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# The Role of Parenting Style and Parenting Stress during Preschool Age: Implications for the Child's Eating Behaviour

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*"You are allowed to be both a masterpiece and a work  
in progress, simultaneously."*

*- Sophia Bush*



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Par la présente, j'atteste avoir rédigé cette thèse sans aide extérieure non autorisée et que cette thèse n'a pas été présentée devant une autre faculté.

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Anaëlle Leuba



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## List of Abbreviations

APA	American Psychiatric Association
APQ	Alabama Parenting Questionnaire
BMI	Body Mass Index
CEBQ	Children Eating Behavior Questionnaire
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DD	Developmental Disabilities
ISEI	International Socio-Economic Index
OBSAN	Observatoire suisse de la sant.
OFS	Office Fédéral de la Statistique de la confédération suisse
PSS	Parenting Stress Scale
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation Score
SEM	Structural Equation Model
SES	Socio Economic Status
SRMR	Standardized Root Mean Squared Residual
TD	Typically Developing
TLI	Tucker-Lewis Index
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization



## Abstract

Eating behaviours are already beginning to establish at a young age. During preschool years, children gain physical and psychological autonomy from their parents, and at the same time, develop different behaviours, including those around food and eating. The preschool period is known to be a critical time for the child's development, and the development of problems in eating behaviours are known to be related to future underweight, overweight and obesity problems including their physical and psychological consequences, as well as eating disorders. According to the World Health Organization (WHO), there is a global obesity epidemic, and the ability to understand the child's underlying eating behaviours that can influence this trajectory is of critical importance. Publication 1 validated a German and French version of the Children's Eating Behaviour Questionnaire (CEBQ) and was demonstrated to be a valid instrument to be used among 2-6 year-old boys and girls. Further findings indicated a need to consider the cultural backgrounds of children.

Parents are the most prominent influence of preschoolers, and throughout their feeding practices, they will help the child build his/her own values and attitudes towards food. However, parents do not only influence their child's behaviour through these practices, but also via their own communication, attitudes and behaviours, that will help build their relationship with their child, and through their parenting styles. The parenting styles are believed to be understood within a dimension of positive versus negative, and have consequences for the well-being, as well as on the behaviours of the child. Publication 2 aimed at finding the associations between different parenting styles and the child's eating behaviours. Findings indicated an

important influence of negative parenting styles, especially inconsistency in parenting, that can be a risk factor in the development of eating behaviour problems in pre-schoolers.

From the results of publication 2, the question of stability of parenting styles throughout childhood has raised concerns for the well-being of the child. Depending on the context of the parent-child dyad, parents are more disposed to offer positive or negative parenting styles and therefore protect or jeopardize the child's development. Such pressure can elevate the perceived parenting stress and have direct and indirect consequences for the child, and is expected to alter parenting styles. Therefore, publication 3 aimed to evaluate the relations between parenting stress and different parenting styles, and to further investigate the stability of both parenting stress and parenting styles over a year during the preschool period. Findings indicated a high stability of parenting stress over the year, as well as for all parenting styles, especially inconsistent parenting. Some parenting styles further revealed small to medium decreases over the year, whereas others revealed medium to large increases in the same period. High level of parenting stress predicted lower levels of only corporal punishment, a year later. Findings of publication 2 and publication 3 indicate a need for deeper understanding of the mechanisms of parenting styles on the preschool child's eating behaviour, and to further investigate inconsistent parenting, which was found to be most related to eating behaviour, and the most stable parenting style, although not affected by parenting stress. The results of publication 3 suggest the need to emphasise consistency in parenting behaviour in family preventions and treatments for problematic eating behaviour.

## 1. Introduction

Research demonstrates an increase in children and adolescents suffering from a mental disorder in the last decades. However, a lack of recognition for their suffering in addition to a lack of access to treatment is concerning (OBSAN, 2019; WHO, 2021), and problems in the development of the child, such as eating behaviour problems and disorders, should not be overlooked. Rates of overweight and obesity have shown a steady increase from the year 2000 also in children and adolescents, and continues to increase (UNICEF, WHO & World Bank Group, 2020), and can result in psychological and somatic consequences (Must & Strauss, 1999). Already setting roots during preschool years, eating behaviour is associated with increases in weight, and can be a risk factor for eating disorders later during childhood or adulthood (Powell et al., 2018; Randi et al., 2010; Wang & Lobstein, 2006). The child's environment plays a great part in the development of their eating behaviour, and during preschool years parents are the most important influencers on the trajectory of the development of eating behaviour (Ashcroft et al., 2008; Birch, 1979; Faith et al., 2013). Not only through feeding practices, but also in the way they communicate with their child, parents implement habits and foundations for future eating behaviours (e.g., Birch et al., 1987; Darling & Steinberg, 1993). Parenting styles comprise the different attitudes and behaviours of the parents that they use to communicate with their children, and help create an emotional climate within the parent-child dyad (Baumrind, 1971). As part of the determinants of parenting (Belsky, 1984), parenting styles have potential protective or risk factors on the child's development, alongside other factors such as the stress parents perceive in their role

of parent (e.g., Cooklin et al., 2012; Deater-Deckard, 2004; Kuppens & Ceulemans, 2019).

The present thesis presents different objectives: to examine eating in a multicultural sample of pre-schoolers and how parenting styles are related to those eating behaviours. Moreover, with parenting styles being associated with the child's outcomes (i.e. psychosocial, psychological, developmental), one of the objectives is to explore the stability of parenting styles, and how parenting stress and parenting styles are related during preschool years. Furthermore, the results of the three publications are discussed in line with a theoretical model of parenting and with future directions for research.

The present thesis consists of three parts: the first publication that aimed to validate a widely used questionnaire to assess the child's eating behaviour, the Children's Eating Behaviour Questionnaire (CEBQ; Wardle, Guthrie, Sanderson & Rapoport, 2001) will be discussed. To illustrate the state of mental health in preschool children, child eating behaviour will be further included as an outcome in the second publication. Following the theme on eating behaviour in children, in the second section, different domains of parenting will be presented in order to differentiate them from one another. As the field of parenting is wide and encompasses varying concepts, the present thesis will address the general concepts that are relevant to the parent's characteristics, and in the second and third parts of the thesis there will be a focus on parenting styles and parenting stress. In the fourth section, findings of the three publications will be discussed within the current state of research. The relevance of parenting in the aetiology of behavioural problems in children at preschool will be put in perspective with much needed prevention and treatment

interventions. Finally, at the end of the thesis, suggestions for further research to enhance understanding of the interactions between eating behaviour, parenting styles and parenting stress will be offered.

The objective of publication 1 was to validate a French and German version of the CEBQ in a sample of healthy Swiss preschool children. To date, no studies have offered a validation of the CEBQ in these cultural backgrounds and only one has validated the CEBQ within a multi-cultural sample of preschool children (Mallan et al., 2013). The aim was therefore to evaluate gender differences, language differences and age differences in a large sample of 2-6 year-olds.

Publication 2 aimed at exploring the associations between different parenting styles (negative and positive) and the child's eating behaviour of the same sample as in publication 1. As studies have focused on the relationship between parenting styles and other behaviours of children, such as conduct problems (Essau et al., 2006), and the associations between feeding practices and the child's eating behaviour (e.g., Blissett et al., 2011; Ek et al., 2016), little is known about the direct associations of parenting styles and child's eating behaviour during preschool age. Therefore, publication 2 aimed to better understand those associations and the consequences that can unfold.

Publication 3 aimed to understand the possible determinants of parenting and how they can alter one another within the same sample as in publication 1 and 2. The differing parenting styles are examined at baseline and at 1-year follow-up, alongside parenting stress. Further, the potential associations between the two variables are

examined. Therefore, publication 3 aimed to better understand the stability of parenting styles and parenting stress throughout preschool years.

## 2. Mental health and eating behaviours in children

### 2.1 Relevance of mental health during childhood

Globally, 14% of adolescents are believed to suffer from a mental disorder, however not all of them have access to treatment or recognition of their suffering (WHO, 2021). According to UNICEF (2021), 37% of Swiss adolescents from 14 to 19 years old suffer from mild to severe symptoms of anxiety and/or depression, and this has recently increased due to the COVID pandemic, as 47% reported that their mental health had worsened since the start of COVID-19. In Switzerland, the second wave of the COVID pandemic drastically increased the psychological distress in 18 to 29-year olds, and an increase of 6% was observed in the hospitalization of children due to psychological distress (OBSAN, 2022). Prior to the pandemic in 2017, 31 in 1,000 children and adolescents were receiving outpatient psychiatric treatment, which already showed an increase of 7.3% in comparison to the year before (OBSAN, 2019). Furthermore, these data show a steady increase of 70% from 2006 until 2017 for children and adolescents in psychological treatment. Still, according to OBSAN (2019), and again, between 2006 and 2017, this number had more than doubled, with a 134% increase of registrations for psychological treatment. Registrations for hospitalization for psychological treatment for children and adolescents until the age of 18 years old, the rates are 0.3%, with a significant increase of hospitalization between 2012 and 2017 (OBSAN, 2019). In sum, the evidence indicates a substantial increase of mental

health problems in children and adolescents that needs to be addressed to prevent further increases.

Although the data are limited for young and preschool children, it is important to detect psychological problems as early as possible to prevent progression across childhood, as they can then persist during childhood, adolescence and adulthood (Bosquet & Egeland, 2006; Briggs-Gowan & Carter, 2008; Lavigne et al., 1998; Reef et al., 2011; Tram & Cole, 2006; Weeks et al., 2016). Relatedly, half of American adults suffer from a psychological disorder at least once in their life, and often the first onset appears during childhood (Kessler et al., 2005). Despite the relevance of understanding the early onset of psychopathologies, there are some concerns about diagnosis during preschool age, such as the fear of “overpathologising” children, negatively influencing their self-image when ongoing physical and neural development could potentially outgrow their difficulties, and the challenge in distinguishing clinically significant problems at a young age (see Egger & Angold, 2006). However, the prevalence of problematic behaviour is between 14 to 26.4% of children at preschool age, with general anxiety disorder, oppositional defiant disorder, conduct disorder and attention-deficit hyperactivity disorder being the most prevalent (Albano et al., 2003; Bufferd et al., 2012; Earls, 1980; Keenan et al., 1997; Lavigne et al., 1996; Sawyer et al., 2001; Thomas et al., 1991). A three year-old who meets the criteria for a diagnosis has five times more risk to meet the criteria at 6 years old than another child who did not meet the criteria earlier (Bufferd et al., 2012). Moreover, early internalizing problems (depression and anxiety) at 2 and 4 years old are a predictor for further internalizing problems at 7 years old (Bayer et al., 2010). Thus, the continuity of psychological problems during childhood and adulthood

contradicts the idea that children can simply outgrow their difficulties. Furthermore, despite the alarming lack of recognition of psychological distress, as well as the lack of implementation of psychological treatment for these children (Egger & Angold, 2006), in the USA, the prescription of medication has been steadily increasing for preschool children (see Fanton & Gleason, 2009). The early onset of psychiatric disorders must be understood from the earliest point, including at preschool age, in order to prevent further development and complications (Egger & Angold, 2006; Kessler et al., 2005). Thus, caring for children as they develop and gain their autonomy is extremely relevant to prevent many problems that might arise in the future.

Another problematic trend is the increase in childhood weight problems. Statistics from 2017 in Switzerland reveal an increase since 1992 of overweight and obesity cases within 15 years old children and above (OFS, 2020). For children under the age of 5 years old, the trend is similar. Indeed, a report from UNICEF, WHO and World Bank Group (2020) shows a steady increase in cases of obesity and overweight children between 2000 and today, especially in southern Asia and northern America. In Europe, overweight prevalence in preschool children between 2006 and 2016 was 17.9%, and 5.3% for obesity, with southern countries showing the highest prevalence (Garrido-Migue et al., 2019). In Switzerland, the prevalence of overweight and obesity is of 9.2% and 3% respectively (Stamm et al., 2014). As the prevalence increases over the years (Jeannot et al., 2015), it points to the relevance of problematic early onset. As societies become more sedentary, and thereby increasing the lack of physical activity, the risk for overweight problems are higher (LeBlanc et al., 2012; WHO, 2019). Overweight and obesity during childhood can then entail short and long-term sequelae, both psychological and somatic, such as cardiovascular risks, diabetes, or

low self-esteem through discrimination, for instance (Must & Strauss, 1999; Washington, 2011), and an increased risk of overweight and obesity as an adult (Singh et al., 2008).

## 2.2. Eating behaviour during childhood

Such consequences can be predicated by eating behaviours, and already at an early age. Eating behaviour is a complex term that refers not only to eating-related disorders and problems related to weight, but also to food choices, diets and attitudes towards food (LaCaille, 2013). After being fed by caregivers, the child further develops more independent eating behaviours that encompass the rapidity and enjoyment of eating, how the child responds to external food cues without being hungry, how the child is capable to feel satiety, the pickiness in the choice of food intake, and the possibility to use food as an emotional response (Carnell & Wardle, 2007). Eating behaviour problems are associated with an increased risk of unhealthy development, which can possibly lead to obesity or other eating disorders later on (Powell et al., 2018; Randi et al., 2010; Wang & Lobstein, 2006). Indeed, food approaching behaviours, such as emotional overeating, food responsiveness, and enjoyment of food, are associated with higher BMI among 3 to 13 year-olds (Domoff et al., 2015; Rodenburg et al., 2012; Viana et al., 2008) and higher cases of obesity in 6 to 12 year-olds (Santos et al., 2011), independent of gender (Jalkanen et al., 2017). This can be explained by findings indicating that increased responsiveness to food and more enjoyment of food are related to faster eating, to eating without hunger, to a higher total energy intake, and further behaviours related to increase in weight (Carnell & Wardle, 2007). Moreover, food approaching behaviours tend to increase

between 4 and 11 years old (Ashcroft et al., 2008), elevating the risk to gain weight during this period.

Among food approaching behaviours, emotional overeating is defined as a behavioural response to a negative event, as a dysfunctional self-regulation strategy that will generate more food intake, and thus increase risk of overweight and obesity (Wardle et al., 2001). A high level of emotional overeating during adulthood is associated with more food intake when confronted with a stressful situation (Tate et al., 2015; van Strien et al., 2012), as stress increases appetite and drives the individual to eat more sweet and high-caloric food (Epel et al., 2001). Children between 7 and 9 years old tend to eat more unhealthy food in an emotional state and thus increase the risk of gaining weight (Webber et al., 2009). Further, in 5-12-year olds, high levels of stress were found to be related to higher levels of emotional overeating (Michels et al., 2012). The risks of emotional overeating also implicate a possible loss of control in eating and are related to Binge-Eating disorder during adolescence (Stice et al., 2002). The prevalence of emotional overeating in American children between 5 and 13 years old is up to 63% (Shapiro et al., 2007), 27% in 4 to 6 year old American girls (Carper et al., 2000), 3.2% in 5-7 year olds from Denmark (Micali et al., 2016), and 1.1% in 2-6 year old Swiss pre-schoolers (Messerli-Bürge et al., 2018). The differing prevalence rates between studies could be explained by the age differences, and that older children have more risk to display this behaviour than younger children (Ashcroft et al., 2008).

There is a further aspect corresponding to the response of external food cues in the absence of hunger, such as the smell or exposure to food (Schachter, 1968; Wardle et al., 2001). This responsiveness is believed to be a main characteristic in

obesity and overweight, already at preschool age and is believed to persist throughout the ages (Carnell & Wardle, 2008; Epstein et al., 1996; Fisher & Birch, 2002), along with being a genetic characteristic (Faith et al., 2013).

Closely related to food responsiveness, enjoyment of food captures the subjective pleasure to eat in the presence or absence of hunger (Llewellyn et al., 2011; Quah et al., 2019; Wardle et al., 2001). The increase of food responsiveness and enjoyment of food as the child grows old can unfold by the shift of parental control over the child's food, given that the child is able to choose more freely from a wider variety of food (Ashcroft et al., 2008; Wardle et al., 2001). Moreover, as enjoyment of food is believed to be the opposite of food fussiness, which declines over time (Finnane et al., 2017; van der Horst, 2012; Webber et al., 2009), the increase of enjoyment of food through the child's development could be related to the decline in food fussiness. Further, higher enjoyment of food could help increase the intake of vegetables and new foods in preschool children with the help of daily exposure (Addessi et al., 2005; Wardle et al., 2003).

Desire to drink is also part of the food approaching eating behaviour. It refers to the desire to drink, most specifically sweetened beverages or more caloric beverages, or to have something in the mouth (Jalkanen et al., 2017; Sweetman et al., 2008; Wardle et al., 2001; Webber et al., 2009). The amount of drink intake can increase due to an increase in salty food intake (Webber et al., 2009), however the association between desire to drink and weight gain remains unclear: in samples of 6 to 12 year olds and 10 to 12 year old twins, there were no association (Santos et al., 2011; Sweetman et al., 2008), but in another sample of 5-6 year olds from Singapore, it was related to higher BMI (Quah et al., 2019). The lack of precision between the types of

beverages in the instruments used to assess this behaviour could explain the different results found in relation to weight (Mallan et al., 2013).

Expected to be on the opposite side of food approaching behaviours are food avoidance behaviours. These comprise behaviours such as satiety responsiveness, slowness in eating, food fussiness and emotional undereating, and appear to protect children from gaining too much weight and are therefore acting as protective factors for overweight and obesity (Domoff et al., 2015; Jansen et al., 2012; Sleddens et al., 2008; Viana et al., 2008). Additionally, food avoidance behaviours decrease between 4 and 11 years old (Ashcroft et al., 2008), due to the changing environment of the child, as food choices multiply and parents are less present to monitor food intake (Ashcroft et al., 2008; Blissett & Haycraft, 2008; Carnell & Wardle, 2008). Further, food avoidance behaviours are more present in girls, than in boys (Jalkanen et al., 2017; Santos et al., 2011).

Satiety responsiveness refers to the possibility to understand internal cues of hunger, and is related to less eating and thus less overeating. In children 4 and 5 years old, a higher satiety responsiveness is associated with less food intake when no hunger is present, less eating in general, and a better capacity to regulate the caloric consumption (Carnell & Wardle, 2007). Being responsive to satiety cues is strongly related to eating slower (Carnell & Wardle, 2007; Mallan et al., 2013; Quah et al., 2019; Webber et al., 2009) and these behaviours are believed to be learnt during infancy, but are quickly modified by the parents and the environment when parents' beliefs and attitudes towards food result in them encouraging their child to eat without acknowledging the child's satiety perception (Birch et al., 1987).

Other avoidant eating behaviours are related to physiological conditions in children. The rapidity of eating is another eating behaviour related to weight, in that fast eating is related to overweight and weight gain, and that slow eating is related to lower BMI (Carnell & Wardle, 2008; Viana et al., 2008; Wardle et al., 2001; Webber et al., 2009).

Food fussiness (Marchi & Cohen, 1990) – also called picky eating – is another food avoidant behaviour referring to a child refusing certain types of food, and often is associated with neophobia (see Cardona Cano et al., 2015). This behaviour is not only that the type of foods often refused are those that are considered healthy, such as vegetables, but it also includes that the child might prioritize high caloric food and thus develop an unhealthy diet (Jacobi et al., 2003; Kutbi, 2021; Taylor et al., 2015). The prevalence of food fussiness tends to peak at 3 years old (27.6%) and is reduced by half at 6 years old (Cardona Cano et al., 2015). However, Dubois et al. (2007) found a high stability during early childhood between 2.5 and 4.5 years, alongside Marchi and Cohen (1990), who found a high stability between 1 and 10 years, and Jacobi et al. (2008) between 8 and 12 years. It is suggested that half of the children that were picky eaters before the age of 6 years continue to have this problem over more than 2 years (Mascola et al., 2010). However, Mascola and colleagues (2010) suggest that this behaviour has an early onset during preschool age, and that the early onset cases are the ones that recover faster. As picky eating is a risk factor for later development of Anorexia Nervosa (Marchi & Cohen, 1990), the early detection of this behaviour to prevent development of later eating disorders is of high importance.

Emotional undereating is found on the opposite side of emotional overeating and describes the avoidance of food intake when under emotional arousal (Messerli-

Bürgy et al., 2018; Wardle et al., 2001). Prevalence of emotional undereating in Swiss preschool children was reported to be 32.9% (Messerli-Bürgy et al., 2018) and of 26% in 5-7 year olds (Micali et al., 2016). Alongside overeating, reactions to an emotional arousal and stress conditions can trigger a reduction in food intake. It is suggested that depending on the individual's physiological response to stress, this will influence subsequent eating behaviour (Epel et al., 2001). However, in preschool children, emotional overeating and undereating were positively correlated in a multi-cultural sample (Mallan et al., 2013), suggesting that the two behaviours are not excluding each other at that age period. Moreover, emotional undereating as a food avoidant behaviour, is thought to be related to lower BMI (Domoff et al., 2015; Sleddens et al., 2008; Spahić & Pranjić, 2019). However, studies have also yielded other mixed findings, with some finding that emotional undereating was related to higher BMI (Webber et al., 2009), not associated with BMI (Quah et al., 2019; Santos et al., 2011; Spence et al., 2011; Svensson et al., 2011), both to higher and lower BMI (Messerli-Bürgy et al., 2018), or only little association (Domoff et al., 2015; Viana et al., 2008). It is suggested that parents do not correctly perceive the emotional eating of their preschool children, hence the inconsistency in association between BMI and emotional undereating (Quah et al., 2019). However, this behaviour tends to diminish by the end of the preschool period (Ashcroft et al., 2008; Svensson et al., 2011).

Eating behaviour problems are believed to set at a young age (Carnell & Wardle, 2008) and preventing such behaviour at the source could protect children from developing disorders. Already at 2-3 years old, the main characteristics of eating behaviours are establishing and they demonstrate a continuity throughout childhood (Ashcroft et al., 2008; Dubois et al., 2007; Powell et al., 2018; Skinner et al., 2002).

Moreover, preschool age is a critical period in the development of emotion regulation, and emotional eating behaviour can be used as an emotion regulation strategy (Messerli-Bürky et al., 2018) setting the tone for later food preferences, food intake and BMI (Birch & Fisher, 1998; Powell et al., 2018). Preschool age is also the period where early signs of behavioural problems arise (Clerkin et al., 2007), and it is important to evaluate the developmental trajectory of eating behaviours at young ages (Powell et al., 2018). Hence, it is relevant to focus on evaluating any form of problematic eating behaviour at that age period when problematic eating behaviours can take roots and grow, in order to prevent further problematic development.

### 2.3. Assessing children's eating behaviours

Although biological factors play a role in the development of obesity and other weight-related problems, individual differences can mediate the genetic factors (Faith et al., 1997, 2004). It is necessary to understand the behaviours that could be implicated in the causality of obesity, meaning that in order to prevent the development of obesity, it is important to understand what kinds of eating behaviours can lead to such development (Wardle et al., 2001). The observation and evaluation of pre-schoolers' eating behaviours are more restricted than with those of older children and with adults, as self-reports are not possible at such a young age. Thus, there are two options: observational assessments or parental reports. Although the main advantage of observational assessment is the objectivity of the evaluation by professionals, it is more demanding, both in terms of materials and time, and consequently, more expensive. It also limits the observation of the behaviour at a given time making it difficult to generalize (Ashcroft et al., 2008), and may alter the

child's behaviour due to the sensation of being observed (Wardle et al., 2001). Further, specific behaviours are usually the focus and it may narrow the overview (Carnell & Wardle, 2007). On the other hand, parental reports are easily distributed and more affordable. With the latter, more individuals can be evaluated and thus allows for a generalization of the behaviours. Psychometric measures better reflect the daily behaviours and procure a good alternative to laboratory assessments (Carnell & Wardle, 2007). Furthermore, maternal reports have been found to be valid when concerning the child's eating behaviours (Chatoor et al., 1998; Powell et al., 2018), however it is inconsistent when it was related to their own feeding practices (Farrow & Blissett, 2005; Powell et al., 2018). One explication to these findings may be that it is more difficult to be objective with one's own behaviours compared to that of others. However, social desirability bias may influence self-reports and be even stronger in parental reports, which are indirect measures of the child's behaviour. Nevertheless, parents of pre-schoolers are in a good position to observe their child's eating behaviours, can procure valuable indications, and are suggested to be a reliable source to observe daily behaviours (Ashcroft et al., 2008; Carnell & Wardle, 2007).

#### 2.3.1. The Children's Eating Behaviour Questionnaire

To understand underlying behavioural traits of eating, instruments have been developed to evaluate various dimensions of the child's eating behaviours. For example, the Child Feeding Questionnaire (Birch et al., 2001) evaluates the feeding practices of parents towards their child; the Child Eating Behaviour Inventory (Archer et al., 1991), assesses mealtime problems, such as choking issues, comparison of specific behaviours expected at the child's age, and other behaviours concerning

more specifically the context of mealtime than the eating behaviour itself. However, across these instruments, a lack of perspective of the child's eating behaviour per se, is notable. Braet and Van Strien (1997) have addressed this issue by creating the Dutch Eating Behaviour Questionnaire, which is a parental report questionnaire assessing external eating, emotional eating, and restrained eating, that has been validated in a sample of 9 to 12-year olds. Although this instrument is useful in its ability to directly assess the child's eating behaviour, only a few aspects of eating are covered, and therefore, it may be limited (Wardle et al., 2001). In order to further understand the precursors of obesity and other eating disorders within preschool age, Wardle and colleagues (2001) developed the Children's Eating Behaviour Questionnaire (CEBQ), a psychometric instrument that is based on literature, interviews with parents, and experimental observations, and assesses eating behaviour in young children via parental report (see Wardle et al., 2001). Advantages of this questionnaire include the large possibilities for application, convenience, as well as the integration of behaviours that occur across different situations to understand behavioural traits (Carnell & Wardle, 2007). However, the lack of cut-off values in the CEBQ hinders the possibility to understand when a certain behaviour starts to be problematic.

