

**Toddlers' Social-Emotional Well-Being in Early
Childhood Education and Care:
The Role of Child Temperament and
Process Quality**

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Abstract

There is an increasing awareness that children's well-being in early childhood education and care (ECEC) should be promoted as soon as possible. Experiencing high levels of well-being forms the foundation for children's current and future learning and developmental outcomes. Multiple theories argue that children's development and well-being result from the interplay between children's characteristics and their environment. However, there is limited research on toddlers' well-being in ECEC and what role their temperament and the ECEC environment have in supporting or challenging their well-being in ECEC.

In this thesis, I aimed to obtain further insight in 1- to 3-year-olds' social-emotional well-being in Norwegian ECEC. I conducted three studies that relied on samples of 567 to 1,561 children from the larger Thrive by 3 study, which is a cluster randomized controlled trial. In the first study, I conducted a psychometric study to validate an existing instrument called the Leiden Inventory for the Child's Well-Being in Daycare (LICW-D). The findings showed a marginally acceptable fit for the hypothesized one-factor model. In addition, I found a satisfactory concurrent validity with other instruments that measured children's development, which were expected to correlate with their well-being, namely problem behavior (Child Behavior Checklist Teacher Report Form for Ages 1.5–5 Years; CBCL-TRF/1.5–5) and temperament (Early Childhood Behavior Questionnaire short form; ECBQ short form). Factorial invariance across gender was confirmed.

In the second study, I conducted multilevel analyses to examine the association between toddlers' temperament (i.e., activity, emotionality, sociability, shyness) and well-being in ECEC. I also wanted to investigate if ECEC process quality (i.e., emotional and behavioral support, chaos in the group, conflict and closeness in the staff–child relationship) affected the potential associations between children's temperament and well-being. Results showed that children who were more shy or emotional showed less well-being, and children who were more social showed more well-being. There was no association between children's activity level and well-being. In addition, I found that process quality affected the association between children's temperament and well-being in different ways. Children who were shy showed less well-being when they experienced low or high conflict with a professional caregiver. Active children showed high levels of well-being, even though the conflict level was high between them and the professional caregiver, and when the emotional and behavioral support

was high. Children who were less active showed less well-being when there was high emotional and behavioral support.

In the third study, I conducted multilevel analyses to examine the longitudinal association between toddlers' early shyness and well-being during the first year in ECEC. I found that children who were shy during their starting period in ECEC showed less well-being by the end of their first year in ECEC.

This thesis contributes to existing literature by providing a starting point for further developing the LICW-D. In addition, this thesis shows that toddlers' well-being in ECEC can result from the interplay between children's temperament and the staff-child relationship. Children have different types of temperament, and therefore, they might need different types of support from the professional caregivers to thrive in ECEC. Future research should focus on, for example, to what extent professional caregivers can adapt their behavior in accordance with children's needs and temperament. Children should be followed over a longer period than was possible in this thesis to obtain further insight in the interplay between children's temperament and the staff-child relationship. In addition, the role of professional caregivers' characteristics should be studied more in depth.

Sammendrag

Det er en økende bevissthet rundt hvor viktig det er å fremme barns trivsel når de begynner i barnehagen. Høy trivsel er et viktig grunnlag for barns læring og utvikling her og nå, og i fremtiden. Flere teorier hevder at barns utvikling og trivsel er et resultat av samspillet mellom barnas egenskaper og det miljøet de vokser opp i. Det finnes imidlertid lite forskning på småbarns (1–3 åringer) trivsel i barnehagen og på hvordan barns temperament og barnehagemiljøet får betydning for hvordan småbarn trives i barnehagen.

I denne avhandlingen ønsket jeg å undersøke småbarns trivsel i norske barnehager. Jeg har gjennomført tre studier som bygger på utvalg med mellom 567 og 1561 barn trukket fra den større Trygg før 3-studien, som er en randomisert kontrollert intervensjonsstudie. I den første studien har jeg gjennomført en psykometrisk studie hvor jeg validerte et eksisterende instrument som er utviklet for å måle barns trivsel i barnehagen kalt *the Leiden Inventory for the Child's Well-Being in Daycare* (LICW-D). Resultatene viste at den foreslåtte en-faktormodellen var marginalt akseptabel. I tillegg fant jeg en tilfredsstillende samtidig validitet med andre mål på barnas utvikling som er forventet å korrelere med deres trivsel, som atferdsproblemer (*Child Behavior Checklist Teacher Report Form for Ages 1.5–5 Years*; CBCL-TRF/1.5–5) og temperament (*Early Childhood Behavior Questionnaire short form*; ECBQ short form). Faktoriell invarians på tvers av kjønn ble bekreftet.

I den andre studien har jeg kjørt flernivåanalyser for å studere sammenhengen mellom småbarns temperament (dvs., aktivitet, emosjonalitet, sosiabilitet, sjenanse) og trivsel i barnehagen. Jeg ønsket også å undersøke om barnehagens prosesskvalitet (dvs., emosjonell og atferdsmessig støtte, kaos på avdelingen samt konflikt og nærhet i ansatt-barn relasjonen) påvirket potensielle sammenhenger mellom barns temperament og trivsel. Resultatene viste at barn som var mer sjenerte eller mer emosjonelle trivdes mindre, og barn som var mer sosiale trivdes bedre. Det var ingen sammenheng mellom barns aktivitetsnivå og trivsel. Videre fant jeg at prosesskvaliteten påvirket sammenhengen mellom barns temperament og trivsel på ulike måter. Barn som var mer sjenerte trivdes mindre når de opplevde lav eller høy konflikt med en ansatt. Aktive barn trivdes godt selv om konflikten mellom dem og ansatte var høy, og når den emosjonelle og atferdsmessige støtten var høy. Barn som var lite aktive trivdes mindre når den emosjonelle og atferdsmessige støtten var høy.

I den tredje studien undersøkte jeg, gjennom flernivåanalyser, den longitudinelle sammenhengen mellom småbarns sjenanse ved oppstart i barnehagen og deres trivsel etter ett barnehageår. Jeg fant at barn som var mer sjenerte ved oppstart i barnehagen trivdes mindre etter ett barnehageår.

Denne avhandlingen bidrar til eksisterende litteratur ved å gi et utgangspunkt for videreutvikling av LICW-D. I tillegg viser denne avhandlingen at småbarns trivsel i barnehagen kan være et resultat av samspillet mellom barns temperament og ansatt-barn relasjonen. Barn har forskjellig temperament og kan derfor trenge ulik type støtte fra ansatte for å kunne trives i barnehagen. Videre forskning bør blant annet undersøke på hvilke måter ansatte best kan tilpasse sin atferd til barns behov og temperament. For å få ytterligere innsikt i samspillet mellom barns temperament og ansatt-barn relasjonen bør barn følges over lengre tid enn det som var mulig i denne avhandlingen. I tillegg vil det være viktig å undersøke betydningen av ansattes egenskaper mer inngående.

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Catharina Petronella Johanna van Trijp

List of Abbreviations

AIC	Akaike Information Criterion
a.m.	Ante Meridiem
B.C.	Before Christ
BIC	Bayesian Information Criterion
CBCL-TRF/1.5–5	Child Behavior Checklist Teacher Report Form for Ages 1.5–5 Years
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CLASS	Class Assessment Scoring System
EACEA	European Education and Culture Executive Agency
EAS	Emotionality, Activity, Sociability Temperament Survey for Children
ECBQ	Early Childhood Behavior Questionnaire
ECEC	Early Childhood Education and Care
EFA	Exploratory Factor Analysis
e.g.	For Example
EPC	Expected Parameter Change
hr	Hours
ICC	Intraclass Correlation Coefficient
ICQ	Infant Characteristics Questionnaire
i.e.	That Is
LECP	Life in Early Childhood Programs
LICW-D	Leiden Inventory for the Child’s Well-Being in Daycare
M	Mean
MAR	Missing at Random
MI	Modification Indices
MIMIC	Multiple Indicator Multiple Cause
min	Minutes
MLR	Maximum Likelihood with Robust Standard Errors
MRCM	Multilevel Random Coefficient Modeling
NCKO	<i>Nederlands Consortium Kinderopvang Onderzoek</i> [Dutch Consortium for Child Care Research]
NSD	<i>Norsk Senter for Forskningsdata</i> [Norwegian Centre for Research Data]
NTNU	<i>Norges Teknisk-Naturvitenskapelige Universitet</i> [Norwegian University

	of Science and Technology]
OECD	Organization for Economic Co-Operation and Development
PERIK	<i>Positive Entwicklung und Resilienz im Kindergartenalltag</i> [Positive Development and Resilience in Kindergarten]
PERMA	Positive Emotion, Engagement, Relationships, Meaning, and Achievement
RBUP	<i>Regionsenter for Barn og Unges Psykiske Helse</i> [Regional Center for Child and Adolescent Mental Health]
REK	<i>Regionale Komiteer for Medisinsk og Helsefaglig Forskningsetikk</i> [Regional Committees for Medical and Health Research Ethics]
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SDQ	Strengths and Difficulties Questionnaire
SRMR	Standardized Root Mean Square Residual
SSTEW	Sustained Shared Thinking and Emotional Well-Being
STRS-SF	Student Teacher Relationship Scale—Short Form
TLI	Tucker–Lewis Index
vs.	Versus
WLSMV	Weighted Least Square with Mean and Variance Adjusted

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Part II: List of Studies

Study 1

Van Trijp, C. P. J., Lekhal, R., Drugli M. B., Rydland, V., & Solheim Buøen, E. (2021).

Validation of the Leiden Inventory for the Child's Well-Being in Daycare (LICW-D) Questionnaire in Norwegian early childhood education and care centers. *Frontiers in Psychology, 12*(767137). Advance online publication.

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Study 2

Van Trijp, C. P. J., Lekhal, R., Drugli M. B., Rydland, V., Van Gils, S., Vermeer, H. J., &

Solheim Buøen, E. (2021). The association between toddlers' temperament and well-being in Norwegian early childhood education and care, and the moderating effect of center-based daycare process quality. *Frontiers in Psychology, 12*(763682).

Advance online publication. <https://doi.org/10.3389/fpsyg.2021.763682>

Study 3

Van Trijp, C. P. J., Lekhal, R., Drugli M. B., Rydland, V., & Solheim Buøen, E.

Examining the longitudinal association between toddlers' early shyness and their well-being during their first year in Norwegian early childhood education and care.

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Part I: Extended Abstract

1. Thesis Outline

This thesis is divided into two parts: the extended abstract (Part I) and the three studies (Part II). The extended abstract is divided into 10 chapters. The second chapter presents the background of this thesis, and the third chapter gives a brief description of the Norwegian early childhood education and care (ECEC) context. Chapters 4–6 position this thesis academically by providing an overview of conceptual and empirical literature on the central themes: children’s well-being, temperament, and ECEC process quality. Chapter 7 discusses the aim of this thesis and which research questions and hypotheses are studied. The eighth chapter presents the study design and procedures, measures, statistical analyses, and ethical considerations. Chapter 9 provides a short overview of the three studies’ main findings. Finally, Chapter 10 discusses the findings of the three studies regarding the conceptual and empirical literature presented in Chapters 4–6, how this thesis contributes to existing knowledge, methodological strengths and challenges, limitations, and implications of findings and future directions. Part II consists of the three article manuscripts that form the foundation for this thesis.

2. Introduction

Multiple studies have shown that sensing a high level of well-being increases children's confidence to explore their environment and profit from learning opportunities, and as a result, supports their current and future learning and developmental outcomes (Department for Education and Child Development, 2016; La Paro & Gloeckler, 2016; Mashford-Scott et al., 2012). Experiencing a high level of well-being in ECEC is especially important during the first 3 years in life because there is a peak in the brain's neuroplasticity (Blakemore & Frith, 2005). In this period, children have increased sensitivity to the support their environment provides, which forms the foundation for the brain structure regarding well-being, learning, and development (National Scientific Council on the Developing Child, 2007). Multiple theories argue that children's development and well-being result from the interplay between children's characteristics, such as temperament, and the environment wherein they participate (e.g., Sameroff, 1989; Thomas & Chess, 1977). The ECEC context plays a large role in children's well-being because an increasing number of young children is spending a considerable amount of time in ECEC settings (Council of the European Union, 2019).

The promotion of children's well-being is a core concept in many international ECEC quality frameworks and guidelines (e.g., Bagdi & Vacca, 2005; Council of the European Union, 2019; European Commission/European Education and Culture Executive Agency [EACEA]/Eurydice, 2019; Sylva et al., 2015). In Norway, where I conducted the current study, children's well-being is one of the main goals in addition to learning, play, and development that should be promoted in ECEC (Organization for Economic Co-operation and Development [OECD], 2015). The Framework Plan for Kindergartens regulates all goals, and well-being, together with play and friendships, is mentioned as fundamental for a good childhood. This framework also states that children's well-being should be monitored and assessed continuously based on the child's individual needs and development (Norwegian Directorate for Education and Training, 2017). In addition, a new law introduced in 2021 states that everyone who works at the ECEC center should follow each child carefully to ensure that the child feels well and safe in the center, and the staff should act when a child is not allowed to join play activities, is bullied, or discriminated. Mentioned indicators for children who are not doing well include when the child, the peers, or parents are stating that the child is not doing well or something happened in the group; or when the child's behavior changes (Norwegian Directorate for Education and Training, 2022). However, these

indicators are challenging to apply because toddlers are more dependent on the professional caregivers' observations to identify whether the child is doing well (Moser et al., 2017). Nevertheless, some studies argue that professional caregivers who work with the youngest children in ECEC should have in-depth knowledge about children's well-being (Barros et al., 2018; Chazan-Cohen et al., 2017; Gibbons et al., 2017).

To improve ECEC frameworks and guidelines, to develop concrete tools, and to help professional caregivers in ECEC working with toddlers' well-being, further insight is needed on what children's well-being in ECEC is, how children's well-being in ECEC can be operationalized and measured, and what predicts children's well-being now and during their first year in ECEC.

3. Norwegian ECEC Context

Before going more in depth on the concepts of children's well-being, temperament, and ECEC process quality, I will provide a brief overview of the Norwegian ECEC context here. When I mention the Norwegian ECEC center in this thesis, I am referring to the center-based childcare that is provided, called *barnehage* in Norwegian. The Norwegian Framework Plan (Norwegian Directorate for Education and Training, 2017) translates this term to "kindergarten," which is indeed the literal translation to English or German. From an international perspective, kindergarten often refers to the year(s) that come(s) before the child starts attending first grade. In the United States, toddlers often enroll in daycare or preschool. However, the Norwegian *barnehage* has a unitary ECEC governance system that accepts all children from 1 to 5 years old. Attendance in ECEC is not compulsory in Norway, but one of the Norwegian government's goals is that all children should have access to ECEC. Therefore, all children from the age of 1 are entitled to a place in a publicly subsidized ECEC center (The Kindergarten Act, 2005) and can attend ECEC until they are 6 years old and start primary school (OECD, 2015). This also explains the high fulltime attendance rate whereby 87% of the children aged 1–2 years attended an ECEC center in 2021, and 96.7% of them spent 41 hr or more per week in the center (Statistics Norway, 2022). The offer for a place in ECEC by the age of 12 months is arranged by the municipality. The municipalities are the local authorities that provide guidance and ensure that the ECEC centers follow the regulations and rules. About half of the ECEC centers in Norway are privately owned. For the units/groups with children under the age of 3 years, there should be a maximum of three children per staff. The head teachers and pedagogical leaders in the center must be qualified as a kindergarten teacher, which is a 3-year university bachelor's degree, or have fulfilled another tertiary level of education for working with children and having pedagogical expertise. There should be one pedagogical leader per seven children under the age of 3 years, and they can work with assistants who can have vocational training and youth workers who can have upper secondary school (The Kindergarten Act, 2005). Note that some municipalities have difficulty arranging regular inspections regarding the ECEC quality due to the lack of qualified staff or the capacity to supervise the ECEC centers (OECD, 2015).

4. Well-Being

4.1. Development of Well-Being

The definition of well-being has been debated for years (Dodge et al., 2012), and the first definitions arose already during the 4th century before Christ (B.C.; Ryan & Deci, 2001). A distinction can be made between two predominant philosophies regarding well-being, namely the hedonic philosophy and the eudaimonic philosophy. First, the hedonic philosophy is defined by the presence of pleasant and/or unpleasant life experiences (Diener & Lucas, 1999; Diener et al., 1998). It formed the starting point for the term subjective well-being, which represents general happiness that consists of the following components: the presence of a positive mood, the absence of a negative mood, and life satisfaction (Ryan & Deci, 2001). In contrast, the eudaimonic philosophy (Ryan & Deci, 2001; Ryff, 1995) formed the starting point for psychological well-being, which is defined as human actualization and can be measured by personal growth, self-acceptance, positive relatedness, mastery, and autonomy (Ryff & Keyes, 1995). Well-being is not striving for pleasure but is an individual's strive for their true potential (Ryan & Deci, 2001; Ryff, 1995). These main concepts of well-being still exist and form the base for some further specific concepts of well-being, such as economic, social, and emotional well-being. In addition, there are other concepts, such as wellness, life satisfaction, and quality of life, which are used interchangeably with well-being (Cooke et al., 2016; Statham & Chase, 2010). However, these theories and definitions mainly focus on adults' well-being and probably are not applicable to what children do and what they find meaningful (Fattore et al., 2007).

