

Mechanisms Behind the Development of Anxiety  
Symptoms in Norwegian Adolescents:  
The Interplay Between  
Self-Esteem and Peer Relations

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## Abstract

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**Title:** Mechanisms Behind the Development of Anxiety Symptoms in Norwegian Adolescents: The Interplay Between Self-Esteem and Peer Relations

**Background:** So far, most studies on anxiety development that have examined the impact of factors like self-esteem and peer relations have focused on symptoms of social anxiety. The current study is amongst the first to address the interplay between self-esteem and peer relations in predicting more general and physiological symptoms of anxiety in adolescence. The overall purpose of the study was to investigate in what way, and to what extent, self-esteem, perceived peer acceptance and peer support predicted symptoms of anxiety in a population-based sample of Norwegian adolescents followed from the age of 16 to 19. More specifically, perceived peer acceptance was proposed to work as a mediator, and peer support as a moderator, in the overall relationship between self-esteem and symptoms of anxiety, which was examined both cross-sectionally and longitudinally.

**Method:** The current study is based on data made available from the last two waves of an epidemiological study named Tracking Opportunities and Problems in Childhood and Adolescence (The TOPP Study). The sample consists of Norwegian adolescents followed over a two-year period from they were 16-17 years old at T7 (N = 375) to they were 18-19 years old at T8 (N = 442). Anxiety symptoms were measured by the Anxiety sub-scale in the Depression, Anxiety Stress Scale. Self-esteem and perceived peer acceptance were measured by Harter's Self-Perception Profile for Adolescents, and peer support was measured using three questions reflecting the adolescent's experience of attachment, mutual respect and belonging. Cross-sectional and longitudinal associations were examined using multiple regression analysis, while controlling for confounding variables like gender and earlier symptom-levels.

**Results:** Self-esteem, perceived peer acceptance and peer support were all negatively related to symptoms of anxiety in adolescents. Perceived peer acceptance partially mediated the relationship between self-esteem and symptoms of anxiety cross-sectionally, however, this mediation was not apparent longitudinally. Peer support, on the other hand, worked as a moderator in the longitudinal relationship between self-esteem and symptoms of anxiety.

**Conclusion:** The findings support the impact of self-esteem on symptoms of anxiety in adolescence, and the importance of addressing aspects of peer relations also when investigating more general symptoms of anxiety. This rather unique composition of predictors has helped to unravel new pathways to the development of anxiety symptoms, enabling a broader understanding of how the interplay between self-esteem and peer relations in adolescence affects the subsequent development of anxiety symptoms. More specifically the findings highlight the importance of ensuring high levels of self-esteem from early on, as it could serve as a protective factor in the development of anxiety symptoms. If initial levels of self-esteem are low, this will subsequently lower the perceived acceptance from peers, which in turn could result in higher symptom-levels. In addition, low peer support was identified as being a risk factor for developing subsequently higher symptom-levels when combined with low levels of self-esteem. Taken together, findings from the current study stresses the importance of early prevention and intervention and thus also provides an important basis for the development of future prevention programs.



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## **Relevance & Background**

The concept of anxiety has been widely addressed and focused upon, both in research and within the society in general. While anxiety as an emotion is universal, the problems arise when the anxiety becomes so severe that it is both counterproductive and debilitating (Simpson, Neria, Lewis-Fernandez, & Schneier, 2010). Anxiety disorders constitutes a specific category within internalizing problems that are manifested by excessive fear, nervousness, worrying and self-conscious apprehension (Felman & Browne, 2018; Remes, Brayne, Linde, & Lafortune, 2016). These intense and prolonged feelings of fear and distress are often also accompanied by physiological symptoms (Baxter, Vos, Scott, Ferrari, & Whiteford, 2014).

While adolescence is known as a period in which we see the emergence and increase of symptoms of anxiety, it is also known as a critical period for the development of self-esteem (Costello, Copeland, & Angold, 2011; Rudolph, 2009). Findings related to the tendency of self-esteem to decline in children when shifting social environments may also relate to adolescents, in their transition from lower secondary to upper secondary school at age 16 (Leary & Baumeister, 2000).

Further, given that adolescence is a period in which the importance of peers increases, the transition from lower secondary to upper secondary school may come with a sense of uncertainty regarding the new peers. Hence, a decline in self-esteem during such a transitional phase is to be expected. Studies indicating a negative relationship between self-esteem and anxiety further highlights the importance of investigating this relation in mid-adolescence (Henriksen & Stenseng, 2016; Maldonado et al., 2013; van Tuijl, de Jong, Sportel, de Hullu, & Nauta, 2014). Moreover, peer relations, both in terms of acceptance and support, have been found to show a negative relationship to anxiety during adolescence (Bédard, Bouffard, & Pansu, 2014; de Lijster et al., 2018; Early et al., 2017; Erath, Flanagan, & Bierman, 2007; Festa & Ginsburg, 2011).

Although there is much research investigating self-esteem, peer relations and anxiety, majority of the available studies are cross-sectional, use clinical samples, or measure symptoms of specific anxiety disorders, such as social anxiety in particular. While research do show support for the negative relationship between self-esteem and symptoms of anxiety, no studies to date have investigated this relationship across time with different aspects of peer relations as mediators and moderators. The current thesis contributes with new knowledge by focusing on the interplay between self-esteem and different aspects of peer relations on a more general measure of anxiety symptoms, independent of any specific diagnosis. Studies have shown how

sub-threshold levels of symptoms in adolescence are associated with later diagnosed anxiety in adulthood (Pine, Cohen, Cohen, & Brook, 1999; Shankman et al., 2009). Thus, investigating anxiety at the symptom level enables the possibility to identify youths who may show elevated symptom levels of anxiety, but before they fulfill the criteria for a specific disorder.

Taken together, the overall purpose of the current study is to investigate in what way, and to what extent, self-esteem, perceived peer acceptance and peer support predicts symptoms of anxiety in a population-based sample of Norwegian adolescents followed from the age of 16 to 19. The following sections will provide an overview of anxiety in adolescence, before presenting relevant theoretical and empirical background on how anxiety symptoms may be related to self-esteem and peer relations. Lastly, the specific hypotheses of the current thesis will be presented.

### **Anxiety in Adolescence**

Anxiety disorders, if remain untreated, tend to become chronic and follow a recurrent, intermittent course across the lifetime (Bruce et al., 2005; Kessler, Ruscio, Shear, & Wittchen, 2010). This, in turn, can cause substantial disability in terms of overall health loss (Mendlowicz & Stein, 2000), alongside disadvantages in aspects of life such as education and interpersonal relations (Lochner et al., 2003). One of the Global Burden of Disease (GBD) studies investigated the burden of anxiety disorders specifically and found that amount of burden was largely caused by the amount of time one had had the anxiety disorder (Baxter et al., 2014). Moreover, findings suggest that anxiety disorders may have a negative impact on public health (Ormel et al., 2008), which points to the importance of investigating possible mechanism behind the development of anxiety symptoms from early on.

### **Prevalence of Anxiety**

From the age of 12-14 and onwards, anxiety is amongst the largest group of diagnosable disorders, with a point prevalence at 10 – 15 % (Mathiesen, Karevold, & Knudsen, 2009; Merikangas, 2005) Although the prevalence varies between different types of anxiety and across different studies, it has been estimated that approximately 20 % will have an anxiety disorder during their upbringing, half of which will also have a significant impairment as a result of these anxiety problems (Costello, Egger, & Angold, 2005; Merikangas, 2005). Although there are no available data on the occurrence of diagnoseable psychological disorders in Norwegian adolescents, empirical data from Norway revealed an estimated population prevalence at 7.4 % (Baxter et al., 2014).

Overall, there is a clear gender difference in anxiety disorders, whereby females are generally found to be twice as likely as males to have an anxiety disorder (Craske & Stein, 2016). These gender differences have also been reported in Norwegian samples (Mykletun, Knudsen, & Mathiesen, 2009). As for years lived with the disability, the GBD-study found the trajectory for males and females to be quite similar; whereby the majority of disability emerges within the adolescent and young adult age groups for both genders (Baxter et al., 2014). Findings from the GBD-study on anxiety disorders also found that the prevalence rose rapidly in the age group ranging from 10-19 years, peaking at around 20 – 24 years of age at 5.5 %; further emphasizing the importance of investigating symptoms of anxiety in adolescents specifically.

### **Development of Anxiety Symptoms**

The concepts of equifinality and multifinality highlights the complexity surrounding the development of different disorders, and the challenge in obtaining knowledge of this sort (Cicchetti & Rogosch, 1996). While the concept of equifinality emphasizes the possibility of there being several pathways to the development of, for instance, anxiety symptoms, the concept of multifinality stresses the notion that several of the initial variables may also lead to different disorders. Although it is well-established that psychological disorders and difficulties are a result of complex interactions between genetic, biological and environmental factors, the aforementioned concepts emphasize the importance of continuously investigating and exploring possible mechanisms that may influence the development of anxiety symptoms.

Many theories have been trying to explain the emergence, development and maintenance of anxiety symptoms. Some of these emphasize the experience of burden and risk that can ultimately threaten one's feeling of safety and security. This may, in turn, lead to the development of anxiety symptoms (Merikangas, 2005). According to attachment theory, early negative experiences, like adverse parent-child relationships, may shape an individual's view of him or herself, alongside what to expect from subsequent interpersonal relations (Bowlby, 1969). It is while interacting with one's primary care givers that one gains knowledge that provides the basis for the formation of internal working models (Bowlby, 1969). These internal working models are, in turn, used as a reference for all future relationships the individual will encounter. Furthermore, these early relationships may also influence an individual's sense of worth, alongside their view of the world and what to expect from it in the future. Several studies support the relation between parenting styles and subsequent self-esteem in adolescence (Grove, 1980; Mogonea & Mogonea, 2014; Oh, 2004; Scholte, Van Lieshout, & Van Aken,

2001; Zakeri & Karimpour, 2011). Hence, negative early parent-child relations could lead to lower levels of self-esteem which might, in turn, trigger the onset of anxiety disorders or difficulties later in life (Merikangas, 2005).

### **The Concept of Self-Esteem**

Self-esteem is often thought of as one of the major keys to success in life. To name a few, self-esteem has been found to be significantly and positively associated with mental health, happiness and hope, as well as life satisfaction (Abdel-Khalek, 2012). Furthermore, given that adolescence is a critical period of development of self-esteem and identity, low self-esteem may in turn endanger the adolescents' emotion regulation and their sense of belonging (Garnefski, Kraaij, & van Etten, 2005; Tsang & Yip, 2006).

The current thesis conceptualizes self-esteem as based on the work of Harter (1999, 2012a). While she believes people to have domain-specific evaluations of competence and adequacy in different aspects of life, she did not exclude the possibility for people to also have an overall sense of global self-worth or global self-esteem. Harter's (2012b) global self-concept is defined as a cognitive generalization of oneself, which includes evaluated perceptions, thoughts and feelings about the self (Harter, 2006). The operationalization of self-esteem in the current thesis is thus based upon the abovementioned definition.

### **Self-Esteem & Adolescent Development**

The formation of self-esteem involves a long process entangled with the development of one's self-image and self-consciousness (Abdel-Khalek, 2016). Adolescence is marked by many significant changes, and it is especially during these transitional periods in life that the self-esteem is bound to be affected. Some of these are maturational changes, which are more biological, such as those related to puberty and general development of the brain. There are also more structural changes, like change of schools and thereby also a change of one's social group and maybe also one's status within the group. With all of this follows a shift in societal expectations, tasks, responsibilities, and conflicting role demands; In all of which self-esteem plays a critical role (Maldonado et al., 2013; Orth, Robins, & Trzesniewski, 2010).

William James (1890) proposed that one's level of self-esteem was reflected through the ratio between one's aspiration and achieved success. He argued that high self-esteem was a result of one's achievements being equal to, or greater than, one's ambitions. Subsequently, low self-esteem would be a result of one's achievements being lower than one's ambitions. Expanding on James' idea of the self, Cooley (1922) argued that self-esteem was a more

socially determined concept. From his point of view, your self-esteem was a result of how you thought significant others in your life thought of you.

