"Am I Good Enough?"
Social Acceptance Self-Esteem and Physical Appearance Self-Esteem in Early Adolescence.

An Exploration of Associations with Maternal Warmth and Perceived Pubertal Status Among Girls and Boys.

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Abstract

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Background/purpose: Self-esteem is a widely studied topic and has been tied to a variety of important life outcomes, including mental and physical health. The topic is particularly interesting in adolescence due to the large developmental changes relating to self- and identity formation in this period of life, and the potential to prevent low self-esteem and negative life outcomes before they occur or become too settled. However, knowledge on more domain-specific types of self-esteem which may be relevant in efforts to promote positive life outcomes is limited, calling for more research. The current study therefore aimed to extend knowledge on two types of self-esteem: social acceptance self-esteem (SASE) and physical appearance self-esteem (PASE), and three factors which may influence or be related to these: gender, perceived pubertal status and maternal warmth.

Method: Using data from the Norwegian Tracking Opportunities and Problems Study (TOPP), associations between SASE, PASE, perceived pubertal status, maternal warmth and gender were explored in a sample of 600 families, consisting of 12- to 13-year-old youths and their mothers. Structural equation modelling of the latent variables for these phenomena was used to carry out correlation and regression analyses to gain an insight into associations between these factors and to explore group differences.

Results: Perceived pubertal status and maternal warmth were associated with self-esteem levels, but the associations varied between SASE and PASE, girls and boys, and those who did and did not consider themselves as pubescent. The analyses indicated that boys had higher levels of PASE than girls, while levels of SASE were similar for both genders. Youths who reported that they had reached puberty showed lower levels of PASE compared to those who reported that they had not reached puberty, but this pattern was only found among boys when analyzing girls and boys separately. SASE did not vary with perceived pubertal status. Finally, as maternal warmth increased, so did SASE and PASE, but for PASE this was only apparent

among those who had reached puberty, and only among boys within this group when separating between the genders.

Conclusion: The current findings contribute to extending the somewhat limited existing knowledge about social acceptance self-esteem (SASE) and physical appearance self-esteem (PASE) and factors associated with these in early adolescence. As illustrated by the differing findings for SASE and PASE, the current research demonstrates the importance of viewing domain-specific types of self-esteem as separate constructs with separate patterns of associations. Furthermore, it highlights the importance of considering how gender and puberty influence self-esteem levels and the associations between self-esteem and other factors in early adolescence.

Preface

The field of developmental psychology – that is, the ways in which people grow and change throughout their lives and how this affects the people they are and become – was what initially drew me to psychology. Within this vast field, non-pathological development and the role of parents in the lives of their children has especially fascinated me. When deciding what area of psychology to write my final thesis about, the choice was therefore easy. The result is the present exploration of domain-specific self-esteem in early adolescence, and how this is related to puberty and maternal warmth among girls and boys. I hope the work is illuminating and of as much interest to read as the writing of it has been to me.

The thesis is based on data from the Tracking Opportunities and Problems Study (TOPP). I would therefore like to thank the respondents in the TOPP-study, without which this research would not be possible, and the TOPP group for allowing me to use the data in my work.

The writing of this thesis became a longer and more solitary journey than first anticipated. I am therefore all the more grateful to both of my supervisors, Evalill Bølstad and Kristin Gustavson, for their expert guidance throughout the extended writing process. Thank you for your time, endless encouragement, flexibility and support. It has been vital in the completion of this work and has taught me a lot along the way.

Finally, a large thank you to my wonderful friends and family for your love and moral support during the past couple of years. I could not have done without.

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1. Introduction

Adolescence is a time of rapid development and big changes. As children enter this period of transition, they experience significant bodily, psychological, cognitive and social changes that eventually shape them into adults. Identity and the self are central themes when discussing psychological development in adolescence. In his classic theory of psychosocial development, Erikson (1950) named the main conflict in adolescence *Identity vs. Role confusion*, highlighting the importance of such themes among youths. In this period, the self becomes more volatile, self-consciousness and self-awareness increase, and the evaluations of others become of great interest (Harter, 1983). With this, subjective evaluations of the self also become central.

Self-esteem is a phenomenon tapping subjective self-evaluations, which has gained much interest in modern psychology. It has been linked to a wide range of important life outcomes, including mental health and happiness (e.g. Baumeister et al., 2003; Zeigler-Hill, 2011), physical health (e.g. Trzesniewski et al., 2006), academic success (e.g. Di Giunta et al., 2013; Liu et al., 1992), coping with stressors (Lo, 2002) and aggression (Teng et al., 2015). With such important factors being linked to self-esteem, there is great interest in discovering what impacts and determines self-esteem levels, especially early in life when preventive measures can be initiated.

Through the years, several factors have been proposed as correlates and possible predictors of self-esteem. Among these is gender, which has been extensively explored and has revealed a robust effect favoring boys and men (Kling et al., 1999). Furthermore, puberty and it's wide-ranging physical and psychological effects in early adolescence has been proposed as impacting self-esteem in this stage of life (Steiger et al., 2014). Parenting has also been proposed as an important factor, and it's associations with adolescent self-esteem have been explored, yielding interesting results (Pinquart & Gerke, 2019). The relationships between these three factors and self-esteem have been explored separately in a wide range of populations, using a multitude of measures and operationalizations. However, they have rarely been explored in relation to more specific domains of self-esteem such as social acceptance and physical appearance, making knowledge on this topic sparse. Moreover, these factors have not been considered in relation to each other simultaneously, which may mask potentially important and impactful interplays between the factors. The current thesis aims to bridge some of these knowledge gaps through an exploration of the interplay between self-esteem and these three proposed influencing factors: gender, puberty and parenting. More specifically, gender, perceived pubertal status and maternal warmth will be explored in relation to social acceptance

self-esteem (SASE) and physical appearance self-esteem (PASE) in a Norwegian sample of early adolescents and their mothers.

In the following sections self-esteem will first be presented as a phenomenon, including its definition, stability and levels across adolescence, with a specific focus on SASE and PASE. Then, gender, perceived pubertal status and maternal warmth are presented as possible impacting or associated factors of adolescent self-esteem levels, including theory and empirical findings thereof. Gender will also be presented as a possible moderator on the relationship between self-esteem, perceived pubertal status and maternal warmth. Finally, perceived pubertal status is discussed as possibly moderating the relationship between self-esteem and maternal warmth.

2. Theory and Previous Findings

2.1 Self-esteem

Self-esteem can be defined as a negative or positive attitude towards the self, based on self-evaluation and a judgement of self-worth (Coopersmith, 1967; Rosenberg, 1965). These reflections about the self can be explicit (conscious) or implicit (largely unconcious; Buhrmester et al., 2011; Pinquart & Gerke, 2019). The present thesis will explore and discuss explicit self-esteem, which is the most widely measured and researched of the two types (Pinquart & Gerke, 2019).

Self-esteem is a broad, multi-faceted phenomenon. The term covers everything from the general attitude individuals have towards themselves as a human being, to specific evaluations of competency within a given social situation or skill on a given day (Brown & Marshall, 2006). This has led researchers and theorists to explore and define different sub-categories or types of self-esteem, making the phenomenon easier to operationalize and research. In the current thesis, self-esteem is operationalized in line with Susan Harter's work on self-evaluations and the Self-Perception Profile for Adolescents (SPPA; Harter, 1988; Harter, 2012) which she developed in order to measure self-esteem. Harter (1999, 2012) separates between two types of self-esteem: global self-worth and domain-specific self-evaluations, which will be referred to as global and domain-specific self-esteem henceforth. The former refers to a general, overall evaluation of one's own worth as a person, and the latter to evaluations of the competency or adequacy of the self within a specific area of life (Harter, 1999). While Harter believes domain-specific self-esteem to contribute to global self-esteem, she specifies that global self-esteem is not a mere

sum of domain-specific evaluations, but rather a separate evaluation of overall worth (Harter, 2012).

Global self-esteem has gained the most attention in research and literature, and has been extensively explored and tied to important life outcomes. However, researchers have also pointed to the importance of domain-specific self-esteem and the role they play in determining levels of overall self-esteem. For example, Harter (1999) demonstrated that clusters of domain-specific self-esteem impacted global self-esteem both directly and indirectly, leading to the conclusion that global self-esteem may be enhanced through higher levels of self-esteem in specific domains (Boyd & Hrycaiko, 1997; Craft et al., 2003). This highlights the importance of not only considering global self-esteem, but also the more specific domains. From both a practical and preventative perspective, this may be especially important. It is easier to design and carry out specific interventions aimed at increasing domain-specific types of self-esteem, such as addressing perceptions of academic or athletic competence, than designing interventions aimed at increasing much broader, diffuse and generalized feelings about the self. Impacting domain-specific self-esteem may therefore be an important way of impacting global self-esteem, and ultimately impacting important life outcomes. This is especially relevant as previous attempts at directly enhancing global self-esteem have showed low success rates and have been critiqued for this (Baumeister et al., 2003). Despite the critique, knowledge on domain-specific self-esteem is limited relative to the knowledge on global self-esteem, and the role domain-specific self-esteem may play appears under-communicated in the field.

As noted in the introduction, themes relating to identity and the self are especially central in adolescence. Perceptions about the self are more volatile (Harter, 1983) and self-esteem levels are generally lower than later in life (Robins & Trzesniewski, 2005; von Soest et al., 2016). Knowledge on self-esteem and the factors which may impact self-esteem are therefore particularly interesting and important in adolescence. From a prevention perspective, this may also be an essential time to start interventions and protective measures against low self-esteem, as one may be able to make an impact before patterns become more set and rigid.

2.1.1 Social Acceptance Self-Esteem and Physical Appearance Self-Esteem

Two domains of self-esteem seem to be of extra relevance in early adolescence: physical appearance self-esteem (PASE) and social acceptance self-esteem (SASE). PASE is the type of domain-specific self-esteem which has most commonly and consistently been tied to global self-esteem (Harter, 1999, 2000; von Soest et al., 2016), and can be defined as the self-

evaluations people have about their own looks, body and appearance (Harter, 2012). Research on the relationship between PASE and global self-esteem has consistently demonstrated high correlations, indicating that PASE may also be relevant for the important life outcomes associated with global self-esteem. Furthermore, if one wants to impact global self-esteem in adolescence, impacting PASE may be a good place to start.

SASE refers to feelings of peer acceptance and entails the self-evaluations people make about their ability to be liked by peers and make friends (Harter, 1988, 1999). Alongside PASE and other domain-specific types of self-esteem, SASE has been suggested to impact levels of global self-esteem both directly and indirectly through parent and peer support (Craft et al., 2003; Harter, 1999), which also suggests that SASE could be associated with important life outcome measures, such as those presented above. Peer support may be especially strongly related to levels of SASE, given that SASE includes feelings of being liked and accepted by peers. Furthermore, high levels of peer acceptance have been associated with high levels of PASE, and peer acceptance has also been suggested as an antecedent of PASE (Craft et al., 2003). The self-perceptions people have about how socially accepted they are by peers and others may therefore be important by themselves and also be important for PASE.

Furthermore, research indicates that domain-specific self-esteem may also be directly related to life outcomes. Skaalvik and Hagtvet (1990) demonstrated this in their study of Norwegian children and early adolescents. They found that academic self-esteem mediated the relationship between global self-esteem and academic performance, and that academic self-esteem among 12 year-olds predicted academic performance a year later (Skaalvik & Hagtvet, 1990). Based on this finding, one could speculate that SASE and PASE also impacts relevant life outcomes directly, though more research is needed to clarify how and in what ways.

Both SASE and PASE are highly relevant in early adolescence. In this period of life, youths are faced with new social settings, new friends and new responsibilities as they enter middle school. At the same time they slowly start growing more independent of their parents, becoming more preoccupied with their peers and the evaluations of others (Harter, 1983). These new challenges and social arenas may impact the degree to which they feel socially accepted by others, and the increased importance of peer relationships has been suggested to lead to increased self-criticism and changes in self-esteem levels (Bolognini et al., 1996). This may then impact behavior and the social acceptance adolescents receive from others, reinforcing their perceptions. Simultaneously, they face the physical developments associated with puberty which have been suggested to impact self-esteem levels in the area of physical appearance (Bolognini et al., 1996).

In light of all of this and the fact that knowledge on these two types of domain-specific self-esteem is limited, the current thesis will explore SASE and PASE as measured using the first version of the Self-Perception Profile for Adolescents (SPPA; Harter, 1988; Harter, 2012)[1]. Advancing research on these types of self-esteem and associated factors can contribute to knowledge which may ultimately be used to promote better self-esteem levels and more positive life outcomes.

Research on SASE and PASE is fairly limited, and previous knowledge about these phenomena will therefore be supplemented by findings on domain-specific self-esteem in general, as well as the even broader but related phenomenon global self-esteem throughout this thesis. Findings on global self-esteem may give indications about PASE especially, due to the beforementioned strong relation between the two constructs (Harter, 2000).

2.1.2 The Stability of Self-Esteem

The self becomes more volatile in adolescence (Harter, 1983). This may lead to assumptions that self-esteem levels also are more volatile and changeable in this period of life, an assumption which is supported by research on the stability and instability of self-esteem. While global self-esteem generally shows a robust rank-order stability through the life span comparable that found for personality traits (e.g. Orth & Robins, 2014; Robins & Trzesniewski, 2005; Trzesniewski et al., 2003), studies also indicate that the level of stability changes over time, with lower stability earlier in life (Trzesniewski et al., 2003). In line with this, studies of SASE and PASE indicate low to moderate stability in early adolescence (Białecka-Pikul et al., 2019; Cole et al., 2001; Steiger et al., 2014). Taken together, findings suggests that domain-specific self-esteem is somewhat unstable in early adolescence, especially when compared to the stability observed in later stages of life. This is also supported by the interesting finding that self-esteem levels tend to be more unstable among those who have lower levels of self-esteem (Kernis et al., 2000). Research generally indicates lower levels of self-esteem (e.g. Orth & Robins, 2014; Robins & Trzesniewski, 2005), including SASE and PASE (Cole et al., 2001; von Soest et al., 2016) in early adolescence compared to later in life. Thus, SASE and PASE may be especially prone to influence from other external factors in the beginning stages of adolescence. This underscores the relevance and importance of exploring predictors of self-

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[1] Note that the Social Acceptance Subscale of the SPPA was revised and renamed Social Competence in the 2012 revision of the scale. The present thesis thus discusses Social Acceptance as measured by the 1988 version of the SPPA and uses data collected using this scale in 2004. See further discussion on this in section 6.2.2

esteem and of starting interventions and preventative measures at this stage of life, while self-esteem is more malleable.

2.1.3 The Antecedents of Self-Esteem

A central theme in self-esteem research has therefore been the question of what lies behind, or determines self-esteem levels. What are the antecedents of self-esteem? Why do some struggle with low levels of self-esteem, while others feel content or good about themselves? By gaining more knowledge about predictors we may be able to foster higher self-esteem through impacting these related factors, thereby promoting the positive life outcomes associated high self-esteem.

Two broad and complementary theoretical perspectives on the antecedents of self-esteem have emerged: the intrapersonal perspective and the interpersonal perspective (von Soest et al., 2016). The intrapersonal perspective originates from William James' (James, 1890 as cited in von Soest et al., 2016) work on self-esteem, and generally asserts that self-esteem is based on each person's own evaluations of how well they perform in the areas of life that they deem important (Harter, 1999; von Soest et al., 2016). The interpersonal perspective, on the other hand, asserts that self-esteem has a more social nature. Within this perspective, some have understood self-esteem as a somewhat passive internalization of the evaluations and perceptions of others, while others understand it as a more active assessment of own social, cultural or interpersonal standing (Leary, 2006).