Nevertheless, during the past 2 decades, the focus in both (inter)national research and policies on children's well-being increased, and some changes have been noticed. For example, less emphasis is put on children's future "well-becoming" (e.g., economic well-being), and more emphasis is now on children's current well-being (e.g., being happy and healthy; Andrews & Kaufman, 1999; Ben-Arieh, 2010). In addition, the focus changed from children's "objective well-being" (e.g., health, housing, materials, education, behaviors) to "subjective well-being" (e.g., personal well-being; Alexandre et al., 2021). Moreover, focus has shifted from the presence (or absence) of negative features of well-being (e.g., distress, discomfort) to positive features (e.g., sense of belongingness; Ben-Arieh, 2010).

4.2. Defining Children's Well-Being

Children's well-being is often referred to as hedonic or subjective well-being, which is a positive and subjective state of the individual child feeling well in relation to others (e.g., Fattore et al., 2009; Foley et al., 2012; Mashford-Scott et al., 2012). Most studies examined children's well-being at the microlevel (i.e., immediate environments that directly influence the child's development; Amerijckx & Humblet, 2014; Bronfenbrenner, 1979). These studies mainly focused on children's well-being at home in relation to their family, whereas studies on children's well-being in ECEC are underrepresented (Amerijckx & Humblet, 2014; Eid, 2008; Sandseter & Seland, 2017). In addition, children's well-being is a dynamic internal state, which means it can change over time. Personal-level and occasion-specific determinants cause changes (Luhmann et al., 2021). Personal states (Magee & Biesanz, 2019), daily events (Nezlek & Plesko, 2001), situational characteristics (Sherman et al., 2015), social stress (Van Roekel et al., 2015), and the composition of the social environment and social interactions (Vogel et al., 2017) might cause fluctuations in children's well-being. The complexity of well-being makes it challenging to find the right definition that fits for all children, all ages, and in every context. Nevertheless, there is an emerging consensus that the definition and measurement of children's well-being in general should include social, emotional, and physical well-being (Guérin, 2012; Statham & Chase, 2010).

Mihaela (2015) defined the social and emotional well-being of preschoolers as the way that a child feels and thinks about themselves and other people, and is reflected in a child's feelings, behavior, and thoughts. Positive emotions, such as happiness, amusement, love, optimism, curiosity, inner peace, inspiration, and self-trust might express feelings. However, the child also lives in an environment with many influences, such as at home and in the ECEC center. The child's relationship with these environments also affects their well-being (Mihaela, 2015). This definition is reflected in multiple theories on well-being. Seligman (2012) moved the focus from the "authentic happiness theory" (i.e., increase life satisfaction) to the "well-being theory" (i.e., increase flourishing by increasing positive emotion, engagement, relationships, meaning, and achievement [PERMA]). Hallowell (2002) introduced a five-step cycle of well-being that should happen from early childhood to later life. Each step should lead to the next step to support a child's well-being: connection, play, practice, mastery, and recognition (Hallowell, 2002). For example, the feelings of positive emotions, engagement, connection, and mastery often happen in relation to others, such as adults and peers

(Hallowell, 2002; Mihaela, 2015; Seligman, 2012). Well-being is not something that only exists in an individual's mind, but is a combination of feeling good, having meaning, having good relationships, and a sense of accomplishment (Seligman, 2012). Therefore, children's well-being in ECEC should also be defined and measured in relation to the professional caregivers, peers, and the center's physical environment.

4.3. Children's Well-Being in ECEC

Some studies focused on children's well-being in ECEC in relation to the professional caregivers, peers, and the center's physical environment. Using the 7-point *Nederlands Consortium Kinderopvang Onderzoek* [Dutch Consortium for the Child Care Research] (NCKO) Well-Being Scale (De Kruif et al., 2007) to observe a total of 30 0- to 4-year-old children's levels of well-being in Dutch ECEC centers, Fukkink (2021) found that well-being is on average neutral (i.e., neither well-being nor discomfort is predominant) for most children but can fluctuate significantly during the day. For example, when children were occupied with free play or caregiver-led activities, their well-being was higher than it was during program transitions or lunch/snack time. Conflicts with peers led to lower levels of well-being (Fukkink, 2021). In Seland et al.'s (2015) Norwegian study, they chose a qualitative phenomenological observation method by observing 18 1- to 3-year-old children's emotional and bodily expressions and their actions and activities. They argued that children express higher well-being in ECEC when they are seen, recognized, and understood as a subject with needs, intentions, and preferences. Other Norwegian studies developed a questionnaire for their research and used this questionnaire during structured interviews with 171 4- to 6-year-old children. They found that positive relationships with peers and staff-child relationship promoted children's well-being (Sandseter & Seland, 2017), but also the physical environment, materials (toys/equipment), authority to choose activities, and common activities (Sandseter & Seland, 2016). These studies also confirm the subjective and dynamic internal state of well-being, which can change by personal-level and occasion-specific determinants. Insight is needed in how these personal-level and occasion-specific determinants interact with each other and affect children's well-being. Even though there are multiple approaches to define and measure children's well-being in ECEC, this thesis uses the definition of De Schipper, Tavecchio et al. (2004), who define children's well-being in ECEC as the degree to which a child feels comfortable with the professional caregiver(s), peers, and within the center's physical setting. To examine how the child feels in relation to others and

being in the center, a valid instrument is first needed that measures children's social-emotional well-being (e.g., the level of enjoyment and feeling of comfort) during different daily situations (e.g., delivery at the center, attendance at the center), social situations (e.g., playing with peers, feeling comfortable with the professional caregivers), and within the center's physical environment (e.g., the playground, materials).

4.4. Instruments Measuring Children's Well-Being in ECEC

Most studies that examined children's well-being in ECEC used proxies (e.g., social-emotional development, academic and cognitive achievements) to measure well-being (Zachrisson & Lekhal, 2014). For example, Mayr and Ulich's (2009) *Positive Entwicklung und Resilienz im Kindergartenalltag* [Positive development and resilience in kindergarten] (PERIK) instrument included dimensions, such as pleasure in exploration, task orientation, self-assertiveness, making contact/social performance, emotional stability/coping with stress, and self-control/thoughtfulness, to study social-emotional well-being. Another instrument called Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997) is widely used and it focuses on hyperactivity/inattention, peer relationship problems, emotional problems, conduct problems, and prosocial behavior. KidsMatter Early Childhood Initiative (Slee et al., 2012) is a comprehensive tool to strengthen the professional caregivers' skills in supporting the children's positive mental health and well-being. However, there is less focus on the individual child (Marbina et al., 2015). Another instrument developed for practitioner self-evaluation, service improvement, and auditing and/or regulatory purposes is the Assessing Quality in Early Childhood Education and Care: the Sustained Shared Thinking and Emotional Well-Being (SSTEWE) Scale for 2- to 5-year-olds. Social and emotional well-being is one of the subscales of social and emotional development domain (Siraj et al., 2010). These instruments are (internationally) validated (Marbina et al., 2015), but seem to focus more on proxies, such as social-emotional difficulties, or on the provided service to support children's well-being in ECEC. As mentioned in the former section, some Norwegian studies used a self-developed questionnaire during structured interviews with children (Sandseter & Seland, 2016, 2017), while others observed the child's behavior in interaction with the professional caregiver to study children's well-being qualitatively (Seland et al., 2015). However, the validity of these instruments is not reported.

Based on my literature review, only a few studies used validated instruments that focused on signals and behaviors of the youngest children in ECEC that might indicate well-being. For example, Laevers (2005, 2017) argued that young children who experience a high level of well-being express enjoyment, vitality (energetic and lively), are relaxed and show inner peace, are open toward others and confident, and are in touch with his/her feelings (do not suppress feelings and recovers easily from different experiences). Children who have a low level of well-being show signals of discomfort, such as crying, screaming, being angry, sad, or frightened; do not respond to others or avoid contact; and/or hurt themselves (Laevers, 2005, 2017). These indicators are part of the Leuven Scale for Well-Being, which is a 5-point scale (ranging from extremely low to extremely high) to measure the level of children's emotional well-being in ECEC. It observes individual children for 2 min (Laevers, 2005). The Dutch Consortium for Childcare Research elaborated on Laevers's (2005) work by developing the NCKO Well-Being Scale (De Kruif et al., 2007). This instrument also focused on enjoyment, vitality, relaxation, and openness, which could be scored on a 7-point scale ranging from very low emotional well-being to very high emotional well-being. The interobserver reliability was adequate (De Kruif et al., 2007; Helmerhorst et al., 2014). They mentioned that the signals did not need to be present all the time, and the expression of certain traits could depend on children's age, temperament, and character (De Kruif et al., 2007; Fukkink, 2021). As Seligman (2012) argued, introverts might be less cheery than extroverts are. In addition, there might be cultural differences in how children express their emotions and develop their well-being (Mihaela, 2015). Finally, the LICW-D questionnaire focuses on the child's general well-being in ECEC, and how comfortable the child is with the professional caregivers, peers, and the center's physical setting (De Schipper, Tavecchio, et al., 2004). The 12 items can be answered on a 6-point Likert scale (ranging from never to always). The LICW-D might be a useful instrument to measure toddlers' well-being in ECEC because it focuses on children's well-being during ECEC-specific situations over a longer period. This helps to obtain a better overview of children's well-being in ECEC rather than focusing on specific situations that happened during data collection.

4.5. Leiden Inventory for the Child's Well-Being in Daycare

According to my literature review, the LICW-D, to date, is only validated in samples in the Netherlands. This questionnaire is an elaboration of the Well-Being Scale of Van IJzendoorn et al. (1998). The Well-Being Scale focused on the degree to which a child feels at ease in the

ECEC setting, whereas De Schipper, Van IJzendoorn, et al. (2004) extended the inventory to 28 items to identify the degree of well-being by focusing on four factors: general well-being, and well-being in the presence of professional caregivers, with peers in the group, and within the center's physical setting. De Schipper, Van IJzendoorn, et al. (2004) validated this questionnaire with 186 professional caregivers of 186 children in the age range of 6–30 months, who were enrolled in 113 different ECEC centers in the Netherlands. The professional caregivers could answer the 28 items on a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*). The four-factor structure was not found. However, further analyses with a one principal component approach including 12 items showed that the items correlated significantly with the main item, "The child enjoys attending the daycare center." Therefore, a one-factor solution fitted the data best ($n = 159$). The average component loading was 0.55 (ranging from 0.33 to 0.69), and the internal consistency was good with a Cronbach's alpha of 0.81. Meaning, the 12 items designed to measure children's well-being in ECEC were well related to each other. Thus, a one-factor model was found for the 12-item questionnaire (De Schipper, Van IJzendoorn, et al. 2004).

Other studies in the Netherlands that used the LICW-D found correlations with different child characteristics (De Schipper et al., 2003; De Schipper, Tavecchio et al., 2004; De Schipper, Van IJzendoorn et al., 2004; Gevers Deynoot-Schaub & Riksen-Walraven, 2006). These studies examined the relations between children's difficult temperament, behavior problems, and well-being in ECEC by using the LICW-D with the Infant Characteristics Questionnaire (ICQ; Bates et al. 1979) and the Child Behavior Checklist Teacher Report Form for ages 1.5–5 years (CBCL-TRF/1.5–5; Achenbach & Rescorla, 2000). The ICQ measures children's difficult temperament (e.g., more irritable distress and more difficulty to adapt to novelty; Bates et al. 1979). The CBCL-TRF/1.5–5 measures children's internalizing (i.e., emotionally reactive, anxious/depressed, somatic complaints, and withdrawn), externalizing (i.e., attention problems and aggressive behavior), and total behavior problems (i.e., sleeping problems and other problems in addition to internalizing and externalizing problems; Achenbach & Rescorla, 2000).

The studies of De Schipper and colleagues (De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004; De Schipper, Van IJzendoorn, et al., 2004) were conducted with the same sample of 186 children in the age range of 6–30 months, whereas the study of Gevers Deynoot-Schaub and Riksen-Walraven (2006) was conducted with a sample of 70 children in the age

range of 15–23 months. These studies found that children with a more difficult temperament showed lower levels of well-being in ECEC (De Schipper et al., 2003; De Schipper, Tavecchio et al., 2004). Lower levels of well-being in ECEC were also found for children with more internalizing (De Schipper, Van IJzendoorn et al., 2004; Gevers Deynoot-Schaub & Riksen-Walraven, 2006) and externalizing behavior problems (Gevers Deynoot-Schaub & Riksen-Walraven, 2006). Whereas children with an easier temperament showed more well-being and less internalizing and total behavior problems (De Schipper, Tavecchio, et al., 2004). In addition, no gender differences were found (De Schipper et al., 2003). Even though the LICW-D is validated in the Netherlands, it is not possible to assume that the LICW-D is a valid instrument to use in other countries. In addition to cultural differences that might be present in how children express their emotions and develop their well-being (Mihaela, 2015), ECEC systems are arranged differently. The Netherlands has a split ECEC system (i.e., younger children go to different institutions than older children do), whereas Norway has a unitary system (i.e., ECEC is organized as a single phase; European Commission/EACEA/Eurydice, 2019). Moreover, it is less common for children in the Netherlands to be fulltime in ECEC compared to in Norway (Statistics Netherlands, 2022; Statistics Norway, 2022). Therefore, the LICW-D should be validated in other countries as well. By using the LICW-D, toddlers' social-emotional well-being in ECEC is measured. Whenever I mention well-being in this thesis, I mean social-emotional well-being if not otherwise specified.

5. Temperament

5.1. Development of Temperament

Similar to well-being, the definition of temperament has been debated for years, and the first definitions arose during the 4th century B.C. when the emphasis was on the biological nature of individual differences (Martin & Fox, 2006). Over time, the focus shifted to the idea that temperament represents an individual's biological and psychological identity, which is genetically defined. For example, Allport (1961) defined temperament as individual differences in emotional reactivity, which are largely heritable. A few years later, Thomas et al. (1963) presented the effect of the environment on temperamental development. Followed by the introduction of Thomas and Chess's (1977) goodness-of-fit theory that focused on temperament as individual differences regarding emotions, attention, and activity level. They were some of the first researchers who focused on childhood temperament and practical applications (Shiner et al., 2012). Based on these conceptualizations, Rothbart and Derryberry (1981) defined temperament as constitutional individual differences in self-regulation and reactivity in the dimensions of attention, affect, and activity. A few years later, Buss and Plomin (1984) introduced three temperamental dimensions (activity, emotionality, and sociability) that were genetically influenced and endured across age and situations. In addition, they introduced shyness as a derivative of sociability and emotionality. Whereas other studies focused on temperamental dimensions that discrete emotions represent (e.g., fear vs. anger) instead of focusing on emotionality as one dimension (Goldsmith et al., 1987; Goldsmith & Campos, 1982).

5.2. Children's Temperament

Although there is still a lengthy debate about defining children's temperament, prior research suggests that temperamental traits have a strong neurobiological or genetic basis, are observable early in life, and are relatively stable across situations and time (Austin et al., 2005; Shiner et al., 2012). Even though there is a strong neurobiological or genetic basis, temperamental traits are also products of complex interactions between genetic, biological, and environmental factors across time (Shiner et al., 2012). These interactions make it challenging to examine children's "overall" temperament because the expression of certain temperamental traits depends on several factors. Temperament can vary across age, situations, gender, and cultures; and can only be assessed by observing children's behavior. However,

behavior also changes with age, which makes it hard to ensure that the same underlying temperamental traits are measured for different ages (Sanson et al., 2002). Even though temperament is not impervious to experience, temperament is relatively stable within a context. It is partially inheritable and provides relevant information about how children approach and react to their environment (Nigg, 2006). This information is important for caregivers to understand children's behavior during certain situations in ECEC (OECD, 2013).