The CEBQ measures eight aforementioned dimensions of eating behaviours: food responsiveness, which measures the responsiveness to external cues like seeing food; emotional overeating, measuring the intake of food as a dysfunctional coping strategy during a stressful event; enjoyment of food, measuring the pleasure to eat with or without hunger; desire to drink, measuring the need to have access to drink and/or sweetened drinks; satiety responsiveness, measuring the responsiveness to

satiety cues; food fussiness, measuring the attitude towards food types; slowness in eating, measuring the speed of the intake; and emotional undereating, measuring the tendency to eat less than usual when emotions are overwhelming (Carnell & Wardle, 2008; Messerli-Bürgy et al., 2018). The eight subscales of the CEBQ are further distinguished in two opposite dimensions in some studies, with food approaching behaviours comprising food responsiveness, emotional overeating, enjoyment of food and desire to drink, and food avoidance behaviours comprising satiety responsiveness, food fussiness, slowness in eating and emotional undereating (Ek et al., 2016; Mallan et al., 2013; Quah et al., 2019; Sleddens et al., 2008; Svensson et al., 2011; Webber et al., 2009).

The CEBQ has been validated in several samples comprising different ages, and translated to several languages. The original 8-factor structure, validated in a sample of 3 to 8 year-olds from England (Wardle et al., 2001), was confirmed in low-income American families of 3-4 year-olds (Domoff et al., 2015), in 3 to 8 year-olds in Sweden (Ek et al., 2016), and in three different ethnically and culturally diverse samples in Australian children 1 to 5 years old (Mallan et al., 2013). Other studies have found a modified factor structure to be a better fit for their sample, with a 7-factor structure among 1 to 13 year-olds from different countries across Europe and South America (Jansen et al., 2012; Santos et al., 2011; Sleddens et al., 2008; Svensson et al., 2011; Viana et al., 2008), and a 6-factor structure among pre-schoolers in Singapore (Quah et al., 2019). These differences in the structure found in diverse studies could be explained by several factors related to the sample. For example, some differences might possibly be due to different cultural populations, as Mallan et al (2013) demonstrated in their study with Australian participants of three ethnically and

culturally different samples: Chinese immigrants, Indian immigrants and a sample of participants born in Australia. Although the original 8-factor structure had an acceptable fit, slight changes had to be made within the items of CEBQ for both samples from immigration backgrounds to obtain an acceptable model fit. Furthermore, in translated versions of the CEBQ, modifications of the structure were made to obtain a better model fit in European and Asian countries (e.g., Cao et al., 2012; Sirirassamee & Hunchangsith, 2016; Spahić & Pranjić, 2019).

Findings on the effects of gender on eating behaviours remains somewhat limited and mixed in young children. Higher food fussiness can be found in girls in toddlers (Cao et al., 2012), whereas it is lower in girls between 6 and 12 years old (Santos et al., 2011; Sleddens et al., 2008), and was also found to be lower in boys of 6 to 8 years old (Jalkanen et al., 2017). Moreover, food approaching behaviours were found to have no differences between genders (Jalkanen et al., 2017). However, between cultures, gender can have differing effects on eating behaviours. Indeed, 6-7 years old boys showed less enjoyment of food than girls (Sleddens et al., 2008), compared to 6 to 11 years old in Thailand who showed the opposite effect (Sirirassamee & Hunchangsith, 2016). However, information on differences in gender across different cultures are lacking.

Age may also be an explanatory factor requiring consideration as shown in the study by Quah et al. (2017), where repetitive assessments over one year revealed different findings. Further, depending on the age, children might only be staying in their family's environment most, but not every day, as others might have other external influences, for example in day-care centres or with grandparents. Parents may then have less insight into their child's eating behaviours, and this could

influence the results if not controlled for. This cumulative evidence on the influence of cultural, gender and age factors call for potential modifications in the factor-structure of the CEBQ and underlines the need for more CEBQ validations in different cultures (Mallan et al., 2013). To date, no validation of the CEBQ in a multi-lingual European country among pre-schoolers can be found. Furthermore, the assessment of eating behaviours and the validation of the CEBQ in a wide age-range throughout the preschool period in a multi-cultural sample of French and German speaker has not yet been conducted. Therefore, information on pre-schoolers' eating behaviour in French and German speakers is lacking.

#### 2.4. CEBQ validation with publication 1

##### 2.4.1. Aim of publication 1

The objectives of *publication 1* were to validate the CEBQ in French and German in a sample of pre-schoolers in Switzerland, and to evaluate the factor-structure of the original version (Wardle et al., 2001). The 8-factor structure has some inconsistencies in the literature, and it has been demonstrated that sample characteristics could influence the results. Due to the multilingual background of Switzerland, the possibility of differences were expected between the two language groups assessed.

##### 2.4.2. Method of publication 1

A large sample of 555 children (511 were retained for the analyses) between the ages of 2 and 6 years old (mean age of 3.85, SD=0.69), from both the French (24%) and German (76%) speaking parts of Switzerland were the participants of The Swiss Pre-schoolers' health study (SPLASHY), a prospective multi-site cohort study (Messerli-Bürky et al., 2016). Recruitment was done in childcare centres in five different

cantons (Aargau, Bern, Fribourg, Vaud and Zurich). The assessments were conducted once in November 2013, and a second time in October 2014, with new participants and simultaneously for a second assessment of those who already participated in November 2013. The present publication only assessed the first wave of assessments. After signing an informed consent form, parents received a link to complete a questionnaire, comprising among others, the CEBQ.

The CEBQ is found to be reliable for children aged 2 to 9 years (Carnell & Wardle, 2007; Wardle et al., 2001). It was translated by German and French native speakers who were fluent in English and working at the University of Fribourg, a bilingual university. Translations were made back and forth until no inconsistencies remained. The CEBQ includes 35 items in eight different subscales and for each item, parents can respond by using a 5 point-Likert scale, ranging from “never” (1) to “always” (5). In this publication, gender and Social Economic Status (SES) level of the child, as well as the language region where the family lived, were controlled.

#### 2.4.3. Main results of publication 1

First, a confirmatory factor analysis (CFA) was conducted on the original 8-factors structure by Wardle et al. (2001), revealing a poor model fit (TLI = 0.920, CFI = 0.929, RMSEA = 0.069 and SRMR = 0.081). Further analyses revealed a better model fit when the factor ‘desire to drink’ and its three items were removed, in addition to the removal of two other items (23 and 28), (due to high loadings on several other factors), and the transfer of item 3 from satiety responsiveness to enjoyment of food, as it loaded much higher on the latter. The proposed 7-factors structure model had a satisfactory fit (TLI = 0.952, CFI = 0.957, RMSEA = 0.061 and SRMR = 0.068) and the

reliabilities of the seven factors, ranging from 0.66 (satiety responsiveness) to 0.90 (food fussiness) were comparable to the internal consistencies of the original factor model. No influences of gender and age were found in the analysis. Only for satiety responsiveness and enjoyment of food did the language region revealed an influence, as French speaking children showed higher values of satiety responsiveness and lower values of enjoyment of food than the German speaking group.

#### 2.4.4. The contributions of publication 1

The highlights of *publication 1* include first, the validation of the CEBQ in a French and German speaking Swiss sample of pre-schoolers, ensuring that a translation in French and German is valid among pre-schoolers, as it has been done within English speaking countries, European countries and Asian countries (Cao et al., 2012; Domoff et al., 2015; Lee et al., 2009; Mallan et al., 2013; Sirirassamee & Hunchangsith, 2016; Spahić & Pranjić, 2019; Svensson et al., 2011). Second, the findings revealed a more adapted factor model for this population. Even though the differences between the two language groups were minimal, it appears that it reinforces the notion that the CEBQ factor structure should be adapted according to the cultural background of the population. Indeed, the subscale 'desire to drink' was not retained in the present study, similar to the sample of 3-13 year-olds (Viana et al., 2008). The lack of validation for this subscale raises the question regarding the understanding of the items, and to what exactly the drink refers to. The original idea was to refer to high caloric and sweetened drinks (Sweetman et al., 2008; Wardle et al., 2001; Webber et al., 2009), but the lack of precision in the items could have misled the parents in the current samples, and they might have thought about any kind of drink, such as water

or other non-caloric drink. Therefore, this points to the lack of clarity of this subscale. The results regarding the subscale of 'desire to drink' could have also been related to the notion that children at that age less easily (and accurately) perceive the difference between hunger and thirst, and they might have consumed high-caloric beverage when hungry (Jalkanen et al., 2017). These results highlight the need for validation of the CEBQ in different cultures to gain deeper understanding as to how cultural background might influence not only eating behaviours, but also the perception of such behaviours by the parents (Quah et al., 2019). Nonetheless, since our diverging findings between French and German speakers might be due to chance effects, our results confirm that the CEBQ is a reliable tool to be used in a multicultural context (Mallan et al., 2013), for both genders, and for children in a wide age-range during the preschool period.

The *publication 1* can be found in appendix A.

Citation: Leuba, A. L., Meyer, A. H., Kakebeeke, T. H., Stülz, K., Arhab, A., Zysset, A. E., Leeger-Aschmann, C. S., Schmutz, E. A., Kriemler, S., Jenni, O. G., Puder, J. J., Munsch, S., Messerli-Bürgy, N. (submitted). Eating behaviour in Swiss preschool children – validation of a German and a French version of the Children's Eating Behaviour Questionnaire (CEBQ).

## 2.5. Relevance of the environment in eating behaviours in pre-schoolers

As food choices and preferences remain stable throughout childhood, this suggests a stability of problematic eating behaviours, which could perpetuate through time, and evolve into increasingly problematic behaviours, such as eating disorders or physiological problems (Ashcroft et al., 2008; Powell et al., 2018; Randi et al., 2010; Smink et al., 2012; Wang & Lobstein, 2006). To modify undesirable behaviours, it may be necessary to understand the potential influences of such behaviours.

Although many individual and contextual factors can influence the development of eating behaviours during childhood, parents still maintain the primary role in the development of the food environment of the child. Furthermore, food choices presented to the child play a part in food preferences development, and reinforce certain types of eating behaviours (Birch, 1979; Carnell & Wardle, 2008). Although young children are sensitive to internal cues and are capable to regulate their energy intake, resulting in a higher responsiveness to satiety (Rhee, 2008), feeding and parenting practices may unconsciously alter those reflexes and capacities, and override them. Consequently, parental and feeding practices could enhance the relevance of environmental factors in the child's eating behaviour and development (Birch & Davison, 2001; Van Der Horst & Sleddens, 2017). Furthermore, parents may reinforce genetic factors for overweight status by providing an environment that promotes the development of those genes and further help the development of the child's food preferences (Birch & Davison, 2001; Breen et al., 2006; Jahnke & Warschburger, 2008; Skinner et al., 2002). Parents may also be influenced by their beliefs on how the child is supposed to behave towards food and further impact the genetic predisposition of the child (Ek et al., 2016; Faith et al., 2013; Kral & Rauh,

2010; Svensson et al., 2011). Parents provide certain beliefs and attitudes towards food that will influence the child later on (Rhee, 2008), and examining how those beliefs and attitudes are transmitted through generations is necessary to further understand the development of eating behaviours during childhood (Frick et al., 1999). The preschool period is an important transition phase, where parents are still the main providers of food, and the most prominent influencers of eating. However, it is also a time where pre-schoolers begin to develop a certain autonomy with food environment and no longer only depend on their parents to feed them (Birch, 2002). Primarily, it is a key period for the development of the child's eating behaviour, food intake and BMI that will become more entrenched and affect future food choices and preferences over childhood, adolescence and adulthood (Ashcroft et al., 2008; Powell et al., 2018). Moreover, the food environment of children is a strong predictor for the behavioural changes over the child's development (Ashcroft et al., 2008). If we can gain a better understanding of the influence of parents on the child's eating behaviour during that time where it starts stabilizing, it will allow us to better prevent problematic eating behaviours and the complications that can occur at that time, or later on (Mascola et al., 2010).

### 3. Parenting behaviours

Parents have many duties towards their children and many ways to interact and influence them, and to that end, parents may display different types of behaviours. The child's rearing can have different impact on the relationship between the parent and the child, and can have consequences on the child's development (e.g., Baumrind

& Black, 1967; Belsky, 1984). During early childhood and throughout the preschool period, children are dependent on their parents and rely on them for their development (Taraban & Shaw, 2018). Thus, parents are the strongest influence at that age, and they can influence the child on different levels that are specific to certain behaviours.

### 3.1. Feeding practices

Feeding practices such as the use of reward, have been assessed in many studies to observe their influence on the child's eating behaviour. During preschool age, these behaviours from parents can be encouraged by their misguided expectations of their child's eating behaviour and have unwanted consequences (Birch et al., 1987; Ek et al., 2016; Leung et al., 2012). Research indicates that there are multiple associations between feeding practices and child's eating behaviours. For example, in a review by Faith et al. (2013), results showed that more restriction was related to more eating without hunger and lower caloric compensation, as when too much indulgent feeding practice is related to higher BMI. Furthermore, in children between 2 and 8 years old, more pressure to eat was related to less enjoyment of food and the child ate more slowly, whereas restriction was associated to more emotional overeating and unhealthy snack intake (Blissett et al., 2011; Boots et al., 2015). Restriction by mothers is also related to higher food intake, especially in girls, although the causality effect is unclear, as mothers who use more restriction have daughters with higher BMI (see Birch, 2002). This relates to the idea that particular behaviours from the child can impact the parent feeding practice as well. Indeed, in 3-8 year-olds, if the

child was highly avoiding food, parents were more likely to then pressure the child to eat (Ek et al., 2016).

### 3.2. Parenting practices and parenting styles

Related to feeding practices, parenting practices more broadly refer to what parents do to prevent unwanted child's behaviours and reinforce desirable child's behaviours (Darling & Steinberg, 1993; Walker & Kirby, 2010). Feeding practices are therefore a specific component of parenting practices, referring to the domain of food. Parenting practices refer to the content of parental behaviours in their interaction with their child, and can be distinguished from parenting styles which are understood as the establishment of an emotional environment around the interaction between the child and parent, and about how parents apply their practices (Baumrind, 1971; Darling & Steinberg, 1993). However, the two concepts are related and parenting practices are suggested to be factors of parenting styles (Russell et al., 1998), and parenting styles can also determine if a parenting practice will be efficient or not. Depending on the manner in which a rule or a demand is brought by the parent, the child might be more likely to accept it (Darling & Steinberg, 1993). According to Darling and Steinberg (1993), parental goals for socialization and their own values of life have an influence on both their parenting style and parenting practices. Parenting practices have a direct impact on the child's outcomes, and the parenting style acts as a moderator on this influence. However, a direct influence of the parenting style on the child's outcome remains unclear as it was seldom evaluated. Nonetheless, parenting style still influences the willingness and reaction of the child on the socialization education

via the parent. Therefore, certain parenting styles could help the child more easily accept certain parenting practices (see Darling & Steinberg, 1993).

However, boundaries between parenting practices and parenting styles are sometimes blurry and misused, and studies tend to use various terminologies such as 'parenting dimensions', 'parenting behaviours' or 'conducts', 'parenting practices' or 'parenting styles', without always clearly stating a definition. Therefore, to enhance clarity, the concept of parenting styles in the current thesis will be used and defined as an assemblage of attitudes and practices parents display to invite their child to socialization (Dallaire & Weinraub, 2005; Darling & Steinberg, 1993).

### 3.2.1 Stability of parenting styles

The stability of parenting styles throughout childhood remains uncertain. Some believe that it is stable throughout the development of the child (Baumrind, 1971; Dallaire & Weinraub, 2005; Rhee et al., 2006; Russell et al., 1998), while others believe that characteristics such as the age or behaviour of the child force the parent to adapt their parenting style to the situation (Frick et al., 1999; Paikoff & Brooks-Gunn, 1991; Smith et al., 2000). However, as the terms 'parenting practices' and 'parenting styles' are sometimes used interchangeably, it may confuse the results and the future use of those concepts. It is suggested that parenting practices, as part of parenting styles, are more adaptive to the context and the child's characteristics, but that parenting styles themselves are understood as more stable than parenting practices and thus, comparable to traits (Dallaire & Weinraub, 2005; Darling & Steinberg, 1993).

### 3.3. Topology of parenting styles

The topology of parenting styles derives from one of the main pioneers of the conceptualisation of parenting styles, Baumrind, who defined three central types reflected in the dimensions of demandingness (parents set rules and limits and ask of the child for mature behaviour) and responsiveness (parents display warmth and understand the needs of their child; Balantekin et al., 2020; Baumrind, 1966). As one of the main styles, authoritative refers to the most positive parenting style, where the parent is warm, rational and will share reasoning with the child for one decision or another, independently from the child's acceptance of such a decision. Rules are clear and exist to keep a structure and to help monitoring the child's behaviour. Nonetheless, the parent is receptive to the needs of the child and helps him/her to develop their autonomy (Balantekin et al., 2020; Baumrind, 1971). Regarding negative parenting styles, two main styles exist according to the original topology: authoritarian and permissive. Authoritarian is considered an extreme of a dimension with permissiveness at the other extremity (Kuppens & Ceulemans, 2019). Authoritarian is described as a will to hold firm control over the child's behaviour, expecting the child to attain a certain standard that the parent has set. Obedience is valued, as much as respect for the parent's decisions and a lack of responsiveness to the child's needs and input is observable from the parent's side (Baumrind, 1966; Kuppens & Ceulemans, 2019). On the opposite extreme of authoritarian parents, permissive parents value the input of their child and allow him/her to choose how to develop their autonomy. A permissive parent presents oneself as a resource for the child to freely use whenever he/she wants and lacks demandingness towards the child (Baumrind, 1966, 1971; Kuppens & Ceulemans, 2019).

The original topology by Baumrind was further developed and expanded with other parenting styles. Maccoby and Martin (1983) first acknowledged a lack of a fourth parenting style on the axis of demandingness and responsiveness. Authoritative, being high on both demandingness and responsiveness dimensions; authoritarian being high on demandingness, but low on responsiveness; permissive being low on demandingness but being high on responsiveness, while a parenting style referring to parents being simultaneously low on demandingness and low on responsiveness was missing. This parenting style has since been termed neglectful, and is defined by parents who reject their child and who are not reinforcing independency and individuality (Baumrind, 1971; Maccoby & Martin, 1983). Later it was criticized for the lack of the concept of corporal punishment (parents hitting their child to correct a behaviour) and monitoring (parents are aware of the child's activities, planning and social relationships) (Dadds et al., 2003; Essau et al., 2006; Shelton et al., 1996). Furthermore, it was criticized for the need for more instruments to be developed in order to evaluate parents of school-aged children and pre-schoolers (Clerkin et al., 2007; Frick, 1991). Additional behaviours of parents were included, such as parental involvement, consisting of how parents are participating in activities with their child, but also how they consciously educate their child (responsible parenting), and to evaluate the consistency in their attitudes towards their child (inconsistent parenting) (Clerkin et al., 2007; Frick, 1991; Reichle & Franiek, 2009). However, there is a need for caution in the use of different topologies as categories, as it induces a lack of flexibility in the parenting styles' dimensions, where parents can display more than one parenting style (Kuppens & Ceulemans, 2019; Mandara, 2003).

### 3.4. Determinants of parenting

Research has primarily focused more on what parents do, and less on why and how they do what they do. However, the recognition of the need to enhance understanding of the aetiology of problematic behaviours in children has been increasing, reflected by the number of studies on this topic. Understanding how dysfunctional parenting can play a role in the development of problematic behaviours and disorders in children is important for the development of more effective interventions.

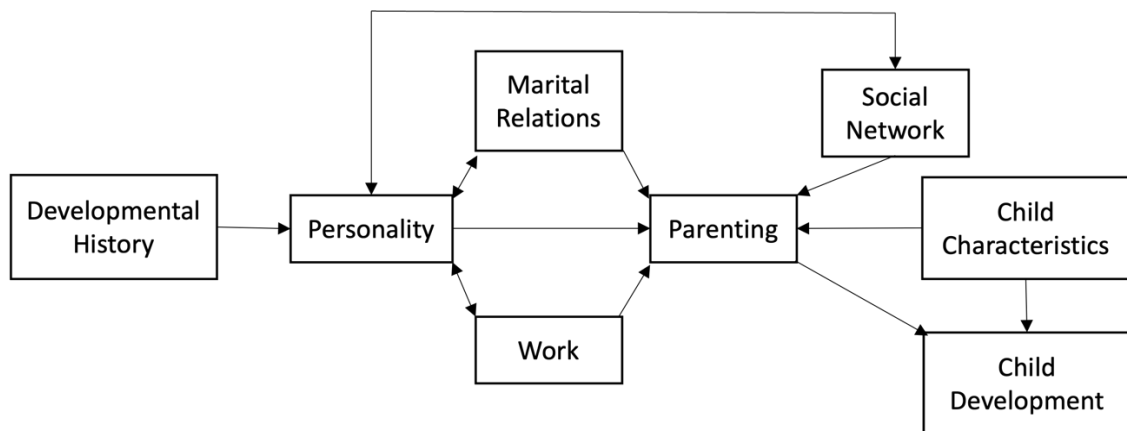
#### 3.4.1. Models of the determinants of parenting

Patterson's behavioural model outlines the response of a parent facing an unsocialized behaviour of the child and how the interaction between child and parent can lead to further consequences (see Patterson, 1990). However, the model lacks understanding of the circumstances and determinants of such parenting behaviours (Abidin, 1992). The widely referenced Belsky's model addresses this lack of inclusion of understanding why and how parents parent the way they do (Belsky, 1984). According to this model, parenting has multiple determinants which can be represented in three topics: (1) the individual characteristics of the parent, including the development, psychological history and personal resources, (2) the child's characteristics, and (3) the context around parenting that can induce stress or bring support (see Fig.1). According to Belsky (1984), the psychological history and the way the parent's development occurred will influence parenting behaviours. Moreover, the contextual characteristics, such as marital, work, and social satisfaction will simultaneously influence parenting behaviour and play a role in the characteristics of

the parent. Moreover, the child's characteristics, such as personality, behaviour, difficulties, will simultaneously influence the parent's behaviour as well. Both the child's characteristics and parenting behaviours will then impact the child's development at all ages. However, the lack of empirical support at the time of the development of the model is notable (Taraban & Shaw, 2018). Furthermore, Abidin (1992) criticized both the minimization of the impact of parental characteristics in the initial model, and that the model does not sufficiently consider the conscious behaviours of the parent. It has been further suggested to include the sociological, environmental, behavioural and developmental variables as determinants of parenting that can influence both the child's adaptation and parent's behaviours (Abidin, 1992). The notion of parenting role (commitment to parenting role) and parenting stress are thus further suggested for inclusion in the original model by Belsky. Indeed, the model does not include different family structures (i.e. single parents, blended families, ethnically-blended families, etc), and the evolution of the father's role (Paquette et al., 2013; Taraban & Shaw, 2018). Despite criticisms, the model by Belsky remains widely used and referenced to emphasize the need to include different determinants of parenting to help understand the influence on the child's development, and therefore, serves as a valuable foundation Taraban and Shaw (2018) offer an update of the model, by adding the socio-economical context of the multi-determinants of parenting and the interactive associations among parent, child and social contextual factors.

The aim of the determinants of parenting model is to reflect the importance of parenting during early childhood (0-5 years), and further, to include multiple determinants of parenting, when the child is the most physically and psychologically

dependent on his/her primary caregivers (Belsky, 1984; Landry et al., 2008; Taraban & Shaw, 2018).



**Fig 1.** A process model of determinants of parenting by Belsky (1984, p.84)

### 3.4.2. Parent's characteristics

According to the model of multideterminants of parenting, the parent's characteristics such as developmental history, personality and other characteristics of an individual, play a role in how this individual will eventually parent (Abidin, 1992; Belsky, 1984; Taraban & Shaw, 2018). Values of life and beliefs regarding how to rear a child are probably being established already at an early age and may orient one's behaviour in the future (Forehand & Jones, 2002). Biological characteristics, such as sex assigned at birth, can influence what is perceived by the individual as expected from them when becoming a parent (Rossi, 1984). Further, social expectations of what it means to be a mother or a father are important to consider, as they can influence the individual's perception of what is expected when enacting the role of parent (Cabrera et al., 2000; Halle et al., 2008; Sarkadi et al., 2008). Furthermore, the development of personality and biological traits including temperament, influence one's behaviour towards the child. For example, a person with a predisposition

towards anger and violence might be more likely to use corporal punishment (see Deater-Deckard, 2004), and parents with poor mental health are at a higher risk of having heated arguments and at a higher risk for violent disagreements (Probst et al., 2008). Indeed, psychopathological predispositions could also interfere in the process of parenting, where depression, for example, induces more inconsistent parenting with children between 4 and 12 years old (Rodgers-Farmer, 1999). Further, maternal schizophrenia is related to poorer parenting outcomes and higher risk of having their baby under social services supervision (Howard et al., 2003). Moreover, high autism traits in parents has been found to be associated with more difficulties in parenting children of all ages, although no associations were found with parenting styles precisely (Dissanayake et al., 2020). On the other hand, good mental health tends to help parents use a more positive parenting style (Belsky, 1984).

#### *3.4.2.1. Attachment theory*

As part of parental characteristics that can affect parenting, attachment style of the parent appears to impact parenting style. The use of warmth and responsiveness, included in positive parenting might be more present in parents when they themselves received such attention while they were children, especially from when they were infants. From an attachment theory perspective, the attachment style we develop as a baby is influenced by our own parents' behaviours (Ainsworth, 1969; Bowlby, 1969, 1988). The theory of attachment serves to explain how an individual socializes with others (Coan, 2010) and is therefore comparable to parenting styles that aim to help the child develop social competencies (Darling & Steinberg, 1993). The attachment style is defined as an emotional bond between the infant and the primary caregiver, and will further dictate behaviours to create or maintain a certain

proximity (Bowlby, 1982a). Depending on the responsiveness to the child's needs and demands, and the consistency of those responses from the parents, the child will develop a certain attachment style towards the primary caregiver (Mikulincer et al., 2003), and four different patterns are then distinguished. The child will be considered to have a secure style if parents are always available and responsive to the child's needs. The child will believe itself to be worthy of love and that others will provide support when needed (Ainsworth, 1969; Bartholomew & Horowitz, 1991). If parents are not consistent in their responses to the child, this could develop an anxious style, and the child develops a strong need for closeness and fear of rejection by believing that he/she is only worthy of love through others' acceptance (Bartholomew & Horowitz, 1991). Avoidant style develops in a child when parents are not responsive to their child's needs and demands and their behaviour teaches the child to become emotionally independent from others (Bowlby, 1988). An avoidant attached person believes that he/she is worthy of love, but that one cannot count on the others (Bartholomew & Horowitz, 1991). Lastly, fearful style refers to the lack of parents' responsiveness to the child's needs and demands, and that the child further believes that he/she is not worthy of love (Bartholomew & Horowitz, 1991). As one becomes an adult, close interpersonal relationships are influenced by the attachment one has had with one's caregivers as an infant and as a child. Indeed, the attachment style one develops forges further attachments in future to other individuals, such as partners (Hazan & Shaver, 1987), and also to future offspring (Nordahl et al., 2020).