These perspectives are typically used to describe global self-esteem and it's antecedents (von Soest et al., 2016). However, these perspectives also can be used to shed light on and hypothesize about factors preceding and impacting domain-specific self-esteem. They will therefore be used as theoretical frameworks in the current thesis.

2.2 Self-esteem and Gender

A factor that has consistently been tied to and explored in relation to self-esteem levels is gender. This factor may be particularly interesting in early adolescence, as there are large hormonal, physical and social developments in this stage of life, which might amplify differences between boys and girls. There have been some reports of null findings (e.g. Orth et al., 2012), but generally, studies report a robust finding of lower levels of global self-esteem among girls and women (e.g. Bolognini et al., 1996; Kling et al., 1999; Orth et al., 2010; Robins

& Trzesniewski, 2005). This observed gender difference has been found across cultures (Bleidorn et al., 2016), emerges in early adolescence and persists through adulthood, until it narrows in old age (Orth et al., 2010; Robins & Trzesniewski, 2005).

Numerous explanations for the observed gender difference in self-esteem have been proposed, including differences in how girls and boys are treated in society, such as boys often being granted more autonomy, and self-confidence being viewed as more positive among boys and men (Steiger et al., 2014). Some have also highlighted the cultural values associated with masculinity (Bariaud and Bourcet, 1994 as cited in Bolognini et al., 1996). Others have proposed differences in maturational changes associated with puberty (Robins & Trzesniewski, 2005). Lastly, many have noted the differences in body image ideals, standards and pressures between men and women, and the cultural emphasis on women's appearance (Bleidorn et al., 2016; Harter, 2000; Robins & Trzesniewski, 2005). But, as noted by Bleidorn et al. (2016), there is still no single, generally accepted, integrated theoretical model on the observed differences.

Gender research on the more specific domains of PASE and SASE is more limited. Furthermore, when considering gender differences in these domains, the trends are not uniform. For PASE, studies consistently report lower levels among girls in line with the trend for global self-esteem (Altıntaş & Aşçi, 2008; Steiger et al., 2014; von Soest et al., 2016), but for SASE only slight or no gender differences have been reported (Bolognini et al., 1996; Cole et al., 2001). von Soest et al. (2016) even found slightly higher SASE among 13-year-old Norwegian girls compared with their male peers. These differences between SASE and PASE can be attributed to several factors. First, it is well documented that PASE is the domain most strongly associated with global self-esteem (Harter, 2000), making the similar findings in these two types of self-esteem unsurprising. It is, however, surprising that SASE has not shown a similar tendency. According to the interpersonal perspective on self-esteem, feelings of competence within social domains are expected to be strongly related to global self-esteem (von Soest et al., 2016). Second, as noted above, many have emphasized the differences in cultural focus and pressure on female appearance and bodies as an explanation for the gender differences in self-esteem levels (e.g. Bleidorn et al., 2016; Harter, 2000). The findings for PASE are very much consistent with these hypotheses. Third, the smaller (or opposite) gender difference in SASE is in line with classical gender stereotypes of girls and women being more socially competent and oriented, and findings on gender are often consistent with such stereotypes (Cole et al., 2001). If girls feel more socially competent, they may also evaluate themselves more positively in social aspects such as SASE, in line with the intrapersonal perspective on self-esteem. This is

supported by the findings by von Soest et al. (2016) who reported higher levels of SASE compared to most other self-esteem domains among Norwegian girls. The only exception was close friendship self-esteem. This was even higher than SASE, but can be interpreted as closely related to SASE as both are related to the ability to make friends when measured using the SPPA, as is done by von Soest et al. (2016) and in the current thesis. Conversely, being more socially oriented could also lead to more importance being attached to social acceptance, which could lead to increased self-criticism and lower SASE (Bolognini et al., 1996). Thus, it is neither empirically nor theoretically clear whether any gender differences in SASE are to be expected and in what direction these would be. More research is needed to clarify this and potentially support the somewhat limited previous findings. The current thesis therefore aims to explore the impact of gender on levels of both SASE and PASE.

2.3 Self-Esteem and Puberty

Puberty, and the hormonal, emotional and physical changes it brings about, plays a key role in the previously mentioned dynamic changes in adolescence, especially in early and mid-adolescence. Such changes are psychologically consequential, as it forces about adaptation to a new appearance and new ways of thinking, and as self-worth within these areas have to be reevaluated and built up anew (Erikson, 1968 as cited in Steiger et al., 2014). Moreover, the two types of self-esteem explored in the current thesis appear especially likely to be impacted by pubertal development, as puberty leads to physical appearance changes (relevant for PASE) and hormonal, affective, cognitive, motivational and social changes (relevant for SASE; Forbes & Dahl, 2010; Mendle et al., 2019). In fact, it has been suggested that decreases in PASE may be related to physical developments being negatively experienced and that the increased importance of peer relationships may lead to more self-criticism and decreases in self-esteem levels among youths (Bolognini et al., 1996).

2.3.1 Definitions and Measurement of Puberty

Puberty or pubertal development can be defined and measured in many ways. There are the specific physical and hormonal changes, as thoroughly mapped by Marshall and Tanner (1969, 1970), and further elaborated upon in the following decades (Dorn & Biro, 2011; Mendle et al., 2019), as well as the associated changes in emotions, cognitions, motivations and behavior (Dorn et al., 2006; Forbes & Dahl, 2010). Then there is the issue of when and how these changes

occur, including the onset of puberty, the timing of pubertal development relative to peers, the synchrony of different pubertal events and the tempo of development (for reviews see Dorn & Biro, 2011; Dorn et al., 2006; Mendle et al., 2019). Of these, timing is the most extensively explored (Mendle, 2014a; Susman & Dorn, 2009).

The current thesis will explore an overarching theme within the field of puberty research: pubertal status. That is, whether or not a youth has reached puberty and how far along in the development they are, independent of their age or timing relative to peers (Mendle et al., 2019). Within the field, there have been discussions about the way in which pubertal status is best measured. The gold standard has long been physical examination and evaluation of the youths' development by clinicians, categorizing them according to the *Tanner stages* based on the aforementioned work by Marshall and Tanner (Dorn & Biro, 2011). However, this is often not possible or practical, and many researchers are reluctant to use this measure due to perceptions that parents and youths are unlikely to agree to such examinations (Dorn et al., 2006). The most common alternative measures of pubertal status are self-reports or parent-reports on the degree of development. These are most often based on questions about specific developments such as menarche and voice change, and/or on a rating of degree of development according to photographs or line drawings of different stages of physical development (Dorn & Biro, 2011; Dorn et al., 2006). While self-reports may not be as objectively accurate as physical examinations, some have pointed to the usefulness of self-reports when it comes to assessing the *perceived* degree of development among youths, adding that this may be a more appropriate measure in some studies (e.g. Dorn et al., 2006). The self-perceptions of pubertal status may be more psychologically revealing than objective assessments of pubertal development, making it interesting and relevant to explore when researching psychological phenomena such as personality, cognitive style, identity, or self-esteem (Mendle, 2014a). It may in fact be a more accurate assessment of the psychological impact of puberty. As pointed out by Mendle (2014a, p. 217): "children are not trained medical professionals, and their self-reports represent their own truths". It is upon these subjective truths that the self-evaluations underlying self-esteem are based, not objective truths that may only be correctly assessed by trained professionals. As long as a youth perceives herself as having or not having reached puberty, her self-evaluations (as well as her actions, cognitions, emotions and so forth) will be based on this perception, even if she technically has or has not entered puberty (Dorn, 2015; Mendle, 2014a).

On the basis of this and the general recommendation to match the measure of pubertal development with the research question (e.g. Dorn & Biro, 2011; Mendle et al., 2019), the current thesis will explore how perceived pubertal status – that is, the youths' own perception

of whether they have or have not reached puberty based on self-reports – may be related to adolescent self-esteem.

2.3.2 Theoretical Perspectives on the Relationship Between Puberty and Self-Esteem

Why and how may perceived pubertal status and self-esteem be related? Both the intrapersonal and interpersonal perspectives on self-esteem can be used as theoretical frameworks for understanding this relationship. As noted earlier, the intrapersonal perspective asserts that self-esteem is the result of people's own evaluations of how well they are doing within different aspects of life, while the interpersonal perspective highlights the social aspects of self-esteem, viewing it as a product of social interactions and the evaluations made by others (von Soest et al., 2016). Note that the interpersonal perspective is included, despite the current thesis exploring perceived pubertal status – a subjective piece of information rarely available to others. However, perceived pubertal status is often impacted by changes which may also be apparent to others, such as physical maturation and changed social patterns. These changes on which the adolescent base their perceptions may also illicit responses from those interacting with the adolescent (Alsaker, 1995). Furthermore, social cognition becomes more complex during early adolescence (Crone & Dahl, 2012) and it has been suggested that young adolescents are more self-conscious and less likely to believe that their significant others hold favorable views of them (Simmons et al., 1973). In line with this, perceived pubertal development may impact how the youths perceive social cues and interactions with others, for example by more easily attributing social cues and comments as relating to their changed appearance or social maturation. This may then impact their self-esteem. However, exactly how and in what direction they are related is not straight-forward.

One may hypothesize that perceived changes in appearance, social interactions, emotions, cognitions and motivations associated with pubertal development impact SASE and PASE, both through an effect on intrapersonal self-evaluations and on interpersonal experiences which then impact self-esteem. For example, the experience of bodily changes associated with puberty, such as the development of body hair, breasts and increased curviness among girls, increased body mass and voice changes among boys, menarche, spermarche, and so forth (Marshall & Tanner, 1969, 1970), may have differing effects on self-esteem. For some youths, the bodily maturation may feel uncomfortable, their bodies feeling 'foreign' or 'strange'. This may then lead to negative self-evaluations of own physical appearance and thus lower PASE, in line with the intrapersonal perspective. Indeed, it has been suggested that

negatively experienced physical development may be related to decreases in PASE (Bolognini et al., 1996) and studies of body image and body satisfaction indicate more negative body image after the onset of puberty among girls (Benjet & Hernandez-Guzman, 2001; O'Dea & Abraham, 1999 as cited in Mendle, 2014b). One may therefore expect PASE to decrease as youths perceive themselves as entering puberty. SASE may also by extension be impacted, as the youths might perceive themselves as less socially attractive due to their changed appearance.

However, such negative associations may not be the case for everyone. Alsaker (1995) point to individual differences in how youths perceive and interpret the changes they go through depending on personality, cognitive style, attributional style, knowledge and how body oriented they are. For some, the changes in appearance may not be bothersome or may instead be perceived as positive, leading to higher levels of PASE. In fact, Benjet and Hernandez-Guzman (2001) found higher levels of body satisfaction among boys after voice change, and Brooks-Gunn and Warren (1988) reported more positive body image among girls at the onset of breast development. A large body of research has also explored the effect of pubertal timing (the time at which youths enter puberty relative to their peers, Mendle, 2014a) on self-esteem, with some studies linking early maturation to lower levels of self-esteem and body satisfaction among girls and higher levels among boys (e.g. Simmons et al., 1979; Tobin-Richards et al., 1983; Williams & Currie, 2000). It is beyond the scope of this study to explore the effects of factors such as personality, cognitive style and pubertal timing on self-esteem, but these factors are mentioned as they may aid in understanding and interpreting potential findings of the current research.

The experienced changes in appearance may also impact self-esteem through social interactions with others which may then impact their views of themselves (Compian et al., 2009), in line with interpersonal perspectives. Youths may feel divergent or different from their peers or perceive others as being more critical or negative towards their appearance, leading to lower levels of PASE. Petersen and Taylor (1980, as cited in Alsaker, 1995) note that the reactions from others may be even more important than the physical changes themselves. This is also in line with the *Sociometer hypothesis* proposed by Leary et al. (1995), which falls within the interpersonal perspective. According to this hypothesis self-esteem is an internal monitor of social belongingness, indicating the degree to which an individual is included or excluded by others (Leary & Baumeister, 2000). Feelings of exclusion will thus lead to lower self-esteem. Through this reasoning, experienced bodily changes may lead to feelings of being different from everyone else, less liked or accepted by others, and thus impact SASE negatively. Conversely, the experienced physical changes may elicit positive reactions from others or make the adolescents feel more physically and socially 'normal', included or liked, leading to higher

levels of self-esteem. Paikoff and Brooks-Gunn (1991) note that girls may initiate more positive social contact with others if the onset of puberty is valued in their peer group. In sum, experiencing the physical changes associated with puberty may impact self-esteem both positively and negatively.

Gender is also an important factor to consider in the understanding of self-esteem and perceived pubertal status, as illustrated by the differing findings for girls and boys cited above. The physical and hormonal developments in puberty differ between the sexes. Moreover, according to a feminist perspective, social and societal views on these developments in girls and boys differ (Vogt Yuan, 2007) which impacts the youths' self-evaluations and self-esteem differently. For example, both girls and boys gain more body mass during puberty, girls become curvier, developing breasts and hips, and boys become larger and gain more muscle mass. However, whereas this change is well matched with the male body ideals of being large and muscular, it contrasts with the widespread female body ideal of thinness (Benjet & Hernandez-Guzman, 2001; Vogt Yuan, 2007). Indeed, studies have found increased concerns about weight among pubertal girls (e.g. Compian et al., 2009). Similarly, the development and presence of body hair is viewed as undesirable among girls and women, but not among men (Toerien & Wilkinson, 2003), and menstruation is taboo and often viewed as bothersome or negative (Chrisler, 2011; Chrisler et al., 1994). Girls may therefore experience pubertal changes more negatively than boys, which could impact their levels of self-esteem, both concerning their physical appearance and social acceptance. This hypothesis is supported by findings that puberty generally seems to decrease psychosocial adjustment among girls while it often improves adjustment among boys (Vogt Yuan, 2007). Conversely, puberty can also have positive effects on girls. For example, Brooks-Gunn and Warren (1988) report an association between breast development and a positive body image for girls, and Garwood and Allen (1979) report a positive association between menarche and several measures of self-concept, including feelings of personal worth, view of body and appearance, and degree of adequacy in social situations.

So far, the potential effect of perceived physical changes during puberty have been discussed, but puberty also involves motivational, emotional and cognitive changes – possibly linked to changes in hormones (Forbes & Dahl, 2010) – which may also impact self-esteem. For example, Forbes and Dahl (2010) highlight an increased social appetite and increasing motivation to gain friends and eventually romantic partners. These changes may not be as apparent to the youths as the physical developments, and thus may not impact perceived pubertal status as strongly as physical maturation. However, as studies of agreement between

physical evaluations of puberty and self-report measures generally indicate at least moderate correlations (Dorn & Biro, 2011), one may expect most adolescents who perceive themselves as pubescent to also be impacted by these factors, and for this to influence self-esteem levels through both interpersonal and intrapersonal mechanisms. For example, the increased social appetite may lead to more frequent and positive social interactions (Paikoff & Brooks-Gunn, 1991), inclusion in new social settings or experiences of being more socially competent than before, leading to higher levels of SASE. PASE may also be positively impacted, for example if social inclusion is interpreted as a sign that their appearance is normal, correct or attractive. On the other hand, the new social developments and changes in puberty may be difficult and confusing for some, potentially leading to social exclusion and feelings of loneliness. It could also play a role in causing symptoms of psychopathology, such as depression or anxiety (Mendle, 2014b). This may then lead to lower levels of self-esteem, both through negative self-evaluations and internalizations of the perceived evaluations of others. Moreover, the emotional and cognitive changes may influence the way social interactions are perceived, leading to more negative interpretations than when they were younger (Simmons et al., 1973). A large body of research has linked pubertal development with depression among adolescents (e.g. Negriff & Susman, 2011) and some have also found increased social uncertainty among pubertal girls (Oldehinkel et al., 2011), which may indicate that pubescent youths are more at risk of negative interpretations of others and the world around them, compared to non-pubescent youths.