Earlier studies focusing on children during infancy and early childhood have mainly focused on the following dimensions of temperament: anger, frustration, effortful control (i.e., fulfilling a subdominant response while suppressing a dominant response), fearfulness, attention, sociability, emotionality, and activity (e.g., De Pauw & Mervielde, 2010; Hanington et al., 2010). Note that researchers often study these dimensions of temperament as part of a broader classification of temperament, such as difficult temperament (e.g., high reactivity, low emotional regulation, difficulty to adapt to novelty, negative emotions; e.g., Beekman et al., 2015; Chess & Thomas, 1989; De Schipper, Tavecchio, et al., 2004; Rothbart & Bates, 2006). However, when studies examine broader classifications, such as difficult temperament, they often focus on different dimensions, and the definition of "difficult temperament" might vary across sociocultural contexts (Chen et al., 2012). Moreover, any temperamental dimension can be difficult or easy depending on the situation's demands, and it has a quite value-laden overtone, which neither are useful when conducting research on temperament (Sanson et al., 2002). Therefore, there is an increasing need for studies on the different dimensions rather than classifications of temperament (Beekman et al., 2015).

5.3. Activity, Emotionality, Sociability, and Shyness

In this thesis, I focused on four temperamental dimensions that Buss and Plomin (1984) introduced: activity, emotionality, sociability, and shyness.

Activity can be defined as expending physical energy by moving (parts of) the body. Components of observed physical activity include tempo, vigor, endurance, and motivation. Examples of these components are the pace of a child's actions (e.g., walks faster around than others do, hopping steps), reacts with greater physical intensity or force (e.g., speaking louder,

banging harder on materials), continues expending energy when others start resting (e.g., keeps playing), and prefers to keep moving (e.g., wants to play, cannot sit still; Buss, 1991).

Emotionality is represented as the distress that intense autonomic arousal accompanies and that can be differentiated into the components fear and anger (Buss, 1991). Fear can be observed or measured by the child's motor acts (e.g., running away from the threat, hiding), facial expressions (e.g., wide open eyes, wrinkles; Buss, 1991; Ekman & Friesen, 1975), physiological reactions (e.g., increased heart rate, blood pressure, sweating), and cognitive feelings (e.g., feeling weak, cramps, nausea; Buss, 1991). Whereas anger can be observed by the same components of motor acts (e.g., temper tantrums), facial expressions (e.g., fist clenched, narrowed eyes), physiological reactions (e.g., readiness to attack), and cognitive feelings (e.g., hostility, disliking others; Buss, 1991).

Sociability is the child's preference to be in presence of others rather than being alone. One component of sociability is that a child's behavior is instrumental, meaning that certain rewards motivate certain behavior. For example, when children seek peers' company, it might be rewarded by sharing activities, such as playing with others. Another reward is having the attention from others (e.g., being listened to) and responsiveness from others (e.g., having social interactions with others, such as conversations). The second component of sociability is responsiveness to social stimulation. Social children become enthusiastic when interacting with others, which their facial expressions or tone in their voice can show (Buss, 1991).

The child's behavioral actions, such as anxiousness, self-consciousness, inhibition, and/or disorganization when he/she is with others can display shyness. Shyness is sometimes seen as low sociability, but sociability refers to the preference to be with others rather than being alone repeatedly. Whereas shyness mainly applies to how a child behaves in social situations with strangers or casual acquaintances. Most shy children do not experience the tendency to escape or feelings of distress when they are with people they know well (Buss, 1991; Buss & Plomin, 1984). Note that infants express shyness mainly by high fearfulness and low sociability, whereas self-consciousness shyness often starts from the age of 4–5 years (Buss & Plomin, 1984).

5.4. Individual X Environment Theories

The former section showed that temperament is determined early in life because it has a strong neurobiological or genetic basis and it is relatively stable across time and situations (Austin et al., 2005; Shiner et al., 2012). However, temperament is sensitive to the environment and experiences (Nigg, 2006; Thomas et al., 1963). An increasing number of studies have shown that children's outcomes resulted from the interplay between children's characteristics and environment. Several theories have been developed to explain how children's development results from the interaction between individual (i.e., genotype) and environmental characteristics. The transactional model of Sameroff (1989) is one of the prominent theories that argues that the child's development is the product of a continuous dynamic interaction of the child and the experiences that the social environment provides. There are transactions between the genotype (i.e., source of biological organization), the phenotype (i.e., the child), and the environment (i.e., the source of external experience; Sameroff, 1989; Sameroff, 2009). Other prominent theories are the diathesis-stress model, the vantage sensitivity model, and the differential susceptibility model (Jolicoeur-Martineau et al., 2020). The diathesis-stress model focuses on how some individuals are disproportionately susceptible to adverse environmental conditions because they carry some "risk" genes (Zubin & Spring, 1977). Meaning, that stressful environments hinder vulnerable children more than their resilient peers (Sameroff, 1983). The vantage sensitivity model states that some individuals can disproportionately benefit from the environment's support due to their genes. This means that sensitive children benefit more from a supportive environment than their resistant peers do (Pluess & Belsky, 2013). Finally, the differential susceptibility model argues that some individuals are more susceptible (i.e., developmentally plastic) to the environment's support and its negative effects (Belsky et al., 2007). Thus, "risk" genes are conceptualized as "sensitivity" or "plasticity" genes (Jolicoeur-Martineau et al., 2020). In the latter model, susceptible children do worse in negative environments and better in positive environments than their non-susceptible peers do (Belsky et al., 2007). These latter three theories argue that children with a particular level of a characteristic (i.e., a particular diathesis, sensitivity, or susceptibility factor) are affected through environmental risks or benefits, and that children who are less susceptible, are less or not responsive to the same environment (Zhang et al., 2021). In addition to these prominent theories, there is Thomas and Chess's (1977) goodness-of-fit theory, which is less well known. The goodness-of-fit theory focuses on multiple aspects of individual differences (e.g., children's temperament) and the

match/mismatch with the environment (e.g., caregivers' expectations, behavior) (Chess & Thomas, 1991). This potential match/mismatch can provide useful information for professional caregivers in ECEC to understand if certain situations in ECEC or if the staff's expectations fit with children's different types of temperament, or if adaptations in the ECEC environment are needed (OECD, 2013).

5.5. Goodness-of-Fit

Goodness-of-fit is when the child's temperament is compatible with the expectations and opportunities that the environment provides, whereas poorness-of-fit regards the discrepancy between a child's temperament and the environment (Thomas & Chess, 1977). This means that the interaction between a child's temperament and the environment can influence a child's development and behavior (Avant & Gazelle, 2011). The goodness-of-fit theory is often used as a basis for temperament-based interventions. Practitioners are provided with a framework to assess individuals within their specific environmental context and to solve temperament/environment mismatches (McClowry et al., 2008). They are encouraged to create an environment that matches with the child's temperament (Chess & Thomas, 1984). The child might also attempt to modify the environment to match their temperament, but the responsibility to provide goodness-of-fit remains mainly with the caregiver. This is sometimes challenging because situations will occur wherein the child will experience discomfort due to environmental demands that do not match their temperament (McClowry et al., 2008). For example, shy children often experience anxiety, wariness, and reticence in (novel) social situations (Buss & Plomin, 1984; Coplan et al., 2004; Rubin et al., 2009). Caregivers can scaffold the child to expand the child's emotional, behavioral, and attentional skills (McClowry et al., 2008). Earlier studies showed that shy 5- to 6-year-olds' peer rejection, internalizing problems, and loneliness decreased when they had a positive and close relationship with the professional caregiver (Arbeau et al., 2010; Baardstu et al., 2022). However, multiple studies also examined 4- to 5-year-old shy children and found that these children generally had less close teacher-child relationships (Rudasill et al., 2006; Wu et al., 2015). Therefore, professional caregivers should pay attention to children's individual needs (Rimm-Kaufman et al., 2002). How the staff-child relationship might moderate the association between toddlers' temperament and well-being in ECEC is less well studied because earlier studies mainly focused on school-aged children (e.g., Holder & Klassen, 2010) or on outcomes such as social-emotional development (e.g., Hipson & Séguin, 2016).

Children with certain temperamental traits might need certain support from the professional caregiver(s) to promote their well-being in ECEC and to match the ECEC environment with the child's temperament.

5.6. Association Between Children's Temperament and Well-Being in ECEC

According to my literature review, only a few studies have discussed the goodness-of-fit theory when examining the association between toddlers' temperament and well-being in ECEC (De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004). These studies found an association between toddlers' temperament and well-being in ECEC, but they examined children's difficult temperament. Chess and Thomas (1984) also mentioned difficult temperament when they combined nine temperamental traits of infants into three classifications of temperament: difficult (i.e., negative withdrawal responses to new stimuli, intense mood expressions, nonadaptability or slow adaptability to change), easy (i.e., positive approach to new stimuli, mild or moderate mood intensity, high adaptability to change), and slow to warm up (i.e., mild intense negative responses to new stimuli, but slow adaptation after repetitive exposure shown by more positive responses and interest). However, the challenge with these classifications of temperament is that studies often focus on different dimensions, and the conceptualization of, for example, a "difficult temperament" might vary across sociocultural contexts (Chen et al., 2012).

Therefore, in this thesis, I focused on the temperamental dimensions of activity, emotionality, sociability, and shyness, which Buss and Plomin (1984) introduced. Holder and Klassen's (2010) qualitative study on 311 school-aged children (9–12 years old) showed an association between these temperamental dimensions and their happiness. Children who were less shy or emotional and more social or active were happier (Holder & Klassen, 2010). Similar results to those of Holder and Klassen (2010) might be found for toddlers in ECEC. However, temperament is susceptible to environmental influences, which might result in different outcomes for younger children in the ECEC context compared to older children in school (e.g., Sanson et al., 2002; Shiner et al., 2012).

5.7. Potential Risks of Early Shyness

In addition to the founded associations between children's current temperament and developmental outcomes, some studies showed that shyness during childhood (hereafter called "early shyness") might be a risk factor for later psychological and social-emotional difficulties (e.g., Abulizi et al., 2017; Biederman et al., 2001; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000). Fear of strangers is part of normative development and it decreases over time, because children have internal coping mechanisms that help them in (novel) situations (Buss, 1986). However, shy children might miss out on early play experiences with peers because they often need more time to adapt to a new environment than their nonshy peers do (Coplan et al., 2008; Jones et al., 2014). Especially the first year in ECEC might be challenging for shy children because they are more wary when confronted with (novel) social interactions with peers and professional caregivers (Buss, 1991; Coplan & Arbeau, 2008). Due to feelings of anxiety and fear in social situations, shy children might end up as "onlookers" during play activities (Coplan et al., 2008). This might result in social exclusion or the desire to avoid social interactions (Asendorpf, 1990; Gazelle & Ladd, 2003; Hanish & Guerra, 2004; Rubin et al., 2009), leading to less opportunities to learn assertiveness and to practice social skills (Jones et al., 2014). Poor social skills and high levels of anxiety can lead to less well-being (Kalutskaya et al., 2015; Karevold et al., 2012; Rubin et al., 2009). Multiple longitudinal studies followed children in different contexts, such as the transition from ECEC to elementary school, or focused on older children and adolescents. These studies found that children who showed a high level of shyness during their first years in life predicted higher levels of depression, emotional problems, poorer social skills, anxiety (e.g., Abulizi et al., 2017; Biederman et al., 2001; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000), and decreased behavioral withdrawal (Booth-LaForce & Oxford, 2008) during childhood or adolescence. However, Bekkhus et al.'s (2021) study on 4- to 7-year-olds in ECEC did not find a clear predictor effect of shyness on socioemotional difficulties. Bould et al. (2014) also did not find an association between the shyness of 6-year-old children and their depression at the age of 18 years. The absence of longitudinal associations between early shyness and later psychological and socioemotional development in some of the studies might be explained by the resilience that young shy children have. An earlier study showed that shy children (aged 3.5–5.5 years) can still learn from social interactions by just watching their peers' play and interactions instead of actively joining these interactions (Lane et al., 2013; Wellman et al., 2011). Young shy children also develop emotion-related skills (e.g.,

recognizing causes of emotions) and use adaptive emotion regulation strategies (e.g., seeking social support and problem solving) to promote positive interactions with professional caregivers and peers and to cope with social stresses (Coplan et al., 2020). In addition to social-emotional development, shy children get used to their professional caregivers, peers, and the physical setting of the ECEC center. Children who were shy during preschool and were examined later in elementary school, showed more experience when interacting with peers and showed less social withdrawal than before, which also improved their social skills and confidence (Booth-LaForce & Oxford, 2008). Some shy children might be classified as “slow to warm up” and start to show more interest in others after repetitive exposure and support from the professional caregivers during (novel) situations (Chess & Thomas, 1984). However, this might not be visible during the first year in ECEC because the children are separated from their parents and most of the 1-year-old children in Norway attend an ECEC center for 41 hr or more per week where they need to adapt to a new environment with new and multiple caregivers (Council of the European Union, 2019; Ereky-Stevens et al., 2018; Statistics Norway, 2022). A longitudinal study is needed to obtain further insights in the association between toddlers’ early shyness and their well-being during the first year in ECEC.

6. ECEC Quality

As mentioned earlier, the ECEC environment should match with children's needs (e.g., OECD, 2013). The support from the professional caregiver is part of the quality of care that the ECEC center provides. ECEC quality can be divided in structural quality and process quality. Structural quality is how the ECEC system is organized and designed (European Commission, 2014). This includes the child–staff ratio, staff's educational level, group size, availability of learning and play materials, safety, protocols about hygiene, routines for communication with parents, work climate, and possibility for staff's professional development (e.g., Slot et al., 2015; Zaslow et al., 2010). The proximal daily experiences characterize process quality (Phillips & Lowenstein, 2011; Sylva et al., 2006). These experiences include affectionate and responsive staff–child interactions, opportunities for peer interactions, positive peer interactions, opportunities to explore materials in accordance with the child's developmental stage, and pedagogically oriented activities as part of the curriculum (Giudici et al., 2001; Rimm-Kaufman et al., 2009; Sylva et al., 2007). Research is developing regarding ECEC process quality for children under the age of 3 years. Novel quality dimensions are being studied, peer and group processes and new findings show that quality might vary within the group (child vs. group level quality), across time (day and years), and across different caregivers within the same group (Cadima et al., 2020). Earlier studies argued that measuring process quality at the group level might not represent what individual children experience in ECEC (e.g., Chien et al., 2010; Downer et al., 2010; Williford et al., 2013). High process quality at the group level might not benefit all children. The strongest positive effects of high process quality on child development have been found for children from disadvantaged backgrounds (e.g., low socioeconomic status, ethnic minority), and there is evidence that there are sometimes negative effects of high quality (Melhuish et al., 2015). Therefore, researchers should take caution when generalizing that certain environmental factors can be beneficial or detrimental for everyone. Some environmental factors might support some children's outcomes but might result in negative outcomes for other children. Thus, the same environmental factor might match certain children's needs, but not others' (Dong et al., 2022). This phenomenon is called a contrastive effect (Belsky et al., 2007). Children who score high and low on particular characteristics, such as temperament, can respond significantly to the influence of an environmental factor such as process quality, but in reverse directions (Dong et al., 2022). Therefore, process quality should be studied at both the child and group level to capture different aspects of

children's experiences in ECEC (Cadima et al., 2020). Research is needed on children's interactions with their social and physical environments (Hooper & Hallam, 2017) and how the different quality dimensions affect children's outcomes (Cadima et al., 2020).

6.1. Process Quality and Children's Well-Being in ECEC

Earlier studies showed that process quality is more closely related to children's outcomes than structural quality is (e.g., Melhuish & Gardiner, 2019; Slot et al., 2018). High process quality associates with better child well-being and development for children under the age of 3 years (e.g., OECD, 2018; Sylva et al., 2011). Professional caregivers' sensitivity, stimulation, and promotion of autonomy toward a child seems to support a child's well-being in ECEC, as a Portuguese case study shows using a praxeological approach (i.e., having a flexible and open approach by using different research techniques to examine the pedagogical praxis that values and beliefs represent, based on educational theories in certain educational contexts with specific educators, beneficiaries, and power relationships; Formosinho & Formosinho, 2012) on 31 children under the age of 3 years (Pinazza, 2012). Bjørgen (2015) also found that autonomy and social relationships in activities are important for children's well-being in ECEC. Seland et al. (2015) found similar results in the earlier mentioned Norwegian phenomenological observation study on 18 1- to 3-year-old children. The quantitative study of Groeneveld et al. (2010) did not find an effect of caregiver sensitivity on 20- to 40-months-old children's well-being in center-based childcare ($n = 45$), but they did for home-based childcare ($n = 71$). An explanation might be that children in center-based childcare have multiple caregivers and individual caregiver differences were not examined in the study (Groeneveld et al., 2010). Environmental chaos in the group also influenced children's well-being in ECEC. Werner et al. (2015) found in their quantitative study that both extremely high and extremely low levels of noise intensity and noise variability levels were associated with lower levels of 245 children's (up to 4 years old) well-being in ECEC. Studies on older children in ECEC also showed positive effects of high process quality on children's well-being. A Norwegian observation study on 24 3- to 5-year-old children attending the same ECEC center found that children's and professional caregiver's shared joint attention and body language during physical play activities might be relevant for children's high level of well-being (Bjørgen, 2015). Another, earlier mentioned, Norwegian study on 171 4- to 6-year-old children in ECEC, which included children's voices during the data collection, showed that children's relationships with the professional caregivers and with peers are

important for their well-being. Especially, the experience that children are kind to each other and like each other (Sandseter & Seland, 2017). Considering the associations found between children's well-being in ECEC and process quality features, such as staff-child relations, peer relations (e.g., Bjørgen, 2015; Pinazza, 2012; Sandseter & Seland, 2017; Seland et al., 2015), and environmental chaos in the group (Werner et al., 2015); and the associations between children's temperament and well-being (e.g., De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004; Holder & Klassen, 2010), process quality might moderate the latter association. Based on the goodness-of-fit theory, high process quality might have different effects for children with different characteristics, such as temperament (e.g., Chess & Thomas, 1991; Melhuish et al., 2015; Phillips et al., 2012; Thomas & Chess, 1977). The selection of potentially relevant process quality features that might be a moderator in this thesis, is based on the recommendation to focus on different quality dimensions (Cadima et al., 2020) and earlier studies that found a relationship between one of these quality dimensions and children's well-being in ECEC (e.g., Bjørgen, 2015; Pinazza, 2012; Sandseter & Seland, 2017; Seland et al., 2015; Werner et al., 2015).