Further building upon the work of James, Harter (1999, 2012a) emphasized how there are especially two factors that play a significant role in the development and maintenance of self-esteem in adolescents. Those are (a) perceived competence in areas of personal importance, and (b) the experience of social support. In addition to having a direct impact on the level of self-esteem, the different domains of perceived competence in turn, also influence the approval and support received from parents and peers.

### **Self-Esteem: A Contributor or Consequence**

It's well known that low self-esteem frequently accompanies several different psychiatric disorders (Silverstone, Salsali, & Silverstone, 2003). A large-scale Norwegian study, conducted by Moksnes and Espnes (2012), used a sample of over 1000 adolescents and found that self-esteem had a strong negative association to both state depression and state anxiety. Furthermore, low self-esteem has been linked to a large scale of psychological problems, including for instance depression, social anxiety, alienation and loneliness (Bosacki, Dane, & Marini, 2007; Henriksen & Stenseng, 2016; Maldonado et al., 2013; Shraddha & Surila, 2014; Slomian, Lakuta, Bergler-Czop, & Brzezinska-Wcislo, 2018; Stavropoulos, Lazaratou, Marini, & Dikeos, 2015). There has also been a debate concerning whether people experience better relationships alongside good physical and mental health due to having high self-esteem, or whether high self-esteem is actually a reflection of one being successful in all of these domains (Baumeister, Campbell, Krueger, & Vohs, 2003).

In light of this debate, there has been conducted several well-designed longitudinal studies aimed at testing the prospective effects self-esteem is hypothesized to have on a wide range of different life domains (Marshall, Parker, Ciarrochi, & Heaven, 2014; Orth, Robins, Trzesniewski, Maes, & Schmitt, 2009; Orth, Robins, & Widaman, 2012; Trzesniewski et al., 2006). Accordingly, this debate is best exemplified by two contrasting theoretical models (Zeigler-Hill, 2011). On one hand, the vulnerability model suggests that low self-esteem may increase the probability of developing psychopathology; on the other hand, the scar model, states that low self-esteem may rather be a consequence of psychopathology. Research investigating the relationship between self-esteem and internalizing problems generally point in the direction of low self-esteem to be negatively associated with anxiety, suggesting support for the vulnerability model. This is the case in a wide range of studies, conducted in both clinical, community and convenience samples, which have been using both cross-sectional and

longitudinal designs (Bajaj, Robins, & Pande, 2016; Henriksen & Stenseng, 2016; In-Albon, Meyer, Metzke, & Steinhausen, 2017; Liu, Wang, Zhou, & Li, 2014; Maldonado et al., 2013; Ran, Zhang, & Huang, 2018; Sowislo & Orth, 2013). However, as majority of the studies have been cross-sectional, any causal inferences cannot be made regarding the direction of the relationship (Bosacki et al., 2007; Derdikman-Eiron et al., 2011; Muris, Meesters, Pierik, & de Kock, 2016; Ran et al., 2018; Slomian et al., 2018; Ybrandt & Armelius, 2010). Thus, to enable a better understanding of the underlying developmental pathways there is a need for more longitudinal research on the role of self-esteem in the development of anxiety symptoms.

A few studies have investigated the temporal order of the relation between self-esteem and anxiety. For instance, a large scale 2-year longitudinal study conducted on a non-clinical sample of over 1500 adolescents found partial support for the vulnerability model (van Tuijl et al., 2014). That is, they found low self-esteem at baseline to be predictive of the relative increases in symptoms of both major depressive disorder and social anxiety disorder. In addition, a study by In-Albon et al. (2017) further illustrated how self-esteem predicted internalizing problems, even when controlling for third variables (coping behavior, efficiency of social networks and stressful life events). Thus, providing further support for the notion that one's level of self-esteem is a significant contributor in the development of anxiety symptoms, beyond the effect of possible third variables.

There has also been conducted a meta-analysis on longitudinal studies investigating whether low self-esteem predicts depression and anxiety (Sowislo & Orth, 2013). While the results showed self-esteem to be predictive of later symptoms of depression, the effects between low self-esteem and anxiety appeared to be quite reciprocal. That is, anxiety predicted self-esteem almost as much as self-esteem predicted anxiety. Nonetheless, with 77 longitudinal studies on depression included in the article, in contrast to only 18 studies investigating anxiety, the meta-analysis made it clear how the past decades of research have had a major focus on depression. In addition, majority of the studies on anxiety were quite old, as they were from 2006 and earlier. Thus, there is clearly a need for more studies addressing the topic of anxiety and self-esteem longitudinally. A clear limitation in this field of research, however, concerns the restricted focus on social anxiety specifically or internalizing problems as a whole. Hindering the generalization of these findings to more general symptoms of anxiety.



Nonetheless, majority of the studies support the notion of low self-esteem to be a vulnerability factor, or at least an essential contributor in relation to future mental health outcomes. This is in contrast to Baumeister et al. (2003) suggesting that self-esteem is just an epiphenomenon of mental disorders.

### **Self-Esteem & Interpersonal Relations**

Both theoretical frameworks and previous research suggests that self-esteem is not only the result of an individual's perception of him or herself but that it may also be linked to other's perceptions of them (Birkeland, Breivik, & Wold, 2014; Cooley, 1922; Leary & Baumeister, 2000). Accordingly, self-esteem is likely to increase when a person experiences love from others, is praised or succeeds in an area of importance (Schmidt & Padilla, 2003). Thus, self-esteem is not something that is formed or maintained in isolation.

An important factor in self-esteem development, which is specifically salient in adolescence, and in line with attachment theories, concerns how significant others perceives you. Two relevant theoretical models here are "the looking-glass self" (Cooley, 1922) and sociometer theory (Leary & Baumeister, 2000; Leary, Tambor, Terdal, & Downs, 1995).

According to Cooley (1922), the process of reflective appraisal, known as the looking-glass self, is part of how self-development happens. This process of appraisal starts off by considering how one looks or presents oneself to others. Having low self-esteem will most likely result in one having little belief in the ability to make a good impression. In contrast, having high self-esteem will in turn boost your confidence and belief in making a good impression on others. Thus, your subsequent appraisal of how others might evaluate you will be affected by your initial level of self-esteem. Lastly, based on your second appraisal concerning how others evaluated you, you develop a positive or negative feeling regarding this judgment.

It is suggested that through these steps of appraisal, people learn how to view themselves in ways that may or may not be internalized (Franks & Gecas, 1992). Whether people internalize these views or not is also dependent on one's initial level of self-esteem. Thus, the process of the looking-glass self relies on mainly two things (a) one's ability to accurately interpret how other people view you, and (b) how important that other person's opinion is to you, that is, the esteem in which you hold the other person whose opinion you are trying to interpret (Franks & Gecas, 1992). Findings have supported that people with low self-esteem are more susceptible to and dependent on external self-relevant cues and approval from others (Campbell & Lavalley, 1993). Furthermore, people with low self-esteem generally seem to have

negative attitudes towards other people and their personal circumstances, and these negative attitudes may further lay the foundation for a general negative appraisal of oneself. Contrasting findings further show that people with high self-esteem assess situations more correctly and may thus have a more precise interpretation of how others perceive them to be (Abdel-Khalek, 2016).

Another theory highlighting one's ability to accurately interpret how you are perceived by others is the sociometer theory (Leary & Baumeister, 2000; Leary et al., 1995). Here, self-esteem is seen as a subjective monitor of the extent to which a person is valued within groups of importance. Given that social inclusion involves many adaptive benefits, the sociometer theory highlights how humans have a fundamental need to belong (Sowislo & Orth, 2013). Accordingly, if one has low level of self-esteem, this indicates that their relational value within the group is low.

The abovementioned theories imply an indirect association between self-esteem and psychological adjustment. That is, self-esteem is related to perceived social inclusion, which in turn has beneficial outcomes when it comes to psychological adjustment. For instance, adolescents subject to ostracism and exclusion may suffer from loneliness as well as low peer support and peer acceptance. Which, in turn, are factors that have been linked to symptoms of anxiety (Kingery, Erdley, Marshall, Whitaker, & Reuter, 2010; Mallet & Rodriguez-Tomé, 1999; Su, Pettit, & Erath, 2016; Tillfors, Persson, Willén, & Burk, 2012). Furthermore, adolescence is known to be a period in which the relation to peers begin to have a stronger impact than does the relation to parents. Hence, the focus of the current thesis will be on peer relations specifically, rather than interpersonal relations in general. Kingery et al. (2010) further highlighted that while researchers within clinical psychology have examined how anxiety relates to peer relations using both normative and clinically anxious samples, developmental psychologists have primarily focused on the peer experiences of shy and withdrawn children. Thus, there is a need to investigate this relation further in a normative sample, from the perspective of developmental psychology specifically.

Taken together, the additional theories and studies presented in this section further suggest a negative relationship between self-esteem and symptoms of anxiety, providing even more support the vulnerability model. As adolescence is also a period in which the development of self and identity is specifically pertinent, one's initial level of self-esteem could potentially have important implications for whether or not one would be in the risk of developing symptoms of anxiety. While low self-esteem alone might not lead to the development of anxiety

symptoms, the combination of low self-esteem and other risk factors could increase the risk for developing such symptoms. Good peer relations, being a source of happiness, support and acceptance, is found to play a significant role in the development and maintenance of good mental health (Bakken, 2018). Accordingly, bad peer relations, in combination with low self-esteem, could in turn play a significant role in increasing the risk for developing symptoms of anxiety. Although research point in the direction of a possible association here, it has not yet been investigated whether this is also true for more general symptoms of anxiety (Kingery et al., 2010). Hence, the current thesis aims at investigating this possible relation further.

## **Peer Relations in Adolescence**

### **Peer Relations & Anxiety Symptoms**

As adolescents grow more independent and distances themselves from their parents, they also spend an increasing amount of time with their peers (Lerner & Steinberg, 2004). Hence, it comes as no surprise that peers, during adolescence, become amongst the most significant sources of support (Buhrmester & Furman, 1987). Accordingly, it becomes increasingly important with age to be able to obtain and retain positive peer relations (Spence & Rapee, 2016).

On a general note, interpersonal models of psychopathology assume good social relationships to be closely tied to an individual's psychological well-being (Whisman & Beach, 2010). Conversely, poor social relationships are thought to contribute to the development of psychopathology. Studies have shown how difficulties in peer relations can be both a risk factor for, and a consequence of anxiety development (Bédard et al., 2014; Erath et al., 2007; Su et al., 2016). For instance, Early et al. (2017) investigated the specificity of social difficulties to social anxiety by testing different types of anxiety and their relation to peer acceptance and peer victimization in both community and clinical samples of 12-14-year-old adolescents. While their findings showed that symptoms of anxiety were negatively correlated with social acceptance, these associations were not unique to symptoms of social anxiety specifically. Thus, their study highlights the importance of considering peer relations also when investigating other symptoms of anxiety amongst adolescents.

However, due to the lack of studies investigating different aspects of peer relations and its effect on symptoms of anxiety at a more general level, the majority of studies being addressed in this part of the thesis investigates the relation between different aspects of peer relations and social anxiety specifically or internalizing problems as a whole. In sum, a better

understanding of the relationship between these factors is essential in understanding the complex nature of the developmental process of anxiety symptoms in adolescence.

### **Peer Acceptance & Anxiety**

Two aspects of peer relations being of critical importance for emotional development in adolescence are peer acceptance and close friendships (Hartup, 1996). While peer acceptance generally provides adolescents with a sense of belonging, close friends provide the emotional support from peers needed in times of hardship. The current section will address the topic of peer acceptance and review studies regarding its relation to anxiety, while the subsequent section aims at exploring the peer support aspect of close friendships.

As adolescence is a time in which adolescents interact with a large number of peers, this is also a time in which they feel the need to establish their identity and find their place within the larger peer group. This peer group, if being inclusive and accepting, may provide the adolescents with a sense of belonging and identity. While all the members of a peer group might not know each other well, the importance of acceptance from such a group grows particularly in importance from mid- to late adolescence (Brown, Eicher, & Petrie, 1986). In addressing peer acceptance in the current thesis, the term mainly refers to acceptance from this larger peer group.