The perspectives presented so far have suggested that perceived pubertal development may impact levels of adolescent self-esteem. However, one cannot exclude the possibility that self-esteem may impact perceived pubertal status. There are two reasons why this may be the case. First, perceived pubertal status is a subjective phenomenon and may therefore be prone to influence from other psychological factors such as self-esteem levels. One may hypothesize, for example, that youths with lower self-esteem are more self-aware and scrutinize their own bodies more than those with high levels, which may lead to earlier detection of bodily changes (or imagined bodily changes) and thus a higher likelihood that they perceive themselves as pubescent. In fact, Chen et al. (1998) found that pubertal changes increased self-awareness among early adolescents. Moreover, in cases where being pubescent is viewed as positive (in certain peer groups, or among boys generally), those with high self-esteem may be more likely to perceive themselves as pubescent, whereas those with lower self-esteem are more self-critical and may believe they have not yet reached this socially desirable developmental stage yet.

Second, even the biological aspects of puberty may be impacted by social and environmental factors. Research has found indications of earlier onset puberty among youths

who grow up in aversive environments as well as faster and earlier pubertal development among youths who receive absent or low warmth parenting (Ellis, 2004; Webster et al., 2014). In light of this, it is reasonable to also consider whether a psychological factor such as self-esteem impacts perceived pubertal status, instead of assuming that puberty is a biological process that cannot be impacted by external psychological factors.

2.3.3 Previous Findings on the Relationship Between Perceived Pubertal Status and Self-Esteem

Theoretical perspectives thus indicate relationships between perceived pubertal status, SASE and PASE. Research on these relationships, however, is limited and findings are mixed. In one study, Huerta and Brizuela-Gamiño (2002) report a decrease in self-esteem among girls as they progress through the Tanner stages of puberty. A study of adolescent female figure skaters, on the other hand, found lower levels of global self-esteem and PASE among the girls who had not reached menarche, indicating an opposite effect (Monsma et al., 2006). Beyond this, most studies report null-findings. Brack et al. (1988), found no association between being/not being in puberty and self-esteem levels, and Altintaş and Aşçi (2008) report no differences in PASE related to pubertal status. Similarly, Craft et al. (2003) did not find an association between menarcheal status and PASE among girls. Benjet and Hernandez-Guzman (2001) did not find statistically significant effects of pubertal status on self-esteem levels among Mexican girls and boys. They did, however, report that an interaction between gender and pubertal status on self-esteem levels was nearly significant ($p = .06$), with girls' self-esteem marginally decreasing and boys' levels marginally increasing more than a year after the onset of puberty. Moreover, they report a significant interaction between pubertal status and gender on body image, which may be relevant for PASE as it was measured using items from a body-self-esteem questionnaire. The results indicate that there were no gender differences before puberty onset, but that girls had a more negative body image than boys after onset. They also report a marginal negative effect of menarche on body image among girls, in line with the feminist perspective on pubertal development.

In summary, the relationship between perceived pubertal status and self-esteem is complex. It can be understood in light of both intrapersonal and interpersonal perspectives on self-esteem, and many factors, including individual differences, social context, perceived pubertal timing and gender may impact the way in which these two phenomena are related. Furthermore, the directionality of the relationship is not clear. The limited research shows

mixed results, but most indicate no association. However, studies have used varying measures of both self-esteem and puberty, some using self-reports of puberty (indicating perceived pubertal status) and others using more biologically based assessments. Furthermore, some explored both genders while others only studied girls. These methodological differences may explain the differing findings and make it difficult to conclude about the relationship between perceived pubertal status and self-esteem. Finally, while some studies have explored PASE, knowledge on SASE and gender effects are completely lacking. Thus, the field is in need of more research.

The current thesis will attempt to bridge some of these knowledge gaps by exploring associations between perceived pubertal status and SASE and PASE among 12- to 13-year-old boys and girls.

2.4 Self-Esteem and Maternal Warmth

In line with the interpersonal perspective that self-esteem stems from social interactions with others, parenting has also been proposed as a possible antecedent of adolescent self-esteem.

In adolescence, children go from the total dependency on their parents or primary caregivers to breaking away, becoming more independent and more preoccupied with the opinions and views of their peers (Harter, 1983). It is also a stormy period of life, often marked by deteriorating relationships between parents and youths (e.g. Conger & Ge, 1999; Steinberg, 1987). In accordance with the interpersonal perspective on self-esteem, one would thus expect adolescent's self-esteem to become less influenced by the evaluations of parents. While this may be the case, adolescents still rely on their parents in many aspects of life, both practically and emotionally, and parents still remain the most influential relations for most youths (Collins et al., 2000). This is especially true in early adolescence, as the process of becoming more independent is just beginning. Exploring to what extent and in what ways parents' interactions with their adolescent youths are associated with the youths' self-esteem in this transitional period of life is therefore important for our understanding of the antecedents and correlates of self-esteem. As described above, this knowledge may ultimately contribute to preventative interventions aimed at reducing low self-esteem and associated negative life outcomes. Note that in the current thesis the term 'parents' may also refer to adoptive parents, step parents and other primary caregivers.

In order to study the effects of parenting, researchers have sought to identify stable, measurable differences between parents (Maccoby & Martin, 1983), such as differences in

discipline, praise, involvement and emotional responses. Instead of studying specific parenting behaviors, early socialization researchers started using the broader term 'parenting styles' in their research on the effects of parenting. Parenting styles can be defined as the emotional climate in which children are raised by their parents (Spera, 2005), and have been widely explored and researched. Several dimensions along which parenting styles could be organized have been proposed through the years, most often reflecting two dimensions: responsiveness/warmth, and demandingness/control (Baumrind, 1966; Maccoby & Martin, 1983; Spera, 2005).

Of these two dimensions, warmth may be especially relevant for self-esteem in early adolescence. Parental warmth can be defined as the degree of acceptance, approval, interest, affection (both physical and non-physical), praise, support, emotional availability and love expressed by parents toward their children (MacDonald, 1992; Rohner, 1994), whereas control can be defined as degree of supervision, boundary-setting, (over)protection, demandingness and intrusion (Boudreault-Bouchard et al., 2013). In accordance with the interpersonal perspective of self-esteem one would expect warmth to be more strongly associated with adolescent self-esteem, as it is more directly concerned with the approval parents show their children. The amount and type of warmth parents show gives the adolescent direct information about their parents' evaluations about them. The current thesis will therefore focus on warmth, more specifically maternal warmth, and its associations with adolescent self-esteem.

The focus on maternal warmth specifically, is for two reasons. First, the current study only had access to data from youths and their mothers, as fathers were not included in the data collection of the fifth wave of the longitudinal TOPP-Study (Tracking Opportunities and Problems Study), on which the present research is based. Second, from a theoretical perspective, mothers may be expected to influence their children to a somewhat greater degree than fathers due to them often being more at home and thus having more contact with the youths than the fathers have. Even in highly egalitarian countries such as Norway, mothers more often work part-time (Statistics Norway, 2022), more often have sole custody (Statistics Norway, 2021) and have been found to still have a greater social responsibility for their offspring (Smeby, 2017). A recent review of gender differences in parenting, also found that mothers often were perceived as more warm and accepting (but also more controlling) than fathers (Yaffe, 2020). In support of the possible stronger influence of mothers, a study in Hong Kong indicated that maternal warmth was more strongly related to self-esteem levels among youths, compared to paternal warmth (Leung Ling et al., 2020).

However, both theoretical views and research often focus on parental warmth, rarely distinguishing between fathers and mothers. In the following sections, knowledge on maternal warmth will therefore be supplemented by the theoretical perspectives and research carried out on parental warmth in general.

2.4.1 Theoretical Perspectives on the Relationship Between Warmth and Self-Esteem

As mentioned above, the interpersonal perspective on self-esteem offers a framework for understanding why self-esteem and maternal warmth would be associated, as it postulates that self-esteem results from or is influenced by the evaluations of others (von Soest et al., 2016). More specifically, classical theories within this perspective, such as Mead's (1934) theory of *The social self*, and Cooley's (1902) *Looking-glass self,* propose that people's self-conceptions and self-appraisals are based on internalizations of the judgement, feedback and views of significant others, both real and imagined (Lundgren, 2004). As mothers (still) are very significant figures in the lives of youths, adolescent self-esteem is expected to be impacted by their feedback, with higher levels of warmth increasing self-esteem. A more recent theory within the interpersonal perspective, the *Sociometer Hypothesis* (Leary et al., 1995), views self-esteem as monitor of social belongingness. According to this hypothesis, youths will experience lower levels of self-esteem if they feel excluded by others (Leary & Baumeister, 2000). Consistent with this, lack of warmth from mothers, which could serve as a sign of non-approval and exclusion, should lead to a decrease in adolescent self-esteem, whereas more warmth should promote higher self-esteem. This may impact levels of SASE in particular, as this type of self-esteem is concerned with feelings of being socially accepted by peers. If adolescents have an experience of not being accepted by their closest relations (parents) they may more easily believe that peers are unlikely to accept them too. In a similar vein, classical attachment theory suggests that consistent experiences of warm and supportive interactions with parents leads to the development of an internal working model in which the youth views themselves as worthy of love and acceptance from others, facilitating self-worth (Harris et al., 2015). The *Interpersonal Acceptance-Rejection Theory* (IPARTheory, formerly known as PARTheory; Rohner, 1975, 2014)*,* postulates that people have a phylogenetically based need for warmth and approval from their closest relations, and a sub-theory asserts that children will develop a specific set of negative personality dispositions, including lower self-esteem, if their needs for warmth and approval are not met. Conversely, high warmth and approval should lead to the development of high self-esteem (Khaleque, 2013). Yeung et al. (2016) suggest a theoretical

connection with a similar outcome prediction, proposing that high levels of parental warmth are associated with more positive approval of the children, which then promotes positive self-approval among these youths, eventually resulting in higher levels of self-esteem.

Kerr et al. (2012) explored relationships between parenting styles and adjustment among adolescents and highlights the importance of considering the effect of adolescents on their parents, not just the effect of parenting on the adolescents. They propose that such effects may be bidirectional or transactional. In their research they found that poor adjustment, including low self-esteem, predicted a movement away from authoritative parenting (high warmth, high control) and toward a neglectful style (low warmth, low control) (Kerr et al., 2012). They suggest that parents find it easier to show authoritative parenting towards well-adjusted children (including those with higher self-esteem). In line with this it could be hypothesized that high adolescent self-esteem will promote higher levels of parental warmth. Mothers may feel the need to show more warmth towards their adolescent youths if they perceive them as less self-confident, perhaps in an attempt to enhance their self-esteem.

Taken together, theories within the interpersonal perspective strongly predict that as warmth increases, so will self-esteem levels, most often with an underlying assumption that this is due to parental warmth influencing self-esteem – not vice versa. This thus supports the proposition that maternal warmth is an antecedent of adolescent self-esteem. However, it is important to also consider whether self-esteem instead impacts maternal warmth. It should also be noted that while the theories above have been formulated with global self-esteem in mind, they can be just as relevant for understanding associations with the more specific domains of SASE and PASE, as general feelings of acceptance and self-worth may spread to specific feelings about own appearance and acceptance from peers.

2.4.2 Previous Findings on the Relationship Between Warmth and Self-Esteem

Research on the association between self-esteem and warmth supports the theories presented above. In one of the early works on the antecedents of self-esteem, Coopersmith (1967) found that mothers of boys with high self-esteem were more affectionate, accepting and involved than mothers of boys with low self-esteem. Newer research supports this. In an extensive meta-analysis of associations between parenting styles and self-esteem among children and adolescents, Pinquart and Gerke (2019) report small to moderate positive associations between global self-esteem and authoritative parenting, and slight positive associations with permissive parenting. Both types of parenting are defined by high parental warmth. Furthermore, the meta-

analysis revealed negative associations between global self-esteem and authoritarian and neglectful parenting, which are both low in parental warmth. Several other studies report positive associations and correlations (typically ranging between .20 and .40) between global self-esteem and varying measures of parental warmth (e.g. Escribano et al., 2013; Harris et al., 2015; Park et al., 2021; Ruiz et al., 2002; von Soest et al., 2016). Notably, Escribano et al. (2013) found that parental involvement and positive parenting as measured using the Alabama Parenting Questionnaire (APQ; Frick, 1991) was associated with higher self-esteem in Spanish children aged 8-12, a finding especially relevant to this thesis due to the use of corresponding instrument.

Studies exploring mothers report similar results. Positive associations have been found between adolescent self-esteem levels and maternal support (Growe, 1980; Plunkett et al., 2007), and Ruiz et al. (2002) found that maternal warmth predicted self-esteem among American youths. They also found negative associations between self-esteem levels and rejection by mothers. However, both of these effects were only significant for youth reports on warmth and rejection, not maternal reports. A study of youths in Hong Kong showed a correlation of .45 between self-esteem and youth reported maternal warmth (Leung Ling et al., 2020) and a meta-analysis by Khaleque (2013) found an average weighted effect size of .26 between youth reports on maternal warmth and youth self-esteem.

As noted earlier, studies on the association between domain-specific self-esteem and warmth, especially maternal warmth, are lacking. However, von Soest et al. (2016) did explore the development of domain-specific self-esteem as measured by the SPPA, including SASE and PASE in a Norwegian sample. They also tested whether youth-reported parental care impacted levels of self-esteem at age 13, and report standardized regression coefficients of .28 and .26 between parental care and SASE and PASE, accordingly. This indicates a pattern similar to that found for global self-esteem. Beyond this one study which explored parental care and not warmth per se, knowledge on warmth, SASE and PASE is lacking, calling for more research. The current study aims to contribute to this.

While the present study presents parental (maternal) warmth as a possible antecedent to adolescent self-esteem, the possibility that self-esteem levels instead impact maternal warmth cannot be excluded. Interestingly, a meta-analysis reviewing cross-lagged analyses of self-esteem and parental warmth indeed indicates a slight directional effect of self-esteem on parental warmth, but not vice versa (Pinquart & Gerke, 2019). This lends support to the hypothesis put forth by Kerr et al. (2012), which was also supported by their own finding that

low self-esteem among adolescents predicted a movement from authoritarian (high warmth, high control) to neglectful parenting (low warmth, low control).

The present research cannot draw any conclusions about the directionality of the relationship between self-esteem and parental warmth. However, it aims to contribute to the field in two ways. First, by indicating whether there are any correlations between maternal warmth and the two domain specific types of self-esteem (on which there is very limited knowledge), and second, by exploring whether this relationship changes according to two other factors: gender and perceived pubertal status. Knowledge about the impact of such factors may give indications about groups in which the association is larger and thus in which it is relevant to check more thoroughly for directional effects.

As pointed out by Plunkett et al. (2007), there is a general lack of studies exploring whether adolescent gender affects parental warmth and its association with self-esteem. In their research, they found significant associations between maternal support and self-esteem levels among both girls and boys, but a slightly larger association for girls. However, the authors do not report whether this slight difference is statistically significant (Plunkett et al., 2007). In a study of Asian-American adolescents, Park et al. (2021) report no moderating effect of gender on the association. Khaleque (2013) write that the positive association between parental warmth and children's self-esteem appears to be robust across gender, but were not able to explore this in their meta-analysis due to most studies not reporting separate measures for girls and boys. Furthermore, the claim is made about children's self-esteem, not adolescent. Knowledge on the effect of gender generally indicate no gender differences on the association between parental warmth and youths' self-esteem, but the literature is insufficient, unclear in childhood and lacking in adolescence. The need for more research on this topic is clear, underscoring the relevance of the present study.