Attachment style of parents impacts parenting behaviours and attitudes towards the child. Secure parents tend to invest a lot in their parenting role (Belsky, 1997), and are associated with an authoritative parenting style (Karavasilis et al.,

2003). Moreover, secure fathers are less likely to use harsh discipline. These fathers have been evaluated as efficient in their father role and highly aware of their child's development during the first year of the child's life (Howard, 2010). Finally, secure mothers are considered more responsive and sharing with their child (Kochanska, 1998).

Conversely, insecure attachment is a predictor of lower quality parenting from both mothers and fathers (Kang et al., 2019; Nordahl et al., 2020; Rholes et al., 1995; Zvara et al., 2020), and insecure parents are less warm with their children and show less structure as secure parents (Cohn, Cowan, et al., 1992). Further, insecure parents have been associated with an authoritarian parenting style in a sample of Chinese pre-schoolers (Zhao, 2010). Avoidant mothers show less support and feel less close to their preschool children than more secure mothers, and high ambivalence in attachment in both men and women has been associated with less certainty of one's parenting competencies (Rholes et al., 1995). Furthermore, avoidant parents are more distressed during a stressful event rendering them less responsive to their child (Edelstein et al., 2004). Moreover, avoidant adults are believed to invest less in their parenting (Belsky, 1997) and are related to negligent parenting, which is characterized by less monitoring, less psychological autonomy granting and less warmth (Karavasilis et al., 2003). Therefore, insecure attachment styles are risk factor for reinforcing or inducing negative parenting behaviours. However, there is a need to include the parental dyad in the understanding of the influence of attachment styles on the child's behaviour. For example, the attachment style of the partner could potentially act as a buffer (Cohn, Cowan, et al., 1992). If the dyad is composed of at least one

securely attached parent, the effect on parenting and its consequences may not be so negative.

Although attachment style of the parent is important to consider in parenting behaviours, it is independent of the personality of the parent (Edelstein et al., 2004), and therefore is one of several other characteristics of the parent that are necessary to help explain parenting styles. Furthermore, certain parenting styles could play a part in the development of the child's attachment style. In pre-schoolers, mothers who displayed more positive parenting were found to contribute to the security of their child's attachment (Nair & Murray, 2005). Parents who are sensitive and responsive to their child's needs during infancy tend to develop a more secure attachment in their child (Bowlby, 1982b; Crittenden & Claussen, 2000). On the other hand, in a harsh and/or inconsistent environment, parents' care for their child is hindered and promotes insecure attachment in the child (Szepsenwol & Simpson, 2019). Through their attachment style and parenting style, parents contribute to the development of the attachment style of their child, promoting an intergenerational transmission (Van Ijzendoorn, 1992). Although attachment style is believed to be stable over childhood and future adulthood, it continues to develop during preschool age (Stievenart et al., 2014), pointing to the importance of this age period in the building of attachment. Further, it is important to note that insecurity attachment in children can be alleviated by a more secure attachment when the parents' behaviours change for the better, indicating that intervention focused on parenting styles could also influence the child's attachment style, and thus preventing additional consequences from an insecure attachment (Altinoğlu Dikmeer et al., 2014; van den Dries et al., 2009).

### 3.4.3. Child's characteristics

Referring to the model of determinants of parenting (see chapter 3.4.1.), the child's characteristics also have their part in explaining parenting behaviours. Parents can consciously decide to behave in a certain way to modify the child's behaviour to a more desirable one (Dallaire & Weinraub, 2005), but they can also adapt to the child's need to prevent any further problematic development. Illness or problematic behaviours of the child can also induce unwanted change in parents' behaviour, and have further consequences on the child-parent relationship. For instance, in a study by Eliacik and colleagues (2016), ill pre-schoolers had a higher risk for living in a poorly functioning family, and to have mothers with higher anxiety and depression symptoms than in a control group. Further, in a sample of children with developmental disabilities (DD) and a control group (CG) of 3-5 and 9-11 year-olds, parenting styles differed depending on the child's difficulties and age (Woolfson & Grant, 2006). Indeed, parents in the older DD group used less authoritative parenting than those in the younger DD group, whilst the opposite pattern was observed in the CG group. The complications involved with rearing children with DD seems to decrease the use of positive parenting styles throughout the years, presumably due to exhaustion of the parents, or the lack of positive reinforcement from their initial parenting style as a DD child may not be able to respond as much as a CG child. Another example is given by Cooklin and colleagues (2012), who demonstrated that infants not sleeping resulted in not only sleep problems in the parents, but then that this lack of sleep in parents was associated with depression and the probability of less efficient parenting. Children with illness and difficulties therefore have an influence on the parenting behaviours. Similar to the child's eating behaviours, when the pre-

schooler is displaying more food approaching behaviours, the parents tend to try to correct the trajectory for fear of weight gain and apply increased use of restriction in their feeding practices (Ek et al., 2016). The opposite was observed in children displaying higher food avoidant behaviours – their parents tended to use more pressure to eat, that is, encouraging feeding practices to ensure they eat more (Blissett et al., 2011; Ek et al., 2016). As a reaction to their child's behaviour or need, parents can consciously adapt their own behaviour to attain a certain goal or modify the situation, but they can also unconsciously adapt their behaviour. Problems in deterioration of parenting style, or decreasing positive parenting behaviours, is that it will undeniably have consequences on the child's rearing and thus, not only on the relation between parent and child, but also on the development of the child.

### 3.5. Parenting style's influences on children's behaviour

Parenting styles have a variety of influences on children and adolescents' behaviours. Positive parenting styles, such as authoritative, are related to higher social and cognitive skills (Smith et al., 2000). Parents with positive parenting styles help their child to develop social relations such as peer relationships during adolescence (Russell et al., 1998). Positive parenting styles are also associated with the lowest levels of conduct problems in children from 8 to 10 years old, and this effect is found to be even stronger when parents are more strict concerning the rules, but use less discipline to correct an unwanted behaviour (Kuppens & Ceulemans, 2019). In line with these findings, pre-schoolers from 3 to 6 years old have less behavioural problems if their parents have a higher level of positive parenting style compared to those who have a higher level of negative parenting style (Querido et al., 2002). In

contrast, negative parenting styles (i.e., permissive, inconsistent, authoritarian, or highly controlling), are related to more problematic behaviours in all ages in children. Permissive parenting is related to higher conduct problems in children 3 to 8 years old (Blissett et al., 2011) and higher internalizing problems in pre-schoolers (Williams et al., 2009). Inconsistent parenting is related to higher externalizing problematic behaviours in preadolescents whereas more parental control was related to higher internalizing problematic behaviours in the same sample, especially if those negative parenting styles are displayed by fathers (Fuentes-Balderrama et al., 2020). In preschool age, children of authoritarian parents are less independent, and girls of permissive parents are less independent, while sons of both authoritarian and permissive parents are less socially responsible (Baumrind, 1971). Further, pre-schoolers whose parents are more authoritarian tend to have higher externalizing problems (Williams et al., 2009). Moreover, children and adolescents of parents using harsh discipline, including the use of corporal punishment, have more socioemotional problems (Eamon, 2001; Hecker et al., 2016). For example, the use of corporal punishment was related to more conduct problems in elementary-schooled children (Reichle & Franiek, 2009), and to more aggressive behaviour in 8-12 year-olds (Gershoff et al., 2010). In pre-schoolers, corporal punishment has been found to be related to more behavioural problems, although this was not consistent over a year (Stülz et al., 2019). However, in a review of children up until 18 years old, results were consistent with positive parenting styles predicting healthier outcomes during childhood, from more physical activity, to healthier eating behaviours with lower caloric intake (Sleddens et al., 2011).

### 3.6. Parenting style's influences on the child's eating behaviour

Parenting styles also have an influence on the child's eating behaviours, however, the literature on this topic is scarce. In a systematic review including children until the age of 12 years, results showed that negative parenting styles are associated with poorer feeding practices, such as pressure to eat, higher restriction and less monitoring (Collins et al., 2014). Further, poor parenting practices are known to be associated with eating behaviour problems in pre-schoolers (Ek et al., 2016) as described in chapter 3.1 of the present thesis. Later, when the child develops more autonomy of eating, parenting styles can also contribute to the development of maladaptive eating behaviours. For example, inconsistent parenting is related to increased junk food consumption in young children, and can play a role in the development of eating behaviours disorders (Ross & Gill, 2002; Williams et al., 2015). Further, permissive parenting is associated with higher food fussiness and higher food responsiveness among pre-schoolers and school-aged children (Blissett et al., 2011; Goodman et al., 2020). Moreover, neglect in parenting is also related to more food approaching behaviours and thus more weight problems in school-aged children, as well as higher consumption of unhealthy diets (Boots et al., 2015; Rodenburg et al., 2012; Wang et al., 2017).

Conversely, positive parenting styles have been found to act as a protective factor for BMI, and more warmth by fathers is associated with healthier food intake in teenage girls (Berge et al., 2010). Authoritative style is related to less food fussiness in middle-aged children (Rodenburg et al., 2012), less emotional overeating (Chen et al., 2019; Goodman et al., 2020), and a healthier diet later on during school age and during adolescence (Alsharairi & Somerset, 2015; Boots et al., 2015; Burke et al.,

2019; Burnett et al., 2019; Carbert et al., 2019; Kiefner-Burmeister & Hinman, 2020). In younger children between 8 and 11 years old, authoritative parents also play a moderating role between the display of high food approaching behaviours and their associations with higher snack intake and higher BMI. Relatedly, when there are high avoidant food behaviours, authoritative parents moderate the effects on extreme low BMI and caloric intake (Rodenburg et al., 2012). Although the influence of more general parenting on children's eating behaviour could be mediated by parental feeding practices (Balantekin et al., 2020), there is some evidence that direct associations between parenting styles and children's eating behaviours exist. Furthermore, as authoritative parents support a more desirable child feeding practice at a young age, they aid in the development and maintenance of healthy eating behaviours and healthy weight (Birch & Fisher, 1998; Rodenburg et al., 2012; Wake et al., 2007). However, the direct influence of parenting styles on pre-schoolers' eating behaviour remains unclear and lacks detailed findings. This age period is important as the parents remain the main food providers and are generally the most present caregivers on a daily basis (Birch, 2002).

#### 3.6.1. Aim of publication 2

The objective of *publication 2* was to explore the associations between the different parenting styles from the APQ, and various eating behaviours. As parenting styles are predictors of a number of child behaviours (e.g., Baumrind, 1971; Reichle & Franiek, 2009), it was expected to see the same patterns with behaviours specific to eating. More positive parenting styles were expected to act as protective factors for maladaptive eating behaviours such as emotional eating, food fussiness and less food

responsiveness (Boots et al., 2015; Goodman et al., 2020; Rodenburg et al., 2012), while more negative parenting styles were expected to act as risk factors for such behaviours (Blissett et al., 2011; Goodman et al., 2020; Innella et al., 2019). The purpose of the present study was to shed light on the effects of positive and negative parenting on pre-schooler's eating behaviours.

### 3.6.2. Method of publication 2

The sample used in *publication 2* was identical to that of *publication 1*. Five hundred and fifty-five children (511 were retained for the analyses) between 2 and 6 years old (mean age of 3.85, SD=0.69) from the French (24%) and German (76%) parts of Switzerland, participating in the SPLASHY study, were recruited between November 2013 and October 2014. Parents received a link for a set of questionnaires after they provided a written consent form. The CEBQ comprising 35 items, and the APQ, comprising 40 items, and both using a 5 point-Likert scale from “never” (1) to “always” (5), were assessed through parental reports. The CEBQ is originally constituted from 8 subscales: *food responsiveness*, *emotional overeating*, *enjoyment of food* and *desire to drink*, all of which belong to the food approach behaviours dimension; and *satiety responsiveness*, *food fussiness*, *slowness in eating* and *emotional undereating*, all of which belong to the food avoidance behaviours dimension (Wardle et al., 2001). In the current study, every subscale with the exception of ‘desire to drink’ were validated and retained in our factor structure model (see publication 1 in annex A and the summary in chapter 2.2.). The APQ is constituted from 7 subscales evaluating different parenting styles: *parental involvement*, *positive parenting* and *responsible parenting*, which are considered

positive parenting styles; and *powerful implementation, inconsistent parenting, corporal punishment* and *low/poor monitoring*, which are considered negative parenting styles (Reichle & Franiek, 2009) and were all included in the analysis of this current publication. Correlates of gender, the age, and the SES level of the child were taken into consideration. Seven different structural equation models (SEM) were constructed, each with one of the APQ subscale as the predictor and the seven CEBQ subscales as the outcomes.

### 3.6.3. Main results of publication 2

*Inconsistent parenting*, understood as a negative parenting style, was the most consistently related parenting style to all eating behaviours, except for slowness in eating. High levels of *inconsistent parenting* were related to high levels of food responsiveness, emotional overeating and emotional undereating, enjoyment of food, satiety responsiveness and food fussiness. The lack of association with slowness in eating was, however, due to chance finding, as this subscale did not significantly differ from the others. These findings were surprising, as inconsistent parenting was positively associated to all eating behaviours, including food avoidance and food approaching behaviours, which are often perceived as being opposite (Ek et al., 2016).

Further, *corporal punishment* was related to food responsiveness, emotional overeating, and satiety responsiveness. That is, higher levels of corporal punishment were related to higher food responsiveness and emotional overeating, but less to satiety responsiveness. Both corporal punishment and inconsistent parenting associations with eating behaviours are rarely (if ever) evaluated in studies, and it remains unclear how exactly they are associated.

Findings showed associations between *powerful implementation* and food responsiveness and enjoyment of food. High levels of powerful implementation are related to more food responsiveness and less enjoyment of food. The lack of further associations of this parenting style with other eating behaviours could be explained by the idea that powerful implementation may be more easily suitable and desirable with children of a young age, as it concerns the notion of setting limits and being stricter. However, it is originally considered as a negative parenting style and comparable to “authoritarian” (Reichle & Franiek, 2009).

*Responsible parenting* was also found to be associated with enjoyment of food, namely, high responsible parenting was related to low enjoyment of food, and high *positive parenting* was associated with low emotional overeating, although these two findings may be due to chance effect.

#### 3.6.4. Contributions of publication 2

Despite the aforementioned findings, more associations between positive parenting styles and eating behaviours were anticipated. However, results of this publication enhance the knowledge on the relationship between parenting styles and eating behaviours in pre-schoolers, as the literature on this topic remains scarce. Inconsistent parenting revealed the most prominent association with six dimensions of eating behaviour (except with slowness in eating), indicating a particular relevance of this parenting style at that age period, and a need to further understand in more depth how it interacts with different eating behaviours. High levels of inconsistency in parenting are related to both high food approaching and high food avoidant behaviours, which could be problematic at an extreme level, and be related to both

under and overweight in children (e.g., Domoff et al., 2015; Rodenburg et al., 2012; Viana et al., 2008). These findings add to the literature on associations between inconsistent parenting and eating behaviour in pre-schoolers, as no study has previously investigated this association. Only one study among children with Leukaemia under steroid treatment found that ill-children were eating more junk food when parents used inconsistent parenting, in comparison to other ill-children not under steroid treatment and healthy children of the same age (Williams et al., 2015), which could lead to weight problems, as higher junk food consumption is related to weight gain (Oginsky et al., 2016). Those results align with our findings, as more vulnerable children could have used the consumption of junk food as a coping mechanism (Bennett et al., 2013; Messerli-Bürgy et al., 2018; Okumus & Ozturk, 2021). The results in the study by Williams et al. (2015) might be explained by the side-effects of steroid treatment (Jansen et al., 2009), but might also reflect findings that parents tend to be more permissive at that time than usual (Hillman, 1997), resulting in more inconsistent parenting.

The present findings regarding corporal punishment might be explained by the triggering of coping mechanisms when a victim of such behaviour, including eating under emotional arousal, and being more responsive to food, regardless of the perception of satiety (Taut et al., 2012). Indeed, more violent environments are also associated with eating disorders in adolescents and adults (Fosse & Holen, 2006; Neumark-Sztainer et al., 2000). Findings of publication 2 contribute to the previous study and the potential danger of the use of harsh discipline on the pre-schooler's eating behaviour, and the future adolescent and adult.

Moreover, powerful implementation (comparable to authoritarian style) was related to more food responsiveness – the opposite of what was found in 6-12-year-olds (Philips et al., 2014). However, it was also related to less enjoyment of food, which was in line with what has been found among toddlers (Van Der Horst & Sleddens, 2017). These findings contribute to the lack of information of this parenting style among pre-schoolers. It is possible that at different ages, parents who are stricter might have a differing impact on the child's eating behaviour, and older children learn to regulate their food intake more easily when becoming less dependent on their parents and thus, less impacted in their eating behaviour by the parenting style.

Finally, findings of *publication 2* regarding positive parenting styles (positive parenting and responsible parenting) confirm results of other studies. That is, they have been have shown to be related to less emotional overeating and less food intake (Boots et al., 2015; Burke et al., 2019; Chen et al., 2019; Goodman et al., 2020; Kiefner-Burmeister & Hinman, 2020; Philips et al., 2014), therefore protecting the child from higher risk of weight gain.

The *publication 2* can be found in appendix B.

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### 3.7. The context of parenting style

Evidence of parenting styles and behaviours associated with, and inducing different behaviours in children of all ages is increasing, as seen above. With the problematic use of the varying and often interchangeably used terms of 'parenting style' and 'parenting practice', the questions of stability, whether they are comparable to traits, and how much these concepts are malleable and variant through different contexts, naturally arise. For example, depending on the age of the child, or the number of children in one's family, it might be expected that the contextual factors could influence parenting behaviours, however, in what ways and how exactly this occurs, remains unclear. According to Belsky's model (1984), among the determinants of parenting (see chapter 3.4.1.) contextual sources of stress and support as a main source of functioning in parenting, are also included. If parents are in good mental and physical health, have enough social support, and overall support, then the general context should help parents to provide more positive parenting (Abidin, 1990; Belsky, 1984; Taraban & Shaw, 2018; Zaidman-Zait et al., 2017). An important source of support can come from the partner, and if marital satisfaction is high, the outcomes for children are more positive than when marital satisfaction is low (Fishman & Meyers, 2000). For example, parents of children suffering from autism between the age of 5 and 12 years old who have low marital satisfaction display a more authoritarian parenting style and have children demonstrating more externalizing symptoms (Greenlee et al., 2021). Furthermore, low marital satisfaction at baseline predicted a higher levels of internalizing symptoms two years afterwards, and an increase in authoritarian parenting levels was also noted. Problems in the household may also impact the family environment and thus, some parenting aspects.

Chaos in the family, defined by noisy, disordered and cluttered ambiance predicts less sensitivity from parents, also showing more intrusive behaviours towards their children (Zvara et al., 2020). These contextual factors that might be considered burdensome, can activate a process in the individual of having insufficient resources to face and handle such situations, and therefore, these environmental factors may be considered stressors.

#### 4. The relevance of stress in the context of parenting

Factors causing stress are called stressors, and they demand that the body readjust to the new situation (Selye, 1973). According to Lazarus and Folkman (1984), stress itself consists of different variables and processes, such as physiological and psychological. It occurs when an event is perceived as a threat to an individual, who is lacking resources to overcome the event for multiple reasons. The demandingness of resources is therefore too high for the individual to procure what is needed to overcome the stress, and the stressors create a threat to the homeostasis of the individual (Lazarus & Folkman, 1984). This results in psychological and physiological changes and can have consequences on mental and physical health (McEwen, 1998).

##### 4.1. Parenting stress

In the family context, stressors can affect one member of the family or several at the same time. The caregivers, often parents, are the first recipients from contextual stressors relative to the functioning of the family. Having children means not only the acceptance of responsibilities, but also some challenges due to the demandingness of the child, and therefore, the very experience of being a parent implies the experience

of stress due to this function. Parenting stress is specific to that of when a child is demanding too much of the parent and the parent then experiences distress because of this challenge (Abidin, 1990; Deater-Deckard, 2004). Deater-Deckard explains that “parenting stress includes subjective experiences of distress such as emotional pain and anxiety. It also includes parents’ thoughts, beliefs, and attributions – expectations about what is “normal”, perceived lack of control and violations of those expectations, and self-doubt” (2004, p.1-2). Parents and children can create challenging circumstances through their expectations of the relationship, and through their own behaviours or needs (Crnic et al., 2005). Indeed, parenting stress is undeniably related to the child, and the relationship between parent and child. Moreover, the perception of the parents of what is appropriate from the child according to their values, and the values of broader society, can influence their level of parenting stress (Deater-Deckard, 2004). Multiple determinants of parenting stress contribute to the explanation of the level of parenting stress.

Parent’s resources are expected to be challenged at different developmental phases of the child. Specifically, during preschool age, parents are expected to perceive more parenting stress (Crnic et al., 2005). Indeed, environmental changes, such as the transition to kindergarten, have been associated with an increase of stress in the child (Anderson, 1985; Decaro & Worthman, 2011; Groeneveld et al., 2013) and can further engender or increase parenting stress (Thomson & Vaux, 1986). When the child is learning to become more autonomous and increases his/her independence, preschool age can be perceived a stressful developmental stage by the parents (Berry & Jones, 1995; Clerkin et al., 2007; Deater-Deckard & Scarr, 1996; Whiting & Edwards, 1988).

#### 4.2. Influencers of parenting stress

According to Abidin (1990), parenting stress can be influenced by various determinants, such as the parents' characteristics, the child's characteristics or the context. Indeed, other stress, such as financial, including that of low-income and less educated parents (Barboza-Salerno, 2020; Deater-Deckard & Scarr, 1996; Lavee et al., 1996), financial difficulties among refugee families (Yu et al., 2020), and racial discrimination in mothers (Condon et al., 2022) were associated with higher parenting stress levels. Furthermore, depending on the support given to the parent by the partner or other social supports, parenting stress could increase or decrease (Östberg & Hagekull, 2000). Indeed, if marital satisfaction is low and the support from the partner is scarce, there is more distress in the parent, while when both parents are sharing the child's rearing, parenting stress tends to diminish (Deater-Deckard & Scarr, 1996). These previous findings reinforce the idea that the context in which the individual lives, plays a role on the level of parenting stress.

Additionally, parents' characteristics also influence the level of parenting stress they perceive. For example, psychopathologies like depression are associated with higher parenting stress (Anastopoulos et al., 1992; Farmer & Lee, 2011; Williford et al., 2007). Further, age can also influence parenting stress, as adolescent mothers tend to be more stressed about their parenting role than older mothers (e.g., Richardson et al., 1995), although women above their thirties display more parenting stress level than younger adult mothers (Östberg & Hagekull, 2000). Moreover, being a single parent is related to higher parenting stress (Williford et al., 2007), as well as the personality traits of the parents (Rantanen et al., 2015; Vermaes et al., 2008; Younger, 1991). Additionally, high scores on avoidant and anxious attachment styles

of the parent are found to be related to increased stress, and further contributes to the deterioration of the maternal bonding during the first weeks of life of the baby (Nordahl et al., 2020).

Finally, the child's characteristics also play a role in parenting stress, such as the age of the child, which can alter the parenting stress levels (Berry & Jones, 1995; Lavee et al., 1996). Indeed, parents with children under the age of 6 years old experience more parenting stress (Berry & Jones, 1995), and this can be explained by the higher demandingness and constant need of monitoring in early childhood and its consequences. Moreover, findings have revealed an association between high parenting stress and the child's emotional dysregulation, proneness to anger (Williford et al., 2007), lack of social skills, externalizing behavioural problems (Neece & Baker, 2008; Neece et al., 2012), disabilities and pathologies of the child, such as developmental disabilities (Bendixen et al., 2011; Woolfson & Grant, 2006), intellectual disabilities (Gerstein et al., 2009), deafness (Lederberg & Golbach, 2002), and poor executive functioning (Wagner et al., 2016). Indeed, parents of children who require special care usually experience higher parenting stress levels, as their children are more demanding, and more rapidly using the parents' resources (Bendixen et al., 2011; Probst et al., 2008). Nonetheless, interventions for parents have been demonstrated to significantly decrease levels of parenting stress in mothers of children with autism (Bendixen et al., 2011; Hastings & Johnson, 2001), in parents of children with intellectual disabilities (Hastings & Beck, 2004), in parents of juvenile offenders (Caldwell et al., 2007), and also in mothers of healthy children (Carroll, 2021). It is suggested that interventions for parents have differing effects depending on the parent's attachment style. Specifically, more secure parents showed a

decrease in their parenting stress after an intervention, whereas those who were more insecure did not display a significant decrease in parenting stress (Kang et al., 2019). Nevertheless, Lederberg and Golbach (2002) suggest that disabilities such as deafness in children, are not inducing more stress due to parenting, but rather, due to the expectations and worries of the parent related to the disability, and thus, parenting stress is mostly affected by the parent's individuality and not entirely to the child's characteristics.

#### 4.3. Relevance of parenting stress in parenting behaviours

Abidin (1990) added parenting stress to the different determinants in parenting in the original model by Belsky (1984), as parenting stress also plays a dynamic role in this constellation. Indeed, higher parenting stress level is believed to be associated with more negative parenting behaviours, and any kind of stress can play a role in the context of parenting. For example, financial difficulties were related to more psychological distress and more hostile parenting (Yu et al., 2020), and parents who have at least one child under the age of 5 and were expressing higher fatigue, demonstrated greater parenting stress, as well as lower parental competencies and more irritability in relation to their children (Cooklin et al., 2012). Although fatigue could be provoked by multiple factors, the consequences of fatigue could also generate poorer parenting behaviours, thus affecting the child. Parenting stress has several direct and indirect outcomes on both the parent and the child's behaviour. Higher parenting stress has been showed to raise the risk of potential violence in families of Indian and Alaskan Natives (Probst et al., 2008), which could lead to behavioural and emotional problems in the child who witnesses such violence

(Kashani et al., 1992). High parenting stress also raises the use of maladaptive feeding styles (Hughes et al., 2015). Further, when parents perceive more stress, they display more authoritarian behaviour, which might then induce more problematic behaviours in the child (Deater-Deckard & Scarr, 1996). However, while high parenting stress levels are not necessarily equating to maladaptive parenting (Abidin, 1990), it may create other vulnerabilities. If parenting stress shows a certain stability throughout the development of the child, it raises the question as to how this can directly impact the child's outcomes, and if this association can be mediated by parenting styles. It is suggested that during that period when children develop more autonomy and independence, parents might perceive their children as being more problematic due to reduction of control they have on their children compared to previously. However, parents may not necessarily perceive increased parenting stress during that period (Deater-Deckard & Scarr, 1996). By perceiving the child as more complicated, parents may tend to use more coercive control on their children, as they perceive less control over them due to the development of their autonomy.