Regarding the importance of peer acceptance in relation to anxiety, several studies conducted in both clinical and community samples show that high levels of social anxiety in adolescence is associated with lower peer acceptance and lower friendship quality (e.g. support) (Erath et al., 2007; Flanagan, Erath, & Bierman, 2008; Kingery et al., 2010; Tillfors et al., 2012).

Findings from Mallet and Rodriguez-Tomé (1999) highlight how the contribution of perceived peer acceptance to social anxiety was more important for junior high students, than for those in elementary, illustrating how perceived peer acceptance became increasingly important for social anxiety in adolescence. Su et al. (2016) further revealed how negative peer experiences, more specifically higher levels of peer rejection, was associated with higher levels of both global and context-specific social anxiety. It's further noteworthy that peer rejection was judged by parents in this study. Although the abovementioned studies are cross-sectional, and the methods (parent, peer & self-report) used to assess peer acceptance differs across this field of research, findings linking lower peer acceptance to social anxiety converge across studies (Kingery et al., 2010).

Tillfors et al. (2012) further investigated the prospective links between social anxiety and adolescent peer relations, herein peer acceptance. First, their findings replicate existing literature in the field, in which a relationship between low peer acceptance and social anxiety has been observed in both cross-sectional (Erath et al., 2007) and longitudinal studies (Teachman & Allen, 2007). Second, their findings also add to the existing literature by showing how lower peer acceptance uniquely contributes to social anxiety over time, that is, also controlled for other variables of peer relations. Surprisingly, levels of social anxiety did not predict being less accepted over time. Taken together, these findings show a clear relationship between low perceived peer acceptance and the development of anxiety symptoms in adolescence.

### **Peer Support**

The concept of social support concerns the function and quality of social relationships and can be defined as the provision of both psychological and material resources with the intention to help someone to cope with stress (Cohen, 2004; Schwarzer, Knoll, & Rieckmann, 2004). Therefore, the availability and provision of peer support in times of hardship and stress could be considered a vital psychological resource aiding successful adolescent development (Chu, Saucier, & Hafner, 2010; Opshaug, 2013).

Research has generally linked good social support to have a positive impact on several aspects of life, some of which concern mental health (Proctor, Linley, & Maltby, 2009; Vitaro, Boivin, & Bukowski, 2009), anxiety and internalizing problems (Bédard et al., 2014; La Greca & Lopez, 1998; Pace, Zappulla, & Di Maggio, 2016), trauma (Yearwood, Vliegen, Chau, Corveleyn, & Luyten, 2019), well-being and positive adjustment (Chu et al., 2010; Proctor et al., 2009).

However, while support is generally considered to be something positive, not all support is good support. Taylor (2011) highlights how the positive effect of social support is not cumulative, that is, more support is not necessarily related to even better outcomes. If the support given does not match the support needed, the support will not be as efficient and optimal as it could have been. Studies have generally found support for this matching hypothesis, while also finding support for the opposite, that is, failed attempts in giving support has actually been shown to increase levels of psychological distress (Horowitz et al., 2001; Taylor, 2011).

The function of social support has generally been based on two contrasting hypotheses (Taylor, 2011). While the direct effect hypothesis states that social support is beneficial in times

of both high and low levels of stress, the buffer hypothesis emphasizes the importance of support only during times of stress and hardship. Support for the buffer hypothesis is provided in Yearwood et al. (2019)'s study investigating the moderating role of peer support in the relationship between environmental adversity, complex trauma and adolescent psychopathology. Findings revealed that active involvement in good peer relations could alleviate the influence of complex trauma (e.g. experiences of abuse and neglect). In the adolescents receiving the highest level of peer support, complex trauma was not related to internalizing or externalizing problems. Conversely, low quality of peer support significantly increased the effects of abuse and neglect on symptom levels. Thus, these results indicate that the level of peer support during adolescence may increase or decrease pathological outcomes after experiences of adversity. While providing support for the buffer hypothesis, the study does not simultaneously address the direct effect hypothesis. Hence, precluding any dismissal of a general direct effect. Regardless, the study, with its cross-lagged design, does provide strong evidence for the buffer hypothesis.

As the abovementioned study investigated internalizing problems as a whole, it's difficult to distinguish any effect that might be specific to anxiety. Moreover, the use of a large sample of adolescents from severely disadvantaged areas of Lima and Peru further limits the generalization of the findings. It remains unclear whether this moderating effect of peer support is also apparent within normal developmental circumstances and less adverse cases, for instance, in the case of low self-esteem. Investigating whether the buffer hypothesis is valid for less advantageous cases in normal development is of equal importance as investigating it in cases of abnormal development.

A large-scale meta-analysis, including 246 studies, investigated the relationship between different aspects of social support and well-being (Chu et al., 2010). Although covering the broad topic of well-being, the meta-analysis coded the well-being variable into eight specific aspects, two of which are of particular interest to the current thesis. That is, well-being as a form for psychological adjustment (e.g. depression, anxiety or happiness), and well-being as a form of good self-concept (e.g. self-esteem, perceived competence or internal locus of control). While the overall results indicated a small, yet positive association between social support and well-being, the moderator analyses further indicated that social support was more strongly associated with self-concept. This may indicate a potential interaction between peer support and self-esteem. Further, the level of perceived support was more strongly related to well-being, than was actual enacted support. Thus, this finding may provide further support for Taylor et

al. (2004)'s suggestion that the support does not need to be activated and enacted in order for it to be beneficial; sometimes the simple perception of support may be more important than the support actually received.

## **The Interplay Between Anxiety, Self-Esteem & Peer Relations**

### **Theoretical Framework: Developmental Psychopathology**

The perspective of developmental psychopathology provides an overall integrative framework for the current thesis (Cicchetti & Rogosch, 2002; Cicchetti & Toth, 1998). This perspective emphasizes how the essentials to understanding both normal and abnormal development is to explore how developmental processes at different levels, (e.g. biological, psychological and social/contextual) are integrated. In the case of the current study, the role of self-esteem (e.g. psychological level) and peer relations (e.g. social/contextual level) will be investigated in relation to the development of symptoms of anxiety. Thus, illustrating social developmental processes.

Kingery et al. (2010) highlighted how there is a need for longitudinal studies examining possible mediators and moderators of the relationships between anxiety and different peer variables. In doing so, we can ultimately obtain an in-depth understanding of how social processes may contribute to symptoms of anxiety in adolescents. Further grounded in the perspective of developmental psychopathology, such research would help identifying risk and protective factors for anxiety, leading to a greater understanding of the way in which peer relations can aid youths towards more adaptive developmental pathways.

### **An Overview of the Current Field of Knowledge**

The following section aims at providing an overview of the current field of knowledge based on both theory and empirical findings presented this far in the thesis. In reviewing key aspects, the potential interplay between self-esteem, peer relations (i.e. peer acceptance and peer support) and symptoms of anxiety will be discussed more specifically.

While there are few longitudinal studies investigating symptoms of anxiety specifically in population-based samples of adolescents, the few studies that do include some aspects of anxiety have a tendency to either investigate internalizing problems as a whole, or symptoms of specific diagnoses of anxiety (In-Albon et al., 2017; van Tuijl et al., 2014). Aiming at investigating more general symptoms of anxiety are of importance as the overall focus on internalizing problems cannot distinguish any specific effects and pathways for anxiety. Thus, while studies investigating internalizing problems can elucidate on potential predictors and

pathways to the development of such problems, they cannot be used to design preventive interventions for anxiety specifically. Moreover, the vast focus on social anxiety in particular further precludes the generalization of these findings to adolescents experiencing rather physiological symptoms of anxiety, that may not be social by nature.

Based on theoretical models and earlier studies, there seems to be a negative relationship between one's level of self-esteem and symptoms of anxiety in adolescents. Especially regarding the role of self-esteem, there has been a debate concerning whether it works as a contributor or a consequence in the development of psychopathology. Based on the literature review provided above, most research so far seems to support the vulnerability model in that low self-esteem contributes to increased anxiety symptoms, rather than being a consequence of such symptoms. Although the association between self-esteem and anxiety is well established, majority of these studies have been cross-sectional, which makes it impossible to draw any causal inferences regarding the role of self-esteem (Bosacki et al., 2007; Derdikman-Eiron et al., 2011).

There have, however, been a few longitudinal studies investigating the vulnerability model alongside the predictive role of self-esteem (In-Albon et al., 2017; van Tuijl et al., 2014), providing support for the role of self-esteem as a contributor and predictive factor. However, as previously mentioned, these studies either investigate internalizing problems as a whole, or social anxiety specifically. Thus, the possible role of self-esteem as a contributor in the development of more general symptoms of anxiety remains to be investigated further.

Another large-scale prospective study, conducted by Henriksen and Stenseng (2016), investigated the protective effects of self-esteem in the development of internalizing problems in adolescents. Their findings revealed that high self-esteem at baseline predicted a reduction in internalizing symptoms at the follow-up three years later. While providing further support for the protective role of initial high levels of self-esteem, they did, however, investigate this relation in a clinical sample of adolescents. Thus, there remains a scarcity of longitudinal research on population-based samples of adolescents, addressing self-esteem as a predictive factor in the development of anxiety.

Several theories have further argued for self-esteem to also work as a contributor, rather than a consequence, in influencing levels of perceived peer acceptance. Attachment theory provides basis for the notion of initial levels of self-esteem to be established early in life, while further emphasizing how these early experiences may influence all subsequent interactions, thereby also one's relation to peers in adolescence. Moreover, drawing on Cooley's model of



the looking-glass self, adolescents trying to make judgements as to how peers might perceive them need to base these judgements on something. This can also be tracked back to one's level of self-esteem. Thus, dependent on whether one's initial level of self-esteem is high or low, this could in turn influence how one perceives acceptance from peers. In addition to sociometer theory highlighting the positive relation between levels of self-esteem and perceived peer acceptance, interpersonal models of psychopathology further emphasize how poor peer relations could also contribute to the development of psychopathology. Although the buffer hypothesis emphasizes the importance of support during times of stress and hardship, it remains to be investigated whether this protective effect of peer support is also apparent in less adverse cases within normal developmental circumstances. For instance, in cases of low self-esteem.

While the theoretical basis is apparent, no studies to date have investigated the relation between self-esteem, peer relations and general symptoms of anxiety altogether. The few studies that have included all of these variables, however, have investigated the role of self-esteem as a mediator (Bosacki et al., 2007) or a consequence of anxiety (Derdikman-Eiron et al., 2011). As previously discussed, limitations to keep in mind about these studies concerns the studies' cross-sectional nature, alongside their focus on different aspects of peer relations, not addressing the importance of perceived peer acceptance and peer support specifically.

Based on the above discussion, self-esteem has been argued to work as a contributor both in influencing levels of perceived peer acceptance and symptoms of anxiety. However, there remains a gap in the literature whereby the role of self-esteem as a contributor in the combined relation to perceived peer acceptance and more general symptoms of anxiety needs to be investigated further. Moreover, while research has investigated peer support in relation to many psychological aspects, there is surprisingly little research investigating the role of peer support in relation to symptoms of anxiety specifically. Thus, there also remains a gap in the literature whereby the possible effects of peer support in relation to self-esteem and general symptoms of anxiety needs to be investigated further. To uncover the developmental pathways to anxiety there is a need to focus the research on anxiety at the general symptom-level. In order to clarify pathways and possible mediating and moderating effects of the relationship between self-esteem and general symptoms of anxiety in adolescents, more longitudinal research on the topic is also needed. Furthermore, targeting population-based samples will increase the generalizability, and thereby the possibility to use the findings in preventive work and actions for better mental health.

### **Purpose of the Current Thesis**

In light of the theoretical perspectives and empirical findings presented in the previous sections, the overall purpose of the current study is to investigate in what way, and to what extent, self-esteem, perceived peer acceptance and peer support predicts symptoms of anxiety in Norwegian adolescents. Unique for the current study is thus the ability to longitudinally examine known factors in a new way, with findings that could potentially add new perspectives to the existing literature.