6.2. Moderator Effect of ECEC Process Quality

The ECEC process quality features I selected in this thesis to examine the moderator effect were the level of closeness and conflict in the interpersonal staff-child relationship, the staff's emotional and behavioral support toward the children in the group, and environmental chaos in the group. I chose to focus on the level of closeness and conflict in the interpersonal staff-child relationship because, for example Rydell et al.'s (2005) study found that children (aged 5-6 years) with certain temperamental traits are vulnerable for the level of closeness (e.g., an affectionate and warm relationship between the professional caregiver and child) and conflict (e.g., the professional caregiver and child are always struggling with each other). Children who were shy had, for example, less close relationships with the staff but also less conflicts (Rydell et al., 2005). Other studies on 4- to 5-year-old children in ECEC also found that shy children generally had less close staff-child relationships (Rudasill et al., 2006; Wu et al., 2015). In contrast, other studies showed that shy 5- to 6-year-old children can profit from a close and positive staff-child relationship because it reduced their internalizing problems, loneliness, and peer rejection (Arbeau et al., 2010; Baardstu et al., 2022). Considering the associations found between children's temperament and the level of closeness and conflict in the interpersonal staff-child relationship (e.g., Baardstu et al., 2022; Rydell et al., 2005; Wu et

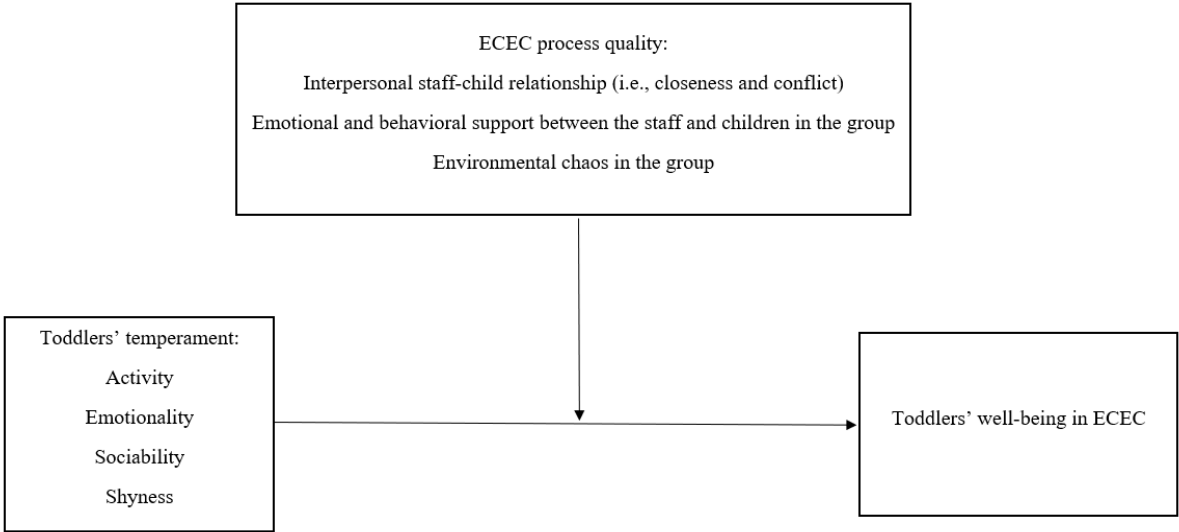
al., 2005), and the association between this process quality feature and children's well-being in ECEC (e.g., Bjørgen, 2015; Pinazza, 2012), toddlers' close or conflictual interpersonal relationship with a professional caregiver might have varying effects on their well-being in ECEC depending on their temperament.

In this thesis, I examined the relationship quality between the staff and children on the group level by focusing on the level of emotional and behavioral support that the staff provide to the children in the group (i.e., positive and negative climate in the group, teacher sensitivity, regard for child perspectives, and behavior guidance). As mentioned, earlier studies showed that relations with others and the group atmosphere might affect children's well-being in ECEC (e.g., Bjørgen, 2015; Groeneveld et al., 2010; Pinazza, 2012; Sandseter & Seland, 2017; Seland et al., 2015; Werner et al., 2015). De Schipper, Tavecchio, et al. (2004) found that the greater availability of trusted professional caregivers affected the association between toddlers' easy temperament and well-being in ECEC because it supported them to adjust easier to the ECEC setting. However, an earlier study (Phillips et al., 2012) also found that high quality does not always support all children because children have personal needs, which might require different types of support. Considering the different temperamental traits children have, certain temperamental traits might require different types of support because there might be a match or mismatch between children's temperament and the ECEC environment (Thomas & Chess, 1977).

Finally, environmental chaos is the lack of temporal and structural regularity (e.g., few routines or regularities, materials do not have a certain place, little is scheduled), high levels of noise, environmental traffic, and crowding in the group (Matheny et al., 1995; Wachs et al., 2004). Earlier studies showed that high levels of chaos and crowding at home were associated with disadvantageous outcomes, such as more negative caregiver-child interactions, less caregiver-child conversations, more child aggression and social withdrawal, and increased stress (Evans, 2006; Evans & Wachs, 2010). Less studies are available on the effect of chaos in the ECEC center on children's well-being. The few available studies focused on noise levels or noise variability in the ECEC center that could affect children's emotional well-being in ECEC (Groeneveld et al., 2010; Kishimoto, 2012; Linting et al., 2013; Werner et al., 2015). These studies showed a negative association between noise levels and children's well-being in ECEC. According to my literature review, studies are lacking on the effect of childcare crowding, the degree of temporal and structural organization in the classroom,

environmental traffic, and the overall noise level. Therefore, I examined these types of environmental chaos to see if they moderated the association between toddlers' temperament and well-being in ECEC. Figure 1 shows a visual representation of the different process quality features examined here as a potential moderator of the association between toddlers' temperament and well-being in ECEC in this thesis and specifically in Study 2.

Figure 1
Examined Process Quality Features as a Potential Moderator of the Association Between Toddlers' Temperament and Well-Being in ECEC



7. Study Aims, Research Questions, and Hypotheses

In this thesis, I aimed to obtain further insight in toddlers' well-being in Norwegian ECEC by validating an existing instrument called the Leiden Inventory for the Child's Well-Being in Daycare (LICW-D; De Schipper, Tavecchio, et al., 2004) that measures children's well-being in ECEC. In addition, I studied the association between toddlers' temperament and well-being in Norwegian ECEC, followed by if there was a moderator effect of ECEC process quality on this association. Finally, I examined in this thesis if there was a longitudinal association between toddlers' early shyness and their well-being during the first year in Norwegian ECEC. An overview of the studied research questions and hypotheses in the three studies is presented below. When I mention "we" in this thesis, I am referring to all authors who were involved in the three studies.

We hypothesized the following in Study 1:

1. The one-factor model for the LICW-D as De Schipper, Van IJzendoorn, et al. (2004) suggested will also be found in our study.
2. No differences will be found between boys and girls on the factor model for the LICW-D.
3. Children scoring high on well-being are more likely to be characterized by a less difficult temperament.
4. Children scoring high on well-being will show fewer symptoms of internalizing, externalizing, and total behavior problems.

In Study 2, we posed research questions and hypothesized from them.

1. Is there an association between children's temperament and well-being in Norwegian ECEC?

We hypothesized that children who are less shy and emotional and more social and active experience more well-being.

2. Does ECEC process quality moderate the association between children's temperament and well-being in Norwegian ECEC?

We hypothesized that process quality (i.e., staff-child relationship, emotional and behavioral support, and environmental chaos in the group) moderates the association between temperament and well-being.

In Study 3, we posed a research question and hypothesized from it.

1. Is there an association between toddlers' early shyness during the starting period in ECEC and their well-being by the end of their first year in the center?

We hypothesized that toddlers' early shyness when they first enter ECEC predicts their well-being negatively by the end of their first year in ECEC.

8. Methods

This chapter goes more in depth on the methodological approaches used in the three studies. First, it provides an overview of the study design and procedures, including the recruitment in the larger Thrive by 3 study and the sample that the three studies used. An elaboration on the measures, statistical analyses, and ethical considerations used in this thesis's three studies follows.

8.1. Study Design and Procedures

All data analyzed in the three studies are part of the larger Thrive by 3 (in Norwegian: *Trygg før 3*) study (Lekhal et al., 2020). Thrive by 3 is a cluster randomized controlled trial of a multicomponent, in-service professional development model to promote the quality of caregiver–toddler interactions, and to strengthen 1- to 3-year-old children's well-being, mental health, and development in Norwegian ECEC centers.

8.1.1. Recruitment

For the Thrive by 3 study, seven municipalities/city districts were invited and consented to participate. Three of them are in Central Norway, and four of them in Eastern Norway. These municipalities recruited the ECEC centers. The eligibility criteria for ECEC centers to participate were that the center should have at least one toddler unit/group with children in the age of 10–36 months. In addition, a maximum of 16 centers per municipality were allowed to participate. If there were too many centers willing to participate, the municipality had to decide which center would fit the Thrive by 3 study best. All potential participants (i.e., center managers, professional caregivers, parents, children) were invited via e-mail (or letter, if needed) with an electronic link to the written consent form. The center managers decided on the center's and their own participation. In addition, the center manager forwarded the written consent form, on behalf of the Thrive by 3 study, to all professional caregivers, parents, and children at the center. In the case of joint custody, both parents needed to consent for the child's participation. In total, 78 ECEC centers (63 municipal centers, 15 private centers), 187 toddler units/groups, 794 staff members working in ECEC (92.9% female), 2,443 parents (58% mothers), and 1,561 children (48.8% girls) agreed to participate. After recruitment, a stratified randomization was used to allocate the ECEC centers to the intervention or waitlist control group. This was done in each municipality and according to the size (small vs. large)

of the ECEC center to assure that smaller and larger centers from each municipality were represented in both the intervention and control group. A statistician researcher from the Thrive by 3 study used a random number generator when conducting the randomization. This resulted in 39 ECEC centers, 87 units/groups, and 733 children who were part of the intervention group. While 39 ECEC centers, 100 units/groups, and 828 children were part of the waitlist control group.

Data were collected preintervention (T1, September 2018), midway (T2, January 2019), postintervention (T3, June/July 2019), and 1-year postintervention (T4, June/July 2020). The waitlist control group received the intervention 1 year after the intervention group did (September 2019), meaning that the waitlist control group did not get feedback on their observation scores during the first three data collection rounds.

8.1.2. Sample

The sample of 1,561 children consisted of mainly children who had Norwegian as their mother tongue (91.4%) and spent 6–8 hr per day in the ECEC center (81.5%). The general family gross income was between 800,000–999,000 Norwegian kroner, and 1.5% of the children had a disability. To avoid any potential intervention effect, the preintervention data were used to examine the validity of the LICW-D, and the association between toddlers' temperament and their well-being in ECEC and the moderator effect of process quality. The preintervention data also formed the starting point to select the sample of children who were younger than 19 months to examine the longitudinal association between toddlers' early shyness and their well-being during their first year in ECEC. Because children in Norway are guaranteed a place in ECEC from the age of 1 year old, most children younger than 19 months have spent 6 months or less in the ECEC center that they are currently attending (respectively, $M = 1.07$ months, $SD = 1.3$ in this thesis). Table 1 presents an overview of the samples used in the three studies. Note that the reported minimum age in Study 1 and 2 (7 months) differed from the reported minimum age in Study 3 (8 months). One of the children had a wrongly reported age in the data set. Therefore, this child was not included in Study 3 and the age of the child was set to missing. However, this did not affect the mean score and standard deviation of the children's age.

Table 1*Overview of the Sample, Measures, and Analytical Approaches in the Three Studies*

	Study 1	Study 2	Study 3
Sample	All children with data on the LICW-D that the professional caregivers at preintervention filled out. A total of 1,472 children (746 boys, 726 girls) in the age range of 7 to 37 months ($M = 21.4$ months, $SD = 6.1$), who were part of 184 units/groups in 78 ECEC centers.	All children at preintervention. A total of 1,561 children (800 boys, 761 girls) in the age range of 7 to 43 months ($M = 21.4$ months, $SD = 6.2$), who were part of 185 units/groups in 78 ECEC centers.	All children who were younger than 19 months at preintervention, and still part of the study at postintervention. A total of 567 children (288 boys, 279 girls) in the age range of 8 to 18 months ($M = 14.6$ months, $SD = 2.2$), who were part of 163 units/groups in 78 ECEC centers. In total, 259 children were part of the intervention group, and 308 children were part of the waitlist control group.
Measures	Preintervention questionnaire data on: <ul style="list-style-type: none"> • Well-being in ECEC: LICW-D • Difficult temperament: ECBQ short version, frustration, and 	Preintervention questionnaire data filled out by the professional caregiver on: <ul style="list-style-type: none"> • Well-being in ECEC: LICW-D • Interpersonal staff-child relationship: STRS-SF 	Postintervention questionnaire data filled out by the professional caregiver on: <ul style="list-style-type: none"> • Well-being in ECEC: LICW-D Preintervention questionnaire data

	<p>soothability scale</p> <ul style="list-style-type: none"> • Internalizing, externalizing, and total problem behavior: CBCL–TRF/1.5-5 <p>The professional caregiver who knew the child best filled out all questionnaires.</p>	<p>closeness and conflict scale</p> <ul style="list-style-type: none"> • Environmental chaos in the group: LECP <p>Preintervention questionnaire data filled out by the parent on:</p> <ul style="list-style-type: none"> • Temperament (i.e., activity, emotionality, sociability, and shyness): EAS Temperament Survey for Children • Child and family characteristics: child’s gender, age in months, language, hours per day in ECEC, and family’s gross annual income <p>Preintervention observation data filled out by trained and certified observers on:</p> <ul style="list-style-type: none"> • Staff–child relationship at 	<p>filled out by the parent on:</p> <ul style="list-style-type: none"> • Shyness: EAS Temperament Survey for Children, shyness scale • Child and family characteristics: child’s gender, age in months, language, hours per day in ECEC, and family’s gross annual income
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		group level: CLASS Toddler version, emotional and behavioral support domain	
Analytical approaches	<p>Factor validity:</p> <ul style="list-style-type: none"> • CFA <p>Test for alternative models:</p> <ul style="list-style-type: none"> • EFA <p>Gender invariance:</p> <ul style="list-style-type: none"> • Multigroup CFA • Chi-square difference test with the WLSMV estimator • CFA with covariate (MIMIC) <p>Concurrent validity:</p> <ul style="list-style-type: none"> • Bivariate correlations 	Multilevel random coefficient modeling with MLR estimator	Multilevel random coefficient modeling with MLR estimator

8.2. Measures

Table 1 presents an overview of the measures used in the three studies and who the respondents were. I will discuss these measures in further detail in the next sections. Note that researchers from the Thrive by 3 study translated all measures from English to Norwegian.

8.2.1. Well-Being in ECEC

The LICW-D measures children's well-being in ECEC. It consists of 12 items that assess children's general well-being (e.g., child enjoys attending the daycare center) and how comfortable the child is with the professional caregiver(s) (e.g., child is happy to see the professional caregiver[s] when he/she is dropped off), peers (e.g., child trusts all the children at the daycare center), and the physical setting of the center (e.g., child really enjoys the games and play material at the daycare center). The 12 items of the LICW-D could be answered on a 6-point Likert scale in earlier studies that validated this instrument (De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004, De Schipper, Van IJzendoorn, et al., 2004; Gevers Deynoot-Schaub & Riksen-Walraven, 2006). However, when the LICW-D was translated from English to Norwegian for the Thrive by 3 study, the distinction between the answer categories "regularly" and "often" was not clear in Norwegian. Therefore, a 5-point Likert scale was used: 1 (*never*), 2 (*seldom*), 3 (*sometimes*), 4 (*often*), and 5 (*always*). A high score on the LICW-D meant that the child expressed a high level of well-being. The LICW-D showed a good internal consistency with a Cronbach's alpha ranging from 0.79 to 0.87 in the three studies. The full instrument can be found in Appendix 1.