Knowledge on the effect of perceived pubertal status on the relationship between self-esteem and parental warmth is, to the extent of my knowledge, nonexistent. However, pubertal maturation has been linked with self-esteem levels as presented previously, and research has also indicated a decrease in the level of parental warmth as adolescents go through puberty (Lansford et al., 2021). One may therefore expect that puberty, including perceived pubertal status, will impact how parental warmth and self-esteem are related, but the direction is unclear.

Taken together, parental warmth appears to be positively associated with adolescent self-esteem, in line with interpersonal theoretical perspectives, among others. Knowledge on associations with SASE and PASE, and on the effect of gender and perceived pubertal status on these associations however, is limited, unclear or non-existent, and in need of further

investigation. The current research will therefore explore this, extending knowledge on the intricacies of the relationship between maternal warmth and youths' self-esteem, that may ultimately be used to promote self-esteem levels among adolescents.

3. Research Questions, Hypotheses and the Current Study

In summary, self-esteem is a widely explored topic that has been linked to important life outcomes. Findings consistently indicate lower levels of global self-esteem among girls than boys in early adolescence, a trend that so far has been found for PASE, but not for SASE.

Research suggest that self-esteem is more volatile in early adolescence compared to later stages in life, which indicates that self-esteem is more prone to the influence of other factors in life- stage. Puberty is a suggested predictor of adolescent self-esteem, and perceived pubertal development may be particularly relevant (Alsaker, 1995). Studies are very limited, often using more objective measures of puberty, and results are mixed. Knowledge on the relationship between perceived pubertal status, SASE and PASE, and whether these relationships differ for girls and boys is lacking, though pubertal maturation is generally believed to impact girls more negatively than boys. Furthermore, the effect of self-esteem on puberty is rarely considered. More research is needed to clarify the relationship between perceived pubertal status and the effect of gender on this.

Finally, parenting, including maternal warmth, has also been suggested as an antecedent of adolescent self-esteem. Studies generally indicate a positive association between self-esteem and maternal warmth. There is, however, insufficient knowledge on relations with SASE and PASE. Finally, the effects of gender and puberty on these associations are lacking or non-existent, calling for further exploration.

The current research aims to bridge some of the knowledge gaps on the relationships between adolescent domain-specific self-esteem, perceived pubertal development and maternal warmth. This will be explored in a sample of Norwegian 12- to 13-year-olds and their mothers. Research questions and hypotheses concerning the associations between the factors and the effect of gender and perceived pubertal status are presented below, along with potential hypotheses. Figure 1 illustrates potential causal paths between the variables based on the theoretical perspectives and previous research presented in the sections above.

Research question 1: Does gender impact adolescent levels of SASE and PASE?
Due to inconsistent findings on SASE, the effect of gender on SASE will be explored with no hypothesis. For PASE, girls are expected to report lower levels compared to boys.

Research question 2: What is the relationship between SASE, PASE and perceived pubertal status? Does gender impact these relationships?

Due to limited and mixed previous findings this will be explored without hypotheses about directions, strengths and differences in associations with SASE and PASE. The effect of gender on the strength of the associations will also be explored without an hypothesis.

Research question 3: What is the relationship between SASE, PASE and maternal warmth? Do gender and perceived pubertal status impact these relationships?

Hypotheses:

    a) There are positive associations between SASE/PASE and maternal warmth. When one increases, so does the other.

    b) The patterns of associations will be similar for both SASE and PASE.

    c) There will be no effect of gender on the associations.

The effect of perceived pubertal status on the associations will be explored without an hypothesis due to a lack of previous findings.

Figure 1

Model of Potential Causal Paths
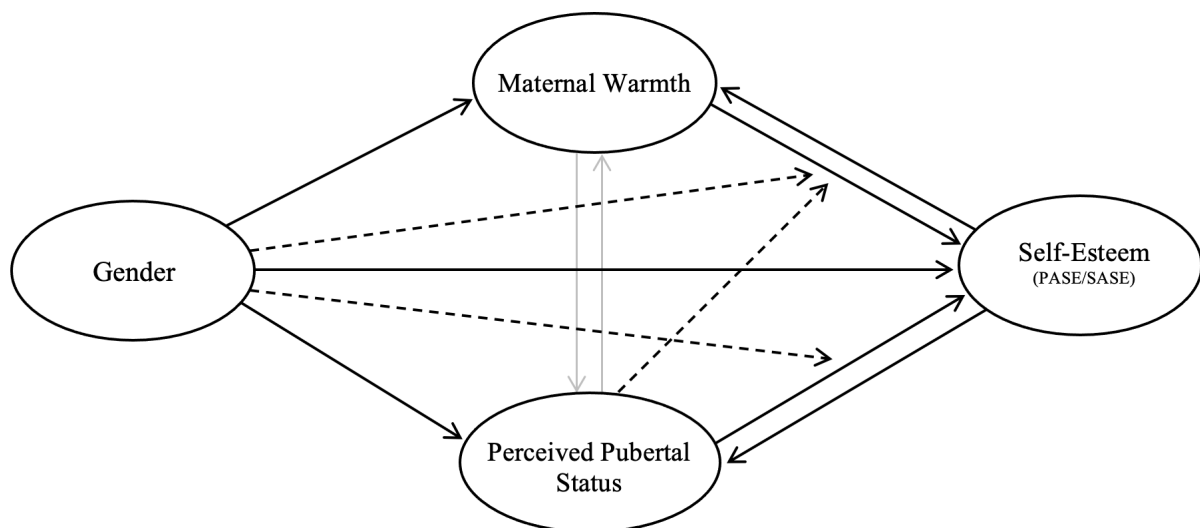
Note. Whole lines represent assumed causal paths. Dotted lines represent assumed moderating effects. Grey lines represent assumed causal associations beyond the scope of the current thesis that will not be explored. In addition to direct associations between the variables, unmeasured confounders may also contribute to the observed associations.

4. Methods

4.1 The TOPP Study

The current study uses data from the Norwegian Tracking Opportunities and Problems Study (TOPP; *Trivsel og oppvekst i barndom og ungdomstid* in Norwegian). The TOPP study is a prospective, longitudinal and community-based study aimed at exploring the mental health and well-being of children and their families.

4.1.1 Procedure and Participants

The study started in 1993 and has collected data from and about the children, their mothers and eventually their fathers in a total of eight waves. The children were 18 months in the first wave (t1), and approx. 18.5 years of age in the last wave (t8) in 2011.

The TOPP study recruited participants from 19 health care centers across Eastern Norway, covering towns, densely populated, rural, coastal and inland areas. All families bringing their children to the routine 18-month vaccination during 1993 were asked to participate. Of 1081 eligible participants, 939 (87%) agreed to participate. The only inclusion criterion was Norwegian language abilities, and only 2% were excluded due to this.

More than 95% of families in Norway routinely attend the 8-12 check-ups of their children in the first four years of life (Mathiesen et al., 2018). Additionally, comparisons of participants vs. non-participants showed no significant differences in maternal age, marital status, length of education, paid work outside the home, number of children, child health and estimated number of family stressors (Mathiesen et al., 2018; Mathiesen & Tambs, 1999). Taken together, this indicates that the sample was reasonably representative of the families using public health care centers in Norway in 1993.

The data was collected through questionnaires which were constructed using items from already established scales and items especially developed for the TOPP study. The questionnaires were handed out by the nurses at the health care centers in the first three waves, and were sent through mail to the mothers and returned in sealed envelopes in the waves after this.

In the t5 wave, on which the current research is based, questionnaire reports were collected from both the mothers and the adolescents. The adolescents were sent their own questionnaires with their own pre-paid envelope for return. In cases with twins, mothers reported separately on their youths, but only once on questions about themselves.

4.1.2 Ethics

The TOPP study followed routine ethical standards and is approved by both the Regional Ethical Committee (*Regional etisk komité*, REK #10831) and the Norwegian Data Protection Authority (*Datatilsynet*). All participants answering questionnaires gave informed consent to participate, including parents on behalf of their children, and were informed on their right to withdraw from the study at any time. After each wave, the participants received a general report on the main findings. The data used in this thesis have been anonymized and the information presented in the thesis cannot be traced back to the participants. Password encrypted USB-drives have been used for the storage of data and analyses.

4.2 Current Sample

The present study had access to wave 5 (t5) of the TOPP study and uses self-report data collected from the adolescents and their mothers in this wave. The fathers were not included in t5 and could thus not be included in the current research. The data were collected in 2004 when the adolescents were between 12 and 13 years old.

The mothers and their youths were given the same ID-number in the study in order for reports from members of the same families to be easily identified and compared. However, there were several cases where reports were missing from either the mother or the youth. In our final sample, we therefore had reports from a total of 600 families, made up of reports from 545 youths and 593 mothers[2].

4.2.1 Demographics

The final sample consisted of 53.7% girls and 46.3% boys. This also included cases where the mothers reported on their adolescents but the adolescents did not respond themselves. When considering only the self-reports of the adolescents, there were 54.7% girls and 45.3% boys, showing a slightly lower percentage of boys compared to the total sample.

The following demographics were only reported on by mothers. Maternal age at t5 ranged between 30 and 55 in with an average age of 41. Of the mothers, 73,9% had completed high-school, with a total of 50.6% having attended or completed higher education. Furthermore,

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[2] Note that these numbers differ from the general participation reported in section 4.2.1. This is due to some participants being excluded in the current t5 sample due to non-response on relevant items, as well as mothers of twins being included in the participation reports of the final sample but not in the numbers reported in section 4.2.1.

83.7% were working part-time or full-time and 95.1% reported that they were coping or coping well economically. Hence, the sample seems to have somewhat higher socioeconomic status than the general Norwegian population in 2004 (Statistics Norway, 2006), especially concerning education, as expected from the attrition analyses reported in the next section.

4.2.2 Attrition and Generalizability

In longitudinal studies, there is usually some attrition over time. This is also the case in the TOPP study. Of the 939 mothers who participated in t1, 566 (60%) of their children completed the self-report questionnaire at t5. The mothers showed similar attrition, with 587 (64%) attending t5. Note that twins are included in the number of adolescents, but not in the number of mothers. At t1, there were 13 mothers with twins.

An analysis of attrition from t1 to t5 found that lower maternal education predicted drop out, but found no other predictors. There were no significant differences in family adversities, maternal distress, social support and child temperament between the families who dropped out and those who continued to attend (Karevold et al., 2009). Furthermore, correlations between several different variables at the first wave (e.g. between symptoms of anxiety, depression and relationship quality) were similar among those who dropped out and those who later stayed in the study (Gustavson et al., 2012). Monte Carlo simulations also showed that association estimates generally were more robust against selective attrition bias than were estimates of means and frequencies (Gustavson et al., 2012). Based on this, it has been concluded that findings on associations between predictors and outcomes could be generalized to the Norwegian population, but with some caution (Mathiesen et al., 2018).

4.3 Measures

4.3.1 Self-Esteem

Social acceptance self-esteem (SASE) and physical appearance self-esteem (PASE) were measured using items based on the Self-Perception Profile for Adolescents (SPPA), developed by Harter (1988). The SPPA consists of nine subscales, aimed at measuring domain-specific self-evaluations as well as global self-worth, and is a widely used measure of self-esteem. In

the TOPP study, three of the five items in the Social Acceptance[3] subscale of the SPPA, and all five items in the Physical Appearance subscale were included (see Appendix A). The items asked adolescents about their feelings of being liked and being able to make friends (SASE), as well as their feelings towards their own looks and bodies (PASE). The SPPA was originally developed with a format where each item consisted of two statements, such as: "Some teenagers really like their looks BUT other teenagers wish they looked different" (Harter, 2012, p. 8). Respondents had to decide which statement they identified with the most and to what degree. In the TOPP-study this was substituted with a single-statement format, such as "I wish my body was different". The modification of the item format is in line with the work of Wichstrøm (1995), who found that the single statement format had better reliability and validity than the original format. The statements were translated to Norwegian, back translated, and the translation was discussed until translators were in agreement. The adolescents rated the degree to which the statements were true on Likert-scales of 1 to 5 (SASE) and 1 to 4 (PASE).

The reliability and validity of the SPPA have been replicated several times. Harter (1988) reported coefficient alpha values ranging between .81 and .90 for Social Acceptance, and between .84 and .89 for Physical Appearance, indicating high internal consistency. Wichstrøm (1995) reported good construct- and factorial validity of the SPPA in a Norwegian sample when using the revised item format. In his sample, he found a coefficient alpha value of .76 for Social Acceptance and .87 for Physical Appearance.

The factor structure and internal reliability of both subscales were examined in the current sample. See procedure in section 4.4.1 and results in section 5.1.

4.3.2 Maternal Warmth

In this study maternal warmth was measured using items from the Alabama Parenting Questionnaire (APQ; Frick, 1991), which were administered to the mothers. The APQ measures five dimensions of parenting (in some cases six, depending on definitions), including Positive Parenting which was used as a measure of warmth in the current research. The dimensions are measured using statements such as "You praise your child if he/she behaves well", and the respondents rate this on a frequency-scale from 1 ("Never") to 5 ("Always"). Five of the six items in the Positive Parenting dimension were used in the TOPP study (see Appendix B), and

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[3] In the 2012 revision of the SPPA, this subscale was modified and renamed "Social Competence". As the data collection for the current thesis was carried out in 2004, the 1988 version of the SPPA was used. See further discussion on this in section 6.2.

the items were translated into Norwegian and back translated as described in the previous section. The items ask parents, in this case mothers, about their explicit praise and displays of affection in response to their children's positive behavior. Four of the mentioned items were used in the final analyses (see section 5.1).

The validity and reliability of the APQ has been replicated by several researchers. Shelton et al. (1996) found coefficient alpha values ranging between .79 and .91 for the Positive Parenting dimension when administered to parents in different samples. Dadds et al. (2003) reported an alpha of .77, indicating acceptable levels of internal consistency. They also report god levels of test-retest reliability across a two-week period. As for validity, acceptable to good criterion-, construct- (divergent and convergent) and external validity of the APQ for parents was found. The findings do, however, also show that Positive Parenting overlaps with the Involvement-dimension in the APQ, indicating that they measure a broader construct (Dadds et al., 2003; Shelton et al., 1996). In the current study, the Positive Parenting dimension was factor analyzed and internal reliability was examined. See section 4.4.1 and 5.1.

4.3.3 Perceived Pubertal Status

Perceived pubertal status was operationalized as whether or not the adolescents perceived themselves as having entered puberty. This was measured using a single question asking: "Have you reached puberty?" with response options: "Yes", "No", and "I don't know". The question was preceded by an introduction stating that the adolescent was at an age where the body starts changing. The adolescents who answered "I don't know" were treated as missing and excluded from the final analyses of perceived pubertal status, making the measure dichotomous.

4.3.4 Gender

Gender was measured by asking the adolescents: "Are you a girl or a boy?" with response options "Girl" and "Boy". Similarly, mothers were asked what gender their child had, with the same response options as the adolescents. Thus, there was no non-binary or non-response option available. See further discussion on this in section 6.2. The distribution of girls and boys is reported above, in section 4.2.1.