Based on the overall purpose, the specific aims of the current study were to investigate the following hypotheses:

1. Self-esteem is negatively related to symptoms of anxiety in that higher self-esteem predicts lower levels of anxiety symptoms (H1).
2. Perceived peer acceptance is negatively related to symptoms of anxiety in that better peer acceptance predicts lower levels of anxiety symptoms (H2).
3. Peer support is negatively related to symptoms of anxiety in that better peer support predicts lower levels of anxiety symptoms (H3).
4. Perceived peer acceptance works as a mediator in the relationship between self-esteem and symptoms of anxiety, thus, low levels of self-esteem would result in a perception of being less accepted by peers, which would in turn result in higher levels of anxiety symptoms (H4).
5. Peer support works as a moderator in the relationship between self-esteem and symptoms of anxiety, thus, the negative relation between self-esteem and symptoms of anxiety is hypothesized to be stronger for those with worse peer support, than it is for those with better peer support (H5).

Given that findings related to gender differences in anxiety are well established throughout the field of anxiety research, the current study will not focus on investigating this further. However, subsequent regression analyses will take this into consideration and control for gender as a confounder.

## **Method**

### **The TOPP Study**

The current study use data made available from the last two waves of an ongoing epidemiological study named the Tracking Opportunities and Problems in Childhood and Adolescence Study (TOPP). The overall aim of the TOPP study is to gain knowledge about both good and difficult developmental trajectories in Norwegian children, adolescents and their families (Norwegian Institute of Public Health, 2016). The longitudinal community-based study has now in a total of eight waves been collecting data of initially more than 900 families. These families have been followed since their children were 18 months old (in 1993) and up until the last wave of data collection in 2011, when the children had turned 19.

### **Procedure**

The TOPP study began in 1993, whereby all families from 19 health care areas in eastern Norway, who visited a public health clinic for the scheduled 18-month (T1) vaccination, were invited to take part in the study and complete a comprehensive questionnaire. Those participating from the start have participated in a total of eight waves of data collection; in which the children were 1.5 years (T1), 2.5 years (T2), 4.5 years (T3), 8.5 years (T4), 12-13 years (T5), 14-15 years (T6), 16-17 years (T7) and 18-19 years (T8).

While the public health clinics administered the first three waves of data collection, the remaining data collection were conducted by post. The mothers received all questionnaires from T1. Up until T4 the mothers completed the questionnaires on behalf of themselves and their children. From T5 and onwards, the mothers also received age-appropriate questionnaires for their youths in separate sealable envelopes. Lastly, fathers were included in the TOPP-Study in the last three waves, whereby they were sent questionnaires and separate return envelopes from T6 to T8. The current thesis is based on adolescents' self-reported data gathered in the last two waves, that is in 2008 (T7) and 2011 (T8); thus, reflecting the period in which the adolescents were 16-19 years old.

### **Sample**

The sample of interest for the current thesis consists of the 375 adolescents (58.7 % females) who participated in the TOPP study at T7 and the 442 adolescents (59.1 % females) who participated at T8. Although the overall aim and focus of the current study lies within the adolescents, the TOPP-study did not collect demographics related to these adolescents. Nonetheless, demographics and measures of the socio-economic status was obtained from the

mothers at T6. Regarding the educational level of the mothers, 26.1 % reported to have a college or university education of four years of less, while 30.7 % of the mothers reported having a college or university educational of four years or more. This was also the case for the fathers, whereby 23.9 % of them had an educational level of 4 years of less from college or university, while 31.2 % of the fathers had an educational level of 4 years or more from college or university. Compared to the general population in 2006, the parents of the current sample indicate a somewhat higher level of education (Statistisk Sentralbyrå, 2008).

In terms of work and financial situation at T6, 62.2 % of the mothers had a full-time job, holding an 80-100 % position. Accordingly, 61.7 % of the mothers also reported that the family had an income above 550 000 Norwegian kroner (NOK), which again was higher than the median income of the general population in 2006 (Statistisk Sentralbyrå, 2013). Overall the families participating in the TOPP study showed a median level of socio-economic status above the general population in 2006.

### **Ethical Consideration**

General ethical guidelines for research have been followed. All participants got information about the study they were to partake in, and signed forms of informed consent emphasizing confidentiality and their right to withdraw from the study at any point. The TOPP-Study has been approved by The Regional Committees for Medical and Health Research Ethics in Norway (REC) and has also reported to the Data Inspectorate. The current thesis, addressing the topic of anxiety symptoms in adolescents, goes under the initial approval from REC and has also been approved by the Internal TOPP study Project Group. All analyses were conducted on anonymous data.

### **Measures**

The following scales and items from the TOPP-Study questionnaires at T7 and T8 were used (see appendix for questionnaires).

**Symptoms of Anxiety.** The measure for anxiety is obtained using the Anxiety sub-scale in the Depression, Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995). Overall, the instrument consists of 42-items measuring symptoms of depression, anxiety and stress over the past week. Each of the three sub-scales consists of 14 items which are responded to by using a 4-point scale ranging from 0 – 3; whereby 0 equals “Did not apply to me at all” and 3 equals “Applied to me very much, or most of the time”. Examples of items are “I felt afraid without any special reason”, “I was terrified” and “I felt I was close to panic”. Given that the 14 DASS-

items reflects a rather physical measure of Anxiety Symptoms (e.g. Autonomic arousal, skeletal muscular effect, situational anxiety, panic and subjective experiences of anxious affect) the TOPP-Study Group also chose to include two items tapping into the social aspect of anxiety to ensure a greater coverage of the phenomenon.

Lovibond and Lovibond (1995) investigated the psychometric properties of the DASS in a normal sample; Finding the internal consistency to be satisfactory, showing good psychometric properties in addition to having the factor structure supported by both exploratory and confirmatory factor analysis. Both the long and short version of DASS is widely used in different languages and cultures, showing great validity and reliability overall (Akin & Cetin, 2007; Oei, Sawang, Goh, & Mukhtar, 2013).

The internal consistency of the Anxiety sub-scale in the current study are high with Cronbach's Alpha-values at  $\alpha = .89$  for T7 and  $\alpha = .91$  for T8.

**Self-Esteem & Peer Acceptance.** Harter's Self-Perception Profile for Adolescents (SPPA; Harter, 1988) aims to measure domain-specific judgments of adequacy in eight different domains (scholastic competence, social competence, athletic competence, physical appearance, job competence, romantic appeal, behavioral conduct and close friendship), as well as measuring a global self-esteem. The current thesis uses the sub-scale of global self-esteem and close friendships, with the latter as an indicator of perceived peer acceptance. Each subscale consists of 5 items that are scored on a 5-point scale ranging from 0 – 4. These are coded so that higher scores represent more positive self-perceptions (Thomson & Zand, 2002).

The instructions given to the adolescents filling out the questionnaires were as follows: "Below are several statements sought to describe how you, more or less, feel nowadays. We ask you to indicate how true each statement is for you." The original version makes adolescents indicate how true a statement is for them by first presenting the statements in the form of "Some teenagers \_\_\_\_" But "Other teenagers \_\_\_\_". However, the version used in the TOPP-Study gave specific statements aimed directly towards the adolescents in the form of "I feel/like/think \_\_\_\_".

Rose, Hands, and Larkin (2012) investigated the reliability and validity of Harter's SPPA on an Australian sample, and further compared their results to other studies. Overall, the scales sought to measure self-esteem and peer acceptance both showed an internal consistency ranging from .76 - .85 in several of the studies, with the majority reporting Alpha-values above .81.

In the current study, a mean score variable was computed for each subscale and the internal consistency for self-report was  $\alpha = .84$  for the sub-scale of self-esteem (T7) and  $\alpha = .86$  for the sub-scale of peer acceptance (T7). Both of which are above the recommended value for Cronbach's Alpha at .70 (Nunnally, 1978). The SPPA scale was not included in the questionnaire used at T8, thus these measures are only available from T7.

**Peer Support.** Three questions reflecting the adolescent's experience of attachment, mutual respect and belonging were used to assess their perceived support from friends (Dalgard, Bjørk, & Tambs, 1995). The three questions were "I feel close to my friends", "My friends listen to my opinions" and "At times I feel left out, even amongst my friends". Items are scored using a 5-point scale ranging from 1 – 5, whereby 1 equals "Totally Agree" and 5 equals "Totally Disagree".

These items measuring peer support have been used in several other studies, demonstrating internal consistencies ranging from .45 - .71 (Olaussen, 2015; Opshaug, 2013). In the current thesis, the items that measured peer support had a Cronbach's Alpha at only  $\alpha = .67$  (T7) and  $\alpha = .68$  (T8), which are both below the recommended value of .70. Getting low Alpha values are not unusual given that this scale only consists of 3 items and Alpha is sensitive to the number of items in a scale. In such cases, it is often more appropriate to report the mean inter-item correlation. According to Briggs and Cheek (1986) this should ideally be between .20 and .40, but higher mean inter-item correlations do also reflect good internal consistency (Pallant, 2011). Given that our scale of peer support had mean inter-item correlations of .43 (T7) and .44 (T8), the internal consistency was above the recommended value.

### **Statistical Methods and Analyses**

All analyses were conducted using IBM SPSS Statistics 25 for Windows. The statistical analyses were carried out in mainly two stages: (a) preliminary analyses in which relevant assumptions were investigated, and (b) main statistical analyses in the form of multiple regression. The mediation and moderation analyses were performed using Hayes (2018) PROCESS Macro version 3.2 for SPSS. The significance level was set at .05 for all statistical analyses, and all tests were two-tailed. Effect sizes were further measured with Pearson's  $r$  for correlational analyses. Providing rules of thumb for the interpretation of effect size, Cohen (2016) highlighted the  $r$  - values of  $r = .10$ ,  $r = .30$  and  $r = .50$  to reflect small, medium and large effects, respectively. When conducting multiple linear regression,  $R^2$  was also reported to indicate the explanatory power of the final models. For consistency purposes, all scales that did

not already have their lowest point at score 1 were recoded so that they did. Furthermore, negative items appearing in the positive scales (e.g. self-esteem, peer support & peer acceptance) were reversed before computing the mean for these variables.

The preliminary analyses were conducted to ensure that there was no violation of the assumptions underlying multiple regression. The assumptions to be investigated concerned linearity, multicollinearity, normally distributed residuals and homoscedasticity (Field, 2018). To investigate whether the assumption concerning linearity was met, a curve estimation was run in SPSS, indicating no violation of this assumption. Further investigation of the correlation matrix revealed that the assumption of multicollinearity was also met.

As for the assumption concerning normally distributed residuals, these were investigated by looking at the histogram and normal P-P Plot for the standardized residuals. Although the PP-Plot did indicate some violation of the assumption, this would not pose any problems due to the large sample size of well above 350 participants. Given such a large sample size, the central limit theorem ensures that the distribution of the error term will approximate normality (Hayes, 2018).

While investigating the assumption of homoscedasticity, the scatterplot revealed a clear violation of this assumption. As violation of this assumption biases the standard errors, this further affects significance testing and the subsequent calculations of confidence intervals. Nonetheless, the PROCESS tool allows for heteroskedasticity-consistent (HC) regression analyses. Following the recommendation of Hayes and Cai (2007), the subsequent multiple regression analyses utilized HC3 (Davidson-MacKinnon) within the PROCESS tool when investigating the proposed mediation and moderation.

All hypotheses were examined by performing multiple regression analyses using the PROCESS tool. As the PROCESS tool does not calculate standardized regression coefficients the subsequent analyses will report unstandardized regression coefficients only. This does not pose any problems to the analyses, given that the aim is not to compare the variables in terms of their individual impact on the dependent variable, but rather to investigate and interpret the overall proposed mechanisms and relationships. The mediation was examined both cross-sectionally and longitudinally. The cross-sectional mediation at T7 aimed at investigating whether perceived peer acceptance mediated the relationship between self-esteem and symptoms of anxiety in adolescents, while controlling for gender. The next step concerned investigating whether the proposed mediation was also apparent over time. Thus, the longitudinal mediation analysis included measures of self-esteem (T7), peer acceptance (T7)

and symptoms of anxiety (T8), while simultaneously controlling for gender and earlier symptoms of anxiety (T7). Accessing the PROCESS tool in SPSS a mediation analysis was ran using model 4, which is a simple mediation model. This model tests whether the effect of self-esteem on symptoms of anxiety is mediated by perceived peer acceptance. Upon establishing the mediation, the current study will follow the traditional steps for mediation analyses provided by Baron and Kenny (1986). Further, keeping in mind the heteroscedasticity going on in the dataset, HC3 (Davidson-MacKinnon) was selected to take this into account in the regression analyses. In order to establish whether the indirect effect was significantly different from zero, the significance of the indirect effect was investigated by running a bootstrap with 95 % bias-corrected confidence intervals and  $k = 5000$  bootstrap samples.