#### 4.4. Stability of parenting stress over the years

As children develop, their needs evolve through the gain of autonomy, and it might then be expected that parenting stress varies alongside the development of the child. However, parenting stress is thought to be relatively stable and can already be predicted when the child is an infant. Indeed, Östberg and colleagues (2007) found that the levels of parenting stress were already relatively stable through infancy, and that the stress level during infancy could predict stress levels seven years later, although they have noticed that the group mean levels were slightly declining when

the children were increasing in age. Chang and Fine (2007) and Williford et al. (2007) found similar results with parenting stress decreasing between 1 and 3 years old, and between 2 and 5 years old, respectively. Further, in terms of daily hassles and life events stress, a relative stability was also found in pre-schoolers (Crnic et al., 2005). After preschool age, studies have yielded similar findings regarding parenting stress stability. Between 4 and 10 years old (Mackler et al., 2015), as well as in a sample of children aged 10 to 14 years, parenting stress was found to be highly stable (Putnick et al., 2010). In the latter study, a slight increase was also noticed due to the deterioration of the parent-child interaction, which may be at least partly due to the transition to adolescence (Marceau et al., 2015; Paikoff & Brooks-Gunn, 1991). Although evidence suggests a certain stability in parenting stress, discrepancies of increasing and decreasing parenting stress over time is also noticed at different ages. Some research has demonstrated a slight decline in parenting stress was found from infancy to 7 years old (Chang & Fine, 2007; Lederberg & Golbach, 2002; Östberg et al., 2007; Williford et al., 2007), and further between 4 and 9 years old (Neece et al., 2012; Stone et al., 2016), while others found an increase in parenting stress between 4 months and 5 years old (Barboza-Salerno, 2020; Gerstein et al., 2009; Mulsow et al., 2002). Although parenting stress may increase from birth to 6 months postpartum, it remains fairly stable from 15 months postpartum to 3 years old, according to Mulsow et al. (2002), as well as up until 4 years old (Lederberg & Golbach, 2002). However, Gerstein et al. (2009) did find an increase of parenting stress in mothers, but not in fathers between 3 and 5 years old. The different determinants of parenting stress might explain the increase, decrease, or lack of variance in the parenting stress level (Abidin, 1990, 1992). Despite the relatively high stability of parenting stress found

during childhood – at a time when the child is gaining more independency and autonomy from the parents – it remains unclear how parenting stress is perceived by the parents. As external factors might be involved in the processing of parenting stress, stress other than that of parenting might conflate with parenting stress and thus, influence the results. Therefore, the parenting stress, (stress being induced by the lack of resources to meet the child's demandingness and needs) may sometimes be comprehending other types of stress.

#### 4.5. Interaction between parenting stress related to children and parenting styles

When considering parenting stress, different domains can be explored: characteristics of the child, characteristics of the parents – which include for example the marital relationship, the attachment style or the social support (Abidin, 1992; Loyd & Abidin, 1985) – and other life stress can be further included (Wagner et al., 2016). These dimensions can be found in the Parenting Stress Index (PSI; Loyd & Abidin, 1985), for example. However, while pertinent external stressors from the child-parent dyad (such as marital satisfaction and social support) are relevant to evaluate the resources of the parents when facing a challenging situation due to parenting, they do not precisely reflect the perceived stress of being a parent. The following publication aims at assessing the direct relationship between the parent-child dyad and circumstances in this relationship that may challenge the resources and competencies of the parent. Therefore, this refers to the definition of stress by Lazarus and Folkman (1984), using the Parental Stress Scale (PSS; Berry & Jones, 1995) that focuses more precisely on this dimension of parenting stress.

#### 4.5.1 Aim of publication 3

The first aim of *publication 3* was to test the stability of parenting styles and the parental stressors factor over one year during preschool. The second aim was to explore the different cross-lagged effects between the various parenting styles and the parental stressors factor over this year, as it is expected that higher parenting stress at baseline predicts more negative parenting styles one year afterwards and inversely, lower parenting stress at baseline predicts more positive parenting styles. As the bi-directional effects between parenting styles and parenting stress remain unclear at preschool age, it was also expected that negative parenting style at baseline predicts higher parenting stress one year after, and inversely, that positive parenting style at baseline predicts lower parenting stress one year after.

#### 4.5.2. Method of publication 3

The identical sample from *publication 1* and *publication 2* was used in publication 3. Five hundred and fifty-five children (511 were retained for the analyses) between 2 and 6 years old (mean age of 3.85, SD=0.69), from the French (24%) and German (76%) parts of Switzerland, participating at the SPLASHY study, were recruited between November 2013 and October 2014. Parents received a link for a set of questionnaires after they provided a written consent form at baseline, and the same set of questionnaires were sent again one year later.

The APQ is constituted of seven subscales evaluating different parenting styles: *parental involvement*, *positive parenting* and *responsible parenting*, considered to be positive parenting styles; and *powerful implementation*, *inconsistent parenting*,

*corporal punishment* and *low monitoring*, considered as negative parenting styles (Reichle & Franiek, 2009).

The PSS contains different subscales: *parental rewards*, *parental stressors*, *lack of control*, and *parental satisfaction*. Only the subscale parental stressors was retained for the current study for theoretical and statistical reasons (see *publication 2*). Correlates including gender of the child, the age, and the SES level of the child were taken into consideration.

Seven different cross-lagged models were set up, each with the values of the subscale 'parental stressors from Time 1' as an exogenous variable, and 'parental stressors at Time 2' as an endogenous variable, and one of the APQ subscales from Time 1 as an exogenous variable, and the same APQ subscale from Time 2 as an endogenous variable.

#### 4.5.3. Main results of publication 3

The autoregressive coefficients revealed a high stability of parental stressors over the year, and the same was observable concerning the different parenting styles, with the seven styles remaining highly stable over the year. Further, the paired t-test to compare means between Time 1 and Time 2 revealed no apparent change for parental stressors and inconsistent parenting. However, paired t-tests revealed small to medium decreases for *powerful implementation*, *responsible parenting* and *corporal punishment*, and medium to large increases for *positive parenting*, *parental involvement*, and *poor monitoring*. Further, the cross-lagged models resulted in only one significant result, with parental stressors negatively predicting corporal punishment one year later.

#### 4.5.4. Contributions of publication 3

Highlights of the findings of *publication 3* include first, that *parental stressors* were found to be highly stable over the one year during preschool years, and this finding aligns with other studies among pre-schoolers (Crnic et al., 2005; Lederberg & Golbach, 2002; Mulsow et al., 2002). This finding contributes to the idea that stability in parenting stress might be explained by an individual's characteristics and resources, such as attachment security, or personality and thus, implies a potentially chronic stress (Östberg et al., 2007). Although high mean levels of parenting stress were revealed in this sample, the sample comprises healthy children and it can be expected that these children followed a stable development and therefore, did not display extreme problems that could have altered or raised the levels of parenting stress.

Second, high stability for inconsistent parenting over the year was found, while other parenting styles revealed a change during this year. Inconsistent parenting also demonstrated no temporal changes between 6 and 17 years old (Frick et al., 1999), and between 3 and 6 years old (Clerkin et al., 2007). A paucity of studies regarding consistency in parenting is notable, indicating a need for further research on the evolution of inconsistent parenting throughout childhood. However, it is suggested that the beliefs in child's rearing are firm, and could explain the relative stability in parenting styles and behaviours (Forehand & Jones, 2002). Further, the present findings regarding the stability of parenting styles confirm previous studies that found parenting styles to be relatively stable through time (Baumrind, 1971; de Maat et al., 2021; Forehand & Jones, 2002; Lee et al., 2013).

Despite the relative stability of parenting styles, six revealed some variance throughout the year during the preschool period. Indeed, responsible parenting,

corporal punishment, and powerful implementation tended to decrease during that time, in opposition with positive parenting, parental involvement, and poor monitoring, which had the tendency to increase. These results are partly in line with the idea that negative parenting styles diminish as the child grows up during preschool age, and parents gain increased parenting competence and thus, display more positive parenting (Dallaire & Weinraub, 2005). The findings also align with studies that found significant alterations in parenting styles when the child was displaying conduct problems (Frick et al., 1999; Hawes et al., 2011), or that a major change in development of the child was occurring, such as puberty (Paikoff & Brooks-Gunn, 1991). Although, the sample was comprised of healthy children in the present study. Furthermore, these findings contribute to the idea that corporal punishment is rather less likely to be used with healthy preschool children, and more likely to diminish during preschool age. During the transition from infancy to preschool age, children gain more autonomy and learn their limits. This development may decrease the need for monitoring and consistent rules from the parents, which could explain the decrease of both monitoring and powerful implementation as the child gets older.

The stability of parenting styles over the years remains uncertain, and it is possible that the often interchangeably used concepts of 'parenting styles' and 'parenting practices' persists as an inconsistency in the literature. The present findings suggest a certain stability of parenting styles, and encourages the idea that the APQ is evaluating parenting styles and not parenting practices, which are more malleable depending on the context (Darling & Steinberg, 1993). Especially in the present study wherein the sample was constituted from healthy children, it might explain the lack of variety in parenting styles.

Lastly, the only interaction between parenting stress and parenting styles was found with corporal punishment, meaning that higher parenting stress levels at baseline were related to less use of corporal punishment a year later. The low mean level of corporal punishment in this sample could imply that the parents of this sample were not necessarily strong proponents of the use of corporal punishment, and therefore, used it only as a last resort and almost never again as the child grew older (Crouch & Behl, 2001). However, publication 3 supports the idea that if parenting styles are stable throughout preschool years, there is a potential danger that negative parenting styles persist throughout childhood and thus, have potential negative outcomes in the child and future adolescent. Moreover, if parenting stress and parenting styles are already stabilized during the early years of childhood, there is an urgent need to prevent the inconsistency in parenting at the earliest point, in order to prevent any chronicity of high level of parenting stress.

The findings of *publication 3* can be found in appendix C.

Citation: Leuba, A. L., Meyer, A. H., Kakebeeke, T. H., Stülz, K., Arhab, A., Zysset, A. E., Leeger-Aschmann, C. S., Schmutz, E. A., Kriemler, S., Jenni, O. G., Puder, J. J., Munsch, S., Messerli-Bürgy, N. (ready to be submitted). How parenting stress is related to parenting styles in parents of pre-schoolers over a year: A cross-lagged study.

## 5. Discussion

The aims of the present thesis were: first, in *publication 1*, to explore the reliability of the CEBQ in a preschool sample of 2 to 6 year-olds, speaking two different languages in one country, and to test if this questionnaire was considered valid in the current sample, and was indeed measuring eating behaviour. The intention was to validate the translated German and French versions of the CEBQ. Second, in *publication 2*, the aim was to use the conclusion of *publication 1* and examine whether parenting styles are related to the child's eating behaviours by using the same questionnaire that was validated in *publication 1*. The intentions of the thesis were to shed light on the relevance of parenting styles, already at preschool age. Therein, the thesis aimed to examine how parenting styles can encourage further eating behaviour development as the child grows older. Third, *publication 3* was aimed at enhancing the knowledge on the parenting system, by shedding light on the stability of parenting styles over one year during preschool years, and to explore if the context of parenting stress could interfere in this stability of parenting styles. Further, *publication 3* also addressed the question of stability of parenting stress over a year during preschool years. The influences of age, gender and SES were considered in all three publications.

### 5.1. Validation of a French and German version of the Children's Eating Behaviour Questionnaire

The findings of *publication 1* revealed a 7-factor structure of the CEBQ, suppressing the factor 'desire to drink' from the original version (Wardle et al., 2001), as the loadings of the factor were insufficient, and did not fit in the model for this sample. Viana et al. (2008) found the same result within their sample of children between 3

and 13 years old and 'desire to drink' was therefore, not compared with the BMI. The current findings reinforce the idea that this subscale may lack precision concerning the term drink and does not differentiate potential differences between sweetened drinks and other unsweetened beverage, such as water (Mallan et al., 2013; Sweetman et al., 2008). Further, parents may have different ideas in mind when reporting on drink. Identical problems were found concerning the loading of the satiety responsiveness and slowness in eating subscales, that were loading on the same factor (Carnell & Wardle, 2007; Santos et al., 2011; Wardle et al., 2001; Webber et al., 2009), as well as emotional overeating and food responsiveness that were combined into one factor due to the loadings (Sleddens et al., 2008; Svensson et al., 2011). Other validations of the CEBQ dropped factors due to the insufficient loading and are thus comparable to our findings in publication 1 (Jansen et al., 2012; Quah et al., 2017, 2019; Sleddens et al., 2008; Svensson et al., 2011; Viana et al., 2008). These findings suggest that the CEBQ is a reliable instrument to evaluate the child's eating behaviour but may slightly differ between cultures, and therefore might require more inter-cultural validations (Quah et al., 2019).

However, *publication 1* confirmed that the widely used CEBQ is a relevant tool to measure eating behaviour in young children. Neither age nor gender had any influence on the assessment, rendering the instrument suitable for children of all genders between the ages of 2 and 6 years. Only small and medium effects were found regarding the language spoken, with French speaking parents having reported more enjoyment of food and more satiety responsiveness than German speaking parents. These divergences may be due to food culture differences, as culture may influence the food choice and prioritize values such as pleasure and social aspects

regarding food (e.g. Djekic et al., 2021; Pettinger et al., 2004). Moreover, the heritability of food preferences may also influence the behaviour of the child towards food (Breen et al., 2006; Jahnke & Warschburger, 2008). However, not only can genetics influence the liking and enjoyment of certain food, but the environment itself can also play a role and influence the child's behaviour. In Switzerland, 71% of children between 0 and 3 years old and 64% of children between 4 and 12 years old in 2018 were in extra-familial child care (OFS, 2020). Depending on the marital or financial situation, but also culture, parents tend to use more or less external child-care systems. Whether the child is eating every day with the parent or is partly cared by others, might differently influence the child's eating behaviour (Benjamin-Neelon, 2018; Farrow, 2014). Indeed, depending on the knowledge of different care systems, promotions for healthy eating might be different (Dev & McBride, 2013; Sleet et al., 2020). Probable differences in caregiving (by grandparents, institutions, nanny, etc.) between cantons in Switzerland might therefore have an influence on the results in *publication 1*. However, more importantly, the results of *publication 1* revealed the potential influence of the environment, and that parents may indeed play a role on the development of the child's eating behaviour during preschool age, as has been shown with feeding practices (e.g., Birch & Fisher, 1998; Kremers et al., 2013). However, as the parents might not always be present during mealtime, parenting behaviours other than feeding practices might have an influence, even when the parent is not present, and exploring this was the aim of *publication 2*.

## 5.2. Relevance of parenting styles in the parent-child dyad

Based on the conclusions of *publication 1*, the findings of *publication 2* provided more insight into how parenting might affect the eating behaviour of children between 2 and 6 years old. Inconsistent parenting (a negative parenting style), was found to be the most related parenting style to the child's eating behaviour. Higher levels of inconsistent parenting were related to higher food approach and food avoidant behaviours. Those two dimensions of eating in extreme values represent unhealthy eating behaviour and can have opposite consequences on the weight of the child, and further in the development of physical or mental problems (e.g. Powell et al., 2018; Randi et al., 2010; Wang & Lobstein, 2006). Inconsistent parenting has been associated with greater externalizing behaviours in adolescents (Fuentes-Balderrama et al., 2020), and to higher junk food consumption in young ill-children (Williams et al., 2015). This parenting style has also been suggested to play a role in the development of eating disorders (Ross & Gill, 2002). However, to our knowledge, no other study examined this direct association, and *publication 2* points to a new direction of interest in the relevance of interaction between inconsistent parenting and eating behaviour.

Corporal punishment was another parenting style found to be associated differently with food approaching behaviours (food responsiveness, emotional overeating, and lack of satiety responsiveness). To our knowledge, this is the first study to demonstrate associations between child's eating behaviour and corporal punishment. One possible explanation for these findings could be that physical punishment might trigger negative emotions in the child and therefore, demands emotion regulation strategies that the pre-schooler might not have sufficiently

developed at this age. Therefore, more food approaching behaviours might act as a coping strategy to reduce negative emotions brought on by the use of corporal punishment, and therefore, related to emotional eating (Taut et al., 2012). Since low levels of corporal punishment were shown in the current publication, it raises the question as to whether associations with eating behaviours would have been stronger and more numerous within a sample comprising higher use of corporal punishment. The use of corporal punishment is most present in families of low-income and is mostly used by parents who believe in the efficiency and the need for such punishment (Deater-Deckard et al., 2003; Holden et al., 1999; Straus & Stewart, 1999). Further, adults who were physically punished as a child tend to believe in the necessity of the use of corporal punishment with their own children (Bower-Russa et al., 2001; Deater-Deckard et al., 2003). Moreover, it appears that there is the highest rate of such behaviour when the child is aged between 3 and 4 years old, and declines when the child is 5 years old (Day et al., 1998; Straus & Stewart, 1999). In the current sample, this would imply that this is probably the peak period of use of corporal punishment that these parents will use on their children. Although there is the possibility that the level of corporal punishment was underreported due to social desirability bias, the low levels of corporal punishment found in the present thesis were in line with an observational study of the Swiss population (Schöbi et al., 2017). Moreover, SES levels were above the mean of the general population (Messerli-Bürgy et al., 2016), which might help to explain the low level of use of corporal punishment, as lower levels of SES are associated with higher use of physical punishment (Gillesims et al., 1995).

Parenting styles in *publication 2* were shown to be associated with eating behaviour in preschool children and thus, acting as either a risk or protective factor of eating behaviours that can cause further problems in the development of eating behaviour as the child grows up, such as eating disorders (e.g., Marchi & Cohen, 1990), depressive symptoms (Graber et al., 1994) or other physiological complications due to problematic eating behaviours (e.g., Must & Strauss, 1999). This publication sheds new light on the relevance of parenting styles in eating behaviour in preschoolers, as knowledge was various concerning the relationship between parenting styles and other children's behaviours (e.g., Ek et al., 2016; Fuentes-Balderrama et al., 2020), however, it lacked in the domain of eating behaviour. Our findings indicate that parenting styles do indeed have an importance in the development of eating behaviours of the child, especially inconsistent parenting, and that this should be addressed when intervening on the feeding practices for example. Finally, results of *publication 2* raised the question as to the variability of parenting styles as the child grows older. As inconsistent parenting has been found to be stable between 6 and 17 years old (Frick et al., 1999), this might suggest that it could have a long-lasting effect on the child's eating behaviour. Therefore, these findings might indicate a risk that the child could develop extreme eating behaviours that could become problematic and, consequently, parents may become concerned about the child's development, potentially heightening parenting stress. The question of stability in parenting styles was evaluated in *publication 3*.

### 5.3. Relevance of the stability of parenting styles and parenting stress and their interactions

#### 5.3.1. Relevance of the stability of parenting styles

Findings of *publication 3* provide significant insight into the stability of different parenting styles measured with APQ, and the parental stressors subscale of the PSS, over one year during preschool age. The stability of all parenting styles is in concordance with the assertion that parenting style might be similar to a trait and related to the attachment style developed during the parent's infancy (Östberg et al., 2007). Although inconsistent parenting showed no temporal changes between the two time points in *publication 3*, the other parenting styles showed decreases (i.e., corporal punishment, powerful implementation and responsible parenting) or increases (i.e., positive parenting, parental involvement, low/poor monitoring) throughout the year. Both concepts of parenting style and attachment style are based on the idea of warmth and responsiveness that the primary caregiver displays to face the child's demandingness (Zvara et al., 2020). A parent develops his/her own attachment style during infancy and forms working models from the experiences with their own caregivers (Bowlby, 1988; Cohn et al., 1992a). Therefore, those working models of both the self and others are a result of the interactions with attachment figures. When becoming adult, the working models formed during childhood are strongly associated with subsequent close relationships, such as romantic relationships (Bartholomew & Horowitz, 1991). The adult therefore demonstrates with his/her partner the type of attachment he/she had during childhood with the primary caregiver. Furthermore, when becoming a parent, the same working models

of the self and others, and attachment style developed as child with the parent's primary caregivers, influence the new attachment with the new-born. The original attachment style from the new parent influences the attachment he/she is then developing with their child, as a cycle of attachment (Bartholomew & Shaver, 1998). Therefore, not only is the attachment style stable throughout one's life, but it also passes on to future generations. Considered to be similar concepts, parenting style reflects the attachment style, and both have the goal to develop further socialization. As an example, an insecure attachment style is considered a risk factor for incompetency in parenting (Cohn et al., 1992b). Anxious and avoidant attachment styles are indeed related to not only less positive parenting styles, but also to higher negative parenting styles (Millings et al., 2013). The association between attachment style and parenting style could help to explain our findings in *publication 3*, with parenting styles being stable and reflecting a trait-like quality. A stability for warmth and monitoring was found between 6-10-year olds and in adolescents aged 13-15 years (de Maat et al., 2021; Forehand & Jones, 2002). Authoritarian and authoritative have also been found to be moderately stable in parents of children aged between 6 and 9 years (Lee et al., 2013). Furthermore, in a study using a similar sample of pre-schoolers (between 3 and 6 years old), inconsistent parenting, corporal punishment and positive parenting revealed no temporal changes during a year (Clerkin et al., 2007). For the parenting styles that demonstrated a variance over the year in our findings, negative parenting styles decreased (except for poor monitoring) and positive parenting styles increased (except for responsible parenting). As non-clinical children were included in our sample, their behaviours may have reinforced the use of more positive parenting styles, as they may not have shown high levels of problematic

behaviours (Clerkin et al., 2007). Further, it may be that parents adapted their behaviours according to the developmental stage of the child, since the needs of the child directly after infancy are not the same as a child just about to enter school. Although *publication 3* was a longitudinal study during preschool age, only a one-year follow-up in a broad age-range of 2-6 year-olds was offered. Consequently, the trajectories of the different parenting styles during the preschool years remain unclear, and more studies are needed to evaluate the stability of inconsistent parenting and other parenting styles during the preschool years, as well as through the transition to school, which is suggested to be a stressful period and therefore, could influence parenting behaviours (Anderson, 1985; Decaro & Worthman, 2011; Groeneveld et al., 2013). Since preschool age is a critical period for child development, if parents demonstrate more negative parenting styles, this could have a long-term impact on the well-being of the child, at the stage where the child is the most dependent of the parents. Therefore, if parenting styles are stable, children might be exposed to negative parenting styles throughout their childhood and suffer from the consequences. Increasing knowledge on how and when parenting styles persist or vary could allow for better targeting in prevention and intervention programs.

Further, these findings shed some light on the misuse of the concept of 'parenting style' instead of 'parenting practices'. Indeed, parenting practices are supposedly changing depending on the context and the child's characteristics (e.g. Darling & Steinberg, 1993; Frick et al., 1999), whereas parenting styles demonstrate little variance (e.g. Rhee et al., 2006; Russell et al., 1998). With our findings, it appears that the use of the term parenting style is more appropriate when referring to the

results obtained with the APQ, due to the relative stability of the different parenting styles.

### 5.3.2. Relevance of the stability of parenting stress

Results concerning the stability of parenting stress in *publication 3* are consistent with previous studies during preschool age (Ciciolla et al., 2014; Lin et al., 2021), but also during childhood and adolescence (Mackler et al., 2015; Neece et al., 2012). However, slight increases and decreases are noticed despite a somewhat certain predictability and stability in parenting stress over time (e.g. Barboza-Salerno, 2020; Lederberg & Golbach, 2002; Mulsow et al., 2002; Neece et al., 2012). Similar to parenting style, parenting stress was strongly predictive of the 1-year follow-up. It was expected that factors such as the child's or parent's characteristics, would influence parenting stress, as Belsky (1984) referred to in his model of determinants in parenting. However, as only one subscale of the PSS (parental stressors) was used, not all dimensions of parenting stress were examined in publication 3, for both statistical and theoretical reasons. The items of the subscale parental stressors, used in the publication, refer to the child being perceived as a stressor for the parent. The items imply a feeling of stress brought about by the child, as the child hinders the parent's life, by challenging the parent's flexibility, sensation of control, financial situation, and reduces the parent's possibility to have more personal time (see Berry & Jones, 1995). If other aspects of parenting stress were included, such as the parents' characteristics (as seen in chapter 3.4.2), the findings might have altered. If then, those characteristics are permanent or temporary, it should theoretically have a differential impact on the stability of parenting stress. Traits, such as personality, and attachment

style of the parents, as well as disabilities of children are related to parenting stress and predict a certain stability (Lederberg & Golbach, 2002; Nordahl et al., 2020; Rantanen et al., 2015). Nonetheless, temporary factors, such as externalizing behavioural problems in children have been associated with higher parenting stress (Mackler et al., 2015; Williford et al., 2007). Although, it has also been found to stabilize parenting stress levels. For example, Stone et al. (2016) found that a decrease of parenting stress was found when the children were between 4 and 9 years old when the child's externalizing behavioural problems were also decreasing. This demonstrates that temporary difficulties can increase parenting stress for a particular time, while other factors that are more permanent help maintain a certain parenting stress stability, such as was found in *publication 3*. In particular, in the sample of the current thesis and publications, children were healthy and coming from a rather high SES background (see Messerli-Bürgy et al., 2016), which are protective factors of parenting stress (Deater-Deckard, 2004).