8.2.2. Problem Behavior

Testing the concurrent validity is needed to examine if the LICW-D correlates well with earlier internationally validated instruments that measure related constructs. It can help to test whether the LICW-D is a valid instrument that measures children's well-being. To examine the concurrent validity of the LICW-D, the mentioned studies that validated the LICW-D should be replicated as best as possible. Therefore, the CBCL-TRF/1.5–5 (Achenbach & Rescorla, 2000) was used to measure children's internalizing, externalizing, and total behavior problems in Study 1. Internalizing problems were assessed by 36 items divided over four subscales: emotionally reactive, withdrawn, anxious/depressed, and somatic complaints. Externalizing problems were measured with 24 items divided over two subscales: aggressive behavior and attention problems. Regarding the total behavior problems, the scales of sleep problems and other problems were added to the internalizing and externalizing problems (a total of 99 items). The professional caregiver could answer these items on a 3-point Likert scale: 0 (*not true*), 1 (*somewhat or sometimes true*), and 2 (*very true or often true*). A high score meant that the child had more behavior problems. The internal consistency ranged from good to excellent with a Cronbach's alpha of 0.88 for the internalizing, 0.90 for the

externalizing, and 0.95 for the total behavior problems in Study 1 on validating the LICW-D. The factor structure, reliability, and validity of the CBCL-TRF/1.5–5 had been proven sufficient to excellent across cultures (e.g., Denner & Schmeck, 2005; Ivanova et al., 2011; Liu et al., 2011; Rescorla et al., 2015). In Norway, this instrument has promising results regarding the internal consistency and factorial validity. However, the somatic complaints scale should be considered carefully because of poor psychometric properties (Stensen et al., 2022).

8.2.3. Difficult Temperament

Earlier studies that validated the LICW-D (De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004), used the ICQ (Bates et al., 1979) to measure children's difficult temperament. Instead of using the ICQ, the frustration and soothability scales of the Early Childhood Behavior Questionnaire short form (ECBQ short form; Putnam et al., 2010) were used to validate the LICW-D in Study 1. The ECBQ short form focuses on toddlers and goes more into depth regarding the frustration and soothability that a child might express compared to the ICQ wherein, for example, soothability is an item without any specification on what it is. The frustration and soothability scales are part of the larger negative effect factor in the ECBQ short form. Frustration was measured with six items that focused on negative affect related to goal blocking or the interruption of ongoing tasks. Soothability was measured with five items that focused on the rate of recovery from peak distress, excitement, or general arousal. The professional caregiver could answer the items on a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*) in addition to *does not apply*. A high score on the frustration scale meant that the child showed a higher level of frustration, whereas a high score on soothability meant that the child showed less soothability. The latter is due to positive-oriented items. The internal consistency ranged from acceptable to good with a Cronbach's alpha of 0.88 for the frustration scale, and 0.70 for the soothability scale in Study 1 on validating the LICW-D. The ECBQ short form showed a sufficient to good validity across international studies (e.g., Gago-Galvagno et al., 2021; Potměšilová & Potměšil, 2019; Putnam et al., 2010), but has not been studied in Norway yet.

8.2.4. Temperament

To measure children's temperament, the Emotionality, Activity, Sociability Temperament Survey for Children (EAS; Buss & Plomin, 1984) was used, which the parent filled out. This

questionnaire consisted of four subscales, which had five items each: shyness (e.g., child takes a long time to feel comfortable with strangers, becomes shy easily), emotionality (e.g., child gets flustered very easily, cries easily), sociability (e.g., child does not like being alone, likes being with other people), and activity (e.g., child is full of energy, is always on the go). All items could be answered on a 5-point Likert scale ranging from 1 (*very typical*) to 5 (*not at all typical*). A high score on shyness, emotionality, sociability, and activity meant that the child showed to be more shy, emotional, social, and active. The internal consistency was good with a Cronbach's alpha of 0.74 for the shyness (0.75 in the longitudinal study), 0.79 for the emotionality, and 0.71 for the activity scales; and poor for the sociability scale with a Cronbach's alpha of 0.58 in Study 2 on the association between toddlers' temperament and well-being in ECEC. Both national and international studies have validated the EAS and it showed to be marginally acceptable to good (e.g., Boer & Westenberg, 1994; Gasman et al., 2002; Mathiesen & Tambs, 1999). The Norwegian study of Mathiesen and Tambs (1999) confirmed the four-factor solution across different ages (18-, 30-, and 50-months-old children). However, international studies, such as from Boer and Westenberg (1994), found that the sociability scale was more ambiguous because this scale significantly related to both the shyness and the activity scale. Note that the association between sociability and shyness was stronger for the younger children (aged 6 years), whereas the association between sociability and activity was stronger for the older children (aged 10 years). The age trend showed that sociability was not the same as not being shy, and that sociability was a separate scale that needed modification (Boer & Westenberg, 1994). Gasman et al. (2002) also found a significant overlap between sociability and shyness for both the teacher- and parent-rated EAS when studying school-aged children (6 to 12 years old). For the subsequent analyses in the studies on the (longitudinal) association between toddlers' temperament and well-being in ECEC, the individual mean scores on each scale were group mean centered (score of the child compared to the other children in their unit/group) for the within level. For the between level, the scores were aggregated (mean score for the whole unit/group). The full instrument can be found in Appendix 2.

8.2.5. Interpersonal Staff–Child Relationship

The Student Teacher Relationship Scale—Short Form (STRS-SF; Pianta, 2001) measured the quality of the interpersonal staff–child relationship. The staff who knew the child best filled out the questionnaire and assessed their relationship to the child. This questionnaire consisted

of two subscales: conflict (seven items, e.g., the child easily becomes angry at me, the child and I always seem to be struggling with each other), and closeness (eight items, e.g., when I praise the child, he/she beams with pride; I share an affectionate, warm relationship with this child). These items could be answered on a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*). A high score on the conflict scale meant that the professional caregiver had a conflictual relationship with the child, whereas a high score on the closeness scale meant that there was a close relationship between the professional caregiver and the child. The internal consistency was good on both scales with a Cronbach's alpha of 0.74 for the conflict scale, and 0.71 for the closeness scale in Study 2 on the moderator effect of process quality on the association between toddlers' temperament and well-being in ECEC. Both national and international studies have proven the two-factor structure of the STRS-SF to be a valid instrument (e.g., Aboagye et al., 2019; Drugli & Hjemdal, 2013; Tsigilis & Gregoriadis, 2008; Yang et al., 2021). For the subsequent analyses in Study 2, the individual mean scores for both scales were group mean centered for the within level and aggregated for the between level.

8.2.6. Staff–Child Relationship at Group Level

The quality of the staff–child relationship at the group level was measured with the emotional and behavioral support domain of the Class Assessment Scoring System (CLASS) Toddler version (La Paro et al., 2012). This domain of the observation instrument consisted of five dimensions: positive climate, negative climate (reversed), teacher sensitivity, regard for child perspectives, and behavior guidance. Each dimension was scored on a range from 1 to 7, where a high score meant a higher level of emotional and behavioral support in the group, and thus, better staff–child interactions at the group level. Twenty-four trained and certified CLASS Toddler observers conducted the observations. Each observation started at 8:30 a.m. and consisted of three rounds that lasted 15 min. Eighteen units/groups (10.3% of the total observations) were observed by two observers to examine the interrater reliability on the emotional and behavioral support domain, which was good (88.3%) in Study 2 on the moderator effect of process quality on the association between toddlers' temperament and well-being in ECEC. In addition, the internal consistency was good with a Cronbach's alpha of 0.88. Multiple international studies have proven the CLASS Toddler instrument's validity (e.g., Bandel et al., 2014; Bichay-Awadalla & Bulotsky-Shearer, 2022; Cadima et al., 2022; Salminen et al., 2021; Slot et al., 2017). The studies of Cadima et al. (2022) and Salminen et

al. (2021) needed to exclude the negative climate dimension to confirm the two-factor model, whereas Slot et al. (2017) found that a three-factor model with a separate domain for emotional support, behavioral support, and engaged support for learning fitted the data better. The validity of the CLASS Toddler has not been studied in Norway yet. For the subsequent analyses in Study 2, first the mean score of the five dimensions were computed to a total mean score for the emotional and behavioral support domain. Then, the total mean score was grand mean centered (score compared to the whole sample) for the moderation analyses.

8.2.7. Environmental Chaos in the Group

The Life in Early Childhood Programs (LECP; Kontos & Wachs, 2000) was used to examine the environmental chaos in the group. The mean score of all professional caregivers in the child's unit/group was used to calculate the level of chaos in the group. The questionnaire consisted of 16 items that could be answered on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*very often true*), focusing on professional caregivers' views on the use of space, group density, environmental traffic (whether many people come and go), and the degree of control and organization in the group (e.g., whether objects are placed in the same place; degree of consistency or routines). A higher score refers to a higher level of chaos in the group. The internal consistency was good with a Cronbach's alpha of 0.87 in Study 2 on the moderator effect of process quality on the association between toddlers' temperament and well-being in ECEC. Research from the United States has proven the instrument to be valid (Wachs et al., 2004), but the validity has not been studied in Norway. For the subsequent analyses in Study 2, the mean scores of the 16 items were computed to a mean score for the LECP, which was grand mean centered for the moderation analyses.

8.2.8. Child and Family Characteristics

For the studies on the (longitudinal) association between toddlers' temperament and well-being in ECEC, we controlled for several child and family characteristics that the parent answered: child's gender (0 = boys, 1 = girls), child's age in months, whether the child had a Norwegian language background (Norwegian as mother tongue) or other linguistic background (answer categories: 1 = Norwegian, 2 = minority language from a Western country in Europe or North America, 3 = minority language from a non-Western country), the number of hours that the child spent in the ECEC center per day (answer categories: 1 = less than 6 hr, 2 = 6 hr, 3 = 6–8 hr, and 4 = more than 8 hr), and the family's total gross annual

income (answer categories: 1 = under 200,000; 2 = 200,000–399,000; 3 = 400,000–599,000; 4 = 600,000–799,000; 5 = 800,000–999,000; and 6 = over 1,000,000 Norwegian kroner). For the subsequent analyses, we computed the answer categories of linguistic background (0 = Norwegian, 1 = minority language), and the number of hours that the child spent in the ECEC center per day (1 = less than 6 hr, 2 = 6–8 hr, 3 = more than 8 hr). These computed variables were grand mean centered, because we wanted to compare the child’s score to the whole sample. The child’s gender and language were treated as dummy variables. In addition to the above-mentioned characteristics, we collected data on if the child had any kind of disability (0 = no, 1 = yes). However, out of the 1,365 parents, only 1.5% of the children were answered with “yes” on this question. Initial analyses with controlling for the child’s disability showed that there was no effect of this variable. Therefore, we decided not to include the “child’s disability” as a control variable.

8.3. Statistical Analyses

Table 1 provides an overview of the analytical approaches in the three studies, which I will discuss in more detail in the next sections.

8.3.1. Factor Analysis

When validating the LICW-D, the initial data diagnostics showed that the observed responses were discrete realizations of a limited number of categories on most items of the LICW-D. Therefore, the data were handled as categorical and the weighted least square mean and variance adjusted estimator (WLSMV), as the assumption of continuity, was broken. First, a confirmatory factor analysis (CFA) was conducted to examine if the one-factor solution that De Schipper, Van IJzendoorn, et al. (2004) suggested could be found. Additional exploratory factor analyses (EFA) were conducted to examine if a multifactor solution would have a better model fit. The one-factor model and alternative models were evaluated by using the following commonly reported fit indices: comparative fit index (CFI), Tucker–Lewis index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR). The Chi-square should be interpreted with caution when examining the overall fit of the LICW-D because it is highly sensitive to sample size. This might result in trivial discrepancies that can lead to rejecting a highly satisfactory model (Brown, 2015). Good model fit was defined as $CFI > 0.95$, $TLI > 0.95$, $RMSEA \leq 0.05$, and $SRMR \leq 0.05$, and an acceptable model fit was defined as CFI and TLI 0.90–0.95, RMSEA 0.06–0.10, and

SRMR 0.06–0.08 (e.g., Hu & Bentler, 1999; MacCallum et al., 1996). The factor loadings of each item were evaluated by the standardized factor loadings (≥ 0.40) and the R^2 estimates (≥ 0.25 ; Brown, 2015). For the CFA of the one-factor solution, the modification indices (MI) above 10 coupled with high-expected parameter change ($EPC \geq 0.40$) were also examined. A large modification index indicates that freeing the parameter or removing the equality constraint might result in a better model fit (Muthén & Muthén, 2017). The following criteria were used to identify acceptable EFA solutions: each factor should have an eigen-value of 1 or above (Kline, 2016), the internal consistency of each factor should be ≥ 0.70 , each factor should be significantly loaded by a minimum of three variables, each variable should not load significantly on multiple factors, and all factors should be theoretically meaningful (Fabrigar & Wegener, 2012). The founded factor model was used to examine the gender invariance and concurrent validity. The gender invariance was studied by conducting a multigroup CFA. The fit of nested CFA models was studied by the Chi-square difference test with the WLSMV estimator (Muthén & Muthén, 2017). Finally, the gender variance was further examined by conducting a CFA with gender as a covariate, which is called a multiple indicator multiple cause (MIMIC) analysis. The concurrent validity was examined by the bivariate correlations between a child's well-being, difficult temperament, and behavior problems. Correlations were rated as tiny (< 0.10), small (0.10–0.29), medium (0.30–0.49), and large (≥ 0.50 ; Field, 2018).

8.3.2. Missing Data

Data were collected on multiple respondents using different questionnaires when studying the (longitudinal) associations between toddlers' temperament and well-being in ECEC. This resulted in missing at random (MAR; Rubin, 1976), and both studies had complete data on 81%–82.4% of the children. Due to MAR, the maximum likelihood with robust standard errors (MLR) was used as the estimation method instead of imputing data.

8.3.3. Multilevel Analysis

Because the children were part of a unit/group within an ECEC center, the within- and between-group variance components were examined for children's well-being. The results showed an intraclass correlation coefficient (ICC) that exceeded the suggested 5% threshold (7.4% in Study 2 and 22.9% in Study 3; Hox et al., 2018; Raudenbush & Liu, 2000). Therefore, the multilevel random coefficient modeling (MRCM) with the MLR estimator was

used in Mplus Version 8 (Muthén & Muthén, 2017). An advantage of using Mplus is that it is possible to specify the variables for each level. MRCM provides more accurate parameter estimates because two parameters are estimated for each effect: fixed and random effects. Fixed effects concern whether coefficients differ from zero, such as means, covariances, difference scores, and interaction effects. Whereas random effects concern hypotheses about the nature of the variability of an effect. If random error terms are not significant, it should be deleted from the model. It shows if the random error for an effect can be reliably estimated (when it is significant) or not (non-significant; Nezlek, 2003). To test the strength of the association between children's temperament and well-being in ECEC, control variables should be added. Therefore, we examined the correlations between child and family characteristics, the temperament scales, and well-being to identify demographic variables that showed significant correlations with the predictors and/or outcome variable. This strategy is also recommended by several studies (e.g., Bernerth & Aguinis, 2016; Sturman et al., 2021). Two models were used in the analyses: Model 1 was uncontrolled, and Model 2 was controlled for child and family characteristics. Because the study on the longitudinal association between toddlers' early shyness and well-being in ECEC included postintervention data, we included a third model to examine a potential moderating intervention effect. In Model 3, well-being was regressed on the interaction term of shyness and the intervention, in addition to the main effects of shyness (group mean centered) and the intervention (0 = control and 1 = intervention); and controlled for the same child and family characteristics as in Model 2. Following Preacher et al.'s (2016) recommendations, we separated the within- and between-level effects by person-mean centering all variables at the child level. At the between level, we included group means. The same model fit indices were used as when conducting factor analysis, that is, CFI, TLI, RMSEA, and SRMR. In addition, the Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to examine the model fit. When a new model had lower values for AIC and BIC compared to the former model, the model fit was better (Finch & Bolin, 2017). To measure the moderator effect, both Level 1 (child level) and Level 2 (unit/group level) ECEC process quality were included in the analyses so that we could study their potential moderating effect on the association between children's temperament and well-being in ECEC. Each ECEC process quality measure was analyzed in a separate model with one moderator. We conducted simple slope analyzes to study the association between the different scales of temperament and well-being. The ± 1 SD of both the predictor and the moderator was used for these latter analyzes.