4.4 Statistical Analyses

Descriptives of the data set (means and frequencies) were calculated using the statistical program IBM SPSS Statistics, version 27.0 (IBM Corp., 2020). All preliminary and main analyses, as well as analyses of gender differences of the variables, were carried out using the statistical program R, version 4.1.0 (R Core Team, 2021). Statistical power analyses were carried out using G*Power (Faul et al., 2009). Questionnaire items defining SASE, PASE, maternal warmth and perceived pubertal status, were treated as categorical to account for non-normality.

4.4.1 Preliminary Analyses

The scales measuring self-esteem and maternal warmth were subjected to exploratory factor analyses – an analytic tool used to empirically determine how many constructs underlie a scale or a set of items (DeVellis, 2017) – in order to determine whether they measured one construct, as intended, or more. First, the suitability of the data for factor analysis was assessed by running Bartlett's Test of Sphericity and computing the Kaiser-Meyer-Olkin criterion (KMO) for each scale. This was done using the *EFAtools* package in R (Steiner & Grieder, 2020). Bartlett's Test of Sphericity compares an observed correlation matrix with an identity matrix, testing whether they are significantly different. A significant result indicates enough covariance among the variables to meaningfully summarize the variables using fewer factors (Steiner et al., 2021). The KMO criterion indicates to what degree an observed variable is predicted by the other observed variables in the same set of data (Steiner et al., 2021). It ranges from 0 to 1, with values between .60 and .90 considered to be acceptable for factor analysis (Kaiser & Rice, 1974). In the current thesis, a scale was considered well-suited for factor analysis when Bartlett's Test of Sphericity was statistically significant ($p < 0.05$), and the KMO criterion was greater than .60 (Pallant, 2020).

Parallel analyses based on polychoric correlations were carried out to decide the number of dimensions for each construct. In parallel analyses, Eigenvalues from the observed data are compared to Eigenvalues from randomly generated sets of data with the same number of observations and variables, but without a factor structure (Franklin et al., 1995). Principal component analysis (PCA) was used for dimension reduction, in line with the recommendations made by Garrido et al. (2013) when performing parallel analyses with ordinal data with high factor loadings. The analyses were carried out using the *EFA.dimensions* package (O'Connor,

2021). The scales were also subjected to factor analysis using the package *psych* (Revelle, 2020) in R, in order to assess the factor loadings of each item.

Finally, the internal consistency of each scale was assessed by calculating their coefficient alpha values (Cronbach's Alpha), based on polychoric correlations. Cronbach's Alpha can be defined as the proportion of the variance of a scale which can be attributed to a common source (DeVellis, 2017), and thus indicates how closely related the items are to each other. The alpha was calculated using the *psych* package in R. In line with DeVellis (2017), coefficient values below .65 were considered as undesirable and values above .70 as ideal.

4.4.2 Latent Variables

The items from the scales measuring SASE, PASE and maternal warmth were used to model latent variables in R. These were modelled using the *lavaan* package (Rosseel, 2012). The latent variables were then used to carry out the main analyses involving SASE, PASE and maternal warmth, instead of using mean scale scores or sum scores.

Latent variables are the underlying phenomena that scales intend to measure. While these phenomena cannot be directly observed, they can be indicated through the relationships between the scores on the scales indented to measure them (DeVellis, 2017). The latent variables used in this thesis were therefore created based on the relationships between the SPPA and the APQ items, respectively.

Using latent variables in the main analyses, as opposed to mean scale scores or sum scores, had several benefits. First, the latent variables were computed using only the shared variance between the scale items. This removed the random error of each item in the scale which normally would impact mean scale scores. Second, the method allowed for treatment of the data as ordinal. This was beneficial as the data was not normally distributed. Finally, the latent variables were calculated using all available data, thus avoiding listwise deletion when participants had not answered all items in a scale.

As the measure of perceived pubertal status and gender were not based on a scales, latent variables were not modelled for these variables.

4.4.3 Main Analyses

All main analyses were carried out through the use of structural equation modeling (SEM). SEM is a set of statistical techniques used to examine relationships between (latent) factors and/or observed variables, by creating a theoretically based model and determining the degree

to which observed data supports this (Ullman & Bentler, 2012). The model can then be used to test hypotheses (Ullman & Bentler, 2012). The SEM analyses were carried out in R, using the package *lavaan* (Rosseel, 2012). These were used to carry out correlation and regression analyses. For all SEMs, factor indicators were treated as ordinal and the variance of the latent variables was set to 1.

The fit of the SEMs was evaluated using several fit indices, which are measures used to evaluate how well a model fits the observed data. In the current research, Comparative Fit Index (CFI; Bentler, 1990) and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973) were used. Both are incremental fit indexes, comparing the current model with a baseline model. The indices were considered acceptable if they were above .95, in line with recommendations by Hu and Bentler (1999). The Root Mean Square Error of Approximation (RMSEA; Steiger, 1990), an absolute fit index which compares the current model with a perfect model, was also used. The value of this index was considered ideal if below .06 (Hu & Bentler, 1999). Finally, the Chi-Square statistic was reported. This is a measure of the deviation between the observed and the model implied covariances, and was considered ideal if not statistically significant (Alavi et al., 2020). Different fit measures may agree or disagree regarding how well the model fits the data, depending on several aspects of the data and the model. For example, the RMSEA may indicate poor model fit even for well-fitting models when the number of degrees of freedom is low (Kenny et al., 2015). The Chi-Square is directly impacted by sample size and can thus be significant even in the presence of small deviations between the observed and model implied covariances when using large samples, and can be small and non-significant even for poor models if the sample size is small (Alavi et al., 2020) Furthermore, the CFI and TLI may indicate good or bad model fit depending on the correlation between the variables in a model, with high correlations contributing to high CFI and TLI values because the baseline model will then be poor. In addition, fit indices and their cut-off values are generally developed for use with maximum likelihood estimation with continuous data under the assumption of a normal distribution (Xia & Yang, 2019). Over-interpretation of fit indices and cut-off values is a well-known problem in research (Lai & Green, 2016). However, the above mentioned fit indices with suggested cut-off values are reported here to give the reader some guidance in evaluating the models used.

Descriptives and Research Question 1. Mean levels and standard deviations of SASE, PASE and maternal warmth, as well as the frequencies (number and percentage) of respondents who reported that they had and had not reached puberty were calculated separately for girls and

boys in SPSS. The statistical significance of gender differences were calculated using linear regressions for the continuous outcome variables, and probit regression for the dichotomous outcome variable perceived pubertal status in R. The regressions of the latent variables of SASE and PASE on gender were used to answer research question 1.

Research Question 2 and 3. Associations between SASE, PASE and perceived pubertal status, and between SASE, PASE and maternal warmth were explored through the calculation of Pearson's *r* correlation coefficients. Correlation analyses were chosen as the model in Figure 1 shows that it is not possible to decide the causal direction of these two associations. The correlation coefficients were calculated using four separate SEMs (two for each research question). These were created using the latent variables of SASE, PASE and maternal warmth, as well as the dichotomous measure of perceived pubertal status. The two SEMs for research question 2 modelled SASE and perceived pubertal status and PASE and perceived pubertal status. For research question 3, SASE and maternal warmth as well as PASE and maternal warmth were modelled.

In order to explore gender and perceived pubertal status differences in the associations, the SEMs were run separately for different groups within the data set. For research question 2, which asked about gender differences in associations, the SEMs were first run with the entire data set and then with data from only girls and only boys. For research question 3, which asked about differences across gender and percieved pubertal status, the SEMs were run using data from the entire data set, girls, boys, those who reported that they had or had not reached puberty, and girls or boys who had or had not reached puberty.

The statistical significance of group differences was calculated in cases where statistical power analyses indicated enough statistical power to detect such differences (see more on statistical power in section 4.4.4). Statistical significance was tested by comparing the correlation coefficients found for relevant groups. For example, the correlation coefficient found among girls was compared to that found among boys. A statistically significant difference between the correlation coefficients would indicate that gender moderated the relationship between self-esteem and maternal warmth. A natural option for performing such significance testing is to run multiple-group analyses and then comparing model fit between models where parameters were constrained to be equal versus allowed to vary between groups. However, such models turned out to be too computationally demanding for *lavaan* to perform, probably due to the combination of non-normal (ordinal) variables and missing data. An alternative approach was therefore chosen, as advised by Cohen et al. (2003), by performing

Fisher's z-transformation of the correlation coefficients and then testing the statistical significance of the difference in z-values. This transformation is done because the sampling distribution of correlation coefficients is not normally distributed and varies for different magnitudes of correlations. This procedure was done using the package *cocor* (Diedenhofen & Musch, 2015) in R.

4.4.4 Statistical Power Analyses

Statistical power is the probability of a statistical test correctly rejecting the null hypothesis (Cohen, 1992), and is influenced both by the reliability of the measures used, the effect size, and the size of the sample (DeVellis, 2017). Considering statistical power is important for several reasons. First, it helps inform the interpretation of findings of non-significant results. Second, failure to consider statistical power increases the risk of contributing to creating a research field with contradictory findings from different studies. When several under-powered studies report different associations that may have been randomly detected due to sampling error, the research field may become fragmented and confusing.

To determine how large effect sizes had to be in order have a reasonable chance of being detected in the current sample, power analyses were run, using the software G*Power (Faul et al., 2009). All analyses were set to be two-tailed, with an alpha value of .05 and statistical power set to .80, as is conventional (Cohen, 1992; Field et al., 2012). Power analyses were also run in order to determine whether there was enough power to detect differences in correlation coefficients between groups (i.e. between boys and girls and between those who had versus had not reached puberty). Differences between associations involve comparison of two estimates that are uncertain. Hence, the statistical power to detect such differences is generally weaker than the power to detect the correlations (Cohen et al., 2003).

5. Results

5.1 Results of Preliminary Analyses

The analyses exploring the data's suitability for factor analyses indicated that the data were suitable. All Bartlett's tests were statistically significant at an alpha level of .05, and all KMO values were above .60. The parallel analyses extracted only one factor for each of the scales. This was very much expected for SASE, as this measure only had three items. Factor analyses on each scale showed that all factor loadings were above .56 for SASE and above .75 for PASE.

On the maternal warmth scale one item had a factor loading of only .28. All other items in the scale showed loadings above .58.

Reliability analyses showed coefficient alpha (α) values of .82 for SASE, .93 for PASE and .78 for maternal warmth. All of these are above .70 and thus considered ideal. However, the reliability analyses for the maternal warmth scale showed that the coefficient alpha value would increase to .83 if the item with the low factor loading was dropped. The item's low correlation therefore contributed more negatively to the coefficient alpha than the positive effect of an increased number of items in the scale.

Furthermore, when evaluating the phrasing of the item, it stood out among the other items in the scale, asking about rewarding when the other items asked about praise and displays of emotional affection. On the basis of this, the low factor loading and the reliability findings, the item was dropped from the scale. The measure of maternal warmth used in the main analyses therefore consisted of four items with a coefficient alpha value of .83 and factor loadings of .58 and above.

DeVellis (2017) notes that when coefficient alpha values are much above .90, such as it can be argued to be in the case of the PASE scale ($\alpha = .93$), one should consider dropping items. This could for example help prevent participant fatigue. However, as the data was already collected, participant fatigue was not a concern in this case. Furthermore, the scale was based on an already established and validated instrument and removing an item would only lower the coefficient alpha slightly, to .90. The scale was therefore kept in full.

5.2 Results of Main Analyses and Statistical Power Analyses

Descriptives of the four outcome variables (SASE, PASE, maternal warmth and perceived pubertal status) for boys and girls are presented in Table 1 and Table 2.

Table 1

Descriptives of Levels of SASE, PASE and Maternal Warmth Among Girls and Boys

Variable	Girls				Boys				Gender difference in standardized latent variables[a]
	N	Missing	Mean	SD	N	Missing	Mean	SD	
SASE	322	32	4.14	.73	278	33	4.07	.68	.15
PASE	322	32	3.04	.72	278	37	3.26	.67	-.35***
Maternal Warmth	322	7	4.39	.50	278	6	4.34	.51	.11

Note. N: total number of observations. SD: Standard Deviation. SASE: Social acceptance self-esteem, PASE: Physical appearance self-esteem. SASE measured on 1-5 scale, PASE measured on 1-4 scale, Maternal warmth measured on 1-5 scale.
[a] Gender differences were tested for statistical significance with linear regression, the rightmost column in the table displays the regression coefficients. This should be interpreted as the difference between boys and girls in terms of fractions of a standard deviation on the latent variable. Gender dummy coded as boys = 0, girls = 1. Statistically significant gender differences indicated by asterisk as follows: * indicates $p < .05$ ** indicates $p < .01$ *** indicates $p < .001$.

Table 2

Descriptives of Perceived Pubertal Status Among Girls and Boys

Variable	Girls				Boys				Gender difference[b]
	N	Missing	Yes (%)	No (%)	N	Missing	Yes (%)	No (%)	
Perceived Pubertal Status	322	63[a]	222 (68.9)	37 (11.5)	278	124[a]	88 (31.7)	66 (23.7)	.89***

Note. N: total number of observations. Yes: number of participants
[a] of these, 26 girls and 89 boys answered "I don't know".
[b] Gender differences calculated by probit regression, the rightmost column in the table displays the regression coefficient. This should be interpreted as the difference between boys and girls in terms of fractions of standard deviations of the continuous variable behind the observed dichotomous puberty variable. Gender dummy coded as boys = 0, girls = 1. Statistically significant gender differences indicated by asterisk as follows: * indicates $p < .05$ ** indicates $p < .01$ *** indicates $p < .001$.

5.2.1 Fit Indices

Model fit of the SEMs used to carry out the main analyses are shown in Appendix C. For some SEMs, the different fit indices disagreed regarding model fit. As noted in section 4.4.3, however, this is not unusual in cases with few degrees of freedom and/or large sample sizes.

5.2.2 Research Question 1, SASE, PASE and Gender

The results of the regression analyses are presented in Table 1 (descriptives). A statistically significant gender difference in levels of PASE was found, indicating higher levels of PASE for boys than girls. Mean levels of SASE were slightly higher among girls compared to boys, but this difference was not statistically significant. However, this may be due to insufficient power to detect such differences as power analyses indicated that effect sizes had to be at least .24 to be detected with an 80% of certainty in the current sample. See details in Appendix D, Table D1. For both SASE and PASE, the standard deviation was bigger for girls than boys, indicating a wider range of scores among the girls.

5.2.3 Research Question 2, SASE and Perceived Pubertal Status

The results of the correlation analyses of SASE and perceived pubertal status are presented in Table 3. The results showed weak, non-significant correlations between the two variables in the entire sample as well as among girls and boys examined separately.

The lack of statistically significant findings could be due to low statistical power, but analyses indicate enough power to detect associations above .12 in the entire sample. See details in Appendix D, Table D2.

5.2.4 Research Question 2, PASE and Perceived Pubertal Status

Results of the correlation analyses of PASE and perceived pubertal status are presented in Table 3. The results showed small, statistically significant negative correlations between the two variables in the entire sample and among boys, indicating lower SASE levels among those who perceived themselves as pubertal compared to those who did not perceive themselves as pubertal. Among the girls, no statistically significant correlation was found, however, power analyses showed that the correlation among the girls had to be at least +/- .17 to be detected with reasonable certainty.

An analysis calculating the power needed to identify statistically significant group differences in associations between girls and boys was run, indicating that the sample was underpowered to detect differences less than .24 between the two correlation coefficients. As the difference between girls and boys was below this value, the current sample could not be used to answer the question of whether there was a gender difference in the association. The statistical significance of the observed difference was thus not tested.