However, within this sample of pre-schoolers, some did commence school in between the measurements, and therefore, it was expected that parenting stress would suffer from this transition. Indeed, transition to school is related to higher stress level in children (Bruce et al., 2002; Decaro & Worthman, 2011; Turner-Cobb et al., 2008) and the stress of both the child and mother have been found to be related from early on (Stenius et al., 2008), with maternal stress also being a predictor of the child's stress level (Essex et al., 2002). It may therefore, be that the transition to school also increases the parenting stress level. Despite this expectation, our findings of *publication 3* did not find any temporal change within parenting stress. One possible explanation is that not all children examined were in this transition to school

period between the two assessments points. Further research should focus on the impact of the transition to school on the stress level within the family members and their relationships. Further, a deeper understanding of the stability of parenting stress throughout the entire child's development, from infancy to early adult age, will be crucial. No studies to date have provided such information on stability or evolution, and this would help increase understanding as to which periods and which factors should be targeted during interventions to reduce parenting stress.

#### 5.3.3. Interaction between parenting styles and parenting stress over a year

Results of *publication 3* were not aligned with what we anticipated regarding the interactions of parenting style and parenting stress. It was expected that both variables would interact with each other, enhancing negative behaviours at time 2 when parenting stress was high at baseline, and vice versa, as was found in previous studies. However, parental stressors negatively predicted corporal punishment only. The results showing that parenting stress predicts less corporal punishment a year after is in contrast with previous findings demonstrating that parenting stress is related to an increase in corporal punishment use, and also to increased intergenerational transmission of such behaviour (Niu et al., 2018). The use of corporal punishment can be a result of beliefs of the parents that using corporal punishment can help attain desired behaviour from the child, and dismiss unwanted behaviour (Crouch & Behl, 2001). Perhaps the parents of the sample for this publication were not believers of such behaviours, as demonstrated by the rather low mean levels. One explanation could be that, although not in Switzerland, many countries have legally banned the use of corporal punishment on children and have

noticed a decline in beliefs in such behaviours after law enforcement (Durrant & Janson, 2005; Zolotor & Puzia, 2010). Moreover, as the level of SES was rather high in the sample (see Messerli-Bürge et al., 2016), and lower SES levels are related to increased use of corporal punishment (Giles-sims et al., 1995), this could help to explain our findings. However, the findings regarding the decrease of corporal punishment after one year when parents were perceiving higher stress, were unexpected. Parents may have reported less use of corporal punishment due to social desirability bias, although it corresponds to the level of findings of a Swiss observational study's findings (see Schöbi et al., 2017).

The absence of an interaction between parenting styles and parenting stress, and the variances of parenting styles throughout the year, demonstrate that these variables may be more independent and have singular impacts on the consequences of parenting (i.e., child's behaviour), which is in contrast with the literature. Indeed, studies have revealed associations between high levels of parenting stress and more negative parenting (e.g. Cooklin et al., 2012; Deater-Deckard & Scarr, 1996; Probst et al., 2008). However, Crnic et al. (2005) found that there was no mediating effect of parenting behaviour between parenting stress and the child's outcomes at preschool age. It is possible that there were no predictor effects between these two variables because they are partly intertwined and might be determined by other factors (as seen in Belsky's model (1984)), and the direct effects could not be seen in the current sample. Moreover, the lack of an interaction between inconsistent parenting and parenting stress may be because both are so highly stable (comparable to traits), that they do not significantly influence each other. These findings provide increased possibilities for intervention, as alongside *publication 3*, *publication 2* revealed that

there are associations between negative parenting and the child's eating behaviour. More specifically, findings of publication 2 revealed a prominent influence of inconsistent parenting on differing eating behaviours of the child and was found to be highly stable in *publication 3*. Therefore, by implementing interventions on parenting styles focusing on inconsistent parenting, this could help prevent further problematic eating behaviours of the child. Indeed, after interventions on parenting, improvements in corporal punishment and inconsistent parenting styles (McDonald et al., 2011; Özyurt et al., 2018), permissiveness parenting (Gouveia et al., 2016; Morawska & Sanders, 2009), authoritarian style (Gouveia et al., 2016), and neglectful parenting styles (Kauser & Pinquart, 2019), have been demonstrated. Parenting intervention programs have largely obtained promising results in decreasing the use of negative parenting styles (mostly by increasing positive parenting behaviours) and in consequence improving the child's behaviour and well-being (Gouveia et al., 2016; Kauser & Pinquart, 2019; Sanders, 2012; Sandler et al., 2015; Souza Silva Branco et al., 2021).

#### 5.4. Clinical implications

The present thesis underscores the relevance of understanding and detecting parenting styles at an early age to reduce the risk of negative impacts on the child's development, which might include eating behaviours, to prevent any further development of behavioural, emotional, and eating problems (e.g. Alshairi & Somerset, 2015; Blissett, 2011; Ross & Gill, 2002) and the further consequences for mental and physical health (e.g. Dubois et al., 2007; Graber et al., 1994; Marchi & Cohen, 1990; Must & Strauss, 1999). Preschool age is posited to be the time when

parents are more present in their children's life. However, in Switzerland, more than 70% of children between 0 and 3 years old are cared for by other relatives or institutions, in comparison to 60% for the 4 to 12 years old (OFS, 2020). Moreover, half of the children are cared for by the grandparents, and as the parenting styles are believed to be passing through the generations, one can assume that parents of the child are reflecting their own parents' parenting style (Campbell & Gilmore, 2007; Kitamura et al., 2009). Moreover, during preschool age, children are more dependent of their parents and mostly influenced by them, and this is a period when the effects of negative parenting might begin establishing problematic interaction in the parent-child dyad. As demonstrated throughout the present thesis, parenting styles are determinant in the development of the child and are relatively stable factors alongside parenting stress. It implies that such behaviours are potentially not very malleable and thus, difficult to modify. The findings of this thesis suggest that clinical interventions should a) include prevention and treatment programs on parenting behaviours to help parents recognize their own parenting style and implement the use of more positive parenting styles, and emphasize the need for consistency; b) include prevention and treatment programs on parenting stress and its impact on the parents as individuals and as a couple, but also its impact on the well-being of the family and the child, and c) emphasize the importance of healthy eating behaviour and its relevance in the construction of food habits and further eating behaviour.

Parenting programs have demonstrated efficiency in enhancing parents' knowledge of the child development, help them reduce their parenting stress, and improve their parenting behaviours in order to improve the child's behaviour (Barlow & Coren, 2017). Further, these programs are believed to be more effective in the

child's early years (see Souza Silva Branco et al., 2021). The Triple P-Positive Parenting Program (Sanders, 1999) is a universal parenting program (i.e., that can be addressed to all low and high-risk families (Souza Silva Branco et al., 2021)) and focuses on improving parenting with a unique structure and short-time interventions (Dretzke et al., 2009). The Triple P program has demonstrated high improvement on parenting skills, enhancement of positive parenting styles, reduction of parenting stress, and positive changes in the child's behaviour (e.g., Bodenmann et al., 2008; Errázuriz et al., 2016; Gerards et al., 2015; Özyurt et al., 2018). Therefore, this program simultaneously targets the multiple determinants of parenting and well-being of the family, as well as child. Long-term efficacy was also demonstrated for pre-schoolers who were difficult during mealtimes (Morawska et al., 2014), who had feeding difficulties (Adamson et al., 2013), and on behavioural and emotional behaviours (Sanders, 1999). Furthermore, improvements in ineffective parenting and the child's obesity-related behaviours, alongside a reduction in BMI scores in 4 to 11 year-olds (West et al., 2010) and in 6-9 year-olds (Golley et al., 2007), were observed after Triple P interventions. Further studies appear to focus more on food-related topics, such as obesity and children with diabetes (Gerards et al., 2012; Lohan et al., 2016). However, no study to our knowledge has demonstrated results of the efficiency of the Triple P program specifically on the child's eating behaviour problems. This program is used worldwide and has proven to be acceptable and effective among Swiss families (Bodenmann et al., 2008), and is available in different countries, including Switzerland. The Triple P is based on social learning and cognitive behavioural principles and can benefit parents of children from mild to severe emotional and behavioural difficulties, with the goal of implementing skills, knowledge and

confidence in the parents on how to behave and respond to their children and difficult situations (Sanders, 1999, 2008, 2012). The program comprises different levels where parents can find solutions for a specific situation, or develop more general skills from mild to severe difficulties they encounter in the child's rearing. Triple P offers many advantages to broaden access including: multidisciplinary, multi-modality, effective on children from birth to 12 years old, and includes both prevention and treatment interventions (Sanders, 2012). It also includes training on how parents can deal with their emotions and their consequences, their different relationships within the family circle, and possibilities to improve their marital satisfaction and reduce parenting stress. Triple P aims to promote the parents' capacities and skills for self-regulation, self-efficacy, self-management, and personal agency. By developing such skills, parents tend more likely to seek appropriate support and develop their social surroundings in case they need more support (Sanders, 1999). Various determinants of parenting are involved in this program and aim to implement new skills in these different domains to enhance functioning of parenting and to reduce risks of the development of emotional and behavioural difficulties in children (Belsky, 1984; Sanders, 1999, 2012). This might explain the high efficacy of this program (Sanders, 1999), as it targets various factors that play a role in the parenting functioning, such as parenting style, parenting stress and the child's characteristics, which have been discussed in the three publications of the current thesis, and are part of the Belsky's model of determinants of parenting (1984). As no studies on the Triple P have specifically investigated the eating behaviours of the child, it remains unclear if any positive outcome can be demonstrated for the child's eating behaviour with Triple P interventions. However, if the program is effective for

parenting styles, obesity-related behaviours, parenting stress, and emphasizes the need of consistency in parenting, the program may also have an indirect influence on the child's eating behaviour. The findings of the present thesis on the stability of inconsistent parenting and parenting stress point to the need to intervene on these two factors separately, to protect children from consequences of high parenting stress levels and high levels of inconsistent parenting style. The Triple P program enables the targeting of what is necessary to change in families, to enhance more highly functioning parenting (Sanders, 1999, 2012). The current thesis, however, highlights the use of corporal punishment and inconsistent parenting styles as being two major negative and impacting parenting styles on the child's eating behaviour at preschool age. Therefore, it might be necessary to have follow-up sessions with families using the Triple P program, to ensure that parents do not revert to their usual parenting style, and that they remain consistent in their parenting to avoid any problematic eating development in the child. There might be a need to provide more than one short-term intervention to ensure long-term effects of the interventions.

Implementing prevention or treatment interventions at the earliest ages of the child such as preschool age, could reduce the risk of the child developing emotional and behavioural difficulties. Targeting new parents could allow for the access to resources to face the difficulties when transitioning to parenthood for the first time (Parfitt & Ayers, 2014). Furthermore, reminders in the general population regarding the relevance of parenting dimensions for the family's well-being could benefit children's development in extraordinary circumstances, such as the COVID pandemic. Indeed, this pandemic has placed families under new pressures, and was a challenging situation for several families in which more dysfunctional behaviours in parents were

triggered (Oliveira et al., 2021). The same can occur in more common situations such as divorce or separation, where co-parenting takes another definition, and needs to be adapted. Inconsistent parenting undermines family well-being in divorced couples, and generates more negative affect, reduces life satisfaction and places the child at risk for externalizing and internalizing problems (Lamela et al., 2016). Understanding families through follow-ups during extraordinary and even more ordinary transitions would help to provide stable interventions for more consistent positive parenting styles, less parenting stress, and healthier eating behaviours.

#### 5.5. Limitations and strengths of the thesis

The present thesis contributes to the research on parenting during the preschool years, using as an example for an outcome the eating behaviour of the child. The importance of understanding the determinants of parenting to reduce the risk of behavioural and emotional problem outcomes during childhood was pointed out throughout the thesis. Notable strengths of the current thesis include firstly, that all publications were investigating the same considerably sized sample of pre-schoolers and their parents and therefore, this allows for a more consistent interpretation of the results between the publications. Further, the sample included children from various regions of Switzerland (five of the largest cantons), speaking two of the main official languages of the country, providing novel insight into Swiss pre-schoolers' and their parents' behaviours (see Messerli-Bürge et al., 2016). Although it should be noted that the majority were from the German parts of Switzerland. However, the validation of the CEBQ in French and German is also a strength that will allow further research to investigate the child's eating behaviour in both French and German

populations to broaden the knowledge of children's eating behaviours in western cultures. Furthermore, the current thesis investigated for the first time many facets of eating behaviours in a broad sample, and evaluated the potential associations with different parenting styles. Results revealed first-time associations between inconsistent parenting and almost every eating behaviour in preschool age. These investigations were never before conducted, and add important information on the associations between parenting styles and child's eating behaviour. Additionally, the richness of the study design in terms of determinants of the child's and family well-being provides the opportunity to further investigate other associations between different parenting behaviour and different child behaviours with longitudinal measures in future research.

Aside from the strengths of the present thesis, some limitations are notable across the three publications. Although the same sample was used for each publication and therefore, provide a more in-depth analysis and comparison of the sample and findings, one of the main limitations is the age range of the children. Indeed, some children started kindergarten between the two assessment points, while others did not. One implication of this difference is that the environments of the children were not necessarily alike, and could call into question the implications of the parenting styles and stress during this period. As the transition to kindergarten provides a new environment and a change in the care-system, it is possible that parents have less time with their child post-transition, and have less insight into the behaviour of both their child and their own, and further, the parenting stress might (even for a short time), adjust to this new transition (Anderson, 1985; Decaro & Worthman, 2011; McClelland, 1995; Rimm-Kaufman & Pianta, 2000; Turner-Cobb et

al., 2008; Wildenger et al., 2008). This might also explain results concerning the increase of poor monitoring in publication 3, as parents might feel that they are losing sight of their child's behaviour as he/she gains more independence. However, only a few of these children were in the transition to school in our sample. Another limitation that can be related to the previous point is that in the current thesis, the type of child-care previous to the kindergarten entry was not controlled for, as well as the type of child-care used besides kindergarten. For example, whether the child was previously spending more time with his/her parents than with other caretakers, such as grandparents or relatives, or other systems like child-care institutions, and to which extent the child was spending time in these other child-care systems, was not controlled for. A possible consequence of the child spending time outside parents' care may be that it could have affected the parental report, as well as the parenting behaviour and parenting stress levels. Moreover, in the current thesis, parental reports were used for the analyses of the child's eating behaviour and for the parents' behaviours as well. Even though children of that age are not capable of completing self-reports, the parental reports offer their share of limitations. First, depending on the care system of the child, parents might not be the primary observers of such behaviours. Second, the parental report might be flawed or not as objective as desired (Powell et al., 2018), and potentially highly dysfunctional behaviours of the child may have been minimised by the parents due to desirability bias. However, evidence suggests that parental reports are valid and objective, and therefore can be used to adequately assess the child's behaviour (Powell et al., 2018; Shelton et al., 1996). To remedy to this issue, including both parents would have allowed a comparison from both primary caregivers, and render a more objective or

comprehensive perspective of the child's behaviour. However, in the present thesis and therefore, in the three publications, only one form was completed by either one of the parents, or both at the same time, but this factor was not controlled for. Further, an important limitation in the child's assessment, was the lack of cut-off values in the CEBQ. The lack of cut-off hinders the interpretation of which and when the different eating behaviours are beginning to present as problematic. Hence, only a quantitative interpretation could be rendered.

Moreover, for the self-report of their own behaviour, parents may have also minimised their more highly dysfunctional behaviour due to desirability bias, and may not be objective observers of their own behaviour. However, as in the present thesis, the sample was healthy, and with a mean SES higher than the general population, it is probable that no highly dysfunctional behaviour was present.

## 5.6. Implications for future research

The present thesis has underlined some complements of the research and provides new ideas for further directions of research. First, there is a need to further investigate the different parenting styles during the preschool age to better understand the child-parent dyad and its influences on the child's development. Including both parents' reports may mitigate desirability bias, and the lack of subjectivity of both the self-reports and parental reports of the child's behaviour. Furthermore, by involving two primary caregivers in evaluating parenting styles, it allows for the exploration of possible protective or risk effects of different compositions of parenting styles in the dyad of the parents, which is still lacking in the literature (Beato et al., 2016; Kuppens & Ceulemans, 2019). Moreover, examining the

different patterns between the genders within the parent-child dyad will enhance knowledge on the outcomes of particular styles of parenting, on the child. Indeed, some studies have previously found parental gender differences on outcomes of the child (Fuentes-Balderrama et al., 2020; Russell et al., 1998), and others found child gender differences on child outcomes (Birch, 2002). Particular combinations of parenting styles have poorer outcomes in children, such as two authoritarian parents, in comparison to better outcomes when both parents display a positive parenting style in 8-10 year-olds (Kuppens & Ceulemans, 2019), indicating a need to understand the parental dynamic. However, to date, there is no information on pre-schoolers outcomes dependent on their gender, and the gender and parenting styles of their parents, and the potential combination of parenting styles between the parents. Findings on the impact of these factors is especially lacking regarding the child's eating behaviour outcomes during preschool years. Moreover, comparing heterosexual couples and homosexual couples and their children's outcomes could provide insight into the impact of gender in the parenting styles' influences on children. Further, to allow for more objectivity in the assessment of the behaviour of the parents and his/her responsiveness to the child's demand, an experimental stress-inducing task between parent and child in a laboratory setting would complement the self-reports and parental reports, and thus allow for analysis of a direct interaction of the dyad.

Although physiological stress regulation (e.g., cortisol response) cannot directly evaluate parenting stress, physiological changes may indicate the presence of stress when the subjective perception of the individual might not recognize it. A self-report method combined with physiological analyses could provide more comprehensive

understanding on how stress is perceived, and if the body's perception is comparable to the subjectivity of the individual. The physiological measures can quantify stress levels, when the self-reports could indicate which stressors are provoking such physiological changes and further, how the parenting stress impacts mental health. Comparisons between the physiological data and the data of the self and parents' reports could enhance the research on understanding how parenting styles and stress can impact the child's behaviour, and the child's stress level. Furthermore, the stress-induced situation would allow for the activation of attachment styles of the parents, and could be analysed as a comparison with the style of parenting in the situation, to further extend the research on the aetiology of parenting style.

## 6. Conclusion

The current thesis contributes to the understanding of several determinants of parenting during preschool age. It underlines the necessity to include both parenting style and parenting stress in the understanding of influences on the child's behaviour, especially in the child's eating behaviour. Further, the stability of both determinants during preschool years has demonstrated the need establish prevention and treatment interventions including both parenting styles, especially inconsistent parenting, and parenting stress to alleviate the risks to the mental health of family members. The parenting styles, especially inconsistent parenting, have been associated with different child's eating behaviours, pointing to the potential risks of the stability of parenting styles to develop eating behaviour problems in the long-term. Assessing the same sample throughout the three publications has provided

more knowledge on a large sample comprising a broad age range of 2 to 6 year-olds, and of different regions of Switzerland, speaking two major official languages of the country. However, the present thesis has also underlined the lack of knowledge on the differences between genders, combinations of parenting styles among parents, and between cultural backgrounds. Further, inclusion of a variety of families (homosexual, heterosexual, single parent, and reconstituted families, etc.) should be ensured in further studies.

Further studies are needed to develop attractive programs to include all types of families to promote more positive parenting, and to reduce parenting stress already during preschool years, to avoid further development of behavioural, emotional, and eating problems in children, and within the family. Implementing protective factors at such an early age could reduce the risk for children to develop further eating behaviour problems, and psychopathologies during childhood, which could then persist throughout adulthood.

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## Appendix

### A) Publication 1



# Eating behavior in Swiss preschool children – validation of a German and a French version of the Children’s Eating Behavior Questionnaire (CEBQ)

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## **Abstract**

The Children's Eating Behavior Questionnaire (CEBQ: Wardle, Guthrie, Sanderson, & Rapoport, 2001) is widely used to assess eating behavior in 2-9 years old children via parental report. It was validated in samples with families of different gender, age and cultural background. Research has shown that the 8-factor structure has some inconsistencies and sample characteristics can influence the results. To which extent such sample characteristics might influence results within a multi-lingual culture has not been investigated so far. Therefore, the aim of the study was to evaluate the factor structure of the CEBQ among 555 preschool children of the French and German parts of Switzerland, aged 2 to 6 years. Confirmatory Factor Analysis showed a modified structure of the original questionnaire, with a 7-factor structure providing a reasonable fit to the data ( $TLI = 0.954$ ,  $CFI = 0.952$ ,  $RMSEA = 0.063$  and  $SRMR = 0.067$ ). The subscale 'Desire to drink' was removed, and a few items moved to other subscales as they loaded higher on a different subscale compared to the original model. Reliabilities based on the coefficient omega were acceptable to satisfying across the seven factors, ranging from 0.66 to 0.90. There were no significant gender or age differences, but French speaking children showed higher levels of 'Satiety responsiveness' and lower 'Enjoyment of food' than German speaking children. Yet, these effects were small. The German and French CEBQ are valid and reliable versions of the original CEBQ and can be used in a multicultural context.

## **Introduction**

Problems of eating behaviour (such as altered speed in eating or response to satiety), at an early age is a worldwide issue. It can put individuals at risk to develop eating disorders and other diseases in later childhood and in teenage years, having a long-term

impact on mental and physical health in human beings (1–6). The onset of eating behaviour problems is believed to set at a young age (2) and is linked to an increased risk for unhealthy development that leads to obesity or other eating disorders at a later age (7). Differences in eating behaviour can also already be found in premature babies and babies with feeding problems showing less enjoyment of food, less appetite, more slowness in eating and a higher satiety responsiveness (8) than others. Main features of eating behaviour seem to be at a starting point at preschool age and show a continuity throughout childhood (1,9). Therefore, understanding the eating behaviour at this early period of life might help to intervene at an early point of development of eating behaviour problems (3) and prevent further problematic developments.

The Children's Eating Behaviour Questionnaire (CEBQ), developed and validated in the UK by Wardle and colleagues (10) is a psychometric instrument to assess eating behaviour in young children (between 2 and 9 years) via parental report. The questionnaire was created to alleviate the issues a laboratory assessment can cause. It is as efficient in assessing children's eating behaviour as behavioural tests (11). The CEBQ has been developed by merging interviews with parents and by modifying questions of already existent scales that focus on parental assessments of the child's eating behaviour (10). It consists of eight different subscales of eating behaviour. The subscales include the following aspects: 'Food Responsiveness' (FR) measuring the responsiveness to external cues of food such as the smell or sight of food (2); 'Enjoyment of Food' (EF) evaluating the pleasure of eating with or without hunger; 'Emotional Overeating' (EOE) measuring the tendency to eat under the pressure of emotions; 'Desire to Drink' (DD) measuring the desire of the child to have drinks with him and/or the want of sweetened drinks; 'Satiety Responsiveness' (SR) measuring the

responsiveness to internal satiety signals; ‘Slowness in Eating’ (SE) evaluating the rate of speed during an entire meal, ‘Emotional Undereating’ (EUE) examining the tendency to eat less when under pressure of emotions, and ‘Food Fussiness’ (FF) that evaluates the attitude towards food choices. These eight subscales of the CEBQ have been referred to the two dimensions ‘Food Approach’ and ‘Food Avoidance’ (12–17). Food Approach comprises the four subscales EF, EOE, DD and FR, while Food Avoidance comprises the four subscales SR, SE, EUE and FF. The two dimensions have been associated with weight in preschool age. Higher score in Food Approach subscales has been related to increased weight and higher score in Food Avoidance subscales to lower weight conditions (3,15,18). Indeed, Food Approach and Food Avoidance are often set as opposite dimensions referring to the eight subscales, however, only one study investigated whether the theoretical distinction between the two dimensions could be empirically supported, with mixed evidence (12). Furthermore, several studies investigated the original 8-factor structure of the original CEBQ by Wardle et al. (10), some of which confirmed the original 8-factor structure (12,13,19), while several others obtained a 7-factor structure (3,15–18,20), and one a 6-factor structure (14).

These inconsistent results regarding the factor structure have been discussed to be influenced by sample characteristics. For instance, different factor structures were found in samples considering different cultural populations within English speaking countries (e.g., different ethnic groups) (13,19), but also in non-English speaking European (16,21) and Asian countries (22–24) which used translated versions of the CEBQ. Further, age has been discussed to influence the factor structure of the CEBQ

as repeated assessment over a one-year period in a multi-ethnic sample of 3 years olds resulted in different findings (25). Besides this, food avoidant behaviour tends to decrease, whereas food approaching behaviour rather increases over time in children from 4 to 10 years (1) due to changes of the child's food environment which includes an increase in food choices at an older age and a loss of monitoring of parents (1,2,26). In addition, gender differences of eating behaviour have been discussed although controversially over different age periods. Whereas higher FF can be found in girls than in boys in toddlers (22), in it the opposite at the age of 6 and 7 (15), Furthermore, boys showed more EOE than girls in a Dutch sample but less EF at preschool age in the same sample (15), whereas Thai boys aged 6 to 11 years showed more EF than girls (24). However, boys were more food responsive in toddlerhood (22), and showed less food avoidant behaviour at the age of 6 and 8 years (27). Thus, evidence on the influence of sample characteristics on eating behaviour assessment is not consistent and could potentially impact the assessment in children within a preschool age range.

To our knowledge, the CEBQ has not been translated and used in a French and German sample. Furthermore, no studies investigated the potential difference in a multilingual country. To sum up, there is no clear evidence for a consistent factor structure of a French and German translation of the CEBQ so far and it remains unclear, whether sample characteristics (e.g., gender, age and language area) might have an impact on a multilingual sample. Therefore, the aim of the study was (a) to validate the original factor structure of a French and German translated version of the CEBQ in a Swiss preschool community sample and (b) to identify the impact of sample characteristics as expressed by age, gender and language area on the different factors obtained.

## **Method**

### **Study sample and design**

The Swiss Preschooler's Health Study (SPLASHY) is a multi-site prospective cohort study including 555 children during early childhood within two sociocultural areas of Switzerland (German and French speaking part) (ISRCTN41045021; for details (28)). Children were recruited from 84 childcare centers within five cantons of Switzerland (Aargau, Bern, Fribourg, Vaud, Zurich). These five cantons together made up 50% of the Swiss population in 2013. Recruitment started between November 2013 and October 2014 when children were 2 to 6 years old. The detailed study design and the overall objectives have been previously described (28). The study was approved by all local ethical committees (No 338/13 for the Ethical Committee of the Canton of Vaud as the main ethical committee) and is in accordance with the Declaration of Helsinki. Parents provided written informed consent. The current analysis focuses on the baseline cross-sectional data collected between February 2014 and November 2015. After parents' written consent, all parents received a link to an online set of questionnaires to complete.