In order to investigate whether peer support moderated the longitudinal relationship between self-esteem and symptoms of anxiety in adolescents, interaction analyses were performed. The outcome variable, anxiety at T8, was regressed on all the predictor variables including the interaction term, consisting of the joint product of self-esteem and peer support at T8, while simultaneously controlling for gender and earlier symptom levels at T7. Given that measures of peer support were available at both T7 and T8, the results from the correlational analyses were used to determine at which time point the moderator should be included in the model. Accessing the PROCESS tool in SPSS the moderation analysis was ran using model 1, which is a simple moderation model. This model tests whether the effect of self-esteem on subsequent symptoms of anxiety is dependent on the level of peer support. Still keeping in mind the heteroscedasticity in the dataset, HC3 (Davidson-MacKinnon) was again selected to take this into account in the regression analyses. While running the moderation, PROCESS further generated data for plotting which was helpful in both visualizing and interpreting the conditional effect of the focal predictor in the subsequent simple slopes analysis. The data for the simple slopes were provided at  $\pm 1SD$  of the mean of the moderator (e.g. peer support).

### **Missing Data**

To maximize the use of available data, and thus also increasing the statistical power of the analyses, all scales were constructed by calculating mean scores for each participant if they had answered more than half of the questions in each scale (e.g. for a scale of 5 items, they would have to answer a minimum of 3 items). Although the overall response rate was high on all scales, with few missing values (see Table 1), the data that was missing was handled pairwise in each analysis.



## Results

### Descriptive Statistics & Correlations

Descriptive statistics were carried out to obtain information regarding the central tendency and standard deviations of each of the continuous variables (e.g. self-esteem, peer support, peer acceptance & symptoms of anxiety). Moreover, correlational analyses using Pearson's  $r$  were also carried out to examine the relationship between the different variables in question.

Table 1 gives an overview of the total number of participants at each time point, in addition to means and standard deviations for each of the measures. Table 1 further presents the bivariate correlations between all the continuous variables in the current thesis. All correlations were statistically significant at  $p < .05$ , while majority of the correlations were also significant at  $p < .01$  and  $p < .001$ .

Table 1  
*Descriptive Statistics and Intercorrelations.*

<i>Variables</i>	<i>N</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5
<b>Time 7 (16-17 years)</b>	<b>375</b>							
1. Self-Esteem (T7)	373	3.82	.80					
2. Peer Support (T7)	372	4.05	.82	.41***				
3. Peer Acceptance (T7)	373	4.07	.73	.58***	.42***			
4. Symptoms of Anxiety (T7)	372	1.30	.39	-.49***	-.21***	-.40***		
<b>Time 8 (18-19 years)</b>	<b>442</b>							
5. Peer Support (T8)	439	3.91	.93	.17**	.25***	.26***	-.15*	
6. Symptoms of Anxiety (T8)	438	1.30	.41	-.32***	-.13*	-.23***	.58***	-.23***

*Note.* \*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Given that peer support at T8 had a stronger association to symptoms of anxiety at t8 than did peer support at T7, peer support T8 was included as the moderator in the subsequent longitudinal multiple regression analysis. In sum, as hypothesized, the correlations revealed that self-esteem, peer acceptance and peer support were robust correlates of symptoms of anxiety, both at T7 and T8. The following section will address hypothesis 1, 2 and 4 as these are related to the mediation, while hypothesis 3 and 5 will be addressed in the section about moderation.

## The Interplay Between Self-Esteem, Peer Acceptance and Anxiety:

### Regression & Mediation

Results from the cross-sectional regression and mediation analyses are displayed in Table 2. The aim of the multiple regression was twofold; The first aim was to investigate the negative relation between self-esteem and symptoms of anxiety (H1) and perceived peer acceptance and symptoms of anxiety (H2) through the individual regressions. The second aim was to investigate the mediating role of perceived peer acceptance on the relation between self-esteem and symptoms of anxiety, while controlling for gender (H4). Figure 1 provides an illustration of the proposed mediation cross-sectionally.

Table 2

*Results of the Multiple Regression Analysis of the Cross-Sectional Mediation at T7.*

<i>Model</i>	<i>Predictors</i>	<i>b</i>	<i>SE (HC3)</i>	<i>t</i>	<i>p</i>
1	<b>Constant</b>	<b>2.06</b>	.14	15.11	<b>&lt;.0001</b>
	Self-Esteem	<b>-.22</b>	.04	- 6.56	<b>&lt;.0001</b>
	Gender	<b>.12</b>	.03	4.26	<b>&lt;.0001</b>
2	<b>Constant</b>	<b>2.25</b>	.18	12.40	<b>&lt;.0001</b>
	Self-Esteem	<b>-.16</b>	.04	- 4.51	<b>&lt;.0001</b>
	Peer Acceptance	<b>-.10</b>	.05	- 2.04	<b>.04</b>
	Gender	<b>.13</b>	.03	4.33	<b>&lt;.0001</b>

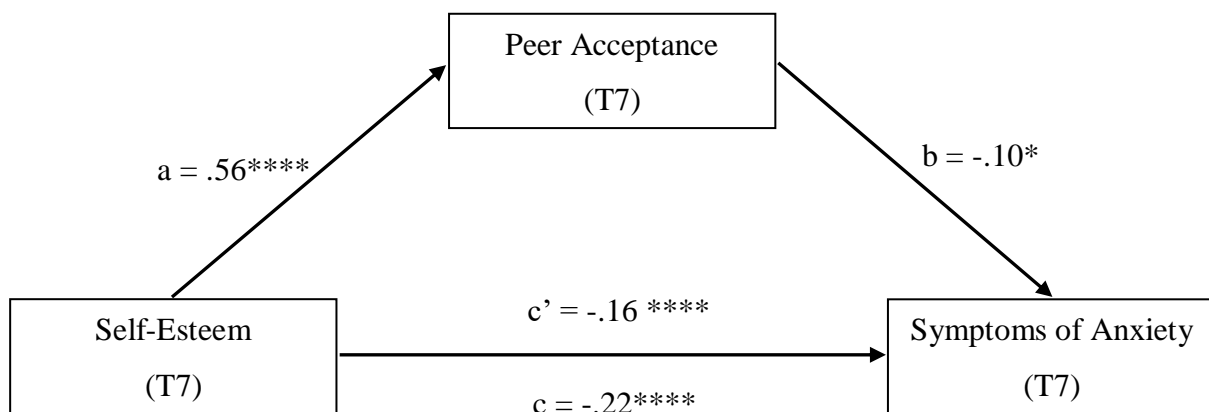
*Note.* The dependent variable is Symptoms of Anxiety at T7. Gender was included in the model as a Covariate. Significant Associations ( $p < .05$ ) are in bold. Total N = 372.

Gender: 0 = Males, 1 = Females.

The first model illustrates the direct effect of self-esteem on symptoms of anxiety while controlling for gender. The overall model was significant ( $p < .0001$ ), meaning that self-esteem and gender together explained 26 % of the variance in the scores of anxiety symptoms at T7 ( $R^2 = .26$ ). More specifically, in support for H1, self-esteem at T7 was a significant predictor of symptoms of anxiety at T7 ( $b = -.22$ ,  $t(369) = -6.56$ ,  $p < .0001$ ), indicating that as self-esteem increases, symptoms of anxiety decreases.

The second model illustrates the effect of self-esteem on symptoms of anxiety, while simultaneously controlling for perceived peer acceptance and gender. The overall model was significant ( $p < .0001$ ), meaning that all the abovementioned predictors together explain 28 % of the variance in the scores of anxiety symptoms at T7 ( $R^2 = .28$ ). As perceived peer acceptance significantly predicts symptoms of anxiety at T7 ( $b = -.10$ ,  $t(368) = -2.04$ ,  $p < .05$ ), the second regression model further provides support for H2, indicating that as perceived peer acceptance increases, symptoms of anxiety decreases.

Following the traditional steps for mediation analyses, certain pathways needs to be investigated in order to establish a mediation (Baron & Kenny, 1986). Having already established the total effect of self-esteem on symptoms of anxiety through H1 (path c in Figure 1) and the direct effect of perceived peer acceptance on symptoms of anxiety through H2 (path b in Figure 1), what remains to be established is the path between symptoms of anxiety and perceived peer acceptance (path a in Figure 1). Regression analyses further revealed that self-esteem at T7 was a significant predictor of peer acceptance at T7 ( $b = .56, t(369) = 13.57, p < .0001$ ), indicating that as one's level of self-esteem increases perceived peer acceptance also increases.



**Figure 1**

*Cross-Sectional Mediation Model at T7*

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . \*\*\*\*  $p < .0001$

To further investigate the mediating role of perceived peer acceptance on the relation between self-esteem and symptoms of anxiety (H4), we need to compare the results of the two models in Table 2. For there to be a mediation, including perceived peer acceptance as a mediator in the second regression model should cancel out the effect of self-esteem alone from the first regression model. That is, the effect of self-esteem should approach zero, or at least decrease, and no longer be significant. In the second model, the effect of self-esteem on symptoms of anxiety is still significant ( $b = -.16, t(368) = -4.51, p < .0001$ ), which signifies that perceived peer acceptance only appears to account for some of the association between self-esteem and anxiety. This further indicates that the direct effect of self-esteem on anxiety symptoms (path c) may be quite robust. Nonetheless, given that the effect of self-esteem on anxiety symptoms is lower in the second model ( $b = -.16$ ), when perceived peer acceptance was included, perceived peer acceptance seems to partially mediate the relationship between self-esteem and symptoms of anxiety at T7.

The Bootstrap further indicated the indirect effect (path a · path b = -.06) to be significantly different from zero with a 95 % CI [-.1119, -.0059]. Thus, in line with H4, this indicates perceived peer acceptance to partially mediate the relationship between self-esteem and symptoms of anxiety at T7.

To investigate whether the initial mediation is also apparent over time, a longitudinal indirect analysis was conducted. Table 3 shows the output from the longitudinal mediation, while controlling for gender and earlier anxiety symptoms.

