullet point). You can view example Highlightson our information site.

Abstract
A concise and factual abstract is required (maximum length 150 words). The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separately from the article, so it must be able to stand alone. For this reason, References should be avoided, but if essential, then cite the author(s) and year(s). Also, non-standard or uncommon abbreviations

should be avoided, but if essential they must be defined at their first mention in the abstract itself.

Graphical abstract
Although a graphical abstract is optional, its use is encouraged as it draws more attention to the online article. The graphical abstract should summarize the contents of the article in a concise, pictorial form designed to capture the attention of a wide readership. Graphical abstracts should be submitted as a separate file in the online submission system. Image size: Please provide an image with a minimum of 531 × 1328 pixels (h × w) or proportionally more. The image should be readable at a size of 5 × 13 cm using a regular screen resolution of 96 dpi. Preferred file types: TIFF, EPS, PDF or MS Office files. You can view Example Graphical Abstracts on our information site.
Authors can make use of Elsevier's Illustration Services to ensure the best presentation of their images and in accordance with all technical requirements.

Keywords
Immediately after the abstract, provide a maximum of **5 keywords**, avoiding general and plural terms and multiple concepts (avoid, for example, "and", "of"). Be sparing with abbreviations: only abbreviations firmly established in the field may be eligible. These keywords will be used for indexing purposes.

Abbreviations
Define abbreviations that are not standard in this field at their first occurrence in the article: in the abstract but also in the main text after it. Ensure consistency of abbreviations throughout the article.

Footnotes
Footnotes should be used sparingly. Number them consecutively throughout the article. Many word processors build footnotes into the text, and this feature may be used. Should this not be the case, indicate the position of footnotes in the text and present the footnotes themselves separately at the end of the article.

Tables
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