### **Assessment**

*Eating behaviour* was assessed by the Children's Eating Behaviour Questionnaire (CEBQ) (10) which includes eight subscales and 35 items and is known to be a valid and reliable parental assessment tool for children aged 2 to 9 years (10,11). For this study, the original version by Wardle et al. (10) was translated into a German and a French version by German and French native speakers who were all fluent speakers of the English language and all working at the bilingual (French and German speaking)

University of Fribourg, Switzerland. Translation of the questionnaires integrated forward and backward translations until inconsistencies could be removed.

In the final CEBQ, parents were asked to respond to different questions on the eating behaviour of their child by using a 5 point-Likert scale ranging from “never” (1) up to “always” (5). The questionnaire includes eight subscales of eating behaviour: Food responsiveness with five items (e.g. “given the choice, my child would eat most of the time”), Enjoyment of food with four items (e.g. “my child enjoys eating”), Emotional overeating with four items (e.g. “my child eats more when worried), Desire to drink with three items (e.g. “if given the chance, my child would drink continuously throughout the day”), Satiety responsiveness with five items (e.g. “my child gets full before his/her meal is finished”), Slowness in eating with four items (e.g. “my child eats slowly”), Emotional undereating with four items (e.g. My child eats less when upset), and Food fussiness with six items (e.g. “my child refuses new food at first”).

*Age of the child* was assessed by calculation of the exact age at the time of assessment using the birth date and the assessment time point at baseline. Further, parents were asked to provide the *gender of their child* and their occupational status which was transformed into an ISEI value (International Socio-Economic Index) (29), whereof the maximum socio-economic status (SES) of both parents was used as the *SES level of the child*. *Language area* was defined by the language of the childcare center of each child living either in the French or the German part of Switzerland.

## Statistical Analysis

Two confirmatory factor analysis (CFA) models were set up, one based on the original model by Wardle and colleagues (10), the second based on a modified version, including only 7 of the 8 original factors. As all items were measured on a Likert scale with five levels and were hence ordinally scaled, the mean and covariance adjusted weighted least squares estimator (WLSMV) was used to compute parameters and their standard errors. To report model fit indices, the respective robust variants including the comparative fit index (CFI), the Tucker Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) are provided. Acceptable model fit requires the following criteria for these indices: RMSEA ( $\leq 0.06$ , 90% CI  $\leq 0.06$ , CFI not significant), SRMR ( $\leq 0.08$ ), CFI ( $\geq 0.95$ ), and TLI ( $\geq 0.95$ ) (30). All analyses were performed using the software R (R Core Team, 2020), including the R package lavaan (31).

A multiple-indicators and multiple-causes (MIMIC) model (32) was used to assess differential item functioning, i.e. assessing the influence of children's gender, age, and Swiss language area (German or French) as explanatory variables on the means of the seven factors as defined in the modified CFA model. Descriptive statistics were calculated using means and standard deviations, or percentages for categorical data. To estimate reliabilities of the factors obtained, we used the omega coefficient (33), which has been shown to be more useful than the often-used Cronbach's alpha (34).

## Results

### Descriptive statistics

In total, we collected the parents' reports of 555 children whereof data of 511 children could be kept in the analyses (parents of 44 children showed incomplete responding to

the CEBQ and therefore these questionnaires had to be excluded from the analysis). Mean age of the children was 3.85 years ( $SD = 0.69$ ), and 47% were girls. A total of 76% were living in the German-speaking part of Switzerland and 24% in the French-speaking part. Mean SES was 62.88 ( $SD=14.97$ ) and slightly higher than in the Pisa study (Swiss sample= 53.00) of OECD countries (35).

### **Factorial validity and internal reliability of the CEBQ**

The original 8-factor structure as suggested by Wardle and colleagues (10) led to a poor model fit in the presented study ( $TLI = 0.920$ ,  $CFI = 0.929$ ,  $RMSEA = 0.069$  and  $SRMR = 0.081$ ). Our modified CFA model variant presented in Fig 1 had a clearly improved model fit which was satisfactory ( $TLI = 0.952$ ,  $CFI = 0.957$ ,  $RMSEA = 0.061$  and  $SRMR = 0.068$ ) and contained the following modifications: First, the factor DD (consisting of three items, of which item 29 “if given the chance, my child would drink continuously throughout the day” had a standardized loading above 1 and a negative error variance), was dropped, leading to a 7-factor model. Second, two other items for which modification indices reported high loadings on several other factors in both cases (item 23 “My child eats more when s/he is happy” and item 28 “Even if my child is full up, s/he finds room to eat his/her favorite food”) had to be removed. Third, item 3 in the original questionnaire (“My child has a big appetite”) needed to be transferred from its original factor SR to the factor EF, as it loaded much higher on the latter.

The reliabilities of the seven factors were in the range between 0.66 (SR) to 0.90 (FF) at baseline (see table 1) and therefore comparable to the original version showing internal consistencies between 0.72 to 0.91 (10).

**Fig 1. The 7-factor structure of the Children's Eating Behaviour Questionnaire.**

This figure shows the loadings of our proposed 7-factor model based on confirmatory factor analysis of the Children's Eating Behaviour Questionnaire (CEBQ) for our proposed 7-factor model. Food Responsiveness (FR), Emotional Overeating (EOE), Enjoyment of Food (EF), Slowness in Eating (SE), Emotional Undereating (EUE), Food Fussiness (FF), and Satiety Responsiveness (SR). "i" means items, " " means error.

**Table 1. Descriptive statistics and reliabilities based on the omega coefficient for each factor**

CEBQ Factors	M (SD)	Omega coefficient
Food Responsiveness, 4 items	2,2 (0,73)	0,83
Emotional Overeating, 4 items	1,5 (0,56)	0,77
Enjoyment of Food, 5 items	3,8 (0,69)	0,86
Satiety Responsiveness, 4 items	2,8 (0,61)	0,66
Slowness in Eating, 4 items	2,9 (0,75)	0,76
Emotional Undereating, 3 items	2,9 (0,84)	0,78
Food Fussiness, 6 items	2,9 (0,8)	0,90

*Note.* Behaviours are rated on a five-point Likert scale. These are the factors retained for our 7-factors structure model.

Correlations among the seven factors were particularly high between FR and EOE ( $r = .75$ ), between EF and SR ( $r = -.58$ ), and between FF and EF ( $r = -.60$ ) (Table 2).

**Table 2. Correlations for factors.**

Subscales	1	2	3	4	5	6	7
1. Food Responsiveness (FR)	-						
2. Emotional Overeating (EOE)	<b>.75**</b>	-					
3. Enjoyment of Food (EF)	<b>.49**</b>	<b>.11*</b>	-				
4. Satiety Responsiveness (SR)	<b>-.26**</b>	-.06	<b>-.58**</b>	-			
5. Slowness in Eating (SE)	<b>-.13**</b>	-.01	<b>-.40**</b>	<b>.34**</b>	-		
6. Emotional Undereating (EUE)	-.03	<b>.20**</b>	<b>-.34**</b>	<b>.46**</b>	<b>.24**</b>	-	
7. Food Fussiness (FF)	<b>-.13**</b>	.04	<b>-.60**</b>	<b>.34**</b>	<b>.19**</b>	<b>.32**</b>	-

*Note.* Factors of our proposed 7-factor structure model. \* $p < .05$ . \*\*  $p < .01$ .

The higher-order model, including the two scales Food Approach and Food Avoidance (12) could not be supported in this study. The higher order model based on the originally proposed 8-factor solution led to a poor model fit (TLI = 0.884, CFI = 0.894, RMSEA = 0.095 and SRMR = 0.110), with the two higher-order factors correlating highly negatively with each other ( $r = -.76$ ). Closer inspection of the model revealed that the inclusion of Food Avoidance was reasonable, but not so for Food Approach and we therefore did not consider higher-order models in further analyses.

### **Influence of gender, age, and language area on the CEBQ subscales**

Fig 2 shows the results from the MIMIC model with the seven factors regressed on the three variables age, gender, and language area. The fit of this model was satisfactory (TLI = 0.954, CFI = 0.952, RMSEA = 0.063 and SRMR = 0.067). The correlations

among the three variables were very low, ranging between .014 and .081, and were set to 0 in the MIMIC model. There was no influence of age and gender on the loadings of the factors. Only for language area did we find an influence on two factors: satiety responsiveness and enjoyment of food (see table 3). Thus, French speaking children showed higher values for satiety responsiveness than their German speaking counterparts, the effect size being small to medium (standardized path coefficient = -0.19). A closer inspection of this factor revealed that the values for three out of the four items of this factor (“... gets full before meal is finished”, “... gets full up easily”, “... cannot eat a meal if had a snack just before”) were increased in the French relative to the German speaking children. The fourth item “... leaves food on plate at the end of a meal” of this subscale did not differ between language areas. In addition, the French speaking children showed lower values in enjoyment of food, the effect size being small (standardized path coefficient = 0.11).

**Fig 2. MIMIC model of our proposed 7-factor structure of the CEBQ.** A MIMIC model based on our proposed 7-factor model of the Children’s Eating Behaviour Questionnaire. Explanatory variables were age, gender, and language (French and German) in a Swiss population of children between the age of 2 to 6 years old. Numbers denote the standardized regression coefficients. \*  $p < 0.05$ .

**Table 3. Regression coefficients of the influence of explanatory variables age, gender, and language area on the seven factors of the CEBQ**

Effect	Estimate	SE	z-value <sup>1</sup>	p-value	Standardized Estimate
Food Responsiveness ~					
Age	-0.038	0.048	-0.793	0.428	-0.040
Gender	0.076	0.066	1.145	0.252	0.058
Language	-0.028	0.076	-0.368	0.713	-0.018
Emotional Overeating ~					
Age	-0.026	0.059	-0.446	0.656	-0.024
Gender	0.115	0.081	1.409	0.159	0.077
Language	-0.061	0.094	-0.644	0.520	-0.035
Enjoyment of Food ~					
Age	-0.028	0.055	-0.514	0.607	-0.024
Gender	-0.116	0.077	-1.512	0.131	-0.072
Language	0.197	0.087	2.273	0.023	<b>0.105*</b>
Satiety Responsiveness ~					
Age	0.014	0.058	0.234	0.815	0.012
Gender	0.152	0.080	1.884	0.060	0.100
Language	-0.333	0.091	-3.673	0.000	<b>-0.187**</b>
Slowness in Eating ~					
Age	0.004	0.050	0.082	0.935	0.004
Gender	0.079	0.073	1.085	0.278	0.054
Language	-0.126	0.088	-1.431	0.152	-0.073
Emotional Undereating ~					
Age	0.047	0.064	0.731	0.465	0.037
Gender	0.159	0.088	1.800	0.072	0.091
Language	-0.054	0.105	-0.513	0.608	-0.026
Food Fussiness ~					
Age	0.037	0.056	0.665	0.506	0.030
Gender	0.112	0.079	1.429	0.153	0.066
Language	0.015	0.090	0.170	0.865	0.008

*Note.* Gender is coded as Males = 1, Females = 2. Language area is coded as French speaking = 1, German speaking = 2. \* $p < .05$ . \*\*  $p < .01$ . <sup>1</sup>Statistic for the test of regression coefficients against 0.

## Discussion

The original English version of the CEBQ is a well validated and frequently used questionnaire which allows the assessment of children's eating behaviour. Data analysis of the German and French questionnaire in this multi-lingual preschool study revealed a 7-factor structure instead of the original 8-factor structure of the CEBQ. The higher-order model including the two dimensions food approach and food avoidance as theoretically discussed and empirically previously investigated (12) was not supported using our data. Neither age nor gender of the child had any influence on the eating behaviour assessment, while for language area we found that French speaking parents reported that their children showed more FE and more SR than the parents of the German speaking preschool children, although these two effects were small and small to medium, respectively. Like in our study, several studies using samples from European countries obtained a 7-factor structure (3,15,16,18). Such a different factor structure solution has been repeatedly reported in many other studies, but some kept the original 8-factor solution because of a reasonable fit (13,19) or to allow comparisons of their own results with other studies despite an unsatisfactory model fit (15,20). Only in one Portuguese study (18) did the authors remove the DD subscale like in our study, while the remaining studies with a different factor structure than the original version reported that other scales were excluded. One explanation for the difficulties of the DD subscale in our study might be, that the subscale DD does not explicitly assess the use of soft drinks (13), on which other studies had also revealed inconsistencies related to the concept of desiring to drink and the consumption of drinking sweetened beverages (27,36) and young children as in our sample are likely to only rarely have access to soft drinks. Further, young children might have more difficulties to separate the feeling of hunger and thirst, and therefore consume more

energy-dense beverages when feeling hungry (27) which might have impacted on our results in relation to the DD subscale.

Many studies refer to the two higher-order scales Food Approach and Food Avoidance (3,12,13,15,16,18,20). The validity of these constructs could not be confirmed in our Swiss study. The sizes of both samples used by Ek (12) and the authors of the present study are comparable, although children in the Swedish study were slightly older (mean age 5.5) and included a small clinical sample (n=47) with 20% of overweight children, which was not the case in the Swiss sample.

Further, there were a few adaptations needed in relation to the item distribution to the different factors in our statistical analyses. The item 3 (“My child has a big appetite”) was transferred in our study from SR to EF, as it loaded much higher on the latter. This was also the case in a study with preschoolers (14) and further among infants less than 6 months old, where this item loaded comparably on the factor SR as on the three other factors EF, FF, and SE (8). In other studies, similar problems were found with this item, but the loading was higher on subscale FR than on all the other subscales (16,19).

Furthermore, two items in our study had to be removed to achieve a satisfactory model fit. Item 23 (“My child eats more when s/he is happy”), originally belonging to the EUE subscale (inversely coded) and item 28 (“Even if my child is full up, s/he finds room to eat his/her favorite food”) originally belonging to the FR subscale. Both loaded on several subscales and could not be assigned unequivocally. The difficulties to assess emotional eating might partly be explained by the fact that young children do not use eating as a coping strategy to emotional conditions yet (15), and that emotional eating is still less defined at this age period (13) and rather learned over the years. As we rely on parents’ reports of very young children where access to food is still limited,

it remains unclear to which extent children might respond to emotional cues in case of free access to food at a later age period. However, no such explanation can be used for low FR in relation to a favorite food, but other studies had revealed that FR and EOE might be overlapping concepts and therefore items might load on several subscales (15,16).

It should also be kept in mind that apart from different study characteristics, the estimation methods used to analyse the statistical model may have an important influence on the results such as the estimates of the loadings or the goodness of model fit. As an example, in our study we considered the fact that the items underlying the latent constructs were ordinally scaled and that hence estimation methods such as maximum likelihood are not appropriate (37).

Analyses on the influence of sample characteristics revealed that French speaking preschool children showed more food enjoyment and a higher satiety responsiveness than children from the German speaking part of Switzerland, although the effect sizes were small to medium at best. Of note, we did not correct for multiple testing when reporting the estimates of the different loadings, and as a consequence these two effects might represent chance findings. We therefore believe that our results are in line with other studies showing that the CEBQ is a reliable tool to be used in a multicultural context (13).

Further, our analyses revealed no impact of age or gender on any of the seven factors of the CEBQ although the sample covered a larger age range of 2- up to 6-year-old children and gender was almost equally distributed with 47% of girls and 53% of boys. The results are only partly in line with a study that focused on age and gender differences as well. Sleddens and colleagues (15) did not find any age difference either,

but they compared only children aged 6 and aged 7 years. In contrast to our results, several studies had reported gender differences on factors of the CEBQ (15,22,24), but only one with a similar age group but in a small sample (15). As our three explanatory variables explained only very little variance of any of the seven CEBQ factors, other factors might play a more important role in defining eating behaviour of a child such as parenting style (3,38,39), sedentary behaviour of relatives (40) and temperament characteristics of the child (28,41,42).

There are several limitations and strengths in this study. As strength, a sufficiently large community-based sample of children aged 2 to 6 years was assessed, although the number of children in the French speaking area was of somewhat limited size ( $n=124$ ). We applied suitable statistical methods to set up our 7-factor CFA model, thereby taking into account the ordinal scaling of the items and we also reported the coefficient omega as a more useful measure of reliability of factors than Cronbach's alpha. Also, in order to find out whether the factors of the CEBQ were influenced by gender, language area, or children's age, used a MIMIC model, thereby taking into account the reliability of the different subscales of the CEBQ by including them as measurement models rather than computing sum scores which often leads to biased estimates (43). Further, this is only the second empirical investigation to assess a possible higher-order factor model of the CEBQ, which our results could not corroborate. The limitations of the study are that we did not consider the differences in culture background which could influence the results. The CEBQ has been proven to be a reliable parental report to assess the child's eating behaviour (11), but social desirability might still have influenced the response tendencies of parents. Further, as mainly mothers but also a few fathers have responded to these questions, gender differences of parents might have influenced the estimated child's eating behaviour, but as the number of fathers

responding to the questions still was low (14%). the impact of parental gender could not be considered in this study. Consequently, it might be preliminary to conclude on the test-theoretical quality of the current CEBQ and future studies should increase attempts to compare both parents' view of the child's eating behaviour. Furthermore, it is unclear whether eating behaviour is consistent over time, as children's eating environment changes over time, it would be interesting in further studies to do a longitudinal analysis.

To sum up, this study aimed at validating the original factor structure of a French and German version of the CEBQ in a Swiss preschool sample and at identifying the impact of age, gender and language areas as sample characteristics on the observed factors in a large sample of preschool children including a broad age range. Our 7-factor version of the German and French CEBQ turned out to be both valid and reliable and might also be used in a multicultural context.

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Figure 1

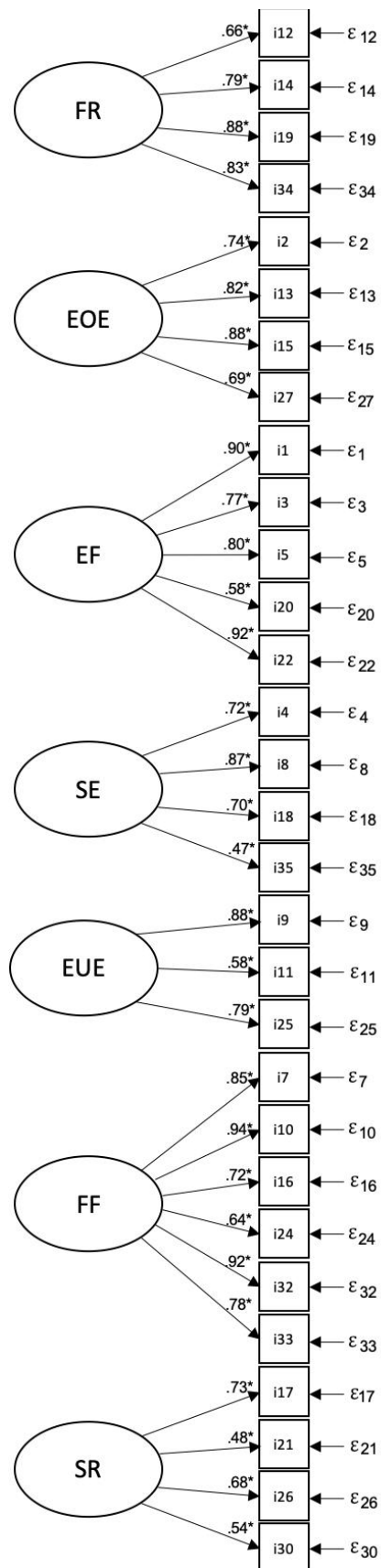
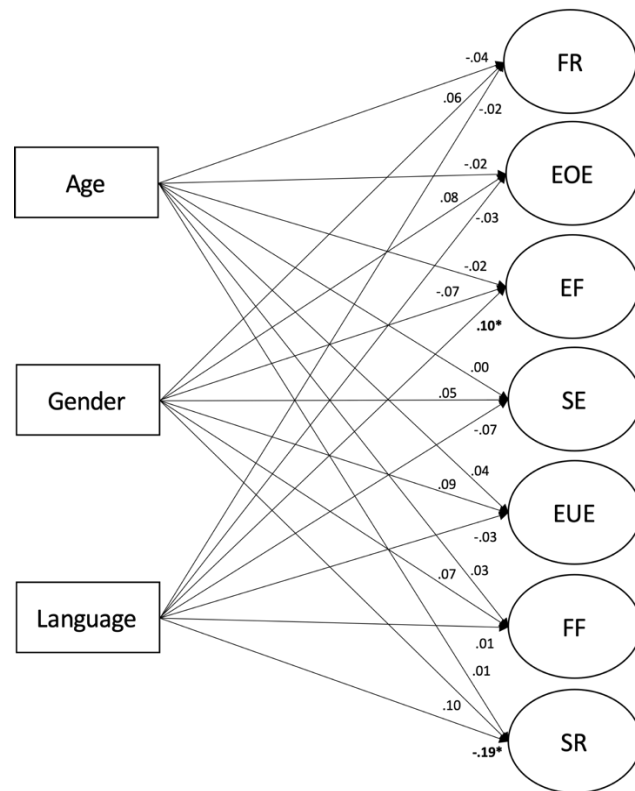


Figure 2





## B) Publication 2



# The relationship of parenting style and eating behavior in preschool children

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Running head: parenting and eating behavior in preschoolers

# Abstract

Background: Eating behavior represents individual appetitive traits which are related to the individual's regulation of food intake. Eating behavior develops at an early age. There is some evidence that parenting styles might impact on the child's eating behavior. The aim of this study was to investigate the relationship of different dimensions of positive and negative parenting styles with the child's eating behavior at a critical age period of the child's early development.

Methods: Parents of 511 preschool children (aged 2 to 6 years) completed the Children Eating Behavior Questionnaire and the Alabama Parenting Questionnaire.

Results: Analyses revealed that different dimensions of negative parenting styles were associated with eating behavior of the child. In details, inconsistent parenting showed a consistent association with eating behavior of a child (i.e. higher emotional eating, higher food responsiveness, higher food fussiness, higher satiety responsiveness and more enjoyment of food), whereas corporal punishment was associated with more emotional overeating and more food responsiveness but less satiety responsiveness. Further, powerful implementation was related to higher food responsiveness and less enjoyment of food and low monitoring was associated with higher emotional overeating and more slowness in eating. There was no such consistent association of positive parenting and eating behavior.

Conclusions: More negative parenting styles were associated with eating behavior which is more often related to potential weight problems in a long term, whereas positive parenting did not show such a consistent relationship with eating behavior. Negative parenting should be in the focus of prevention and treatment of eating behavior problems in young children.

Trial registration: ISRCTN41045021 (06/05/2014)

Key words: eating behavior, preschool, parenting style, SPLASHY

## Background

Eating behavior represents individual appetitive traits which are related to the person's regulation of food intake [1]. Eating behavior develops already in early childhood and individual differences in appetitive and satiety traits are therefore determined early in a child's life [2–4]. Especially the preschool age is a critical age period for its development. Previous research has shown that the eating behavior of a child at preschool age remains stable over childhood and up to adulthood [5,6], and influences the child's growth and weight [7]. Therefore, problems in eating behavior at preschool age are related to increased eating- and weight-related problems at a later age and may cause long-term health consequences in adolescents and adults [4,6–10].

Eating behavior is divided into food approaching and food avoidant behavior. Food approaching behavior includes behavior which involves increased food intake (e.g. high emotional overeating, high food responsiveness and increased food enjoyment when eating). Food avoidant behavior represents restrictive and selective eating behavior which correspond to less food intake such as emotional undereating and picky eating or to the child's ability to reduce food intake after eating such as high satiety responsiveness [11]. Food approaching and food avoidant behaviors may both be related to negative weight consequences in early childhood. Whereas approaching eating behavior is related to an increased risk for overweight and obesity on a long term, avoidant behavior has been associated with future problems of underweight [5,7,11–15].

The development of a child's eating behavior at preschool age is influenced by the parental behavior at meal and snack times and by the child's disposition (i.e. satiety responsiveness [16]). There is evidence that parents not only contribute to the child's development of food

preferences [17] but their parental feeding practices shape the child's beliefs and attitudes towards food [16] and determine the child's eating behavior in the long run [3,4,16,18]. Previous research has shown that feeding practices such as encouraging and rewarding practices increase food approaching behavior and might even reduce satiety responsiveness in children [19–21]. Other feeding practices (e.g. **pressuring to eat**) **rather reduce food intake and limit food enjoyment** [3]:

Besides feeding practices, parenting styles which are not specifically related to feeding but rather represent the general communication attitudes of parents towards their child [22,23] **might contribute to the complex situation of daily food intake in a family's life**. Parenting styles might influence the general environmental conditions of a family's mealtimes and impact on specific eating behavior such as emotional over and undereating but also other dimensions of child's eating behavior (e.g. food enjoyment). However, research on the impact of parenting styles on eating behavior in preschoolers has been little investigated so far. A systematic review identified seven studies on this topic [24] and revealed a weak to moderate relation between parenting style and feeding practices [24] which might indicate that these are two different aspects of parental behavior towards a child. In line with this idea, parenting style has been found to moderate the impact of feeding practices on the child's eating behavior [25] and therefore may also contribute to problematic eating behavior on its own [26].

Parenting style is a parental trait to communicate with the child and aims at influencing the a child's behavior [27]. Parenting style is categorized at the origin by the dimensions of demandingness (parents providing limits and assure structure to control and monitor the child's behavior) and responsiveness (parents provide warmth and understanding according to the needs of a child to develop autonomy) [22,26]. A combination of high levels of demandingness and high levels of responsiveness is defined as a positive parenting style [28–30] which is considered the most beneficial in Western countries [22,31,32]. Positive parenting

is associated with healthier parental feeding of preschoolers [33] and predicts less behavioral problems in preschool children [22,34,35]. In a systematic review by Sleddens et al. (2011), studies involving children up to 18 years showed that a more positive parenting predicts healthier outcomes in childhood such as more physical activities and a healthier diet (e.g., lower caloric intake). Several studies focused on the effect of positive parenting on eating behavior in children, adolescents and young adults so far. They revealed that an authoritative parenting style, a positive parenting style (e.g. combination of high responsiveness and high demandingness), is related to less food fussiness in school-aged children [37], a more healthy diet at school-age and during adolescence [38–43] and less emotional overeating in young adults [44]. Only one study included children at preschool and early school age (age range of 2.8–7.5 years) and confirmed that authoritative parenting was related to less emotional overeating and less food fussiness at that early age period [45]. However, other dimensions of eating behavior were not investigated in that study, although there is evidence that they (e.g. emotional undereating, food and satiety responsiveness or enjoyment of food) contribute to long-term eating and weight problems [5,7,11–15].