Table 3

*Results of the Multiple Regression Analysis of the Longitudinal Mediation from T7 to T8.*

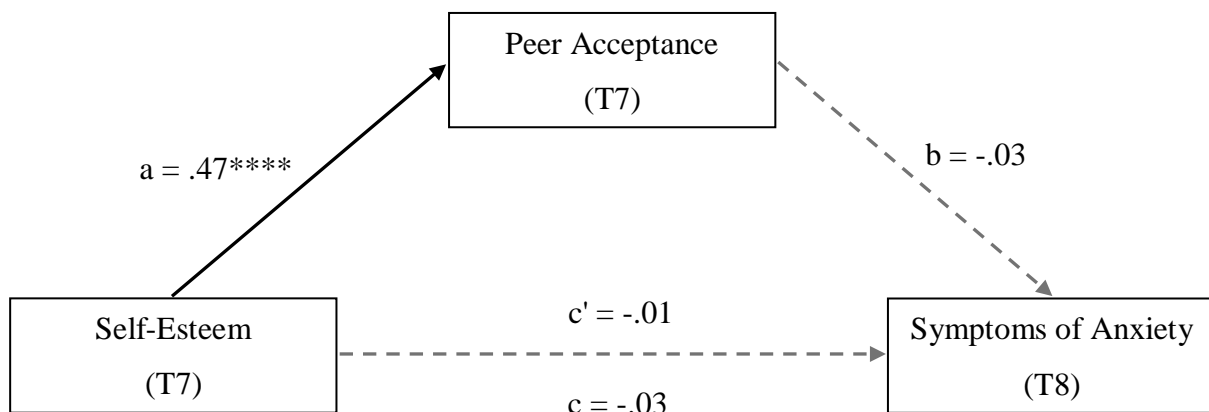
<i>Model</i>	<i>Predictors</i>	<i>b</i>	<i>SE (HC3)</i>	<i>t</i>	<i>p</i>
3	<b>Constant</b>	<b>.66</b>	.17	3.82	<b>&lt;.001</b>
	Self-Esteem (T7)	-.03	.03	- 1.02	.31
	Symptoms of Anxiety (T7)	<b>.52</b>	.08	6.70	<b>&lt;.0001</b>
	Gender (T8)	.03	.03	1.06	.29
4	<b>Constant</b>	<b>.72</b>	.21	3.44	<b>&lt;.001</b>
	Self-Esteem (T7)	-.01	.03	-.53	.60
	Peer Acceptance (T7)	<b>-.03</b>	.03	-.77	<b>.44</b>
	Symptoms of Anxiety (T7)	<b>.52</b>	.08	6.50	<b>&lt;.0001</b>
	Gender (T8)	.04	.03	1.21	.23

*Note.* The dependent variable is Symptoms of Anxiety T8. Gender T8 and Symptoms of Anxiety T7 were included as Covariates in model 3 and 4. Significant Associations ( $p < .05$ ) are in bold. Total N = 290. Gender: 0 = Males, 1 = Females.

The third model illustrates the direct effect of self-esteem (T7) on symptoms of anxiety (T8), while simultaneously controlling for gender and earlier symptoms of anxiety (T7). While the overall model was significant ( $p < .0001$ ), the unique contribution of self-esteem in predicting anxiety symptoms two years later was not ( $b = -.03$ ,  $t(286) = -1.02$ ,  $p = .31$ ). Thus, although the overall model does explain 38 % of the variance in anxiety symptoms at T8 ( $R^2 = .38$ ), this is mainly due to earlier symptoms of anxiety from T7 ( $b = .52$ ,  $t(286) = 6.70$ ,  $p < .0001$ ).

Having already established the total effect of self-esteem on subsequent symptoms of anxiety (path c in Figure 2), we proceed by investigating the remaining pathways. First off, we have the relation between self-esteem and perceived peer acceptance (path a in Figure 2). In line with the cross-sectional findings, self-esteem was still a significant predictor of perceived peer acceptance ( $b = .47$ ,  $t(286) = 8.70$ ,  $p < .0001$ ).

Lastly, the fourth model illustrates the longitudinal effect of self-esteem (T7) on symptoms of anxiety (T8) while simultaneously controlling for gender, perceived peer acceptance (T7) and earlier symptoms of anxiety (T7). While the overall model was significant ( $p < .0001$ ), perceived peer acceptance (T7) did not predict symptoms of anxiety (T8). Thus, path b in Figure 2 was not significant, ( $b = -.03$ ,  $t(286) = -.77$ ,  $p = .44$ ). Neither was path c' in Figure 2 significant, that is, the effect of self-esteem (T7) on symptoms of anxiety (T8), while controlling for perceived peer acceptance (T7) ( $b = -.01$ ,  $t(285) = -.53$ ,  $p = .60$ ). Thus, although the fourth model does explain 38 % of the variance in anxiety symptoms at T8 ( $R^2 = .38$ ), this is mainly due to earlier symptoms of anxiety from T7 ( $b = .52$ ,  $t(286) = 6.50$ ,  $p < .0001$ ). Lastly, the Bootstrap of the indirect effect (path a · path b =  $-.01$ ) was not significantly different from zero, indicated with a 95 % CI  $[-.0413, .0192]$ . Thus, the proposed mediation in H4 is not supported longitudinally. Figure 2 illustrates the suggested longitudinal relations among the variables when controlling for both gender and earlier symptom-levels of anxiety.



**Figure 2**

*Longitudinal Mediation Model from T7 to T8.*

*Note. Nonsignificant pathways are marked with dotted lines.*

*\*\*\*\*\*  $p < .0001$ .*

### **The Interplay Between Self-Esteem, Peer Support and Anxiety:**

#### **Regression & Moderation**

Results from the longitudinal regression and moderation from T7 to T8 are displayed in Table 5. Overall, the model with all its predictors was significant ( $p < .001$ ), indicating that 41 % of the variance in the scores of symptoms of anxiety at T8 can be explained by self-esteem (T7), symptoms of anxiety (T7), peer support (T8) and gender ( $R^2 = .41$ ).

Table 5  
*Longitudinal Moderation Model from T7 to T8.*

	<i>b</i>	<i>SE (HC3)</i>	<i>t</i>	<i>p</i>
Constant	<b>1.85</b>	.47	3.98	< . <b>001</b>
Self-Esteem (T7)	<b>-.27</b>	.10	-2.65	<b>.009</b>
Peer Support (T8)	<b>-.30</b>	.10	-2.91	<b>.004</b>
Self-Esteem (T7) X Peer Support (T8)	<b>.06</b>	.02	2.56	<b>.011</b>
Symptoms of Anxiety (T7)	<b>.49</b>	.07	6.81	< <b>.001</b>
Gender (T8)	.04	.03	1.35	.179

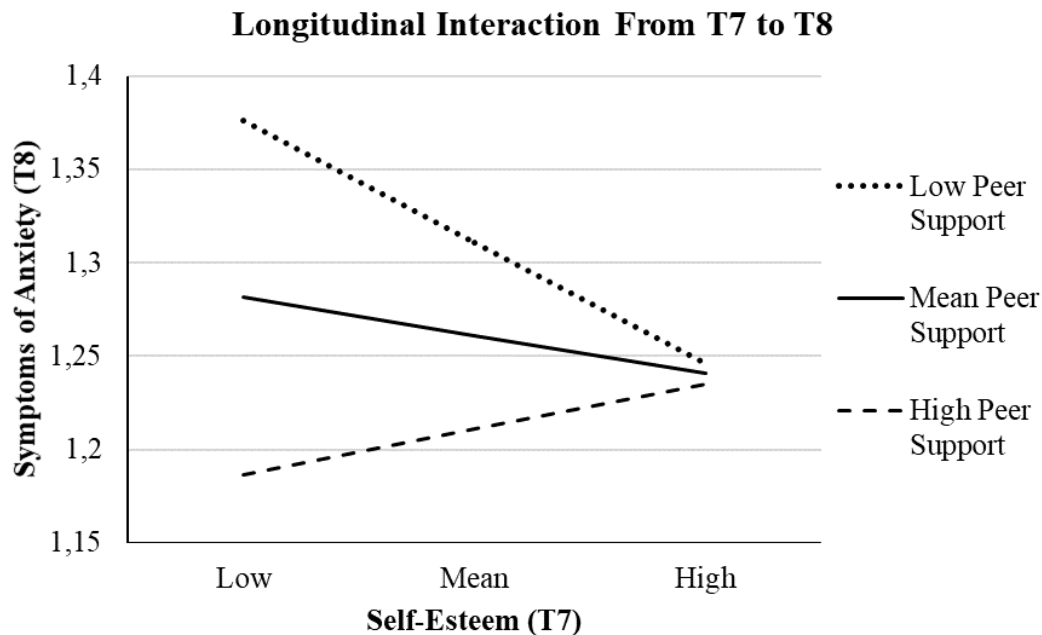
*Note.* The dependent variable is Symptoms of Anxiety at T8. Gender and Symptoms of Anxiety at T7 were included in the model as Covariates. Significant Associations ( $p < .05$ ) are in bold. Total N = 289. Gender: 0 = Males, 1 = Females.

Turning to the individual predictors, self-esteem at T7 was found to be a significant predictor of symptoms of anxiety at T8 ( $b = -.27$ ,  $t(283) = -2.64$ ,  $p < .01$ ). Peer support (T8), included as a moderator in the longitudinal regression model, was also a significant predictor of symptoms of anxiety at T8 ( $b = -.30$ ,  $t(283) = -2.91$ ,  $p < .01$ ), indicating that as levels of peer support increases, symptoms of anxiety decreases. This result further provide support for H3, stating that peer support is negatively related to symptoms of anxiety.

Lastly, in favor of H5, peer support at T8 significantly moderates the relationship between self-esteem at T7 and symptoms of anxiety at T8 as the interaction term, Self-Esteem (T7) X Peer Support (T8), was significant ( $b = .06$ , 95 % CI [.0083, .1056],  $t(238) = 2.56$ ,  $p = .01$ ). While the addition of the interaction term to the longitudinal model was also a small, but significant change to the model ( $F(1, 238) = 6.56$ ,  $p = .01$ ,  $R^2\text{-Change} = .015$ ), it is still difficult to interpret. Thus, simple slopes were used to visualize and investigate the longitudinal interaction further (Hayes, 2018).

The simple slopes for the longitudinal interaction was provided based on  $\pm 1SD$  of the mean of the moderator, in this case peer support (T8). The slopes thus represent how self-esteem (T7) predicts symptoms of anxiety (T8) at different levels of peer support (T8) in the current sample. For low levels of peer support (PS = 3.03), 1 SD below the mean, there was a significant negative relationship between self-esteem (T7) and symptoms of anxiety (T8) ( $b = -.08$ ,  $t(283) = -2.32$ ,  $p = .02$ ). Meaning that low levels of peer support impacts the initial relation between self-esteem and later symptoms of anxiety. For mean levels of peer support (PS = 3.94), there was a non-significant negative relationship between self-esteem and symptoms of anxiety ( $b = -.03$ ,  $t(238) = -1.04$ ,  $p = .30$ ). For high levels of peer support (PS = 4.85), 1 SD above the mean, there was a non-significant positive relationship between self-esteem and symptoms of anxiety ( $b = .03$ ,  $t(238) = 1.00$ ,  $p = .32$ ). Taken together, these results indicate that the longitudinal

relationship between self-esteem and symptoms of anxiety only really emerges when levels of peer support are low (1 SD below the mean). That is, the interaction is not evident when levels of peer support are average or high. Figure 3 provides a visualization of the simple slopes for the longitudinal interaction.



**Figure 3**  
*Visualization of the Longitudinal Interaction.*

## Discussion

The overall purpose of the current thesis was to investigate in what way, and to what extent, self-esteem, perceived peer acceptance and peer support predicted symptoms of anxiety in a population-based sample of Norwegian adolescents followed from the age of 16 to 19. More specifically, perceived peer acceptance was proposed to work as a mediator, and peer support as a moderator, in the overall relationship between self-esteem and symptoms of anxiety, which was examined both cross-sectionally and longitudinally. The following key findings emerged when investigating the abovementioned relations: (a) self-esteem, perceived peer acceptance and peer support were all negatively related to symptoms of anxiety in adolescents; (b) Perceived peer acceptance partially mediated the relationship between self-esteem and symptoms of anxiety cross-sectionally, however, this mediation was not apparent longitudinally; (c) Peer support worked as a moderator in the longitudinal relationship between self-esteem and symptoms of anxiety. The key findings and their implications are discussed further in the following sections.

### **The Associations Between Self-Esteem, Peer Relations & Symptoms of Anxiety**

As expected from hypothesis 1, self-esteem was negatively associated with symptoms of anxiety at both T7 and T8. This result is in support of research consistently showing that high scores on self-esteem predicts lower levels of anxiety symptoms in adolescents (Henriksen & Stenseng, 2016; In-Albon et al., 2017; Maldonado et al., 2013; van Tuijl et al., 2014). This finding further converge with studies showing how adolescents with high levels self-esteem more often report having good mental health, are relatively content with themselves and their life as it is, alongside having an overall positive and optimistic attitude (Abdel-Khalek, 2016; Orth & Robins, 2014; Orth et al., 2012); circumstances in which one would imagine stressful and anxiety-provoking symptoms to be less likely to occur.