8.4. Ethical Considerations

The Regional Committees for Medical and Health Research Ethics South East Norway (REK) approved the Thrive by 3 study (reference number 2017/430), as did the Norwegian Centre for Research Data (NSD, reference number 332636). In addition, the project is registered at clinicaltrials.gov (identifier NCT03879733). As mentioned, the municipalities, managers of the ECEC centers, professional caregivers, and parents gave written consent. In the case of joint custody, both parents had to consent for the child. All participants could withdraw from the study at any time without providing a reason. We anticipated low risk of harm for participation in the study because based on literature and previous studies, education and guidance for ECEC staff have been proven positive for children's development (Burchinal et al., 2015; La Paro et al., 2004; Pianta et al., 2003; Sroufe, 2000). In addition, the activities in the ECEC center could be continued as usual during observations, seminars, and supervision meetings of the larger Thrive by 3 study. No video or audio recordings were collected. All data were anonymized and archived in accordance with the Norwegian law. The data are saved on a secured server, which only the members of the research team could access. All participants could contact the researchers in case they had any questions or concerns.

9. Results

9.1. Main Findings of Study 1

A marginally acceptable one-factor model fit was found after allowing the measurement error of four item pairs to be correlated ($\chi^2(50) = 916.701, p < .00001, CFI = 0.94, TLI = 0.93, RMSEA = 0.11, SRMR = 0.05$). Removing items 2, 7, and 11, which had the lowest factor loadings and R^2 estimates, did not improve the model fit. Neither did additional EFAs to examine a multifactor solution. Therefore, the slightly modified one-factor model was used to examine the gender invariance and concurrent validity. Gender invariance was confirmed. The least restricted solution showed an acceptable model fit ($\chi^2(131) = 985.500, p < .00001, CFI = 0.95, TLI = 0.95, RMSEA = 0.09, SRMR = 0.05$). The restricted solution did not significantly alter the model fit ($\chi^2(11) = 10.012, p > .05, CFI = 0.96, TLI = 0.96, RMSEA = 0.08, SRMR = 0.05$), which means that boys and girls did not differ on well-being. Finally, using gender as a covariate in the MIMIC analysis showed a non-significant effect on well-being ($\beta = -0.03, p > .05$). Our findings regarding the bivariate correlations showed a satisfactory concurrent validity. Children who scored high on well-being score low on difficult temperament (frustration: $r = -0.09, p < .01$; soothability: $r = 0.29, p < .001$). Note that the soothability scale was positively oriented. Children who scored high on well-being scored low on behavior problems (externalizing problems: $r = -0.14, p < .001$; internalizing problems: $r = -0.49, p < .001$; total behavior problems: $r = -0.34, p < .001$).

9.2. Main Findings of Study 2

An association was found between toddlers' temperament and well-being in ECEC. Children who were more shy (estimate = $-0.14, p < .001$) or emotional (estimate = $-0.07, p < .001$) showed less well-being in ECEC. Whereas children who were more social showed more well-being (estimate = $0.08, p = .002$). We found no association between toddlers' activity and well-being in ECEC (estimate = $0.04, p = .104$). The level of conflict in the staff-child relationship had a significant negative moderating effect on the association between children's shyness and well-being in ECEC (estimate = $-0.17, p = .001$). Children who were shyer showed less well-being when they experienced a low (estimate = $-0.06, p = .026$) or high (estimate = $-0.24, p < .001$) conflictual relationship with the professional caregiver. The difference between low and high conflict was significant for both children scoring low on shyness (estimate = $-0.12, p = .001$) and children scoring high on shyness (estimate = $-0.34,$

$p < .001$). We also found a significant positive moderating effect of conflict on the association between children's activity and well-being in ECEC (estimate = 0.12, $p = .037$). Active children showed more well-being when the level of conflict was high (estimate = 0.11, $p = .006$). The difference between low and high conflict was significant for both low active children (estimate = -0.28 , $p < .001$) and those who were highly active (estimate = -0.15 , $p < .001$). Finally, emotional and behavioral support had a significant positive moderating effect on the association between children's activity and well-being (estimate = 0.10, $p = .001$). More active children showed higher levels of well-being when the level of emotional and behavioral support was high (estimate = 0.11, $p = .001$). The difference between low and high emotional and behavioral support was larger for children with low activity levels (estimate = -0.08 , $p = .006$), but not significant for highly active children (estimate = 0.04, $p = .149$). Alternative models that tested the moderation effects of the different temperament scales with staff-child conflict and closeness scale, emotional and behavioral support, and environmental chaos in the group did not yield significant results (all $p > .05$).

9.3. Main Findings of Study 3

An association was found between children's early shyness at preintervention and well-being in ECEC at postintervention (estimate = -0.06 , $p = .026$). Children who were shy during their starting period in ECEC showed a lower level of well-being by the end of their first year in ECEC. When examining the interaction term of shyness and the intervention, no significant effect was found on well-being ($p > .05$).

10. Discussion

In this thesis, I aimed to obtain further insight in toddlers' well-being in Norwegian ECEC, and the role of child temperament and ECEC process quality. These three concepts have been studied for decades, but research is scarce on the potential relationship between these concepts for toddlers in ECEC. Debates regarding the definitions of the three concepts, a lack of valid instruments to measure the concepts, and the underrepresentation of toddlers in ECEC research have made it challenging to obtain further insight in toddlers' well-being in ECEC. However, this thesis complements previous research by finding a marginally acceptable fit for the hypothesized one-factor model of the LICW-D, which measures children's well-being in ECEC. The validation of the LICW-D can form a starting point for further development and research of it. In addition, in this thesis, I found an association between toddlers' temperament (shyness, emotionality, and sociability) and their well-being in ECEC. Moreover, staff-child conflict moderates the association between activity and well-being, and between shyness and well-being. Whereas high emotional behavioral support moderates the association between activity and well-being. Finally, in this thesis, I found a longitudinal association between toddlers' early shyness and their well-being during the first year in ECEC. This chapter discusses the findings more in depth regarding the research questions and hypotheses that were studied along the three studies (see pages 25 and 26) and how these findings contribute to earlier research and theories. Methodological strengths and challenges are also discussed, followed by limitations, implications of findings, and future directions.

10.1. Is the LICW-D a Valid Instrument to Measure Children's Well-Being in ECEC?

Study 1 demonstrates that the LICW-D can form the starting point for further development and research of the LICW-D as an instrument that measures children's levels of well-being in ECEC. The findings were in accordance with De Schipper, Van IJzendoorn et al.'s (2004) study, in which they also found a one-factor model for the LICW-D. However, four modifications were needed to reach a marginally acceptable fit in Study 1. No differences were found between boys and girls, and children who scored higher on well-being were showing less difficult temperament and fewer symptoms of internalizing, externalizing, and total behavior problems. These latter findings were also in accordance with earlier studies (De

Schipper et al., 2003; De Schipper, Tavecchio et al., 2004; De Schipper, Van IJzendoorn et al., 2004; Gevers Deynoot-Schaub & Riksen-Walraven, 2006) and they confirmed the hypotheses of Study 1.

The founded marginally acceptable model fit was not surprising because measuring toddlers' well-being in ECEC is rather complex and still in a developmental phase. Earlier studies have shown that well-being is a subjective and dynamic internal state, which can change by personal-level and occasion-specific determinants (Fukkink, 2021; Sandseter & Seland, 2016; 2017; Seland et al., 2015). Moreover, measuring toddlers' well-being might be more vulnerable for misinterpretations of children's actual levels of well-being because toddlers have more difficulty expressing themselves (Eide et al., 2017). The expression of emotions is also dependent on age, temperament, character, and culture (Fukkink, 2021; Mihaela, 2015; Seligman, 2012), making it challenging to develop a valid instrument that covers the full variation of such a complex concept such as toddlers' well-being in ECEC. Nevertheless, the LICW-D has the potential to tackle these challenges.

The LICW-D provides insight in the level of enjoyment and comfort that children have during different daily situations, social situations, and within the physical environment of the center over time. Unlike other instruments that observe children's emotions and behavior, such as such as enjoyment, vitality, relaxation, and openness for a very short period (e.g., De Kruif et al., 2007; Laevers, 2005), the LICW-D can provide an overview of children's well-being during ECEC-specific situations over a longer period. Moreover, the LICW-D might be less susceptible for misinterpretations of children's emotions and behavior because, for example, introvert children might be less cheery than extrovert children are (Seligman, 2012). However, the interpretation of some of the LICW-D's items might also be disputable. Similar with many other instruments, the LICW-D does not seem to take into account age and cultural differences.

Age differences might be found regarding Item 7 on the child being distressed or inconsolable when he/she is saying goodbye to the parent. The separation situation at delivery is a complex interplay between the child, parent(s), and the professional caregiver(s). The child has increased sensitivity to what is happening when they feel insecure and vulnerable (Klein et al., 2010). A child might express lower levels of well-being during this separation situation when he/she just had started in ECEC compared to when they attend the center for more than

1 year. Moreover, I question whether researchers can interpret a low score on this item differently for a 1-year-old compared to a 3-year-old child. How problematic is it when a child is still distressed or inconsolable when he/she is delivered after spending 2 years in the center? Similar questions might be raised regarding, for example, Items 6 and 10. How problematic is it when a 3-year-old child still avoids contact with other children and/or does not feel at ease in the group? These questions need to be considered when interpreting the LICW-D's results.

In addition to age-related differences, cultural differences exist in what represents children's well-being in ECEC. The findings of Study 1 showed that the instrument does not fully represent children's well-being in Norwegian ECEC, and some items might not fully represent Norwegian values in the ECEC center. In Norway, children's autonomy and choices are highly valued and are on the political agenda. Giving children choices and autonomy can promote their development, learning motivation, self-control, self-regulation, and later life outcomes (OECD, 2015). Having the opportunity to be active, to participate, and to be responsible relate to children's well-being in ECEC in Norway. This means that children often can choose their activities (Storli & Sandseter, 2019), and that they can play alone if they prefer. Some of the items suggest that the child should be comfortable with all children or professional caregivers, or they should seek for company all the time to experience high levels of well-being. However, previous research (Howes, 1983, 1987) showed that from an early age, children differentiate between available playmates and show a preference for one or two children within a larger peer group. Established friendships can help the child experience a strong sense of well-being even though they do not feel at ease with some of the children in the group (Borge, 2014). Therefore, feeling comfortable with all children might not be relevant to experience a high level of well-being in ECEC. Fukkink's (2021) study also showed that most children's well-being in ECEC fluctuates significantly during the day depending on the activity or situation, but that their well-being is on average neutral. Therefore, a low score on some of the items might not represent their well-being in general, and attention should be paid to the mean score on the whole LICW-D. Even though most of the children in Study 1 scored high to very high, there was still variation visible between children who scored lower on well-being compared to their peers. For children who score low on the LICW-D, attention should be paid to the item level as well to figure out what explains their lower levels of well-being.

Multiple studies, including Study 1, showed that children who express more behavior problems often show lower levels of well-being (De Schipper, Van IJzendoorn, et al., 2004; Gevers Deynoot-Schaub & Riksen-Walraven, 2006). However, these findings also indicate that a distinction can be made between children's lower levels of well-being and behavior problems, and therefore, using problem behavior to indicate lower well-being needs reconsideration. The focus on measuring positive emotions and behavior during certain situations in ECEC as in the LICW-D might also better represent children's actual well-being, instead of using negative emotions or problem behavior to predict lower levels of well-being. Therefore, the LICW-D appears to be a more appropriate instrument to measure children's well-being in ECEC because it can be used to evaluate longer periods and does not provide certain classifications of enjoyment or feeling at ease that represent high levels of well-being in certain ECEC situations. Instead, it focuses on how often certain situations occur, and the professional caregiver can rate the child's level of well-being in accordance with how the child expresses themselves during certain situations across time. In addition, other available instruments that have been used to measure children's well-being in ECEC sometimes focus more on the service provided in the ECEC center to support children's well-being (e.g., Siraj et al., 2010; Slee et al., 2012). However, these instruments should be used in combination with instruments, such as the LICW-D, to support children's well-being as best as possible.

10.2. Is There an Association Between Children's Temperament and Well-Being in ECEC, and Does Process Quality Moderate This Association?

Study 2 found that toddlers' shyness, emotionality, and sociability were associated with their well-being in ECEC. Children who were more shy or emotional showed lower levels of well-being, whereas children who were more social showed higher levels of well-being. Study 2 is an expansion on existing knowledge because it goes more in depth on which temperamental dimensions associate with children's well-being in ECEC. Earlier studies on children in ECEC (De Schipper et al., 2003; De Schipper, Tavecchio, et al., 2004) examined children's "difficult temperament," which might vary across social-cultural contexts and situations, as multiple studies argued (Chen et al., 2012; Sanson et al., 2002). However, by focusing on temperamental dimensions that are more concrete, such as shyness, emotionality, sociability, and activity, more can be learned about what can affect children's well-being in ECEC and which children might need extra support from the professional caregivers. The findings of

Study 2 are in line with Holder and Klassen's (2012) study on 9–12-year-old children and confirmed our first hypothesis. Although, Study 2 did not find an association between toddlers' activity and well-being in ECEC. The latter might be explained by Buss's (1981) study, which found that less active children often have more harmonious and peaceful interactions with caregivers, and therefore, experience well-being in ECEC. However, note that the associations found in Study 2 are significant but weak. As seen in Study 1, well-being depends on personal-level and occasion-specific determinants (Fukkink, 2021; Sandseter & Seland, 2016, 2017; Seland et al., 2015). The same applies to temperament. Temperament has a strong genetic or neurobiological basis, but is also a product of complex interactions among genetic, biological, and environmental factors across time (Shiner et al., 2012). Thus, there might be other explanations for the level of well-being in ECEC and the temperament that toddlers show. Certain environmental factors might trigger different behavior and experiences for children. Therefore, Study 2 investigated the moderator effect of both interpersonal and group level quality features. There is a continuous interplay between individual and environmental factors, and there might be a match/mismatch between children's temperament and the professional caregivers' expectations or provided support, as Thomas and Chess's (1977) goodness-of-fit theory argues.

Study 2 found that a conflictual staff–child relationship moderated the association between children's shyness and well-being, and between activity and well-being. Whereas the emotional and behavioral support at the unit/group level influenced the relationship between children's activity and well-being in ECEC. These findings confirmed the second hypothesis of Study 2, but not all investigated process quality features moderated all associations. Nevertheless, Study 2 found proof for the goodness-of-fit theory and showed that toddlers' well-being in ECEC can result from the interplay between children's temperament and the staff–child relationship at the interpersonal and group level. Shy children might experience anxiety at the slightest level of conflict, which affects their well-being negatively. Even though they often have less conflictual relationships, they also have less close relationships (Rydell et al., 2005). Whereas active children typically have more energy and seek play and sensation (DeNeve & Cooper, 1998). This might sometimes exceed the caregiver's tolerance threshold for intensity, and it can result in more conflictual relationships compared to less active children (Buss, 1981). In addition, Study 2 showed that even though the emotional and behavioral support between the staff and children at the unit/group level was high, low active children appeared to benefit less from it. It might be that Study 2 found a contrastive effect of

high emotional behavioral support for low active children. They responded significantly differently than their active peers did. This confirms earlier studies that argue that high quality does not always support all children because of children's individual needs and the way they experience the provided quality (e.g., Melhuish et al., 2015; Phillips et al., 2012). Therefore, professional caregivers should respond to and adjust the environment to the child's needs and not vice versa (Chess & Thomas, 1984). Note that children from families with a minority background or low income, as well as children with a disability, might have further needs to experience high levels of well-being. The strongest positive effects of high process quality on child development are often found for children from disadvantaged backgrounds (Melhuish et al., 2015). These groups of children are still underrepresented in research, and different results might be found for them when examining the goodness-of-fit theory as in Study 2.

The lack of a moderation effect of process quality features, such as closeness and chaos, does not mean that these features are not important for children's well-being in ECEC. It might be that the children in Study 2 were part of units/groups where most children had a close relationship with the professional caregiver they knew best, and that the level of chaos was low. This makes it increasingly difficult to find potential effects of extreme cases. Moreover, the founded significant associations were weak, which makes it also more challenging to find a moderator effect of process quality features. Even though the associations were weak, the findings of Study 2 showed that toddlers' temperament, well-being, and ECEC process quality were intertwined. It is not possible to claim that temperament has an effect on well-being because Study 2 did not examine why high shyness and emotionality should cause lower levels of well-being, and why high sociability should cause higher levels of well-being. However, the results show it is highly possible that these concepts share developmental similarities. Moreover, Study 2 confirmed that both toddlers' temperament and toddlers' well-being in ECEC result from the interplay between personal and environmental determinants because some process quality features showed a moderating effect.