Besides the positive impact of positive parenting on eating behavior, there is some evidence that negative parenting styles are related to negative parental feeding and more eating behavior problems [46,47] as well as other behavioral problems in children and preadolescents [27,48–50]. Negative parenting is defined by a lack of warmth, of responsiveness, either a complete dismiss of control or an overcontrol on the child such as a lack of monitoring or an augmented use of strict discipline, or a complete inconsistency in responding to a child's behavior or needs [22,29,51,52]. Previous studies investigated some of these negative parenting styles in relation to eating in children. They revealed that inconsistent parenting is related to more consumption of junk food and a higher risk for eating behavior problems in a clinical sample of preschool children and even in young adults aged 19 years [46,47]. Further, authoritarian parenting style (more controlling and using stricter disciplines) was related to

more emotional overeating in the previously mentioned study with 496 preschool and early-school aged children [45], which is known to increase the risk for eating behavior problems in preschoolers [3]. Moreover, Goodman et al. (2020) found that permissive parenting (e.g. dismiss of control) is associated with higher fussiness which had previously been found in a small sample of 77 English children aged 3-8 years [53]. To sum up, so far only two studies [45,53] investigated the relation between negative parenting style and eating behavior in children at preschool age and only one study focused on the relationship of positive parenting and eating behavior. As preschool age is known to be a critical time period for the development of eating behavior, there is a need of profound knowledge to understand these relations and potentially adapt preventive and therapeutic strategies. Therefore, this study aimed to provide an overview on the relationship of different dimension of general parenting styles and of the different facets of the child's eating behavior at preschool age and to detect the specific links between parenting style and eating behavior at that early age.

## Methods

### **Study sample and design**

The Swiss Preschooler's Health Study (SPLASHY) is a multi-site prospective cohort study including 555 children within two sociocultural areas of Switzerland (German and French speaking part) (ISRCTN41045021; for details [54]). Children were recruited from 84 childcare centers within five cantons of Switzerland (Aargau, Bern, Fribourg, Vaud, Zurich) which made up 50% of the Swiss population in 2013. Recruitment was ongoing between November 2013 and October 2014 when children were 2–6 years old. Parents were asked to give their written informed consent for study participation before completing a set of questionnaires. The study was approved by all local ethical committees (No 338/13 for the Ethical Committee of the Canton of Vaud as the main ethical committee) and is in accordance with the Declaration of

Helsinki. The detailed study design and the overall objectives have been previously described [54].

## Assessment

### Child Eating Behavior

Eating behavior was assessed by the German and French version of the Child Eating Behavior Questionnaire (CEBQ) of Wardle and al. (2001). The questionnaire is validated in children from 2 to 9 years old [55,56] and includes eight subscales and 35 items using a 5 point-Likert scale (never (1) to always (5)). Subscales focus on the child's eating behavior and include *Food responsiveness* (e.g., "given the choice, my child would eat most of the time"), *Enjoyment of food* (e.g., "my child enjoys eating"), *Emotional overeating* (e.g., "my child eats more when worried"), *Satiety responsiveness* (e.g., "my child gets full before his/her meal is finished"), *Slowness in eating* (e.g., "my child eats slowly"), *Emotional undereating* (e.g., "my child eats less when upset"), and *Food fussiness* (e.g., "my child refuses new food at first") and *Desire to drink* (e.g., "my child always asks for something to drink"). Depending on the scale, very high or very low levels indicate unhealthy eating behavior, however no cut-off values exist to demonstrate behaviors that can be classified as dysfunctional. The German and French version of the CEBQ revealed a 7-factor structure solution TLI = 0.954, CFI = 0.952, RMSEA = 0.063 and SRMR = 0.067) [57] excluding the subscale desire to drink but proofing high validity and reliability in the German and French version with omega's coefficients ranging from .66 (Satiety responsiveness) to .90 (Food fussiness) and the alpha's values ranging from .69 (Satiety responsiveness) to .89 (Food fussiness) [57], comparable to the alpha's values from the original version ranging from .72 (Emotional overeating) to .91 (Food fussiness) [56].

## Parenting style

The parenting style was assessed using the Alabama Parenting Questionnaire (APQ: [35]). The APQ comprehends 40 items and seven subscales (for details see table 1). **Positive parenting styles** consisted of the subscales: *Parental involvement* (e.g., “you drive your child to special activities”), *Positive parenting* (e.g., “you have a friendly talk with your child”), and *Responsible parenting* (e.g., “you explain your child how to behave in a specific situation”) which all are in line with the authoritative parenting. **Negative parenting styles** include the subscales *Powerful implementation*, which is comparable to authoritarian (e.g., “if your child negotiates with you, you’re giving clear instructions”), *Inconsistent parenting* (e.g., “you threatened to punish your child and then do not actually punish him/her”), *Corporal punishment* (e.g., “you hold your child firmly or shake him/her, if he/she did something wrong”), and *Low monitoring* (e.g., “your child is not at home and you don’t know where he/she is exactly”) which is in line with permissive parenting. High levels in the different scales representing higher frequency of parenting style in the daily life of a parent, however no cut-off values exist related to the subscales of APQ. The reliabilities to the APQ factors were ranging from .68 (Corporal punishment) to .85 (Positive parenting) for alpha values, findings that are comparable to the study among children of an elementary school with reliabilities with alpha values of .60 (Corporal punishment) to .84 (Positive parenting) [35].

## Statistical analyses

Statistical analyses were conducted using R [58], including the package lavaan [59]. As 44 of the 555 children provided no data on the relevant study characteristics, 511 children were included in the analysis. Descriptive statistics including the means  $\pm$  SD for continuous variables and frequencies and percentages for categorical variables are reported. To analyze the impact of parenting style on eating behavior in these preschool children, structural equation models (SEM) were set up with the seven APQ subscales as predictors and the seven CEBQ subscales

as outcomes. Seven different models were conducted, one for each of the following APQ subscales: parental involvement, positive parenting, responsible parenting, powerful implementation, inconsistent parenting, corporal punishment, and low monitoring. Each model contained the respective APQ subscale as predictor and all seven CEBQ subscales as outcomes. This way a) all seven path coefficients and b) the differences among all pairs of path coefficients could be estimated. Analyses were controlled for potential correlates with age, gender, language area, BMI of both parents and parenting stress level. Subscales of both CEBQ and APQ were not operationalized using sum scores since these pose problems with respect to validity and reliability [60]. Instead, we set up measurement models for each subscale (CEBQ or APQ) involved. Items of both questionnaires APQ and CEBQ subscales were all measured on an ordinal scale (range 0-4). Thus, the mean and covariance adjusted weighted least squares estimator (WLSMV) was used to compute model parameters and their standards errors. In order to report model fit indices, the robust versions of the Tucker Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) are provided by considering the required criteria of an acceptable model fit for these indices: RMSEA ( $\leq 0.06$ , 90% CI  $\leq 0.06$ , Cfit not significant), SRMR ( $\leq 0.08$ ), CFI ( $\geq 0.95$ ), and TLI ( $\geq 0.95$ ) [61]. To estimate reliabilities of the factors specified in the measurement models, omega coefficient [62] was used, which is known to be more useful than the often-used Cronbach's alpha [63]. No attempt was made to control for multiple testing as we considered our analyses to be of explorative nature.

## Results

### Descriptive statistics

Mean age in the sample ( $n = 511$ ) was 3.85 years ( $SD = 0.69$ , ranging from 2.21 to 6.64 years) and 47% of the participants were girls. A total of 76% were living in the German-speaking part

of Switzerland and 24% in the French-speaking part. Mean SES of the family was 62.88 (SD = 14.97) and higher than in the Pisa study (Swiss sample = 53.00) of OECD countries [64]. Mean age of mothers were 37.17 (SD=4.92) and of fathers 39.86 (SD=6.31). More than half of the children were living in rural parts of the country (59,6%) and a total of 58,7% had one or both parents being migrants. Mean levels of eating behavior subscales were comparable to the original version [56], ranging from 1.5 (*Emotional overeating*) to 3.5 points (*Enjoyment of food*) (see Table 1).

**Table 1**

*Descriptive statistics of factors from the Children Eating Behavior Questionnaire (CEBQ) and the Alabama Parenting Questionnaire (APQ)*

Factors	N	M (SD)	Omega coefficient
<b>Parenting styles</b>			
Parental involvement, 4 items	511	4,2 (0,53)	.49
Positive parenting, 6 items	510	4,5 (0,38 )	.76
Powerful implementation, 5 items	508	3,5 (0,61)	.72
Responsible parenting, 6 items	511	3,8 (0,53)	.68
Inconsistent parenting, 5 items	511	2,5 (0,54)	.69
Corporal punishment, 4 items	509	1,6 (0,55)	.59
Low monitoring, 5 items	510	1,3 (0,38)	.61
<b>Eating behaviors</b>			
Food responsiveness, 4 items	509	2,0 (0,75)	.83
Emotional overeating, 4 items	504	1,5 (0,55)	.77
Enjoyment of food, 5 items	509	3,5 (0,47)	.86
Satiety responsiveness, 4 items	511	2,9 (0,65)	.66
Slowness in eating, 4 items	509	2,9 (0,74)	.76
Emotional undereating, 3 items	507	3,0 (0,87)	.78
Food fussiness, 6 items	509	2,9 (0,79)	.90

*Note.* Behaviors are rated on a five -point Likert scale. These are the factors retained for our 7-factors structure model of CEBQ and the 5 retained factors for APQ.

## Relation of parenting styles and the child's eating behavior

Model fits of the seven SEMs (one for each of the seven APQ subscales) were all satisfactory, with robust values ranging from .945 to .951 for TLI, .044 to .049 for RMSEA, and .059 to .064 for SRMR (values for the RMSEA of the corresponding null models varied between .33 and .34). Regression analyses revealed several patterns (see table 2 and 3). The 95 CI of the RMSEA varied between .42 and .45 for the lower limit, and between .49 and .52 for the upper limit.

Positive parenting styles were hardly related to any CEBQ subscale. In details, high levels of positive parenting were related to low levels of emotional overeating and further high levels of responsible parenting was related to low levels of enjoyment of food. There was no other significant relation of positive parenting or responsible parenting and eating behavior, nor did parental involvement as a positive parenting style play a role on eating behavior of the child in this sample.

In contrast, there were several negative parenting styles linked to the child's eating behavior. First, inconsistent parenting was positively associated to most of the eating behavior subscales in these preschool children, except with slowness in eating. Thus, high levels of inconsistent parenting were associated with high levels in food responsiveness, in emotional over- and undereating, but also with high levels in enjoyment of food, in satiety responsiveness, and in food fussiness what was contrary to our expectations (see table 3).

Secondly, high levels of corporal punishment were specifically related to more food responsiveness and more emotional eating and less satiety responsiveness in these children, whereas high levels of powerful implementation were related to more food responsiveness and less enjoyment of food. Finally, low levels of monitoring were related to more emotional overeating and more slowness in eating.

**Table 2**

*Regression coefficients of the relationships of positive parenting styles (predictors, in bold type) on the child's eating behavior*

Effect	Estimate	SE	z-value <sup>1</sup>	p-value	Standardized Estimate
<b>Parental Involvement</b>					
Food Responsiveness	-0.050	0.067	-0.753	.0451	-.044
Emotional Overeating	-0.096	0.085	-1.129	0.259	-0.075
Enjoyment of Food	-0.089	0.082	-1.076	0.282	-0.066
Satiety Responsiveness	-0.054	0.084	-0.638	0.524	-0.043
Slowness in Eating	0.021	0.078	0.274	0.784	0.017
Emotional Undereating	-0.064	0.094	-0.677	0.498	-0.042
Food Fussiness	-0.104	0.084	-1.245	0.213	-0.071
<b>Positive Parenting</b>					
Food Responsiveness	-0.142	0.075	-1.890	0.059	-0.111
Emotional Overeating	-0.234	0.096	-2.441	0.015	<b>-0.160*</b>
Enjoyment of Food	-0.157	0.087	-1.805	0.071	-0.103
Satiety Responsiveness	0.020	0.088	0.233	0.816	0.014
Slowness in Eating	0.040	0.082	0.481	0.630	0.028
Emotional Undereating	0.028	0.097	0.283	0.777	0.016
Food Fussiness	-0.117	0.089	-1.318	0.188	-0.070
<b>Responsible Parenting</b>					
Food Responsiveness	-0.014	0.077	-0.187	0.852	-0.010
Emotional Overeating	-0.036	0.100	-0.360	0.719	-0.022
Enjoyment of Food	-0.194	0.089	-2.169	0.030	<b>-0.112*</b>
Satiety Responsiveness	-0.007	0.097	-0.074	0.941	-0.004
Slowness in Eating	-0.078	0.091	-0.857	0.391	-0.048
Emotional Undereating	0.017	0.111	0.152	0.879	0.009
Food Fussiness	-0.070	0.096	-0.724	0.469	-0.037

*Note.* \* $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . <sup>1</sup>Statistic for the test of regression coefficients against 0.

**Table 3**

*Regression coefficients of the relationships of negative parenting styles (predictors, in bold type) on the child's eating behavior*

Effect	Estimate	SE	z-value <sup>1</sup>	p-value	Standardized Estimate
<b>Inconsistent Parenting</b>					
Food Responsiveness	0.149	0.055	2.692	0.007	<b>0.165**</b>
Emotional Overeating	0.258	0.064	4.058	0.000	<b>0.250***</b>
Enjoyment of Food	0.178	0.064	2.789	0.005	<b>0.166**</b>
Satiety Responsiveness	0.253	0.068	3.742	0.000	<b>0.250***</b>
Slowness in Eating	0.108	0.061	1.775	0.076	0.108
Emotional Undereating	0.222	0.067	3.334	0.001	<b>0.185**</b>
Food Fussiness	0.179	0.063	2.837	0.005	<b>0.152**</b>
<b>Corporal Punishment</b>					
Food Responsiveness	0.262	0.075	3.489	0.000	<b>0.246***</b>
Emotional Overeating	0.273	0.094	2.919	0.004	<b>0.224**</b>
Enjoyment of Food	-0.019	0.085	-0.228	0.820	-0.015
Satiety Responsiveness	-0.194	0.087	-2.238	0.025	<b>-0.163*</b>
Slowness in Eating	0.041	0.082	0.504	0.614	0.035
Emotional Undereating	-0.009	0.095	-0.092	0.927	-0.006
Food Fussiness	-0.048	0.083	-0.581	0.561	-0.035
<b>Powerful Implementation</b>					
Food Responsiveness	0.146	0.058	2.492	0.013	<b>0.132*</b>
Emotional Overeating	0.022	0.074	0.291	0.771	0.017
Enjoyment of Food	-0.183	0.070	-2.602	0.009	<b>-0.141**</b>
Satiety Responsiveness	0.013	0.073	0.184	0.854	0.011
Slowness in Eating	-0.061	0.068	-0.888	0.375	-0.050
Emotional Undereating	0.050	0.088	0.575	0.566	0.034
Food Fussiness	-0.128	0.073	-1.737	0.082	-0.089
<b>Low Monitoring</b>					
Food Responsiveness	0.119	0.066	1.182	0.070	0.138
Emotional Overeating	0.207	0.076	2.725	0.006	<b>0.210**</b>
Enjoyment of Food	0.114	0.068	1.669	0.095	0.111
Satiety Responsiveness	0.135	0.072	1.886	0.059	0.139
Slowness in Eating	0.145	0.066	2.196	0.028	<b>0.150*</b>
Emotional Undereating	0.084	0.079	1.058	0.290	0.072
Food Fussiness	0.063	0.066	0.951	0.341	0.056

Note. \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ . <sup>1</sup>Statistic for the test of regression coefficients against 0.

## Discussion

In a sample of 511 children, we investigated the relation between positive and negative parenting on children's eating behavior during children's preschool age. Although we expected that both parenting styles would be related to eating behavior, this was not the case. While the different negative parenting style subscales were often related to the different eating behavior subscales in children, the different positive parenting subscales were mostly not. For example, the subscale "inconsistent parenting" had the most consistent association with the different subscales of children's eating behavior. Further negative parenting styles were related to the food approaching behaviors "food responsiveness" and "emotional overeating" .

More precisely, inconsistent parenting was associated with every eating behavior subscale, except for slowness in eating but only with small to medium effect sizes. This means, high levels of inconsistent parenting were associated with high levels of food responsiveness, emotional overeating, enjoyment of food, but also emotional undereating, food fussiness and unexpectedly with satiety responsiveness. These results reveal that inconsistent parenting (representing the extent to which parents are not able to enforce rules and consequences in a consistent way), is associated with high levels of food approaching and at the same time with high levels of food avoidant behavior which are both known to be related to weight problems, such as overweight and underweight problems in school-aged and preschool children [11,14,37,65]. The role of inconsistent parenting has not been investigated in the previous studies on eating behavior in young children. Additionally, there is only one study on a clinical sample of preschool with leukemia where inconsistent parenting was related to the diet (more junk food), but eating behavior was not in the focus of that study [47]. However, inconsistent parenting has previously been found to negatively impact the child's development. A previous meta-analysis revealed that only inconsistent parenting had a profound impact on the development of pediatric obesity [66] and none of the other parenting styles. Therefore, it can

be assumed that this parenting style might play a specific role in the determination of eating and weight-related conditions of children and could be associated with the risk to use eating as a coping strategy to solve problems as shown in studies focusing on emotional eating [67,68]. Surprisingly, higher use of inconsistent parenting was also related to higher satiety responsiveness, which is an adaptive behavior as it is limiting food intake when eating and therefore balancing energy intake and energy consumption supporting a healthy weight condition as a consequence [69,70]. To our knowledge, no other study had investigated this relation of inconsistent parenting and satiety responsiveness so far. Therefore, a comparison of these contradictory findings with the literature is not possible. However, there are two explanations for these findings. First, as correction for multiple was not considered (due to the exploratory nature of the paper), the results could potentially be seen as a random effect, but coefficient level was relatively high with  $CE=0.253$ . Another explanation would be related to the items of the questionnaire and the question to which extent parents might have misunderstood the content. In relation to satiety responsiveness, the CEBQ asks parents about finishing plates, not eating when snacking before, easily getting full up etc. which might have seen as a problematic eating behavior for parents which they would see as even more problematic when rather inconsistent in parenting. On the other hand, problematic eating behavior might also provoke distress in parents and negatively impact on their parenting style which means that the cause-effect relation of parenting styles and eating behaviors remain still unclear.

Our findings further revealed that high levels of corporal punishment were related to more food responsiveness, more emotional overeating, and less satiety responsiveness which all represent food approaching behaviors that are associated with more eating and weight problems on a long term [5,7,11–15]. To our knowledge, this is the first study which investigated the role of corporal punishment on eating behavior in preschool children. We assume that corporal punishment might provoke a more externally or cue-driven eating

behavior which is related to more eating behavior problems such as more food responsiveness, higher food intake and less satiety and might represent a coping strategy too. These parenting styles might provoke more negative emotions such as fear or anger in the parent-child interaction which demands emotion regulation strategies, that are potentially not available at preschool age and might be replaced by increased food intake in such stressful conditions (emotional overeating) [71].

Finally, powerful implementation, which is related to the authoritarian style [35], was associated with more food responsiveness and less enjoyment of food in these preschool children. This result is in line with another study. Van Der Horst and Sleddens (2017) found similar results in toddlers. Authoritarian parenting style was related to lower enjoyment of food even in these young children [72]. It can therefore be assumed that high levels of controlling behavior in parents might cause more difficult or conflict situations during mealtimes which potentially reduce enjoyment of food. In which way such powerful implementation might be related to food responsiveness has not been investigated so far and there is only some evidence of a potential relation between aspects of authoritarian parenting and healthy eating [73,74], which does not correspond directly with the child's eating behavior.

In contrast to these associations between negative parenting styles and eating behavior, our results did not reveal any relationship of positive parenting styles and eating behavior as we would have expected from a previous cross-sectional study of Goodman and colleagues (2020) in young children. They had investigated 496 young children of similar age range (2.8–7.5 years). Their analyses revealed that authoritative parenting was related to less emotional overeating and less food fussiness, but in contrast to our study, analyses focused on cross-sectional data only. Besides this, other studies only focused on the relationship of positive parenting styles and feeding behavior of parents [37] and therefore evidence for the relation of positive parenting styles and the child's eating behavior is still limited.

Although preschool age is a critical time-period in the development of eating behavior, the impact of positive and negative parenting styles might be more explicit at an older age when access to food is not limited anymore.

There are several strengths and limitations in this study. First, a large sample of healthy Swiss children covering a broad range of preschool age were investigated in this study and for the first time all facets of eating behavior and the different dimensions of parenting styles were assessed which has not been done before. However, assessment techniques were limited to standardized parental questionnaires and parental responses might have been influenced by parents' individual experiences with their children which might not correspond with an expert's perspective. Moreover, the social desirability bias might have played a role in the assessment of negative parenting styles [51] and therefore have limited the actual magnitude of parenting styles. Furthermore, parental assessment was limited to one parent of each family and mainly mothers (only 14% of the sample were fathers). As mothers and fathers show different parenting styles [30,75], findings might have been different if both parents had been considered in this study. In addition, each parent might base the assumptions on the child's eating behavior depending on other expectations and experiences, and findings of this study mainly represent the maternal understanding of a child's eating behavior. So far, fathers have rarely been assessed [76], but some research has shown that paternal feeding practices influence the child's eating behavior too [77]. Moreover, the cross-sectional design of the study does not allow to draw any conclusion on cause-effects, and it remains unclear to which extent the child eating patterns might have influenced specific parenting styles. Furthermore, there is some evidence that similarities of general parenting styles and feeding style can be expected, but they do not seem to be interchangeable [78]. Parents mostly apply different styles in eating specific and other parenting situations [79,80]. Therefore, general parenting

style and eating specific parenting style both contribute to the child's eating behavior. It should also be kept in mind that we estimated a total of 49 (7 subscales of APQ x 7 subscales of CEBQ) associations. Based on  $\alpha = .05$  and assuming independent associations we would expect on average ca. 2.45 ( $.05 \times 49$ ) significant effects purely by chance. Analyses revealed clearly more than 2-3 significant results, but effects were all small to medium and therefore other factors (i.e. environmental and individual aspects) might play an important role in the determination of eating behavior of a child. Furthermore, this study investigated a healthy sample of preschool children and therefore the full range of eating behavior problems might not have been represented in this sample. Further research on clinical samples need to prove to which extent parenting style can be related to eating behavior in children at preschool age.

## Conclusions

Our findings suggest that mainly negative parenting is associated with the child's eating behavior at preschool age. Inconsistent parenting had the most consistent impact on food approach and on food avoidant behavior. Besides this, corporal punishment and powerful implementation and low monitoring were all related to mainly food approaching behavior in these young children and might be a proxy for negative family conditions which could influence eating and weight development of children in the longer term. Therefore, preventive approaches should consider negative general parenting styles which seems to play a consistent role in the development of eating behavior during a critical time-period of early childhood.

## List of abbreviations

SES	socioeconomic status
SPLASHY	Swiss Preschoolers' Health Study
APQ	Alabama Parenting Questionnaire,
CEBQ	Child Eating Behavior Questionnaire
SEM	structural equation models SEM

## Declarations

*Ethics approval.* The study was approved by all local ethical committees (No 338/13 for the Ethical Committee of the Canton of Vaud as the main ethical committee) and is in accordance with the Declaration of Helsinki. Parents were asked to give written informed consent to participate in this study.

*Consent for publication.* Not applicable.

*Availability of data and materials.* The datasets generated and/or analyzed during the current study are not publicly available due the fact that participants were not asked at that time to provide consent on open data but are available from the corresponding author on reasonable request.

*Competing interests.* The authors declare that they have no competing interests.

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Foundation neither interfered with the design of the study nor provided direct support (e.g., subject recruitment).

*Authors' contributions.* The main responsibility for the study design and project management was with the principal investigators JJP, SM, SK and OGJ. All authors conducted this research project and contributed to the data collection and data analyses. AL and NM drafted the first version. AHM performed the final data analyses. All authors (AL, NM, THK, AHM, AA, AEZ, KS, CSLA, EAS, SK, JJP, SM, OGJ) read and commented on drafts and approved the final manuscript. The last five authors (SK, JJP, SM, OGJ, NM) have a shared last authorship.

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### C) Publication 3



## **How parenting stress is related to general parenting in preschoolers over a year: a cross-lagged study**

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### **Abstract**

Parenting styles and parenting stress have different impact on children's development. If they show stability throughout the childhood, they have potentially long-lasting consequences for the child's mental health and well-being. Furthermore, higher parenting stress challenges the resources of the parent, who might thus use less positive parenting. The aim of the study was to evaluate the stability of parenting stress and parenting styles over one year during the preschool period. A total of 511 parents of preschoolers (aged 2 to 6 years) were asked to complete the Alabama Parenting Questionnaire (APQ) to measure the parenting style, and the Parenting Stress Scale (PSS), focusing on parental stressors, at baseline and at 1-year follow-up. The results revealed a high stability for both parental stressors and all subscales of parenting style. Also, some parenting styles revealed small to medium sized decreases over the year (i.e. powerful implementation, responsible parenting, and corporal punishment) whereas others indicated a medium to large sized increase in the same period (i.e. positive parenting, parental involvement and low monitoring). Further, out of 14 cross-lagged associations between parental stressors and seven subscales of parenting style, only one significant effect was found, which was small to medium sized and appeared counterintuitive (higher parenting stress at baseline revealed lower use of corporal punishment one year later). To conclude, there was no temporal change of inconsistent parenting and parental stressors over one year preschool period but did not influence each other. Both should be considered in prevention for the enhancement of parenting and potential consequences.