Table 3

Correlation Coefficients (r) of Self-Esteem and Perceived Pubertal Status,

Explored in Different Groups

Group	SASE and perceived pubertal status		PASE and perceived pubertal status	
	N	R	N	R
Entire sample	534	.03	525	-.25***
Girls	288	.04	284	-.12
Boys	243	-.03	237	-.27**

Note. N: the number of observations used in the analysis (missing removed). R: Pearson's *r* correlation coefficients. SASE: Social Acceptance Self-Esteem, PASE: Physical Appearance Self-Esteem. Perceived Pubertal Status is coded: 0 = not reached puberty, 1 = reached puberty. Statistical significance indicated by asterisks as follows: * indicates $p < .05$ ** indicates $p < .01$ *** indicates $p < .001$

5.2.5 Research Question 3, SASE and Maternal Warmth

Table 4 presents the correlations between SASE and maternal warmth within different groups. The analyses indicated a small but statistically significant correlation between the two variables in the entire sample, as well as for both genders examined separately. No statistically significant associations were found in any other groups. The lack of findings in some of these groups may be due to lack of statistical power, see details in Appendix D, Table D3. The statistical significance of the difference between girls and boys was not tested due to the marginal difference between the two coefficients and lacking power to detect such small differences in the current sample.

5.2.6 Research Question 3, PASE and Maternal Warmth

Results of the correlation analyses are presented in Table 4. The analyses indicated no statistically significant association between the variables in the entire sample, nor for either gender when analyzed separately. There was a small, but statistically significant correlation between PASE and maternal warmth among those who had reached puberty, but not for those who had not, indicating an effect of perceived pubertal status on the association. Furthermore, an even stronger positive association was found among boys who reported that they had reached puberty. No statistically significant associations were found in any other groups, indicating an effect of both perceived pubertal status and gender on the association. However, power analyses indicated that correlation coefficients had to be up to .45 in some of these groups in order to be

detected with reasonable certainty. Some effects may therefore not be found due to lacking power. See details in Appendix D, Table D3.

Analyses of the power needed to detect statistically significant differences between groups (e.g. between those who had and had not reached puberty) showed effect sizes (Cohen's *q*) ranging between .33 and .48, indicating that differences in correlation coefficients (Pearson's *r*) had to be between .32 and .45 in order to be detected with reasonable certainty. While such differences were technically not found between the relevant groups in the current sample, the difference between girls and boys who reported that they had reached puberty was nearly large enough. The significance of this group difference was therefore tested and showed a statistically significant difference between girls and boys who perceived themselves as pubescent $z = -2.18$, $p = .03$.

Table 4

Correlation Coefficients (r) of Self-Esteem and Maternal Warmth, Explored in Different Groups

Group	SASE and maternal warmth		PASE and maternal warmth	
	N	R	N	R
Entire sample	587	.16**	586	.09
Girls	312	.15*	312	.07
Boys	271	.16*	270	.14
All reached puberty	300	.11	301	.16*
All not reached puberty	100	.18	100	.07
Girls reached puberty	214	.12	214	.08
Girls not reached puberty	35	.20	35	-.11
Boys reached puberty	83	.05	84	.35**
Boys not reached puberty	63	.22	60	.23

Note. N: the number of observations used in the analysis (missing removed). R: Pearson's *r* correlation coefficients. SASE: Social Acceptance Self-Esteem, PASE: Physical Appearance Self-Esteem. Statistical significance indicated by asterisks as follows: * indicates *p* < .05 ** indicates *p* < .01 *** indicates *p* < .001

6. Discussion

The overall aim of the current study was to explore factors related to two types of self-esteem in early adolescence in order to gain more knowledge on what influences self-esteem during such an important stage of youths' identity formation. This was done in three steps. First, by exploring the impact of gender on levels of social acceptance self-esteem (SASE) and physical appearance self-esteem (PASE) in early adolescence. Second, through an exploration of the relationship between SASE, PASE and percieved pubertal status, and whether gender impacted this relationship. And last, by exploring the relationship between SASE, PASE and maternal warmth, and whether gender and percieved pubertal status impacted these relations. These explorations were carried out using self-report data from mothers and their 12- to 13-year-old adolescent children.

Overall, findings showed higher levels of PASE among boys compared to girls, but no significant gender difference in levels of SASE. The results indicated lower levels of PASE among those who reported that they had reached puberty in the entire sample and among boys. No significant relationship between SASE and perceived pubertal status was found. Finally, as maternal warmth increased, so did SASE and PASE, but for PASE this was only apparent in certain subgroups of the sample. In the following sections, the different results will be discussed in light of theoretical views and previous empirical findings. Then, strengths and limitations of the current study will be discussed, before the overall implications of the research are presented along with directions for future research and concluding remarks.

6.1 Current Findings in Light of Theory and Previous Research

6.1.1 Domain-Specific Self-Esteem Levels Among Girls and Boys (Research Question 1)

The first research question asked whether gender impacted levels of PASE and SASE. The results supported the proposed hypothesis, which predicted that girls would report lower levels of PASE compared with boys. This is consistent with theory and previous reports of a robust gender difference in this domain of self-esteem (e.g. Altintaş & Aşçi, 2008; Steiger et al., 2014) similar to that of global self-esteem (e.g. Bolognini et al., 1996).

For SASE, however, the mean level was marginally higher for girls ($\bar{x} = 4.14$) than boys ($\bar{x} = 4.07$), but this difference was not statistically significant. The findings are thus consistent with the previous reports of no significant gender differences for SASE (e.g. Cole et al., 2001). The marginal (though non-significant) higher mean score for girls goes against the general

finding of higher self-esteem among boys and men (Bolognini et al., 1996). However, it is in a similar direction to the findings reported by von Soest et al. (2016), who found marginally higher levels of SASE among 13-year-old-girls compared to boys in a Norwegian sample.

As presented in the theory and literature review in the beginning of this thesis, the lack of gender differences for SASE may be explained by the classical stereotype that girls are or feel more socially competent and socially oriented than boys, which may lead to higher levels of SASE, according to the intrapersonal perspective on self-esteem. Boys may therefore feel relatively less competent compared to girls and experience lower levels of SASE. This contrasts with other domains, such as PASE, where being male is more of an advantage, given the typical cultural views on male and female bodies (Harter, 2000). Findings by von Soest et al. (2016) partially support this, indicating relatively higher levels of SASE compared with most other domains among girls. They do not, however, indicate lower levels of SASE among boys.

Many have noted that, while robust, the reported gender difference in global self-esteem is often small (e.g. Orth et al., 2012), both in terms of effect size and relative to the gender differences found for other psychological variables (Kling et al., 1999). Small differences in how both girls and boys view themselves in the domain of social acceptance, such as girls feeling marginally more confident or boys marginally less competent, may therefore be enough to cancel out this gender effect.

Finally, it is worth noting that the current results show that self-esteem scores for PASE and SASE are more varied among girls than boys. While more girls have lower self-esteem scores, more girls also have higher self-esteem scores than boys. This highlights the fact that there is a large degree of overlap between girls and boys in terms of self-esteem levels, and that the gender difference found for PASE is on a group level – masking the variations in individual differences for boys and girls.

6.1.2 Domain-Specific Self-Esteem and Perceived Pubertal Status (Research Question 2)

The second research question asked about the relationship between SASE, PASE and perceived pubertal status, and whether gender impacted this relationship. Due to mixed previous findings and a lack of clear theoretical predictions, no hypotheses about the direction or strength of these relationships were presented.

Associations Between SASE, PASE and Perceived Pubertal Status. No statistically significant associations were found between SASE and perceived pubertal status, neither in the

whole sample nor among girls or boys separately. This finding goes against the theoretical predictions that the two factors would be associated, either negatively through pubertal changes leading to feelings of being deviant, less likeable and thus excluded by others which would reduce self-esteem according to the *Sociometer hypothesis* (Leary et al., 1995), or positively through increased social appetite and more positive social interactions with others (Paikoff & Brooks-Gunn, 1991). However, it is in line with previous reports of no association between global self-esteem and pubertal status (Benjet & Hernandez-Guzman, 2001; Brack et al., 1988). To my knowledge, no previous studies on associations between SASE and pubertal status have been carried out. The current findings thus offer a completely new insight into the relationship between these factors, indicating that SASE and perceived pubertal status are not related at this early stage of adolescence. However, a relationship may develop later, and more studies are needed before any conclusions about the relationship can be drawn.

The analyses did show an association between PASE and perceived pubertal status, indicating that PASE was significantly lower among those who perceived themselves as pubescent compared to those who did not. Contrary to the findings on SASE, this may lend support to interpersonal predictions in line with the *Sociometer hypothesis* (Leary et al., 1995), suggesting that the physical changes associated with puberty may lead to feelings of looking different from everyone else, being deviant and less likeable, or perceiving others as negative toward their changed appearance, ultimately leading to lower levels of PASE. As pointed out by Petersen and Taylor (1980, as cited in Alsaker, 1995), the anticipated reactions from others may be even more important than the physical changes themselves. Furthermore, it could support the intrapersonal prediction that the physical changes lead to personal negative evaluations of own looks, owing to discomfort with a 'new', 'strange' or 'foreign' body. Finally, a completely different interpretations may instead be more appropriate: that youths with lower PASE are more self-aware, scrutinize their bodies more and thus are more likely to detect and be aware of pubertal changes, and to perceive themselves as having reached puberty. This is consistent with the finding of increased self-awareness among pubertal youths (Chen et al., 1998). However, the current research cannot conclude which – if any – of these theoretical predictions are more likely, due to the correlational nature of the findings.

Gender Differences. The effect of gender on the association was also explored, revealing a difference between girls and boys. For boys, an association similar to that found for the entire sample was found: lower levels of PASE among those who perceived themselves as pubescent. For girls, however, there was no significant association between perceived pubertal

status and PASE. Even though the statistical significance of the gender difference found could not be tested due to lack of power and therefore should be interpreted with some caution, possible interpretations of the gender difference will be discussed below as the finding is unexpected.

The finding that PASE was lower among boys who reported that they had entered puberty, but not among girls, is interesting in light of the theoretical predictions about the effect of perceived puberty for girls vs. boys. As previously discussed, the feminist perspective suggest that entering puberty is more difficult for girls due to more negative cultural and social views on female maturation (Vogt Yuan, 2007) and should thus lead to lower levels of self-esteem. Furthermore, research findings of increased concerns about weight (Compian et al., 2009) and reduced body satisfaction among pubescent girls (O'Dea & Abraham, 1999 as cited in Mendle, 2014b) as well as higher body satisfaction among boys after voice change (Benjet & Hernandez-Guzman, 2001), would all suggest a gender difference opposite to the one observed in the current sample. Moreover, it suggests that PASE would be lower among the girls who report that they have reached puberty compared to girls who have not.

The indicated gender difference may be due to the different timing of pubertal changes among girls and boys. In Norway, the average age of pubertal onset is 10-11 for girls (Bruserud et al., 2020), and girls generally enter puberty 1-2 years earlier than boys (Benjet & Hernandez-Guzman, 2001; Negriff & Susman, 2011). As the adolescents in the current sample were 12-13 years old, this indicates that most of the girls likely were well into puberty, while most boys had only recently entered or were only starting enter puberty. This is supported by the distribution in the current sample, showing that nearly 70% of the girls reported that they had reached puberty, while only slightly more than 30% of the boys reported the same. Furthermore, over 30% of the boys answered "I don't know" when asked whether they were in puberty, indicating that more of the boys perceived themselves as being in the transition between being and not being pubescent. One may speculate that more girls had become used to the physical changes associated with puberty, less uncomfortable with their changing bodies, and that being pubescent was more normalized among the 12- to 13-year-old girls as a large proportion of them had already entered puberty at this age. For the boys, however, pubertal physical changes may be more novel and also more uncomfortable, perhaps making them more prone to negative evaluations of own looks, leading to lower levels of PASE. Pubertal changes among boys such as increased height, and increased body- and muscle mass are typically viewed as more positive and desirable (Vogt Yuan, 2007), and research has indicated higher levels of body satisfaction among pubescent boys (Benjet & Hernandez-Guzman, 2001; Simmons et al., 1979; Tobin-

Richards et al., 1983). However, several features of male pubertal development, such as spermarche and voice changes, may also feel uncomfortable or embarrassing, especially in the beginning stages of these changes. Furthermore, girls may have more arenas in which to talk about, process and normalize the concerns about their changing bodies. First, through sharing the changes they go through with friends, as indicated by research findings that girls self-disclose more to their peers (Rose & Rudolph, 2006) and through engaging in more problem talk with friends than boys do (Rose et al., 2016). Second, since female maturation is generally more stigmatized in western culture (Vogt Yuan, 2007), teachers and parents may be inclined to actively work towards destigmatizing these changes among girls through talking more about it and normalizing it, while this may be less frequent for male maturation. Boys who go through uncomfortable bodily changes a bit before or at the same time as others, may therefore feel more alone or abnormal than girls do. They may also have less arenas in which to share these feelings, leading to more negative evaluations of their own bodies in the beginning stages of puberty.

The differing findings for SASE and PASE are unsurprising, as physical changes are very prominent and salient in puberty. Youths likely base the majority of their evaluation of whether they have or have not entered puberty on signs of physical maturation, not social and emotional developments. This could thus explain why associations with PASE are found but not with SASE.

6.1.3 Domain-Specific Self-Esteem and Maternal Warmth (Research Question 3)

The third research question addressed the relationships between SASE/PASE and maternal warmth, and whether gender and pubertal status impacted these relationships. The results did not support the hypothesized prediction that the relationships with maternal warmth would be similar for SASE and PASE. Consequently, the results for SASE and PASE will be discussed separately.

SASE and Maternal Warmth. As predicted, a positive correlation between SASE and maternal warmth was found for the entire sample, indicating that as levels of maternal warmth increase, so do the SASE of the young adolescents and vice versa. This finding supports the theoretical predictions and previously reported findings that self-esteem and warmth are positively related, and adds to the very limited knowledge on associations between warmth and SASE. The association may represent an effect of maternal warmth on SASE, as predicted by

the theories within the interpersonal perspective on self-esteem, an effect of SASE on warmth as proposed by Kerr et al. (2012) and supported by previous studies of directional effects (Pinquart & Gerke, 2019), or it may be bidirectional, transactional or spurious. The current research cannot draw any conclusions as to which of these are true due to the correlational nature of the current findings.

Interestingly, the correlation found is relatively modest ($r = .16$). It is smaller than the correlation coefficients typically reported for global self-esteem (between .20 and .40, approx.; e.g. Harris et al., 2015; Park et al., 2021), indicating that SASE is not as strongly related to maternal warmth as global self-esteem is. Perhaps signs of maternal warmth are interpreted as a more global evaluation of the self, thus impacting global self-esteem more strongly than more specific evaluations of being liked by peers and being able to make friends. Alternatively, in line with the hypothesis that parents find it easier to be warm toward well-adjusted children (Kerr et al., 2012), perhaps mothers are more impacted by the adolescents' global views and feelings about the self than the specific feelings associated with SASE. Globalized feelings about the self may also be more visible and apparent to mothers than SASE.