10.3. Is There an Association Between Children's Early Shyness and Their Well-Being During the First Year in ECEC?

Study 3 showed an association between toddlers' early shyness and their well-being by the end of their first year in ECEC. Those children who were shy when they first entered ECEC showed lower levels of well-being by the end of their first year in ECEC, which confirmed

our hypothesis. These findings compliment earlier studies that showed that early shyness might be a risk factor for children's outcomes. However, none of the earlier mentioned studies focused on toddlers' well-being during their first year in ECEC. Instead, they followed children over a longer period in different contexts and focused on psychological and social-emotional difficulties as an outcome (e.g., Abulizi et al., 2017; Biederman et al., 2001; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000). According to my literature review, Study 3 is the first one showing that shy toddlers' first full year can be an unsettling period for them, and that they probably need more time to adapt to the new environment compared to their nonshy peers. Because there is an extensive focus on play and forming friendships in Norwegian ECEC (Norwegian Directorate for Education and Training, 2017), shy children might miss out on playing opportunities, which also affects their opportunity to develop social skills and assertiveness (Coplan et al., 2008; Jones et al., 2014). Watching other children play might not be enough for shy children to develop internal coping mechanisms during their first year in ECEC. In addition, 2-year-old children express shyness mainly by low sociability and high fearfulness (Buss & Plomin, 1984), which requires more individual support from the professional caregivers when approaching peers for play activities.

Note that the association between toddlers' early shyness and well-being by the end of their first year in ECEC was significant but weak. Possibly, as Bekkhus et al. (2021) suggested, early shyness is mainly a risk factor when there are other risk factors present. Shy children from families with a disadvantaged background might have multiple risk factors, such as language and cultural differences, which might result in a stronger association between their early shyness and well-being during their first year in ECEC. In Study 3, the children score high to very high on well-being in ECEC, which made it difficult to examine potential explanations for lower levels of well-being. Possibly, most children participated in groups with high process quality, which might reduce the risk for early shyness on children's well-being. Nevertheless, Study 3 still found that early shyness can challenge toddlers to thrive during their first year in ECEC. As in Study 2, it is not possible to make causal conclusions for Study 3. No claims can be made regarding that early shyness has an effect on well-being by the end of the first year in ECEC, and why early shyness causes lower levels of well-being. However, the results do show that there is a high possibility that these concepts are sharing developmental similarities. This is also supported by earlier studies that (novel) social

situations are often more challenging for shy children (e.g., Buss, 1991; Coplan & Arbeau, 2008).

10.4. Methodological Strengths and Challenges

All types of research need to assure high methodological quality, transparency, accuracy, and reliable findings (Cohen et al., 2011; Shadish et al., 2002; Silverman, 2014). This section presents an overview on the validity, reliability, and generalizability of my studies.

10.4.1. Validity

Validity refers to whether the research findings correspond with earlier theories and measures of the same concept, and that the study measures what it is supposed to measure (Cohen et al., 2011). As mentioned in the theoretical perspectives chapter, there is a lengthy debate regarding the definition of children's well-being and temperament, and different tools and indicators are used to measure these concepts. This can make it challenging to reach construct validity (i.e., whether the content of the measurements reflect the underlying phenomena, such as, well-being, temperament, and ECEC process quality). Therefore, I followed earlier studies' theoretical perspectives and findings to obtain an overview of which theories are present, what has been done earlier, and where are the gaps in research regarding the concepts in which I am interested. This helped me to design my research and decide on the measurements and analytical approaches I wanted to use. To promote construct validity, I chose measurements that were valid in earlier studies that examined children's well-being in ECEC, temperament, or ECEC process quality.

Even though I followed these procedures, I encountered some challenges when measuring the three main concepts of this thesis. All questionnaires that have been used along the three studies to measure children's well-being in ECEC, temperament, and ECEC process quality were relatively short. Most of these questionnaires, such as the LICW-D, EAS Temperament Survey for Children, and STRS-SF, are often developed for research. Measures for research should cover the distribution of the construct as best as possible. Short questionnaires for research can raise some questions regarding if the scales cover (more than) the variation that is expected in the content of interest. Inspection of the content validity is needed to examine the evidence of content relevance, representativeness, and the technical quality of items. In addition, the structural validity should be studied to investigate if the scores on the measures

can interpret more concepts than what they were supported to address (John & Benet-Martínez, 2000).

In all three studies, I used the LICW-D to measure children's well-being in ECEC. However, 12 items might be too few to grasp the full variation of such a complex construct as children's well-being in ECEC. Study 1 showed a marginally acceptable model fit because of the nonacceptable RMSEA. Finding an explanation for the high RMSEA with a one-factor model is challenging, and the explored two-factor model in Study 1 did not improve the RSMEA. Moreover, examining the number of factors, the indicators, and the error theory in the one-factor model did not provide a statistical explanation for a potential misspecification. Removing Items 2, 7, and 11 that had the lowest factor loadings and R^2 did not either. Therefore, a more theoretical and conceptual perspective is needed to reevaluate the items. I have already mentioned some concerns regarding age and cultural differences, but some items are also possibly disputable regarding if they measure toddlers' well-being in ECEC or another (intertwined) concept. For example, Items 3, 5, and 7 represent the child's behavior when he/she is delivered at the ECEC center. It might be questionable if these items during this separation situation actually represent the child's well-being during the day in the ECEC center. Some children might be distressed or inconsolable when they are delivered but are enjoying themselves the rest of the day in the center. Caution should be taken when children score low on these items because they might only represent the child's well-being at delivery but not during the day. Other items of the LICW-D might have some overlap with temperament, such as Items 6 and 10, which might represent children's shyness, or Item 11, which might represent sociability. However, well-being cannot be seen as something that only exists in an individual's mind, but is a combination of feeling good and having meaning, good relationships, and a sense of accomplishment (Seligman, 2012). Therefore, children's well-being in ECEC should be measured in relation to the professional caregivers, peers, and the center's physical environment. The items of the LICW-D focus on these aspects. Moreover, the LICW-D showed similar results when examined for boys and girls. The concurrent validity was satisfied. Only tiny to medium significant correlations were found with problem behavior. The strongest correlation was found between well-being and internalizing problem behavior. This is not surprising because internalizing problem behavior sometimes represents lower levels of well-being. Nevertheless, a distinction can be made between a low level of well-being and internalizing problem behavior.

Similar concerns regarding the shortness of the scales might exist for the EAS Temperament Survey for Children, which was (partly) used in Study 2 and 3. Each scale consists of five items, which might not be enough to examine the full variation of children's temperament. Buss and Plomin (1984) argued that shyness should not be seen as a temperament, but as a derivative of the emotionality and sociability. However, multiple studies showed that even though there was a significant overlap between, for example, shyness and sociability, a distinction could be made between the four temperament scales (e.g., Boer & Westenberg, 1994; Gasman et al., 2002; Mathiesen & Tambs, 1999). Shyness mainly applies to how the child behaves in social situations with strangers or casual acquaintances, and do not experience distress or tendency to escape when they are with people they know well (Buss, 1991; Buss & Plomin, 1984). Given that multiple studies found the EAS Temperament Survey for Children a valid four-factor model, I used this measurement in Study 2 and 3.

ECEC process quality is a complex construct as well. Earlier studies have shown that high process quality at the group level might not support all children (e.g., Chien et al., 2010; Downer et al., 2010, Williford et al., 2013). Therefore, I included group level and interpersonal level process quality features. The choice for which process quality features to include was based on earlier studies that found a relationship with children's well-being in ECEC (e.g., Bjørgen, 2015; Pinazza, 2012; Sandseter & Seland, 2017; Seland et al., 2015; Werner et al., 2015). Some of the measurements, such as CLASS Toddler and LECP, are validated in international studies, but not in Norway yet. The CLASS Toddler's original two-factor model has been confirmed in the United States (e.g., Bandel et al., 2014; Bichay-Awadalla & Bulotsky-Shearer, 2022), and the LECP is one of the few available validated instruments that measures chaos in ECEC groups (Wachs et al., 2004).

Because there are always concerns regarding the validity of measures, it is recommended to collect data with multiple measures and to include multiple informants. In all three studies, I used multimethod data and compared my results with earlier studies to see whether I could confirm their results, and what could be an explanation of why I found certain results from a theoretical, methodological, and practical perspective.

In Study 2 and 3, I used multiple informant data of both the professional caregiver who knew the child best and one of the parents. In the larger Thrive by 3 study, both the professional caregiver and the parents filled out the LICW-D and EAS questionnaires. I checked if

differences existed between these respondents' answers at the sample level. This was not the case for the LICW-D. Therefore, I decided to use the LICW-D data from the professional caregiver because this was also the data I validated in the first study. In addition, the LICW-D was originally developed for professional caregivers in ECEC, and this caregiver probably will know best if a child showed well-being in ECEC. Moreover, some items focus on certain social situations in ECEC, which might be harder for parents to rate. Therefore, the professional caregivers' answers might be more accurate at the child level. Regarding the EAS, there was a slight difference between professional caregivers' and parents' answers on some items at the sample level—mainly on the activity items. An explanation might be that these items are context specific. A professional caregiver will not see if the child is active and running about from the moment it wakes up in the morning, and the energy level is spread during the day, which might result in the child also liking to have time alone or prefers to sit quietly. In addition, a child might be more accustomed to other people than at home, which might make other people less exciting in the ECEC center. Therefore, using the EAS Temperament Survey for Children: Teacher Ratings would have been more appropriate (Buss & Plomin, 1984). Even though it was originally developed for the school context, it might be applicable to the ECEC context. Nevertheless, the responses between the two parents on the EAS at the sample level were similar. Considering the items on which professional caregivers and parents scored differently (mean score difference of 0.40 or more), I chose to use the answers of parents because they probably have the best overview on their child's temperament. Earlier research also recommended using the parental ratings, because parents can observe the child's temperamental behavior across time and in different situations (Bates et al., 1991; Smith & Hart, 2002).

10.4.2. Reliability

Reliability implies that results should be consistent across time, different researchers, and informants when the study is repeated under the similar conditions and analytical approach (Cohen et al., 2011), and to which degree the test scores are free from measurement errors (Salkind, 2012). To show transparency, I described the theoretical perspectives that formed the base for my studies, the analytical approach, and both theoretical and practical interpretations of the findings (Silverman, 2014). In addition, I described my decisions regarding how I selected my samples, measures, and analytical approaches. During my data

analyses, I made notes and saved all syntaxes and outputs. Together with my coauthors, I double-checked if I did the analyses correctly and discussed the results and interpretations.

In all three studies, the Cronbach's alpha of all measures was examined to investigate the reliability. All scales ranged from acceptable to good internal consistency, meaning that the set of items were well related to each other as part of a certain scale. Although, the sociability scale in Study 2 had a poor internal consistency. Similar to earlier studies (Boer & Westenberg, 1994; Gasman et al., 2002) a significant Pearson correlation was found between sociability and shyness, and sociability and activity in Study 2. This is not surprising because some of the sociability items might represent shyness, such as when a child scores high on prefers to be alone or scores low on likes being with other people. Whereas other sociability items might represent activity, such as when a child thinks other people are more exciting than anything else is (Boer & Westenberg, 1994). Boer and Westenberg (1994) recommended modifying the sociability scale.

Toddlers' well-being is a latent construct because it cannot be measured directly, and researchers depend on the observed indicators of what can represent toddlers' well-being in ECEC. In Study 1, a CFA was conducted and confirmed that well-being as a latent variable explains the association between the observed indicators, and measurement errors are excluded. However, in Study 2 and 3, the mean score of well-being was used, which means that the indicators caused well-being. The items were allowed to be correlated. Study 2 and 3 did not treat well-being as a latent variable because I wanted to examine associations between temperamental traits and well-being, and the moderation effects. The temperamental traits and process quality features were group mean and grand mean centered, meaning that I used mean scores to compare different constructs. Therefore, I focused on the mean score because I wanted to treat well-being in its current form.

In Study 2, I used the data from the CLASS Toddler observations. Certified and trained CLASS Toddler observers performed these observations, and the interrater reliability between observers was examined by observing 18 units/groups (10.3% of the total observations) with two observers. The interrater reliability was good (88.3%).

Even though it is not possible to claim that the used measures in Study 1, 2, and 3 are free from measurement error, the choice of the instruments is based on earlier studies that

validated and applied the instruments across time and with different informants. Moreover, the three studies in this thesis used multimethod and multi-informant data to increase reliability. In addition, we used the LICW-D pre and postintervention, and in different samples (1–3-year-olds and younger than 19 months old). The latter also applies to the shyness scale of the EAS. Similar Cronbach's alphas were found across time and informants.

10.4.3. Generalizability

Generalizability regards how the results of a study should be valid for a larger group than the studied sample. This means that the study's inferences should hold across variations in settings, persons, outcomes, and treatments, or in other words, is “transferable” to the aimed population. When certain results are found in multiple studies, it is easier to generalize results (Shadish et al., 2002). This thesis used data from the larger Thrive by 3 study, which recruited a large sample of ECEC centers, staff, parents, and children. The sample of ECEC centers was varied, including municipal and private centers, small and large centers, small and large units/groups, and were geographically spread throughout urban areas and in the countryside. Because the ECEC centers could indicate their interest to participate to the municipality, the sample consisted of highly motivated centers. This could have resulted in that these centers were more willing to apply the intervention and providing already high ECEC quality. Less variation in the quality makes it harder to find explanations for the presence or absence of certain associations and moderation effects.

In this thesis, I studied toddlers in Norwegian ECEC and referred to them as such in the text. However, I am aware that my sample does not represent all toddlers who attend a Norwegian ECEC center. I tried to select a representative sample; however, the samples of children used in the three studies consisted of mainly ethnic Norwegian children from mainly high-income families. Children from families with a minority background or lower income were underrepresented, as well as children with mental/physical disabilities. Less variation in the group of children also makes it more difficult to find explanations for the presence or absence of certain associations and moderation effects. Children with a disadvantaged background often respond differently to high process quality (Melhuish et al., 2015) and might have more challenges to thrive in ECEC compared to their Norwegian peers from high-income families.

Finally, attention should be paid to the risk of categorizing people. In my thesis, all studied concepts are categorized, for example, in low and high levels of well-being or process quality. Whereas temperament is categorized in low and high activity, sociability, emotionality, and shyness. None of the respondents received information on how the child scored on the different questionnaires. However, this categorization increases the risk of simplifying the population I wanted to study, and it suggests that certain levels of well-being, quality, or temperamental traits are “better” than others are. Nevertheless, to improve children’s well-being and ECEC practices, these concepts must be standardized to compare results. This is a challenge that has been going on for years regarding the debate on how to define and measure well-being as well as the lack of resources and inspections to study the quality in Norwegian ECEC centers. It is important to underline that I aimed to obtain further insight in the thesis’s studied concepts, meaning that nothing is perfect and that lower scores are common. Nevertheless, all used measurements were validated in earlier studies, which provides a solid and valid base for this thesis.

10.5. Limitations

In addition to the multiple theoretical and methodological insights that this thesis presents, there are some limitations that should be mentioned. One limitation applies to the sample, namely that children from families with a minority background or lower income, as well as children with disabilities were underrepresented. These children might experience more challenges because they often have other needs to experience high levels of well-being compared to children with a Norwegian language background, who are from high-income families and do not have disabilities. ECEC centers with low process quality were underrepresented as well, which makes it more difficult to examine their moderation effect on the association between toddlers’ temperament and well-being in ECEC. Although the samples in the three studies were relatively homogenous regarding language background and income, there were still associations found between children’s temperament and well-being in ECEC and moderation effects of process quality features.

Another limitation is the lack of background information about the professional caregivers who filled out the questionnaires for the individual children. The professional caregivers’ characteristics could have influenced how they saw the child and therefore could have affected their responses. In addition, we only used the professional caregivers’ responses to

study children's well-being in ECEC. This is a common limitation when studying very young children, and the children's views would have offered valuable information about their well-being in ECEC. When studying the youngest children in ECEC, researchers are more dependent on the professional caregivers' observations. To map children's behavior over a longer period and to minimize the risk of misinterpretations, the professional caregivers who knew the child best were asked to fill out the questionnaires about the children.

All three main concepts (toddlers' well-being in ECEC, toddlers' temperament, and ECEC process quality) that I studied in this thesis are complex and dependent on personal and environmental determinants. Interpreting the findings should be done carefully by considering age and cultural differences as well. Nevertheless, this thesis did find associations between toddlers' temperament and well-being in ECEC, as well as moderator effects of some ECEC process quality features. Note that it is not possible to make causal conclusions by claiming that temperament affects well-being and that process quality can have an effect. However, with the used study design, this thesis confirms these concepts intertwine.