Perceived peer acceptance was also found to be negatively associated with symptoms of anxiety. Thus, the higher the level of perceived acceptance from peers, the lower the levels of anxiety symptoms. This finding supports hypothesis 2 and is also in accordance with previous research on the relationship between peer acceptance and symptoms of anxiety in adolescence (Early et al., 2017; Erath et al., 2007; Su et al., 2016; Teachman & Allen, 2007; Tillfors et al., 2012).

Findings from the current study also provided support for hypothesis 3 and converge with previous research in that there is a negative relation between peer support and symptoms of anxiety (Bédard et al., 2014; Chu et al., 2010; Pace et al., 2016). This result thereby highlight how adolescents with higher levels of support from peers in turn are less likely to display higher levels of anxiety symptoms. Moreover, it's important to note how current peer support had a stronger association to symptoms of anxiety than did peer support two years prior, supporting the notion that current support may be of greater importance than support received earlier. This finding further emphasizes that while one might be affected by experiences related to support received in the past, one can still work on the current level of peer support.

The findings related to perceived peer acceptance and peer support are further in line with the interpersonal models of psychopathology; stating how good social relations are closely tied to psychological well-being (e.g. reflected through low level of anxiety symptoms), and conversely, how poor social relations are associated with the development of psychopathology (e.g. reflected through higher levels of anxiety symptoms).



### **The Mediating Role of Perceived Peer Acceptance**

Findings from the cross-sectional mediation analyses revealed that perceived peer acceptance partially mediated the relationship between self-esteem and symptoms of anxiety in 16-17-year old adolescents, hence providing partial support for hypothesis 4. This finding is, to my knowledge, the first of its kind in the field of anxiety research to stress the importance of perceived acceptance from peers, also regarding more general symptoms of anxiety.

As the current study investigates symptoms of anxiety in adolescents, a time in which the basis for self-esteem is already set by early influences, one's initial level of self-esteem in the transition from lower secondary to upper secondary school could affect the way in which one meets and interprets these new surroundings (Bowlby, 1969; Leary & Baumeister, 2000). Moreover, findings have shown how the contribution of perceived peer acceptance to social anxiety was more important for junior high school student, than those in elementary. Thus, further highlighting the importance of peer acceptance in adolescence specifically.

As high levels of self-esteem may reflect good internal working models, it could further be said to provide a good basis for the subsequent interactions with peers (Bowlby, 1969). Adding this to the findings that bad peer relations are associated with worse mental health supports the notion of the observed partial mediation (de Lijster et al., 2018; Early et al., 2017; Erath et al., 2007). Accordingly, high levels of self-esteem would imply higher perceived acceptance from peers and subsequently lower symptom levels. Conversely, low levels of self-esteem would imply lower perceived acceptance from peers and thereby higher symptom levels.

As expected, the results were also in accordance with sociometer theory, indicating a positive relationship between one's level of self-esteem and the degree to which one feels accepted by the peer group. Moreover, the way in which you feel accepted by the group may also affect the way in which you interact with this group. Adding this to the interpersonal models of psychopathology, highlighting the important role of good peer relations in obtaining good mental health, these theories together also supports and provides basis for the observed mediation.

Given that no previous studies have investigated the observed mediating effect of perceived peer acceptance in the relation between self-esteem and general symptoms of anxiety there are no studies to directly compare these findings to. However, given that the partial mediation is observed in the cross-sectional analysis, the reverse could also be possible. Cooley's theory of the looking-glass self, states how one's level of self-esteem is bound to both affect and be affected by one's perceived acceptance from peers and people of significant value.

Thus, perceived peer acceptance could also be influencing symptoms of anxiety through the mediating effect of self-esteem. This possible relation was investigated by Bosacki et al. (2007), and while they did find support for self-esteem to partially mediate the relation between peer relationship difficulties and internalizing problems, their findings were also based on cross-sectional data.

Taken together, the cross-sectional mediation indicated the relationship between self-esteem and symptoms of anxiety to be quite robust. Although the effect of self-esteem on symptoms of anxiety remained significant upon including perceived peer acceptance in the model, the initial effect did decrease significantly, indicating support for a partial mediation through perceived peer acceptance at T7.

In terms of the longitudinal model, perceived peer acceptance at T7 did not mediate the relationship between self-esteem at T7 and symptoms of anxiety at T8. Nevertheless, as symptoms of anxiety at T7 was controlled for in the longitudinal model, majority of the variance in anxiety scores at T8 was mainly accounted for by earlier symptom levels, that is, symptom levels two years prior. Despite no longitudinal mediation, these findings still shed light on the importance of early prevention. By ensuring health promoting actions aimed at reducing the occurrence of anxiety symptoms early in adolescence, one could also ensure the symptom-levels to remain low two years later.

Overall, the study found support for a cross-sectional mediation, in which perceived peer acceptance partially mediated the relationship between self-esteem and symptoms of anxiety. While the findings indicate a relation between the investigated variables, future studies need to investigate whether these relations can be of relevance for other samples (i.e. minority groups, clinical samples), and whether these relations may be of greater importance across a different time frame (i.e. during the transition to higher education).

### **Peer Support as a Moderator**

Hypothesis 5 postulated peer support to work as a moderator in the negative relation between self-esteem and symptoms of anxiety. This negative relation was hypothesized to be stronger for those with worse peer support, than for those with better peer support. That is, the negative relation between self-esteem and symptoms of anxiety was expected to be more apparent in adolescents with low levels of support from peers. Findings from the longitudinal moderation analysis yield support for hypothesis 5 and revealed peer support at T8 to significantly moderate the relationship between self-esteem at T7 and symptoms of anxiety at T8, even when controlling for earlier symptom levels. Taken together, the results of the simple

slopes analysis further illustrated how the longitudinal relationship between self-esteem and symptoms of anxiety only really emerges when levels of peer support are low. That is, the interaction effect is not evident when levels of peer support are average or high. Moreover, the longitudinal moderation analysis further provide support for hypothesis 1 in that levels of self-esteem also significantly predicts symptoms of anxiety over time.

While there is a scarcity in the current field of research addressing the specific role of peer support as a moderator in the relation between self-esteem and symptoms of anxiety, findings from the current study draws attention to the crucial role of this exact interaction. The results of the moderation highlight how the initial negative relation observed between low self-esteem and higher symptoms of anxiety is further enhanced in combination with low peer support. On the other hand, higher levels of peer support do not seem to affect the initial negative relation between self-esteem and symptoms of anxiety. Thus, adolescents with low self-esteem seems to be especially vulnerable for developing more symptoms of anxiety if also subject to low peer support, which is why future interventions should aim at aiding and increasing levels of peer support in these adolescents, so that the development of anxiety symptoms is not enhanced further.

However, as hypothesized, and illustrated in figure 3, low level of peer support is not a risk factor for developing higher symptom levels if one's initial level of self-esteem is already high. These findings provide support for the idea that the higher the level of self-esteem, the less one might be dependent on external validation and support from peers. Findings have shown how adolescents with high levels of self-esteem are generally content with themselves, their overall situation and their relation to others (Abdel-Khalek, 2016; Mackinnon, 2015). Adolescents with low self-esteem, on the contrary, are not happy with themselves, often have negative appraisals towards their overall situation as well as negative views towards others. Hence, one's level of self-esteem can be said to provide the basis for how one meets the world and one's surroundings.

In line with the vulnerability model, the finding related to the contributing effect of earlier levels of self-esteem, on the subsequent development of anxiety symptoms in adolescence, further stress the importance of early prevention by ensuring good and healthy development of self-esteem from early on. Extending the findings from van Tuijl et al. (2014), the current study further illustrates how self-esteem is not only important for the development of social anxiety disorder, but also for the development of more physiological symptoms of anxiety.

Previous research has established good peer support to be an essential aspect of good mental health, while also having a positive impact on anxiety and internalizing problems in general (Bédard et al., 2014; Festa & Ginsburg, 2011; Proctor et al., 2009; Vitaro et al., 2009). Grounded in previous research and the buffer hypothesis, it is interesting how neither mean or high levels of peer support showed a significant interaction with low self-esteem in predicting subsequently lower levels of anxiety symptoms in the current study. Based on the non-significant findings related to higher levels of peer support, the current findings do not support the role of peer support to work as a buffer within a normal developmental aspect such as low levels of self-esteem. Neither do the findings provide support for the direct effect hypothesis which hypothesizes support to be beneficial in times of both high and low levels of stress. Although not significant, the results tended towards what would be expected based on the buffer hypothesis. That is, the lower the level of self-esteem (e.g. more hardship), the greater the impact of better peer support in lowering the development of subsequent anxiety symptoms.

In interpreting the role and impact of peer support, Taylor (2011) has highlighted a twofold distinction to keep in mind. First, there is the perceived availability of support; that is, one's perception of support and assistance to be available if one were to be in need for such in times of hardship. In contrast, support actually received concerns the amount of support one received during a specific time. While the current study does not differentiate between the support perceived and actual received, these aspects and their individual impact on the development of anxiety symptoms remains important and should be investigated more specifically in future research.

Given that few previous studies, if any, have reported similar findings, the significance of these results should be taken into consideration both in future work with interventions aimed at preventing the development and increase of anxiety symptoms in adolescents, as well as when trying to identify pathways to the development of anxiety in adolescence. Moreover, these results extend the findings from Early et al. (2017) and further contributes to the field of anxiety research by illustrating the importance of peer relations, even in aspects of anxiety that are not social by nature. Last, but not least, these findings further highlight the role of self-esteem as a significant contributor in the development of anxiety symptoms both cross-sectionally and longitudinally.

### **Strengths & Limitations**

Regarding the overall strengths and limitations of the current thesis, there are some key aspects to be addressed. One of the major strengths of the current study concerns the large population-based sample of adolescents. Opting for a population-based sample allows for the sampling of a large and diverse group, that, to a greater extent than convenience sampling techniques, reflects the overall population. Thus, the current findings can more easily be generalized to Norwegian adolescents and similar populations. Given that the overall response rate was high on all scales, the obtained findings were also minimally affected by missing data.

Another noteworthy strength concerns the methodological design; In which the proposed mediation was examined both cross-sectionally and longitudinally, while the proposed moderation was examined longitudinally. Given the paucity of longitudinal research available on anxiety, this study further makes a contribution to the overall field of anxiety research by investigating symptoms of anxiety over a two-year period.

Moreover, the current study might be the first to address the interplay between self-esteem and peer relations in combination with a rather physiological measure of anxiety symptoms. This can enable a broader understanding of how the specific interplay between self-esteem and peer relations in adolescence affects the subsequent development of anxiety symptoms.

Despite several strengths, there are also some limitations to be addressed. First, to test a proper mediation model, one should ideally have data from three time points (Baron & Kenny, 1986). Although longitudinal, the current thesis only had data from two time-points available. More specifically, both measures of self-esteem and perceived peer acceptance was from the same timepoint, thereby precluding conclusions about causality and direction of pathways. Nonetheless, one can argue for the proposed relation by turning to the available theoretical and empirical background presented earlier in the thesis.

While available theoretical and empirical background support the proposed relations, one can never exclude the possibility of influences from other third variables. Possible third variables could be related to the support and acceptance actually received and the source of the support and acceptance (e.g. parents, teachers, close friends and the larger peer group). Moreover, factors like the impact of important or adverse life events, alongside previous family history may also play an important role in the development of anxiety symptoms.

A third limitation concerns the generalization of the findings. Although the sample was population-based, the educational level and income of the parents were higher than that of the

general population at the time. Thus, the findings may underestimate the level of the associations, and may not generalize to adolescents in families with lower socioeconomic status. Furthermore, it's important to note that the low, mean and high levels of each variable in the current thesis is relative to the overall levels reported by the sample. Given that this was a community-based sample, and the adolescents generally reported low levels of anxiety symptoms, the findings might not be valid for clinical populations.