Furthermore, the finding may be explained by the fact that reports on parenting were collected from mothers, not the adolescents themselves. Ruiz et al. (2002) collected measures of warmth from adolescents and parents, and found a smaller correlation with adolescent self-esteem levels when using maternal reports ($r = .10$) than adolescent reports ($r = .40$). This is likely due to youths basing their self-evaluations (self-esteem) on the warmth they perceive, not the objective amount of warmth received, or the amount of warmth the mothers feel that they are expressing. Mother and youth experiences and perceptions of warmth may not always converge, especially as maternal reports are likely to be impacted by social desirability effects. It would be interesting to explore this association using youth reports as well as parent reports, to see whether these converge and whether stronger associations emerge. In support of this hypothesis, the correlation found in the current research is smaller than the associations in previous reports of perceived maternal warmth and global self-esteem (e.g. Khaleque, 2013; Leung Ling et al., 2020). It is also smaller than the association[4] of .28 between SASE and parental care reported by von Soest et al. (2016) who also explored associations in a Norwegian sample. In their study, youth reports on parental care were used instead of parental reports. The larger association found in their sample and in previous studies on maternal warmth may

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[4] Note that von Soest et al. (2016) report regression coefficients, not correlation coefficients. However, as the regression coefficients were standardized, they are comparable to correlation coefficients for the purposes of the current study.

therefore be due to the measurement of youth-perceived warmth, as argued above. See further discussion on the use of maternal and adolescent reports in section 6.2.

It was hypothesized that there would be no effect of gender on the association between SASE and maternal warmth. The results support this hypothesis, as nearly identical positive associations for both girls ($r = .15$) and boys ($r = .16$) were found. The finding also supports the limited previous reports that associations between self-esteem and warmth are similar across both sexes (e.g. Khaleque, 2013; Park et al., 2021), thus indicating that patterns of associations are similar for SASE and global self-esteem.

Finally, the possible effect of perceived pubertal status on the association between self-esteem and maternal warmth was explored. Due to a lack of previous findings on this topic, no predictions were made. The results did not indicate any differences between those who did and did not perceive themselves as pubertal. Furthermore, explorations of gender differences among those who did and did not perceive themselves as pubertal did not produce any significant effects. Taken together, this may indicate that neither gender nor perceived pubertal status impact the association between SASE and maternal warmth, and that youths and parents influence each other similarly across these two dimensions.

PASE and Maternal Warmth. Contrasting with the results found for SASE and what was predicted, no statistically significant association was found between PASE and maternal warmth in the sample as a whole. This also contrasts with the findings for global self-esteem and the findings by von Soest et al. (2016) who reported a positive association between PASE and parental care, similar to the one reported for SASE. The differing results may be explained by the measure of warmth used in the current study. It measures explicit praise and affection from mothers in response to positive actions by the youths (see section 4.3.2 and Appendix B). This may be more strongly related to adolescent feelings of social acceptance than feelings about their bodies. Furthermore, the measure of warmth used by von Soest et al. (2016) targets a wider range of parental behaviors, some of which may be more relevant for youths' perceptions of their appearance. However, as discussed below, associations between PASE and maternal warmth were found in the current sample in some groups, making it likely that the lack of findings in the entire sample is a result of group differences within the sample masking associations.

It was hypothesized that there would be no effect of gender on the association between self-esteem and maternal warmth on the basis of previous reports of no moderating effect of gender on this association Park et al. (2021). This gained partial support: when analyzing girls

and boys separately, no significant associations were found, indicating no group differences. However, when exploring differences between the genders among those who did and did not perceive themselves as pubertal, significant associations were found – this is discussed further below.

The results showed a small, but significant positive correlation between maternal warmth and PASE among those who considered themselves as having reached puberty ($r =$ .16), but no correlation among those who reported that they were not in puberty. This indicates that as the PASE of pubescent youths increases, so do levels of maternal warmth and vice versa. When gender differences within this group were explored, results showed that this trend was only true for boys and also much stronger ($r = .35$), while no association was found among the pubescent girls. No associations between PASE and maternal warmth were found in any other groups. Taken together, this suggests that perceived pubertal status impacts the association between PASE and maternal warmth both in the entire sample and among boys, and that gender impacts the association among those who report that they have reached puberty. It is important to note that the statistical significance of the effect of perceived pubertal status was not tested due to lacking power to detect such differences with reasonable certainty. The differences should therefore be interpreted with caution.

Notwithstanding, it is worth noting that the current finding of an association with maternal warmth only among those who reported being in puberty is in line with the speculation that being in puberty will make adolescent self-esteem more volatile and prone to impact from others, including mothers. In puberty, the adolescents may be more self-aware as indicated by previous research (e.g. Chen et al., 1998), and thus more prone to interpreting warmth from mothers as an evaluation of their appearance than before they start experiencing pubertal changes. Another explanation may be that mothers are impacted by the adjustment of their adolescent children, as proposed by Kerr et al. (2012). Pubertal development among youths has been tied to an increase in parent-adolescent conflicts (Laursen et al., 1998; Steinberg, 1987, 1988) and lower levels of parental warmth (Barber et al., 2005; Conger & Ge, 1999; Harris et al., 2015; Lansford et al., 2021), indicating a break-down of relationships between mothers and youths in this period of life. In light of this, seeing their sons and daughters as well-adjusted and confident in their bodies may be a positive contrast to this otherwise turbulent transitional period and may elicit more warmth from mothers, while lower self-esteem levels may contribute to the conflicts and lead to lower levels of warmth. However, the positive association (that increased self-esteem is associated with increased warmth) goes against the speculation

that mothers may show more warmth towards youths who have lower self-esteem in an attempt to support or enhance their self-esteem.

The statistically significant gender difference among those who perceive themselves as pubescent is very interesting as it indicates that boys are more prone to influence from mothers than girls – or that mothers are more influenced by the PASE levels of their sons than daughters when expressing warmth. This contrasts with previous indications that there are no gender differences in the association between warmth and self-esteem (Khaleque, 2013; Park et al., 2021) and that if such differences exist, the association would be stronger among girls, not boys (Plunkett et al., 2007). Furthermore, it goes against the work indicating that as children mature, girls become more other-oriented, while boys' identity is more based on separation and becoming more autonomous (Bolognini et al., 1996), and that girls tend to become increasingly identified with their mothers while boys become more identified with their fathers (Leung Ling et al., 2020).

In line with the previously discussed distribution of perceived pubertal status among girls and boys, a possible explanation for the gender difference in PASE-warmth associations may be that the boys who report that they have entered puberty perceive themselves as maturing early relative to their same-age peers, as only 31.7% of the boys in the sample reported being in puberty. This falls within the topic of pubertal timing (when adolescents enter puberty relative to peers), which is widely researched and shows mixed results concerning the effects of early maturation on boys. Some studies indicate that early maturation leads to increased body satisfaction among boys (Simmons et al., 1979; Tobin-Richards et al., 1983), which then could be associated with higher levels of maternal warmth as argued above. However, the current findings indicate that PASE is lower among the boys who perceived themselves as pubescent. As previous research has linked lower levels of self-esteem with more unstable self-esteem (Kernis et al., 2000), it is more likely that these early maturing boys instead have more volatile PASE and that they are thus more prone to influence from their mothers. In fact, Ge et al. (2001) found that pubertal status in 7th grade (12-14 year-olds, who the researchers labelled as early maturing) was associated with more internalized distress and hostile feelings in the following years, but that this was not found for those who matured on-time or late. This suggests that the boys who perceived themselves as pubertal in the current study may also be more prone to distress and hostility, which is consistent with the findings of lower levels of PASE in this group. This could then be associated with lower levels of maternal warmth, as mothers may be less prone to expressing warmth towards poorly adjusted youths (Kerr et al., 2012), thus explaining the association between PASE and maternal warmth among the pubescent boys.

Early maturation has also been tied to negative effects among girls (Tobin-Richards et al., 1983; Williams & Currie, 2000) but in the current sample, the girls labelling themselves as pubescent likely consists of both early and on-time maturing girls, masking any such effects of early maturation. This may explain why PASE and maternal warmth are not related among the pubescent girls. However, it is worth noting that the girls in the current sample have significantly lower average levels of PASE compared to boys, and that pubertal maturation independent of timing has been linked to more externalizing behavior among girls (Benjet & Hernandez-Guzman, 2001). This could also lead to a breakdown of mother-daughter relations and lower maternal warmth. According to the argumentation above, one would therefore expect an association between PASE and maternal warmth among girls as well. Therefore, the above speculations may not fully explain the unexpected gender difference found. More research is needed to further clarify the relationship between maternal warmth and PASE among girls versus boys as they enter puberty.

SASE versus PASE. Interestingly, the patterns of associations between self-esteem and warmth differed between the two types of self-esteem explored. All associations found were positive, but while no group differences between boys and girls, and those who did and did not perceive themselves as pubescent were found for SASE, some were found for PASE. For PASE, no associations were found between self-esteem levels and warmth in the entire sample. The differing findings could be explained by the nature of the types of self-esteem explored. SASE may be more universal, leading to few gender differences and effects of puberty, while PASE is more directly connected to both the physical effects of puberty and pubertal timing, and the gender differences in societal and cultural views on bodies (e.g. Vogt Yuan, 2007). The current findings highlight the importance of considering and exploring different domains of self-esteem separately. More research is needed on these two types of self-esteem in order to further illuminate their associations with maternal warmth in early adolescence.

6.2 Strengths and Limitations

The current study provides a unique in-depth insight into the relationships between two types of domain specific self-esteem, gender, perceived pubertal status and maternal warmth. To my knowledge, these factors have not been considered simultaneously in any previous studies. Moreover, the current findings add to several self-esteem fields in which research is generally lacking, as outlined in the introduction.

A particular strength of the current research is the fact that it was carried out using a large sample (N = 1138; 545 youths and 593 mothers), making results more reliable and less prone to effects from outliers. The data was collected during the fifth wave of a longitudinal study and attrition-analyses have indicated low maternal education as the only factor predicting drop-out (Karevold et al., 2009). Analyses of the generalizability of the sample have indicated that associations between variables, such as those explored in the current thesis, are robust to this selective attrition (Gustavson et al., 2012) and it has been concluded that such findings can be generalized to the wider Norwegian public (Mathiesen et al., 2018). However, it should be noted that the current sample appears to have somewhat higher socioeconomic status (SES) than the Norwegian population at large (see section 4.2.3). Higher SES has been theoretically linked to higher self-esteem levels by the interpersonal perspective on self-esteem (von Soest et al., 2016) and some studies of self-esteem, parental warmth and puberty have found effects of SES on these factors and the relationships between them (e.g. Bleidorn et al., 2016; Ruiz et al., 2002). Therefore, some caution should be used when generalizing the results, as also advised by Mathiesen et al. (2018). Even more caution should be used if generalizing the findings to other populations, as cross-cultural studies of self-esteem report differences across cultures, for example in the effect of gender on self-esteem (Bleidorn et al., 2016).

Another strength of the current research is the use of reports from two groups of respondents when assessing parenting and self-esteem. By collecting data from two respondents instead of one, mono-informant bias has been avoided. Mono-informant bias refers to instances in which the same person provides reports on both or all variables explored, and this may lead to an overestimation of effects due to shared variance across these reports (Pinquart & Gerke, 2019; Podsakoff et al., 2003). Furthermore, in their research on the APQ, Shelton et al. (1996) found that parental reports were more useful than child reports up the age of 13, suggesting the suitability of the use of such reports in the current study. However, the use of maternal reports on warmth can also be viewed as a limitation. The self-reports on warmth may be impacted by social desirability effects (Podsakoff et al., 2003), leading the mothers to report higher levels of warmth than they in reality express to their adolescent children. Furthermore, as previously discussed, adolescent reports of perceived maternal warmth may have been a more appropriate measure when assessing the effect on psychological phenomena such as self-esteem and percieved pubertal status. Several studies have indicated larger associations between adolescent reports on parenting and self-esteem levels than those found in the current research (e.g. Leung Ling et al., 2020; von Soest et al., 2016) and when compared with maternal reports (Benjet & Hernandez-Guzman, 2001). The adolescents base their self-evaluations and perceptions of

themselves on what they themselves perceive from the world around them, and their perceptions may not be the same as their mothers'. Branje et al. (2013) note that parents and their children often experience their relationship very differently, as illustrated by differing reports on amounts of conflict. In fact, adolescent reports are often more in line with reports made by objective observers, indicating that they are more honest or accurate in their evaluations of their relationships with their parents (Branje et al., 2013).

Some other limitations of the current research should also be noted. First, only maternal warmth was considered in the current study, not paternal. This is due to paternal reports not being included in the fifth wave of the TOPP-study, on which the present analyses are based. Lack of paternal reports and effects is often the case in this type of research, as noted by Plunkett et al. (2007), and is problematic as it leaves out an effect which may be very different to that found when studying mothers. As illustrated by research carried out by Benjet and Hernandez-Guzman (2001), boys' self-esteem may be more influenced by affect expressed by fathers than by mothers. However, others have reported that perceived maternal warmth is more strongly related to self-esteem levels among both girls and boys compared to perceived paternal warmth (Leung Ling et al., 2020). Either way, the effect of paternal parenting may be different to the effect of maternal parenting, which would be important to consider if one attempts to influence parenting in an effort to influence adolescent self-esteem. Therefore, it is important to consider the gender of the parent and the potential effect it may have on associations between parenting and self-esteem in future research.

Second, the method used to measure self-esteem levels has some limitations. Self-esteem was measured using the first version of the SPPA (Harter, 1988), but the instrument has since been revised (Harter, 2012). In the revision, the measure of PASE remained the same, but SASE was modified and renamed 'Social Competence'. Harter (2012) writes that the original items measuring SASE may not necessarily reflect characteristics of the self, but could instead reflect the benevolence of others, and the new scale is believed to better reflect attributes of the self that is involved in social success. This is important to consider in future research on social self-esteem and if current results are compared to newer research using the SPPA.

Third, maternal warmth was measured using the APQ, which is an American instrument. One may question the validity of this instrument in a Norwegian setting, given considerable cultural differences in child rearing between these two cultures. For example, the APQ also includes a measure of parental discipline (not used in the current study) that asks questions about corporal punishment, which is illegal in Norway (The Children Act, 1982, Section 30), illustrating the cultural differences. Such differences could also impact the measure of warmth,

and some nuances of warmth as expressed by Norwegian mothers may be lost due to this. Furthermore, maternal warmth was measured using the positive parenting scale of the APQ, which includes items about explicit praise and affection in response to the adolescents behaving well. These are important aspect of warmth, but it should be noted that warmth is a broad phenomenon and can also be defined as including aspects such as emotional availability, support, interest and involvement (MacDonald, 1992; Rohner, 1994). Differences in findings between the current research and previous research may therefore partly be explained by differences in the operationalizations and measurement of warmth.

Fourth, the measurement of pubertal status warrants a discussion as self-reports of pubertal status were used in the current research. The use of self-reports have been criticized, and studies of the agreement between self-reports and physical examinations of pubertal status have found varying results, ranging from moderate (e.g. Brooks-Gunn et al., 1987) to high degrees of agreement (e.g. Dorn et al., 1990). Generally, there seems to be a consensus that self-reports are not as accurate for assessing the physical pubertal development of adolescents as physical examinations, due to the reports often being biased (for reviews see Coleman & Coleman, 2002; Dorn & Biro, 2011). For example, Schlossberger et al. (1992) found that youths tended to overestimate their development when they were just starting to develop, but underestimated it as they matured further. However, as the current work was interested in the subjective perceptions of the youths, self-report was evaluated as the most appropriate measure. Perceived pubertal development was measured using only one question of whether or not the adolescents had reached puberty. The question was preceded by a sentence stating that the youth was at an age where the body starts to change and become more like a grown-up. By measuring puberty with this minimalistic method, the youth's own knowledge and conceptualization of what puberty entails and how this might affect them becomes very important. Contrary to other self-report instruments, such as the much-used Pubertal Development Scale (PDS; Petersen et al., 1988) the adolescents were not asked about specific bodily changes, which may give them some indication as to what puberty entails. What the adolescents themselves considered as 'having reached puberty' may therefore be highly individual and vary from respondent to respondent. While this can be viewed as a limitation, it could also be a strength, as it may capture the individual perceptions of the youths more accurately due to the minimal impact of external information about puberty on the youths' answers.