## **Introduction**

Parenting styles refer to the patterns of child rearing and are a set of behaviours parents use to communicate with their children (Baumrind, 1971a; Darling & Steinberg, 1993). Therefore, parenting style is defined as a constellation of parental attitudes and behaviours in the interaction with the child, and it includes positive and negative dimensions of parenting behaviour (Baumrind, 1971a; Scaglioni et al., 2011). Positive parenting style (e.g., responsible parenting, authoritative and parental involvement) is related to the parent's high responsiveness to the child's needs and demands, showing warmth and involvement, but also includes the parental expressed expectations and support in the abilities of the child to self-control, to adapt and to display mature behaviour (Maccoby & Martin, 1983; Rhee, 2008). Positive parenting style is the most beneficial parenting style as it contributes to the child's long-term wellbeing (Baumrind, 1971a; Zlomke et al., 2014). Indeed, positive parenting style has consistently been a predictor for positive outcomes in children, including high academic achievements (Newman et al., 2008; Spera, 2005), more healthy behaviour (Sleddens et al., 2011), and better mental health (Yap et al., 2016; Zhou et al., 2008). However, a study on preschool children did not find such a link of positive parenting and mental health (Stülz et al., 2019) and a recent meta-analysis confirmed that the impact of positive parenting style is less consistent than previously thought, especially at adolescence (Clayborne et al., 2021).

In contrast, negative parenting style has been clearly related to behavioral problems in children. Negative parenting style (e.g., use of corporal punishment, permissive, authoritative behaviors) considers all negative parental behaviours towards the child, such as low responsiveness to the child's needs, extremely low or very high parental

demands related to the child's behavior such as too few or too strict and rigid rules, low monitoring, high tendencies to overcontrol, and harsh disciplines (Baumrind, 1971; Essau et al., 2006; Frick et al., 1999; Rhee, 2008). Children and adolescents with parents using negative parenting style showed more behavioural problems than others in several studies (de la Osa et al., 2014; Frick et al., 1999; Fuentes-Balderrama et al., 2020; Kuppens & Ceulemans, 2019; Mackenbach et al., 2014). Negative parenting style was further related to more socially difficult behavior in children (i.e. aggressive behavior) (Kawabata et al. (2011) which might damage social relationship and impact on social integration in the long run (e.g., Stassen Berger, 2007). Furthermore, there is evidence that inconsistent parenting (lack of consistency in parental behaviours, and rules, for instance) is associated with more cyberbullying and victimization of cyberbullying in adolescents (Katz et al., 2019), and with more externalizing problems in preadolescents (Fuentes-Balderrama et al., 2020). Inconsistent parenting has also been shown to be related to child's mental health at preschool age (Stülb et al., 2019). Its impact was even stronger than that of socioeconomic status in preschool children (Stülb et al., 2019). This association between inconsistent parenting and behavioral problems remained consistent over a one-year period within preschool age (Stülb et al., 2019) which might be explained by the impact of inconsistent parenting on cortical development which determines social and sensorimotor functioning (Whittle et al., 2022).

A similar effect on cortical development was found for harsh discipline (Whittle et al., 2022). Harsh discipline which includes the use of physical (e.g. corporal) punishment or psychological force with the intention to cause pain and control the child's behavior (Hecker et al., 2016) was related to more socioemotional problems in children and

adolescents (Eamon, 2001; Hecker et al., 2016) and to more conduct problems in younger, elementary-schooled children (Reichle & Franiek, 2009). Further, studies revealed that harsh discipline is related to more aggressive behavior in school-aged children (8–12 years old) (Gershoff et al., 2010) and to more internalizing problems in adolescents (Baumrind, 1966). Similar results were found in preschool children. Corporal punishment was related to behavioral problems but not consistently over one year (Stülz et al., 2019).

Besides this, other studies confirmed the adverse impact of negative parenting style on the child's mental wellbeing. Parental low monitoring at adolescence was related to more mental health problems (e.g. depression) in girls aged 16–20 years (Bellamy & Hardy, 2015). In another study with younger children aged 3–7 years, those with less responsive parents showed higher distress levels during vaccination than others (Edelstein et al., 2004). Negative parenting was also associated with more aggressive behaviours and distress in 8 years old boys with fathers showing more authoritative parenting, whereas girls of the same age showed more aggressive behaviours and in addition higher negative emotions if their father was more permissive (Pascual-Sagastizabal et al., 2021).

Parenting style might be influenced by the children's characteristics such as age and potentially by the children's demanding behaviour (Frick et al., 1999; Paikoff & Brooks-Gunn, 1991; Smith et al., 2000). There is some evidence that parenting styles are stable over time (Baumrind, 1971b; Rhee et al., 2006; Russell et al., 1998) at least during the first six years of life where parents play an important role in the development of the child's regulation, socialization, and child competences (Baumrind, 1975; Dallaire & Weinraub, 2005). However, increased stress might cause changes in

parenting style (Belsky, 1984; Deater-Deckard, 2004) such as more negative parenting styles and less positive parenting styles. The tasks and responsibility related to parenting are demanding, especially in children with behavioral problems and might provoke distress in parents. Stressors causing parental distress refer to conditions where a parent's resources are challenged by the needs or behaviours of the child and the limited resources of parents to respond to them (Abidin, 1990; Deater-Deckard, 2004). Parental stressors might include familial conditions such as family conflicts, financial difficulties and other problems (Louie et al., 2017), or might correspond with the constantly existing expectations that a parent is responsible and available to react to the child's needs (Crnic et al., 2005) and having at the same time limited control and limited resources in terms of energy, time and flexibility (Deater-Deckard, 2004). Previous research revealed that parenting stress does not change over time among parents of preschool children aged 22 months to 4 years (Lederberg & Golbach, 2002). Similar findings were reported by Mulsow *et al.* (2002) who found that parenting stress increased only during the first 6 months after birth, but then remained similar up to the age of 3 years. Therefore, persistent parenting stress could cause persistent parenting styles. Such high levels of parenting stress cause distress in the family and influences the child's development (e.g. Berry & Jones, 1995; Caldwell et al., 2007; Louie et al., 2017) and might impact on negative and positive parenting styles. Previous studies revealed that high levels of parental stress caused more harsh and punitive behavior of parents towards their child (Bugental & Johnston, 2000; Deater-Deckard, 2004; Yu et al., 2020) and less affection, more inconsistent parenting and more parental disengagement (Deater-Deckard, 2004). Further parenting stress caused more hostile parental behaviours causing more emotional and behavioural problems in children (Yu et al., 2020). Further, parenting stress was related to less pleasure and more conflicts in

child-parent interaction in preschool children (Crnic et al., 2005) and was also related to more parental fatigue which provoked more feelings of frustration, more impatience and more irritability towards the child (Cooklin et al. (2012) which in turn could increase parenting stress in the long run. There is some evidence that limited parental resources are related to feelings of incompetence which might provoke additional stress and more negative parenting (Cooklin et al., 2012; Johnston & Mash, 1989; Zvara et al., 2020). Such changes in negative parenting have been found in a study that focused on children aged 0 to 6 years (Dellaire & Weinraub, 2005), but positive parenting remained unchanged during the same period. To sum up, increased parenting stress could cause increased use of negative parenting styles, which might in turn provoke an augmentation of parenting stress.

In the present study, we aimed at investigating positive and negative parenting styles and parenting stress over a one-year period. The objective was to identify the stability of both parenting stress and of parenting styles, i.e. the influence of parenting stress and of positive parenting on the respective outcome of the same variable, and to assess possible cross-lagged effects, i.e. the impact of both parenting stress on the different parenting styles and the impact of the different parenting styles on parenting stress, over a one-year period. To this end we set up a cross-lagged panel model.

## **Method**

### **Participants and study procedure**

The Swiss Preschooler's Health Study (SPLASHY) included a total of 511 children aged 2–6 years, recruited in 84 childcare centers in the French and German parts of Switzerland. The study was conducted between November 2013 and October 2014. The study design and the objectives were described in detail in a previous paper (ISRCTN41045021; for details see (Messerli-Bürgy et al., 2016). The study was

approved by the local ethical committees of Switzerland of all the cantons that had been involved (No 338/13 for the Ethical Committee of the Canton of Vaud as the main ethical committee) and was in accordance with the Declaration of Helsinki. After providing written informed consent, parents received a link to a set of questionnaires (at baseline and again at 1 year follow-up) to complete online.

### **Assessment**

**Parenting Stress** was assessed by using the Parental Stress Scale (PSS; Berry & Jones, 1995). The PSS comprehends 18 items in four subscales, *parental rewards*, *parental stressors*, *lack of control* and *parental satisfaction*. The PSS assesses the perceived stress levels of parents due to their parenting role. Parents are asked to respond to different questions by using a 5 point-Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5). Out of the four domains of parenting stress, the subscale focusing on *parental stressors* was analysed for this study as the study aimed at investigating the stress levels parents experience in relation with their child. It contains 6 items in the original version of Berry & Jones (1995): item 3 “Caring for my child(ren) sometimes takes more time and energy that I have to give”, item 9 “The major source of stress in my life is my child(ren)”, item 10 “Having children leaves little time and flexibility in my life”, item 11 “Having children has been a financial burden”, item 12 “It is difficult to balance different responsibilities because of my child(ren), and item 16 “Having children has meant having too few choices and too little control over my life”.

**Parenting style** was assessed using the Alabama Parenting Questionnaire (APQ; Reichle & Franiek, 2009). Parents are asked to respond to questions by using a 5 point-Likert scale, ranging from “never” (1) to “always” (5). The APQ contains 40 items and

seven subscales representing different positive and negative parenting styles. Subscales such as *positive parenting* (e.g., “You have a friendly talk with your child”), *parental involvement* (e.g., “You drive your child to special activities”) and *responsible parenting* (e.g., “You explain your child how to behave in a specific situation”) all belonging to a positive parenting approach, and *powerful implementation* (e.g., “If your child negotiates with you, you’re giving clear instructions”), *inconsistent parenting* (e.g., “You threatened to punish your child and then do not actually punish her/him”), *corporal punishment* (e.g., “You hold your child firmly or shake him/her, if he/she did something wrong”) and *poor monitoring* (e.g., “Your child is not at home and you don’t know where he/she is exactly”) belonging to a negative parenting approach.

### **Statistical analyses**

Statistical analyses were conducted using R, version 4.0.2 (R Core Team, 2020), including the package lavaan, version 0.6-9 (Rosseel, 2012). In total, 511 children’s data were complete and were used for the analyses. In the descriptive statistics, the means  $\pm$  SD for continuous variables, and frequencies and percentages for categorical variables are reported. To compare means of subscales across the two waves we used paired t-tests. Cross-lagged panel models were set up, with time 1 (baseline, wave A) values of the subscale parental stressors and the respective APQ subscale as exogenous variables, and time 2 (1 year follow-up, wave B) values of parental stressors and the respective APQ subscale as endogenous variables (see Fig. 1). In the cross-lagged panel model, autoregressive coefficients (labels  $a_{12}$  and  $b_{12}$  in Fig. 1) denote correlations between the same variables across the two time points, controlled for the other variable measured at time 1, and hence refer to stability ("relative level stability" *sensu* Newsom; Newsom, 2015). Note that high stability does not imply that average or

individual absolute values remain the same across the two time points but rather that individuals with high/low values at time 1 tend to have high/low values at time 2. As a consequence, high stability implies that the score of an individual at time 1 would be a good predictor for the score of that individual at time 2. Cross-lagged coefficients (labels  $c_{12}$  and  $d_{12}$  in Fig. 1) denote correlations between variable measured at time 1 and the other variables measured at time 2, controlled for the influence of these other variables measured at time 1. Seven different models were conducted, one for each APQ subscale (positive parenting, responsible parenting, powerful implementation, inconsistent parenting, corporal punishment, parental involvement and low/poor monitoring). Age, gender and SES level were included as covariates. The parental stressors subscale and all subscales of the APQ were not operationalized using sum or mean scores since these pose problems with respect to validity and reliability (McNeish & Wolf, 2020). Instead, we set up measurement models for each subscale involved. The residuals of the different measurement models were thereby allowed to correlate if this improved model fit. This concerned in particular the correlation between residuals of the same item, measured at the two different waves (Newsom, 2015). As all items of the parental stressors subscale and all APQ subscales were measured on an ordinal scale with range 0–4, we used mean and covariance adjusted weighted least squares estimator (WLSMV) to estimate the parameters and their standards errors. Robust versions of the comparative fit index (CFI) and the Tucker Lewis Index (TLI), and root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were reported as indicators of model fit. Acceptable model fit requires the following criteria for these indices: RMSEA ( $\leq 0.06$ , 90% CI  $\leq 0.06$ , CFI not significant), SRMR ( $\leq 0.08$ ), CFI ( $\geq 0.95$ ), and TLI ( $\geq$

0.95) (Hu & Bentler, 1999). Further, we used the omega coefficient (Bollen, 1980) to estimate reliabilities of the factors obtained, which has been shown to be more useful than Cronbach's alpha (Trizano-Hermosilla & Alvarado, 2016). Cronbach's alpha values are only reported to allow for comparison with the literature.

*[Insert figure 1 here]*

## **Results**

### **Descriptive statistics**

The number of children retained for the analyses was 511 with a mean age of 3.85 years (SD = 0.69), including 47% of girls. Furthermore, 76% were living in the German-speaking parts of Switzerland, and 24% in the French-speaking parts. The mean level of SES was 62.88 (SD = 14.97) and somewhat higher than in the Pisa study (Swiss sample = 53) of OECD countries (Konsortium PISA.ch, 2018). Mean values of parental stressor and parenting styles are presented in table 1.

Omega values for the APQ subscales ranged from .49 (parental involvement) to .76 (positive parenting) at wave A (Cronbach's alpha: .63–.85) and from .45 (parental involvement) to .79 (positive parenting) at wave B (Cronbach's alpha: .49–.86). Cronbach's alpha values are comparable to those found in the study by Reichle & Franiek (2009) who found reliabilities of alpha values ranging from .60 for corporal punishment to .84 for positive parenting in a sample of elementary schooled children.

Omega values for the *parental stressors* subscale were .71 (Cronbach alpha: .75) at wave A and .75 (Cronbach alpha: .79) at wave B and thus comparable to those obtained by Zelman and Ferro (2018) in a sample of chronic ill children and adolescents aged 6–16 years.

Preliminary analyses of the measurement model for the original factor *parental stressors* provided a poor model fit (TLI = .928, CFI = .936, RMSEA = .104, SRMR = .055), which was improved by the exclusion of one item (item 3), resulting in an excellent model fit (TLI = 1.009, CFI = 1.000, RMSEA < .001, SRMR = .007). We subsequently used this modified measurement model for the analysis of cross-lagged panel model.

*[Insert table 1 here]*

### **Temporal change of parental stressors and parenting style over a one-year period**

Parental stressors did not change over time in parents of preschool children in this sample (table 1). In contrast, significant changes between the two waves were found for most of the parenting styles subscales. Thus, values for powerful implementation, responsible parenting, and corporal punishment all decreased from wave A to wave B, with small to medium effect sizes. Values for positive parenting, parental involvement, and poor monitoring in contrast increased in the same period, with medium to large effect sizes. Values for inconsistent parenting remained similar across the two waves.

### **The impact of parental stress on parenting style within preschool age**

Of the seven cross-lagged panel models, five (positive parenting, powerful implementation, responsible parenting, parental involvement and poor monitoring) led to good model fits, and two to acceptable model fits (corporal punishment and inconsistent parenting; table 2).

*[Insert table 2 here]*

Autoregressive coefficients for parental stressor(*a12*) pointed to high stability between the two waves, with values ranging between .77 and .86 (table 3), depending on which

subscale for parenting style had been used. Corresponding coefficients for stability of parenting style subscales ( $b_{12}$ ) ranged between .66 (responsible parenting) and .90 (corporal punishment). Cross-lagged coefficient, however, were mostly very small and hence negligible, except for the influence of parental stressors at wave A on corporal punishment at wave B (see table 3), with higher levels of parental stressors being related to less corporal punishment one year later. The effect size for this association was small to medium.

*[Insert table 3 here]*

### **Discussion**

The aim of the current study was 1) to examine the stability of parental stressors and parenting style and 2) to investigate the potential impact of both parental stressors on parenting style and parenting style on parental stressors over a one-year period in a community sample of preschool children. Analyses revealed that parental stressors were highly stable over the one-year period within preschool age in these children with a broad age range of 2–6 years at baseline. Thus, parents with high/low levels of parental stressors at baseline usually kept high/low levels one year later. Our findings are comparable to other studies that found a high stability in parenting stress of mothers with children aged 3 to 5 years (Ciciolla et al., 2014), in mothers of 3-9 year olds (Neece et al., 2012), in parents of 1,5-3,5 years old (Lin et al., 2021), and in parents of children aged 4 to 10 years (Mackler et al., 2015). Other studies looked at temporal change, which is not comparable to our findings (Lederberg & Golbach, 2002; Mulsow et al., 2002; Östberg et al., 2007). Further, increased parenting stress had been thought to spill over on the relationship of both parents and cause stress in the family (Abidin, 1990; Östberg et al., 2007) which might increase parental stressor

levels in the long run. However, according to our findings it could be assumed that this might not happen within a one-year period and therefore rather remains similar to slightly higher parenting stress level in comparison with other studies (Algarvio et al., 2018; Browne et al., 2010; Zelman & Ferro, 2018).

Similar results for stability were found for parenting style subscales with high stability values between waves A and B. However, while for parental stressors mean values remained the same during the one-year study period, they either increased or decreased in the subscales of parenting styles over the same period, except for inconsistent parenting. Thus, whereas powerful implementation, responsible parenting, and corporal punishment decreased over the one-year period, with small to medium effect sizes, positive parenting, parental involvement, and poor monitoring increased during this one-year period, with medium to strong effect sizes. These findings are only partly in line with previous studies. The stability in parenting style at that age period had been believed to be stable from a theoretical point of view (Baumrind, 1971b; Rhee et al., 2006; Russell et al., 1998), but only a few studies have investigated stability of parenting so far. Two studies found high stabilities for positive parenting (i.e. warmth and high monitoring) in their sample with parents of children aged 6-10 years (Forehand & Jones, 2002) and adolescents aged 13 to 15 years (de Maat et al., 2021), whereas one study reported a moderate stability for authoritarian and authoritative parenting styles in parents of children aged 6 to 9 year (Lee et al., 2013). Further, high stability was found for poor communication in parents of children aged 6 to 18 years (Loeber et al., 2000). But so far, none of the studies investigated stability of positive or negative parenting in children at preschool age and only a few focused on temporal

change of parenting styles, which answers another question (Clerkin et al., 2007; Dallaire & Weinraub, 2005).

Results regarding cross-lagged coefficients showed almost no support for parental stressors at wave A to predict negative parenting style at wave B or vice versa, over the one-year study period. Other studies had shown that high parenting stress predicts more negative parenting style (Belsky, 1984; Deater-Deckard, 2004). In our study, we only found one significant effect in which higher parental stressors predicted lower corporal punishment levels one year later, which seems counterintuitive. Indeed, in a study on preschool children, high parenting stress intensified corporal punishment and psychological aggression (Niu et al., 2018). Note however, that this significant cross-lagged effect was only small to medium and that cross-lagged effects were always controlled for the influence of the other variable at wave A. Therefore, suppressor effects might be responsible for this counterintuitive result. Also, there were 14 cross-level coefficients to be estimated (7 models x 2 cross-level coefficients per model), of which only one turned out to be significant at the 5% level. By chance we would on average expect 0.7 significant effects purely by chance. Hence a chance effect cannot be ruled out in this case. A reduction of corporal punishment over time in parents of children growing up and getting older can be expected (Clerkin et al., 2007; Frick et al., 1999) which correspond with a reduction that was found in this study, but to which extent high parenting stress predicts low corporal punishment remains open.

### **Strengths and Limitations**

This study has some strengths and limitations. First, a relatively large sample size of parents with preschool children covering a broad age range (2 to 6 years) provided information on parenting stress and parenting style within a longitudinal design. However, parenting stress and the parenting style are part of a complex dynamic system (Abidin, 1990) which is difficult to capture in a longitudinal design across a one-year time period.

Further, the parental stressors levels might have been influenced by the child's current stress stages related to environmental change such as transition to kindergarten which is known to be a period of increased stress for children and therefore might cause or reduce parenting stress (Anderson, 1985; Decaro & Worthman, 2011; Groeneveld et al., 2013), but parental stressors remained on the same level. Moreover, as the present study only analysed the subscale *parental stressors*, the findings could have been different if the other subscales were included. Further, parenting stress levels are expected to be lower in families with more than one child and might usually cause lower levels of parenting stress (Östberg et al., 2007), but parenting stress was similar to rather high in comparison to other studies and participants covered different family settings with one and more children. Further as these were mainly healthy individuals with rather mainly moderate to high SES levels and generally low levels in daily life, parenting stress needs to be considered as rather one of the main reasons of stress perception which did not predict parenting style in this sample. It could be assumed that parenting style might generally have other determinants than parenting stress such as individual resources, individual beliefs, cultural aspects which had not been considered in this study (Abidin, 1990; Belsky, 1984). Further, self-reports were used to assess parenting stress and parenting styles in this study which might have biased

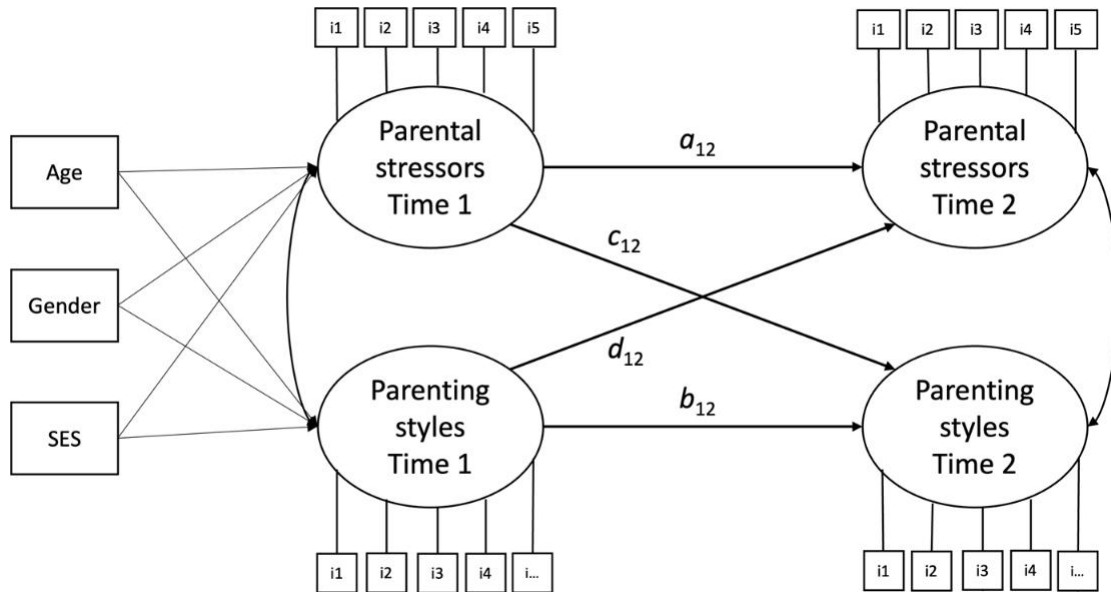
some of the results such as the report of corporal punishment due to socially desirability, however low levels of corporal punishment were in line with an observational study of Schöbi et al. (2017) in the Swiss population.

To conclude, parental stressors and negative and positive parenting were found to be highly stable across a one-year study period in our sample of preschool children aged 2–6. Absolute levels of parental stressors and inconsistent parenting did not change within that time period, but all other positive and negative parenting styles did and might therefore have been influenced by other stress condition of the individual parents or their families. Parental stressors at wave A did further not predict parenting styles at wave B or vice versa for six parenting style subscales. Therefore, it can be expected that clinical samples might reveal other findings and reaches a different conclusion.

## Tables and figures

**Figure 1**

*Example of the cross-lagged panel models.*



*Note.* This figure shows an example of a cross-lagged panel models. Ellipses represent the factors of parental stressors on the top, and in place of parenting styles, each model contains one of the APQ factors: positive parenting, powerful implementation, responsible parenting, inconsistent parenting and corporal punishment. “i” means items, “e” means error.

**Table 1***Descriptive statistics*

Variables	Time 1		Time 2		Cohen's <i>d</i>
	M (SD)	Omega coefficient	M (SD)	Omega coefficient	
<i>Parenting stress (PSS)</i>					
Parental stressors	2.73 (0.70)	.707	2.72 (0.74)	.753	−0.015
<i>Parenting style (APQ)</i>					
Positive parenting	3.68 (0.41)	.759	3.97 (0.43)	.788	0.696
Responsible parenting	3.79 (0.55)	.682	3.55 (0.52)	.673	−0.454
Parental involvement	3.13 (0.53)	.492	3.65 (0.49)	.452	0.971
Powerful					
implementation	3.50 (0.57)	.718	3.39 (0.59)	.698	−0.189
Inconsistent parenting	2.44 (0.53)	.690	2.44 (0.53)	.663	0.002
Corporal punishment	1.58 (0.56)	.589	1.52 (0.54)	.588	−0.120
Poor monitoring	1.26 (0.36)	.605	1.41 (0.49)	.729	0.435

*Note.* Cohen's *d* denotes the effect size for the change in means across the two time points, according to Feingold (2009).

**Table 2**

*Fit indices of the cross-lagged panel models for the seven subscales of parenting style.*

<b>Parenting style subscale</b>	<b>TLI</b>	<b>CFI</b>	<b>RMSEA</b>	<b>SRMR</b>
Positive parenting	.980	.962	.045	.062
Powerful implementation	.971	.955	.047	.062
Responsible parenting	.967	.947	.048	.060
Parental involvement	.979	.967	.039	.059
Inconsistent parenting	.949	.910	.066	.072
Corporal punishment	.960	.942	.058	.077
Poor monitoring	.987	.976	.031	.064

*Note.* TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Squared Residual

**Table 3**

*Path coefficients of the seven cross-lagged panel models between waves A and B for two variables. One variable denoted the parenting stressors subscale, the other one denoted either of the seven subscales of parenting style.*

Parenting style subscale	Coefficient			
	<i>a</i> <sub>12</sub>	<i>b</i> <sub>12</sub>	<i>c</i> <sub>12</sub>	<i>d</i> <sub>12</sub>
Positive parenting	.790**	.735**	-0.064	-0.11
Powerful implementation	.829**	.722**	0.04	0.043
Responsible parenting	.802**	.655**	-0.12	-0.083
Parental involvement	.820**	.838**	-0.093	0.006
Inconsistent parenting	.858**	.823**	0.036	-0.105
Corporal punishment	.818**	.895**	-.179*	-0.063
Poor monitoring	.770**	.757**	0.01	0.14

*Note.* All paths of the seven models are shown. \*  $p < 0.05$ , \*\*  $p < 0.001$

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