As the current study is based on self-report measures only the results might be influenced by the common method bias, which occurs in cases where the method or respondents used is the source of information concerning both the dependent and independent variable (Jakobsen & Jensen, 2015). In terms of using the same respondents on all measures, the common method bias may arise from when specific tendencies within these respondents systematically influences their responses across the different measures in the questionnaire as a whole. A well-known example of such a tendency, which might also have influenced the adolescents' responses in the current study, is the social desirability bias. This bias makes people answer in a way that is socially desirable, accepted and hence makes them look good. The current sample of adolescents showed fairly high levels of self-esteem, reflected through medium to high scores throughout. While this pattern is in accordance with the general tendency of self-esteem scores to be skewed towards high self-esteem, with even the lowest scores being above the mean (Adler & Stewart, 2004), these scores may also illustrate susceptibility to the social desirability bias.

However, it is the individual's subjective and internal aspects that are of importance for the current study in its investigation of the development of anxiety symptoms in adolescents. Particularly, as self-esteem, by definition, is a subjective construct, it cannot validly be assessed objectively (Baumeister, 1998). Moreover, perceived peer acceptance and the experience of rather physiological anxiety symptoms are important from the viewpoint of the individual. As all these variables mainly address internal aspects and judgements, they are difficult to assess from the viewpoint of peers or parents. An alternative could be to carry out direct observations or physiological measures, however, such methods are much more costly, especially if investigating large-scale population-based samples, and might not even capture the subjective and internal states of interest.

Besides the general criticism towards the use of self-report measures, another limitation could be related to the adolescents' relationship with their mother. Considering that the questionnaires were handed from the mother to the adolescent, we do not know how or if the

quality of their relation might have had an impact on the way the adolescents chose to answer, or whether they decided to partake in the study at all. An overview of the number of participants in the TOPP-Study over time revealed a discrepancy in number of mothers included in the study, and number of adolescents. At T7, 421 mothers answered the questionnaires, while only 375 adolescents did the same. At T8, 520 mothers answered the questionnaires, while only 442 adolescents did the same (Mathiesen, Sanson, & Karevold, 2018).

The variation in number of respondents from wave to wave is an obvious limitation in many longitudinal studies. In the current study there were more adolescents at T8 ( $N = 442$ ) than T7 ( $N = 375$ ). This is a result of the TOPP-Study bringing in extra resources to follow-up on the respondents by phone calls to remind them on participating and answering the questionnaires.

Last, but not least, a general limitation often addressed in large-scale longitudinal research concerns the length of the questionnaires. As many variables are to be investigated, the measures for each variable should be as short as possible. This may, in turn, affect the internal consistencies of the scales. However, both the reliability and validity of the scales utilized in the current study were well-supported. Most of the utilized scales are widely used and have good psychometric properties; This has also been supported by subsequent analyses done with data from the TOPP-study (Mathiesen et al., 2018). Moreover, most of the instruments used in the current study showed acceptable to good internal consistency at both time points, further strengthening the reliability of the results obtained here. While the internal consistency for the scale of peer support was somewhat lower, a considerable higher internal consistency could have been obtained by deleting an item. While the deletion would in turn give an  $\alpha$ -value of .86 at T7, and .89 at T8, it would also reduce the variation in the measure and result in only two items to measure peer support. Considering that the original mean inter-item correlations were above the recommended value all items were kept in the scale.

### **Implications and Directions for Future Research**

The results obtained through the current study have important implications for the understanding of the developmental pathways of anxiety symptoms in adolescence. The findings further elucidate the importance of self-esteem and different aspects of peer relations when looking at the development of symptom levels, which again has important scientific and clinical implications. Moreover, the results also bring forward aspects of importance for future research.

First off, the results have scientific implications in showing how aspects of peer relations are of relevance also to the development of anxiety symptoms that are not purely social by nature. This finding adds to the work of (Early et al., 2017) and further implies that researchers investigating different aspects of anxiety in adolescents should keep the importance of peer relations in mind.

Considering that the results are based on a population-based sample, and thus addresses subthreshold levels of anxiety symptoms, the obtained knowledge has the potential to help in the development of future prevention programs. Findings from the current thesis further adds to the available literature on anxiety in showing how there is an interaction between different levels of self-esteem and low levels of peer support. The knowledge gained thus has the potential to help professionals in identifying adolescents that are likely to be at greater risk of developing higher levels of anxiety symptoms by pointing towards adolescents with low levels of self-esteem and poor peer support combined. Moreover, the results highlight the importance of early prevention and intervention, as the longitudinal mediation analysis revealed how symptom levels two years prior had the greatest predicative value for subsequent symptom levels two years later. Thus, by implementing measures to ensure healthy development of self-esteem, and further facilitate for the development of good peer relations in school, this could in turn be highly beneficial in preventing the development of later anxiety symptoms.

Last, but not least, the findings also have implications regarding directions for future research. The current study has provided some promising results, and an indication of relations to be investigated further. The next step should therefore be to investigate the proposed relations with data from three time-points, to better be able to establish the direction of the mediation. Future research should aim at investigating whether self-esteem affects perceived peer acceptance, or whether it might be the other way around. There might also be a prospective relation, whereby self-esteem and peer relations influence each other over time in an upward or downward going spiral, which in turn could influence levels of anxiety symptoms. Regardless, the study has highlighted the importance of taking self-esteem and peer relations into consideration when investigating the development of anxiety symptoms in adolescents.

The difference between what one perceives versus what is actually the case gives reason to further investigate whether perceived acceptance and actual acceptance from peers would contribute differently to the relation between self-esteem and symptoms of anxiety (Taylor, 2011; Taylor et al., 2004). More specifically, future research should therefore investigate



whether different aspects of peer relations (e.g. the quality of peer support and whether this support is perceived or actually received, alongside both self-reported perceived peer acceptance and peer-reported actual acceptance) contributes independently or differently to the relationship between self-esteem and symptoms of anxiety. Future research should also map whether there is a noteworthy discrepancy in the perceived and actual aspects of peer relations, and whether these in turn have different implications for the development of anxiety symptoms. Another possible aspect to investigate concerns whether there could be a difference in the impact of perceived acceptance from different sources. Perceived acceptance from close friends could, for instance, be of greater importance than perceived acceptance from the larger peer group. On the other hand, acceptance from close friends might be regarded as more stable than that of the larger peer group, thereby the uncertainty linked to being acceptance by the larger peer group might be especially apparent in adolescents with low levels of self-esteem.

Given that one cannot rule out the possibility that there might be other third-variables influencing the relation under investigation, future research should further aim at exploring other possible variables that could influence the relationship between self-esteem and symptoms of anxiety. This could, for instance, be related to the experience of adverse life events or possible ways to cope. Moreover, considered that the data material used is from 2008 and 2011, times in which social media had just emerged, future research could also aim at investigating whether and, if so, how it impacts adolescents' level of self-esteem, peer relations and its overall effect on the development of anxiety symptoms.

Considering that the current study was conducted using a community-based sample, with families above the median level of socioeconomic status at the time, future research should aim at investigating whether the proposed relations are also valid for families with lower socioeconomic status and ethnic minority groups. Therefore, replications with more diverse samples are needed in order to increase the external validity of the obtained results.

Taken together, the thesis elucidates the importance of the proposed factors in the development of anxiety symptoms, and thus also the importance of investigating these variables further in future anxiety research.

## Conclusion

The overall purpose of the current thesis was to investigate in what way, and to what extent, self-esteem and different aspects of peer relations predicted symptoms of anxiety in 16– to 19-year-old Norwegian adolescents. The current study highlights the importance of including both overall level of self-esteem alongside different aspects of peer relations also in understanding the development of anxiety symptoms that are not primarily social by nature. Moreover, the study provides new insight into the complex pathways in which perceived peer acceptance and peer support affects the relationship between self-esteem and symptoms of anxiety.

The study adds to previous research by providing empirical evidence for perceived peer acceptance to work as a mediator in the cross-sectional relation between self-esteem and symptoms of anxiety. Moreover, given that earlier symptom levels turned out to be the strongest predictor of subsequent symptom levels two years later, the longitudinal model stresses the importance of early prevention and intervention.

Another unique contribution of the current study concerns the finding of peer support to work as a moderator in the longitudinal relation between self-esteem and symptoms of anxiety. While low level of peer support was found to be a risk factor in the subsequent development of anxiety symptoms, these findings further elucidates how initial high levels of self-esteem may serve as a protective factor in combination with low peer support, thus further emphasizing the importance of healthy self-esteem development from early on.

Being the first study to address the development of rather physiological symptoms of anxiety in adolescents using the current combination of predictors, this work adds to the field of research by showing the interplay between self-esteem and different aspects of peer relations. More specifically the findings highlight the importance of ensuring high levels of self-esteem from early on, as it could serve as a protective factor in the development of anxiety symptoms. Future research should aim at further investigating the direction of the cross-sectional mediation presented here, while also exploring whether different aspects of peer relations, both self-reported and peer-reported, have different impacts on the development of subsequent anxiety symptoms. Regardless, the findings from the current study highlights the importance of early prevention and intervention and thus also provides central knowledge that can inform the development of future prevention programs.

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## Appendix



## Venner, foreldre og fritid

Når folk beskriver forholdet til vennene sine, bruker de ofte setninger som nedenfor. På en skala fra 1-5, hvor enig eller uenig er du i beskrivelsene nedenfor?  
(Sett ett kryss på hver linje)

84	Jeg føler meg nært knyttet til mine venner	Helt enig	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	Helt uenig
85	Vennene mine hører på meningene mine	Helt enig	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	Helt uenig
86	Det hender at jeg føler meg utenfor selv blant venner	Helt enig	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	Helt uenig

Følelser og tanker *fortsetter*

Les gjennom alle utsagnene og kryss av for å vise i hvor stor grad du føler at utsagnet passer for deg den siste uken. Det er ingen svar som er riktige eller gale.  
(Sett ett kryss på hver linje)

		Passer ikke i det hele tatt	Passer til en viss grad, eller noe av tiden	Passer godt, eller en god del av tiden	Passer best, eller mesteparten av tiden
60	Jeg merket at jeg var tørr i munnen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61	Jeg hadde pustevansker (f.eks. pustet altfor fort, eller ble andpusten uten fysisk anstrengelse)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62	Jeg følte meg skjelven (f.eks. følte at bena kom til å gi etter under meg)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63	Jeg opplevde situasjoner som gjorde meg så engstelig at jeg ble utrolig lettet når de var over	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64	Jeg følte at jeg kom til å besvime	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65	Jeg svettet mye (f.eks. i hendene) uten at det var varmt og uten fysisk anstrengelse	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66	Jeg følte meg redd uten å ha særlig grunn til det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67	Jeg hadde problemer med å svelge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68	Jeg var oppmerksom på hjerterytmen min uten at jeg hadde vært i fysisk aktivitet (f.eks. følelse av økt hjerterytme, eller at hjertet hoppet over et slag)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69	Jeg følte at jeg var nær ved å få panikk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70	Jeg var redd for at selv en enkel, triviell oppgave kunne bringe meg ut av fatning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71	Jeg var livredd	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72	Jeg bekymret meg for å komme opp i situasjoner der jeg kunne få panikk og dumme meg ut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73	Jeg skalv ofte (f.eks. på hendene)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74	Jeg unngikk aktiviteter hvor jeg var i sentrum for andres oppmerksomhet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75	Jeg unngikk å gjøre ting eller snakke til andre av redsel for å bli flau	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## HVORDAN HAR DU DET? . . . . .

Nedenfor følger en rekke setninger som i større eller mindre grad beskriver hvordan du er nå for tiden. Vi ber deg om å krysse av for hvor godt beskrivelsene passer på deg

(sett kun et kryss på hver linje).

	0	1	2	3	4
	Stemmer svært dårlig	Stemmer ganske dårlig	Stemmer litt	Stemmer ganske godt	Stemmer veldig godt
Jeg har mange venner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg ønsker at jeg så annerledes ut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg liker ikke den måten jeg lever livet mitt på	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg føler at jevnaldrende godtar meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg ønsker at kroppen min var annerledes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg synes det er ganske vanskelig å få venner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er stort sett fornøyd med meg selv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Andre ungdommer har vanskelig for å like meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg liker utseendet mitt veldig godt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg liker meg selv slik jeg er	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er svært fornøyd med hvordan jeg er	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er ikke fornøyd med utseendet mitt	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er populær blant jevnaldrende	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg synes jeg ser bra ut	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er ofte skuffet over meg selv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>