Another point worth discussing is the decision to exclude the data from the youths who answered "I don't know" when asked about their pubertal status. This was mainly decided on the basis of statistical issues and ease of interpretation, but as pubertal status was

operationalized as subjective, exploring the impact of being uncertain about one's own pubertal status (which could indicate that the youth is not very concerned with puberty) would also be interesting in future research.

Fifth, gender was defined as binary in the current study, separating only between girls and boys. This is due to gender being measured as binary during the 2004 data collection. In line with a more contemporary view on sex and gender identity than that held in 2004, it would be more optimal to separate between gender identity and sex assigned at birth, and also include at least one more gender category in order to be more nonbinary-inclusive (Westbrook & Saperstein, 2015). This would also allow for more accurate categorization of the youths, especially in the analyses of the effect of gender. Children whose gender identity does not correspond with the sex they were assigned at birth often know this before or around the age studied in this thesis (Olson et al., 2015). This indicates that some participants in the current study may not have been able to answer the question used to assess gender ("Are you a girl or a boy?") appropriately as it did not distinguish between assigned gender and gender identity.

Sixth, the fact that data was collected 18 years ago raises questions about the potential impact of technological developments on the relevance of the current findings. Youths spend far more time online today, and a larger portion of their social interactions happen through social media than it did 18 years ago (Smith et al., 2021). Social media use has been tied to both positive and negative experiences of social inclusion (Smith et al., 2021), and has consistently been tied to negative body image and negative appearance comparisons among youths (Fardouly & Vartanian, 2016; Jarman et al., 2021), factors which appear highly relevant for SASE and PASE. Furthermore, Norwegian youths today may have more easy access to information about pubertal changes and worries than earlier, for example through web resources where they can read and ask questions anonymously. The ways in which this may impact the factors explored in the current study and the relationships between them are unknown, but would be interesting to explore.

Seventh, the current research was somewhat limited by reduced statistical power due to small sample sizes when dividing the sample into different groups (girls/boys and pubertal/non-pubertal). In several cases, associations had to be up to moderate size in order to be detected with reasonable certainty in the current sample (see further details in Appendix D). Furthermore, differences between groups had to be relatively large to be correctly detected in most cases, and the statistical significance of group differences was therefore only calculated in one case. As mentioned throughout the results section, this may explain some of the nonsignificant results, and may mask some effects. However, it also indicates that the

significant effects found are not simply coincidental effects that have reached significance only due to a large sample size.

Finally, it is once again worth noting that the present study could not determine any directional, causal or longitudinal effects due to the design of the study. This should be considered in future research, as outlined below.

6.3 Implications and Future Directions

As stated in the introduction of this thesis, a large body of research has linked adolescent self-esteem to a multitude of important life outcomes, including physical and mental health (e.g. Baumeister et al., 2003; Sowislo & Orth, 2013; Trzesniewski et al., 2006; Zeigler-Hill, 2011), academic achievements (Di Giunta et al., 2013), later job satisfaction (Judge & Bono, 2001), economic prospects and criminal conduct (Trzesniewski et al., 2006) – to name a few. As a consequence of this, higher self-esteem levels in the population have become desirable, and interventions to boost self-esteem levels or prevent low self-esteem have been initiated (Baumeister et al., 2003). Some researchers have criticized this, pointing to the correlations between self-esteem and life outcomes being low to moderate, that causal effects have not been consistently demonstrated, self-esteem boosting interventions have failed to change self-esteem or the desired life outcomes and that boosting self-esteem may even have undesirable effects such as decreasing academic efforts and results (e.g. Baumeister et al., 2003; Boden et al., 2008). Many researcher do however, still argue for the importance and relevance of associations between self-esteem and life outcomes (e.g. Orth & Robins, 2014; Trzesniewski et al., 2006), including domain-specific self-esteem. Enhancing these more specific types of self-esteem may first of all be more practical, as they are more specified and more easily targeted in interventions. Second, they may enhance global self-esteem (Boyd & Hrycaiko, 1997; Harter, 1999). And third, they may mediate the observed relationship between global self-esteem levels and the desired life outcomes (Skaalvik & Hagtvet, 1990). Interventions aimed at boosting domain-specific self-esteem may therefore be more effective and practical, and dismissing self-esteem and its potential positive effects completely may be premature.

In light of this, the current findings have several implications. First, the difference in findings between SASE and PASE, between girls and boys, and between those who did and did not perceive themselves as pubertal, support the idea of considering differentiated and specific effects of self-esteem more carefully and moving away from global effects. For example, aiming to boost self-esteem through boosting maternal warmth could be effective for all youths

when it comes to SASE, but may only have a significant impact among boys who have reached puberty when it comes to PASE – if such directional effects exist. In general, the importance of considering different types of self-esteem, and also the effect of other factors such as gender and puberty, are highlighted by the current study.

Second, in extension of the point above, the positive associations between levels of maternal warmth and both SASE and PASE indicate that maternal warmth may be a path through which self-esteem in these two domains could be impacted. While a causal link cannot be determined, the findings do imply that increasing maternal warmth likely will not lead to lower levels of self-esteem, and that such efforts may be more fruitful in some groups (e.g. those who perceive themselves as pubescent, especially boys).

Third, the lack of gender differences for levels of SASE contrary to the typical finding that girls have lower self-esteem levels than boys, suggest that efforts to boost self-esteem are just as important among boys as among girls, especially in some groups. This is further supported by the finding that levels of PASE are lower among pubescent boys, and that associations between PASE and maternal warmth are the strongest in this group as well.

Fourth, the negative association between PASE and perceived pubertal status indicates that youths who perceive themselves as pubertal may be especially at risk of having low appearance self-esteem levels, making them an important group to consider when determining who to target in interventions.

Finally, the current work has implications for the field's understanding of the complex interplay between SASE, PASE, perceived pubertal status and levels of maternal warmth, especially in light of the differences in associations in different groups and for the different types of self-esteem. This should be taken into consideration in future research on these factors and in the planning of interventions.

To extend the knowledge on self-esteem, gender, puberty and warmth, future research should explore the relations between these factors in a longitudinal design with relatively frequent measurements, as also highlighted by other researchers (Pinquart & Gerke, 2019). This will allow for more accurate estimates of how the factors develop and interact over time, and it will make the exploration of directional effects possible. This was not done in the current study, due to the current thesis only having access to data from one wave of the longitudinal TOPP-study, and measurement differences of some variables across waves also making the data less suited for longitudinal explorations of the specific combination of factors explored here.

Additionally, comparing the effects of warmth, puberty and gender across more domains of self-esteem, including global self-esteem, would be relevant. As the current research

shows, patterns of associations and moderating effects were not similar for SASE and PASE, suggesting that patterns may also differ for other types of self-esteem. It would also be relevant to include reports on warmth from both fathers, mothers and the adolescents themselves, in order to explore how different respondents may impact associations found and to extend the generally lacking knowledge on paternal effects (Plunkett et al., 2007). Finally, using wider measurements of gender, warmth and puberty, including a measure of perceived timing and an objective measure of pubertal status, could contribute to illuminating the effects of these factors further.

Continuing to extend the knowledge within this field through an exploration of self-esteem and related factors is important as it may contribute to promoting positive life outcomes and preventing negative outcomes in the population at large.

7. Conclusion

In conclusion, the relationships between self-esteem levels, gender, perceived pubertal status and maternal warmth in early adolescence are significant and important, but at the same time relatively complicated. While the current research cannot determine any causal effects, the results do indicate that perceived pubertal status and maternal warmth are associated with levels of social acceptance self-esteem (SASE) and physical appearance self-esteem (PASE) among early adolescents, especially in some groups, such as boys who have reached puberty. The current study aimed to illuminate the relationships between these factors and bridge some of the knowledge gaps in the field. The results have contributed to this, for example by showing that there are no significant gender differences in levels of SASE, contrary to the otherwise robust gender difference in global self-esteem levels. Furthermore, the findings showed that that entering puberty may also be challenging for boys, despite the typical view that pubertal maturation is easier for them than for girls. Finally, the importance of considering the associations between self-esteem and potential related factors for different types of self-esteem and in subgroups, such as girls and boys and those who have and have reached puberty, was underscored by the different findings among these groups in the current sample. In sum, the current research has contributed to new knowledge within understudied areas of self-esteem research, thus contributing to work aimed at preventing negative development and promoting positive life outcomes in early adolescence.

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Appendices

Appendix A: Self-Esteem Items

Figure A1

Items Measuring Social Acceptance Self-Esteem (SASE)

FORHOLD TIL VENNER OG ANDRE

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 for deg. **(Husk å sette kryss på alle linjene.)**

		1 Aldri	2 Sjelden	3 Av og til	4 Ofte	5 Svært ofte
176	Jeg får lett venner					
189	Jeg synes det er ganske vanskelig å få venner					
190	Andre ungdommer har vanskelig for å like meg					

Note. Items originally collected from Harter's Self-Perception Profile for Adolescents (SPPA; Harter, 1988)

Figure A2

Items Measuring Physical Appearance Self-Esteem (PASE)

Når alt kommer til alt, hvor fornøyd er du med utseendet ditt? Kryss av for hvor godt utsagnene nedenfor stemmer for deg:

(Husk å krysse av for hver linje)

		1 Stemmer svært godt	2 Stemmer nokså godt	3 Stemmer nokså dårlig	4 Stemmer svært dårlig
141	Jeg er ikke fornøyd med utseendet mitt				
142	Jeg ønsker at kroppen min var annerledes				
143	Jeg ønsker at jeg så annerledes ut				
144	Jeg synes jeg ser bra ut				
145	Jeg liker utseendet mitt veldig godt				

Note. Items originally collected from Harter's Self-Perception Profile for Adolescents (SPPA; Harter, 1988)

Appendix B: Maternal Warmth Items

Figure B1

Items Measuring Maternal Warmth

BARNEOPPDRAGELSE

De følgende setningene beskriver noen aspekter ved barneoppdragelse. Vær snill å angi hvor ofte beskrivelsene gjelder for deg ved å sette et kryss i en av rutene utenfor hver påstand. Det er ingen svar som er riktige eller gale. Det er viktig at du er så ærlig som mulig når du setter kryss, slik at svarene til sammen skal kunne gi et variert bilde av foreldres ulike tilnærminger til barneoppdragelse:

		1 Aldri	2 Nesten aldri	3 Av og til	4 Ofte	5 Alltid
363	Du sier noe pent til barnet ditt eller roser når han/hun har gjort noe bra					
365	Du belønner barnet ditt ekstra når han/hun oppfører seg pent					
369	Du viser at du liker det når barnet ditt har gjort noe i huset					
376	Du roser barnet ditt hvis han/hun oppfører seg pent					
381	Du koser eller klemmer barnet ditt når han/hun har gjort noe bra					

Note. Items originally collected from the Alabama Parenting Questionnaire (APQ; Frick, 1999). Item 365 was excluded from the final analyses, see further details in section 5.1.

Appendix C: Fit Indices

Table C1

Fit Indices for SEMs Used to Calculate Regression and Correlation Analyses for Different Groups

	N	Missing	Df	Chi-Square	RMSEA	CFI	TLI
Regression, SASE on gender	542	5	2	.762	.000	1.000	1.001
Regression, PASE on gender*	534	7	9	.000	.124	.994	.993
Regression, warmth on gender*	587	3	5	.141	.034	.998	.998
Regression, puberty on gender	413	1	0	--	.000	1.000	1.000
Correlation, SASE - puberty							
Whole sample	543	9	2	.712	.000	1.000	1.002
Girls	295	7	2	.484	.000	1.000	1.002
Boys	248	5	2	.616	.000	1.000	.999
Correlation, PASE - puberty							
Whole sample	536	11	9	.000	.121	.994	.990
Girls	291	7	9	.000	.103	.996	.993
Boys	245	8	9	.000	.132	.992	.986
Correlation, SASE - warmth							
Whole sample	598	11	13	.110	.029	.998	.997
Girls	321	9	13	.432	.007	1.000	1.000
Boys	277	6	13	.539	.000	1.000	1.001
All reached puberty	310	10	13	.185	.033	.998	.996
All not reached puberty	103	3	13	.862	.000	1.000	1.008
Girls reached puberty	222	8	13	.800	.000	1.000	1.006
Girls not reached puberty	37	2	13	.294	.069	.997	.995
Boys reached puberty	88	5	13	.051	.091	.988	.981
Boys not reached puberty	66	3	13	.952	.000	1.000	1.017

	N	Missing	Df	Chi-Square	RMSEA	CFI	TLI
Correlation PASE - warmth							
Whole sample	598	12	26	.000	.067	.995	.993
Girls	321	9	26	.001	.057	.997	.995
Boys	277	7	26	.003	.059	.996	.994
All reached puberty	310	9	26	.002	.057	.996	.995
All not reached puberty	103	3	26	.004	.093	.994	.992
Girls reached puberty	222	8	26	.076	.044	.998	.997
Girls not reached puberty	37	2	26	.048	.118	.995	.993
Boys reached puberty	88	4	26	.729	.000	1.000	1.003
Girls not reached puberty	66	6	26	.184	.061	.997	.996

Note. N: Total number of observations. SASE: Social acceptance self-esteem. PASE: Physical appearance self-esteem. Warmth: Maternal warmth. Puberty: Perceived pubertal status. N: number of observations used in the analysis. Df: degrees of freedom. RMSEA: Root mean square error of approximation. CFI: Comparative fit index. TLI: Tucker-Lewis index.
*indicates that modification indices were run due to reduced fit, but the indices showed no relevant changes. SEM was therefore kept.

Appendix D: Power Analyses

Table D1

Statistical Sensitivity Power Analyses for Regressions of SASE and PASE on Gender

| | N | | Cohen's *d* |
	Girls	Boys	
SASE	290	245	.24
PASE	290	241	.24

Note. N: the number of observations used in the analysis (missing removed). The power analyses are two-tailed, alpha .05, statistical power .80. Cohen's *q* indicates regression coefficients needed to detect statistically significant gender differences in 80% of cases.

Table D2

Statistical Sensitivity Power Analyses for Correlations Between Perceived Pubertal Status, SASE and PASE in Different Groups

| Group | SASE and perceived pubertal status | | PASE and perceived pubertal status | |
	N	R	N	R
Entire sample	534	.12	525	.12
Girls	288	.16	284	.17
Boys	242	.18	237	.18

Note. N: the number of observations used in the analysis (missing removed). R: Pearson's *r* correlation coefficients. The power analyses are two-tailed, alpha .05, statistical power .80

Table D3

Statistical Sensitivity Power Analyses for Correlations Between Maternal Warmth, SASE and PASE in Different Groups

Group	SASE and maternal warmth		PASE and maternal warmth	
	N	R	N	R
Entire sample	587	.12	586	.12
Girls	312	.16	312	.16
Boys	271	.17	270	.17
All reached puberty	300	.16	301	.16
All not reached puberty	100	.28	100	.28
Girls reached puberty	214	.19	214	.19
Girls not reached puberty	35	.45	35	.45
Boys reached puberty	83	.30	84	.30
Boys not reached puberty	63	.34	60	.35

Note. N: the number of observations used in the analysis (missing removed). R: Pearson's *r* correlation coefficients. The power analyses are two-tailed, alpha .05, statistical power .80