The theoretical overlap can also be noticed when examining the validity and reliability of the measures used in the three studies. The poor internal consistency of the EAS sociability scale might be concerning. Running a CFA for the EAS could have provided further insight in the validity of the different scales, and if these scales could explain the associations between the observed indicators. However, using latent variables has also some limitations, which applies to the next limitation. The modified model for the LICW-D in Study 1 was not applied in Study 2 and 3. In Study 1, children's well-being in ECEC was treated as a latent variable, but as mentioned, the mean scores were of interest in the latter two studies. There is no measurement error when using a latent variable, but unsystematic error can still be present. When using mean scores, the indicators cause the construct, and the items are allowed to correlate. The indicators do not reflect change in the factor, but they form the factor (Loehlin & Beaujean, 2017). Because Study 2 and 3 did not focus on change in children's well-being in ECEC, the use of mean scores probably did not affect the findings.

During the third study, it turned out that one of the children had a wrongly reported age, and this child was removed from the data set in Study 3. Therefore, there was a difference regarding the reported minimum age along the three studies. However, this did not affect children's mean age and standard deviation.

The last limitation regards the descriptive variable on how many hours the child attends the ECEC per day. For this question, there were two answer categories that could be filled out when the child was attending the center for 6 hr per day. Parents could have answered that the child was attending the center for “6 hr” or “6–8 hr.” Therefore, these answer categories were computed, which resulted in few categories with large ranges. However, this probably did not affect the findings because most of the children were fulltime in ECEC.

10.6. Implications of Findings and Future Directions

In this thesis, I aimed to obtain further insight in toddlers’ well-being in Norwegian ECEC, and the role of child temperament and ECEC process quality. First, the LICW-D was found to have the potential to become a well-validated instrument to map children’s levels of well-being in ECEC. Second, toddlers’ shyness and emotionality were negatively associated with their well-being, whereas toddlers’ sociability was positively associated with their well-being in ECEC. A conflictual staff–child relationship can affect the association between toddlers’ shyness and well-being, and between activity and well-being. A high emotional behavioral support also moderated the association between activity and well-being. Third, a negative association was found between toddlers’ early shyness and their well-being by the end of the first year in ECEC. This thesis addresses the challenges that have been experienced for years regarding the theoretical discussions and complexity of measuring constructs as well-being, temperament, and process quality on the youngest children in ECEC, who have been underrepresented in research.

The findings of Study 1 can be used as the starting point for further research and validation of the LICW-D. Cultural differences might cause that some items do not represent the values and norms in all countries. To further develop the LICW-D and its applicability in Norwegian ECEC centers, a group of both Norwegian researchers and professional caregivers could be invited to discuss how they would define children’s well-being in Norwegian ECEC, how children express well-being, and what they would think about the current 12 questions of the LICW-D. Based on their feedback, the LICW-D could be adapted and tested. To test the applicability of the LICW-D in multiple countries, the questionnaire can be tested in its current state, but international studies might also consider inviting an expert group to discuss the instrument. In addition, children who can express themselves verbally should also be

asked about their well-being to investigate how they experience their well-being. However, another tool should be used to ask young children about their well-being in ECEC. In addition to cultural differences, the age differences should be studied. The validity of the LICW-D can be tested by conducting CFA in the same sample over time, but also in different age groups.

The findings of Study 2 can be used to further explore the goodness-of-fit theory. Because the goodness-of-fit theory was developed to describe how the interactions between children and their caregivers influenced each other's behavior, the professional caregivers' temperament and well-being could be studied as well. The professional caregivers' temperament or well-being could affect how they saw or interacted with the child. For example, the interactions between shy children and shy professional caregivers might differ from the interactions between shy children and less shy professional caregivers. Furthermore, professional caregivers who experience lower levels of well-being might also rate the child's well-being differently compared to colleagues who experience high levels of well-being. Therefore, the characteristics from the professional caregivers should be studied as well. This allows examining the goodness-of-fit theory on a more interpersonal level between the child and professional caregiver, considering not all children appear to profit from high quality at the group level. In addition, the children might be followed during their full ECEC period to see whether the results are replicated. Moreover, causality might be studied to see how the concepts affect each other and why. Finally, I recommend including children with disadvantaged backgrounds and ECEC centers with low process quality to examine if similar results can be found.

The findings of Study 3 can be used as the starting point for further examination of shy children from their start in ECEC and their well-being over multiple years. Shy children might be "slow to warm up," and they might need more than 1 year to acclimate to their peers and professional caregivers in order to experience higher levels of well-being. In addition, an instrument that has more questions on children's shyness, including questions that focus on certain daily situations in ECEC, could be used to explore further children's shyness in ECEC. An expert group with both professional caregivers and researchers can be invited to develop further questions that assess young children's shyness in ECEC, and that might represent situations that can be challenging for shy children. In addition, the professional caregivers' role could be further explored on how to provide the support that shy children might need as soon as they start in ECEC to promote children's well-being. In addition, the

professional caregivers' temperament might be examined to see how this might affect shy children.

In sum, this thesis showed that toddlers' well-being in Norwegian ECEC results from the interplay between a child's temperament and ECEC process quality. Children have different types of temperament that ask for different types of support to promote their well-being in ECEC. In addition, this thesis provided insight in which children are more at risk to experience lower levels of well-being, and what type of staff-child relationships might affect the association between children's temperament and well-being in ECEC. The findings of this thesis can be used to examine further toddlers' well-being in ECEC and the role of child temperament and ECEC process quality. The goodness of fit theory can be a useful theory in this examination, and it might provide professional caregivers more insight in how the child's temperament and the professional caregivers' role can be intertwined and can affect each other. Future research can focus on which type of support might be best for children with certain types of temperament, and to what extent professional caregivers can adapt their behavior in accordance with children's needs.

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Appendix 1: Leiden Inventory for the Child's Well-Being in Daycare

Every child experiences the stay in daycare differently. We would like to know how you think this child finds it at the nursery. Can you indicate in the following questions how often this situation occurs? In doing so, try to keep in mind the situation of the past four weeks. This may not always be possible. In that case, indicate your overall impression.

	Never (1)	Seldom (2)	Sometimes (3)	Often (4)	Always (5)
This child enjoys attending the daycare center (LICWD_1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child doesn't feel at ease with some of the children (LICWD_2R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child is happy to see the professional caregiver(s) when he/she is dropped off (LICWD_3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child trusts all the children at the daycare center (LICWD_4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child is sometimes reluctant to attend the daycare center (LICWD_5R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child tends to avoid contacts with other children (LICWD_6R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child has difficulty saying goodbye to the parent, he/she is distressed or inconsolable (LICWD_7R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child feels at ease with all the professional caregivers (LICWD_8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child doesn't feel comfortable outside the playground (LICWD_9R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

This child doesn't feel at ease in the group (LICWD_10R)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child actively seeks the company of other children (LICWD_11)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
This child really enjoys the games and play material at the daycare center (LICWD_12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note. R = reversed for analyses.

Appendix 2: Emotionality, Activity, Sociability

Temperament Survey for Children

To what extent do the following statements apply to your child's behavior during the last two months?

	Very typical (1)	Quite typical (2)	It varies (3)	Not very typical (4)	Not at all typical (5)
The child gets shy easily (EAS_1R_SHY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child easily cries (EAS_2R_EMO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child likes being with other people (EAS_3R_SOC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child is always on the go (EAS_4R_ACT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child would rather play with others than alone (EAS_5R_SOC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child easily reacts with strong feelings (EAS_6R_EMO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child usually moves at a steady pace (EAS_7_ACT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child easily makes friends (EAS_8_SHY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child is active and running about from the moment it wakes up in the morning (EAS_9R_ACT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child thinks other people are more exciting than anything else (EAS_10R_SOC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child often whines and cries (EAS_11R_EMO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The child is very sociable (EAS_12_SHY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child is full of energy (EAS_13R_ACT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child takes a long time to feel comfortable with strangers (EAS_14R_SHY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child easily gets flustered (EAS_15R_EMO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child prefers to be alone (EAS_16_SOC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child prefers to sit quietly and play rather than playing in a more active way (EAS_17_ACT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child doesn't like being alone (EAS_18R_SOC)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child shows strong reactions when it gets flustered (EAS_19R_EMO)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The child trusts strangers very easily (EAS_20_SHY)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note. R = reversed for analyses; SHY = shyness; EMO = emotionality; SOC = sociability; ACT = activity.

Part II: List of Studies

Study 1

Van Trijp, C. P. J., Lekhal, R., Drugli M. B., Rydland, V., & Solheim Buøen, E. (2021).

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Validation of the Leiden Inventory for the Child's Well-Being in Daycare (LICW-D) Questionnaire in Norwegian Early Childhood Education and Care Centers

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The promotion of children's development and well-being is a core concept in Early Childhood Education and Care (ECEC) quality frameworks. Yet, few validated instruments measuring young children's well-being exist. This study examined the validity of The Leiden Inventory for the Child's Well-being in Daycare (LICW-D) (De Schipper et al., 2004b) in a sample of toddlers ($n = 1,472$) attending ECEC centers in Norway, using confirmatory factor analysis. Factorial invariance across gender and concurrent validity were also investigated. Indicators of concurrent validity were problem behaviors and difficult temperament, as rated by professional caregivers. Results showed a marginally acceptable fit for the hypothesized one-factor model, when allowing the measurement error of four item pairs to be correlated. This slightly modified model showed satisfactory concurrent validity, and factorial invariance across gender was confirmed.

Keywords: well-being, toddlers, ECEC, professional caregivers, Norway, confirmatory factor analysis

INTRODUCTION

There is an increasing international focus on the promotion, measurement, and monitoring of people's well-being (Ben-Arieh, 2008; Huppert and So, 2013). This focus seems to be encouraged by the findings of multiple international studies showing positive consequences of a high level of social-emotional well-being ("well-being") on health, learning, productivity, social relationships, and life expectancy (Lyubomirsky et al., 2005; Huppert, 2009). For example, children with a strong sense of well-being engage more confidently and positively with their learning environment. This might help them to profit more fully from the education and care settings wherein they participate (Department for Education and Child Development, 2016). Moreover, it may support children's development and experience of quality of life (Mashford-Scott et al., 2012). A strong sense of well-being seems to be particularly important during the early years of life. Neurobiological studies

showed that there is a peak in the neuroplasticity of the brain during the first years of life (Blakemore and Frith, 2005). During this period, the child is more sensitive to the level of support from their environment, which determines how the foundations for well-being and learning develop in the brain (National Scientific Council on the Developing Child, 2007). Thus, children's well-being, development, and later life outcomes are largely dependent on children's experiences with their environment. Monitoring children's well-being as early as possible might prevent certain developmental challenges in children's current and later life. However, at present there is a lack of well-validated instruments that measure children's well-being during their first years of life.

In many European countries, besides the home environment, most children spend considerable time in Early Childhood Education and Care (ECEC) during their early years (Council of the European Union, 2019). In Norway, where the present study was conducted, 85.4% of 1- to 2-year-olds attended an ECEC center in 2020 (Statistics Norway, 2021). Moreover, Norway is known for its holistic approach to ECEC, which means that ECEC centers aim to promote children's well-being, learning, and development, for all ages and with similar ECEC quality, before the children enter compulsory schooling (Organization for Economic Co-operation and Development [OECD], 2015). This focus on the promotion of young children's well-being and development is also present in international ECEC quality frameworks and guidelines (Organization for Economic Co-operation and Development [OECD], 2012; Sylva et al., 2015; Council of the European Union, 2019). The considerable attention to children's well-being is promising, as it seems that well-being during the early years and children's experience in ECEC form a foundation for their current and later life outcomes. However, when it comes to research on children's well-being in ECEC, there are some limitations.

At present, there is a lack of well-validated instruments that measure children's well-being in ECEC. Zachrisson and Lekhal (2014) found that only a few studies have examined the impact of ECEC on children's well-being directly. De Schipper et al. (2003, 2004a,b) measured children's well-being directly by the degree to which a child feels at ease with his or her caregivers, and how comfortable the child is with other children in the group and in the physical setting of the center. Instead, most studies focus on the impact of ECEC on social-emotional development, behavior, and cognitive and academic achievements, which can be considered as proxies for children's well-being (Zachrisson and Lekhal, 2014). Other examples of proxies that have been used to study children's well-being are children's health and safety, material resources, education, quality of school life, personal relationships, risk behavior, and housing and environment (Bradshaw and Richardson, 2009; Organization for Economic Co-operation and Development [OECD], 2009). Zachrisson and Lekhal (2014) stressed the need for studies that measure the impact of ECEC on children's well-being. However, the use of proxies by multiple studies to measure well-being underlines the urgent need for an instrument that measures children's well-being in ECEC directly.

One of the few available instruments that measure young children's well-being in ECEC is the Leiden Inventory for the

Child's Well-being in Daycare (LICW-D) (De Schipper et al., 2004b). To our knowledge, this questionnaire has only been validated in samples in the Netherlands. There is therefore a need to validate this instrument in other samples and countries as well. For this reason, the present study investigated the psychometric properties of the LICW-D in a large sample of toddlers attending ECEC centers in Norway. A well-validated instrument will provide national and international research, policy, and practice with a tool for measuring children's well-being in ECEC.

The LICW-D is an elaboration of the Well-being Scale of Van IJzendoorn et al. (1998). The latter focused on the degree to which a child feels at ease in the professional child-care setting. De Schipper et al. (2004b) extended the inventory by focusing on well-being as the degree to which a child feels at ease with his or her caregivers, and how comfortable the child is with other children in the group and in the physical setting of the center. The first version of the LICW-D consisted of 28 items and was developed to identify four factors related to well-being: general well-being, and well-being with group members, in the presence of caregivers, and within the physical environment. Professional caregivers in daycare centers responded to the items on a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*) (De Schipper et al., 2004b).

De Schipper et al. (2004b) validated the LICW-D with 186 professional caregivers of 186 children, aged 6–30 months, enrolled in 113 different daycare centers in the Netherlands. The intended four-factor structure was not confirmed. In particular, items that were related to the child feeling at ease did not show a clear pattern. In their further analysis, De Schipper et al. (2004b) used a one principal component approach that included 12 items that correlated significantly with the main item "This child enjoys attending the day care center." A one factor solution fitted the data most adequately. The average component loading for this analysis was 0.55 (ranging from 0.33 to 0.69), and the internal consistency was good: Cronbach's alpha 0.81 ($n = 159$). Thus, the final model showed a one factor, 12-item questionnaire.

The few studies in the Netherlands that have used the LICW-D found correlations with different child characteristics. Children with a more difficult temperament (e.g., showing more irritable distress and more difficulty to adapt to novelty) had a lower feeling of well-being in ECEC (De Schipper et al., 2003, 2004a). A lower feeling of well-being also correlated with more internalizing (De Schipper et al., 2004b; Gevers Deynoot-Schaub and Riksen-Walraven, 2006) and externalizing behavior problems (Gevers Deynoot-Schaub and Riksen-Walraven, 2006). Children with an easier temperament showed more well-being and less internalizing and total behavior problems (De Schipper et al., 2004a). Gender differences were not found (De Schipper et al., 2003).

This study examined the factor structure of the 12-item LICW-D in a large sample of 1- to 3-year-olds in ECEC centers (center-based daycare) in Norway using confirmatory factor analysis (CFA). In addition, we investigated the concurrent validity of the instrument and whether there is factorial invariance across gender. The aim was to validate the LICW-D in a Norwegian toddler sample. As a result, this study might provide national and international research, policy, and practice

with a tool for measuring children's well-being in ECEC and for developing systematic knowledge.

We hypothesized that the one-factor model suggested by De Schipper et al. (2004b) would be supported and that there would be no differences between boys and girls (De Schipper et al., 2003). In line with earlier studies, we also hypothesized that children scoring high on well-being would be more likely characterized by a less difficult temperament (De Schipper et al., 2003, 2004a), and show fewer symptoms of internalizing, externalizing, and total behavior problems (De Schipper et al., 2004b; Gevers Deynoot-Schaub and Riksen-Walraven, 2006).

MATERIALS AND METHODS

Procedures

The present study is part of the larger Thrive by 3 cluster randomized controlled trial study (Tryggvør 3) (Lekhal et al., 2020). Thrive by 3 is a model of intervention and implementation of quality building and control in Norwegian ECEC centers to strengthen 1- to 3-year-olds' mental health, social and cognitive development, and well-being and to reduce their cortisol levels (stress). All data was collected through electronic questionnaires filled out by parents and professional caregivers, and through observations of the staff-child interactions in ECEC centers. Seven municipalities/city districts were invited and consented to participate in the study – four in Eastern Norway and three in Central Norway. The managers of the ECEC centers received an e-mail (or letter if needed) with an electronic link to the written informed consent form to decide on the ECEC center's participation and their own participation. In addition, the managers forwarded the e-mail with the written informed consent from the Thrive by 3 study to all professional caregivers, parents, and children at the center. A total of 187 units/groups in 78 ECEC centers agreed to participate. The staff-child ratio in each unit/group was at least one professional caregiver working with three children. Parents provided written consent for their child. The study was approved by the Regional Committees for Medical and Health Research Ethics South East Norway and by the Norwegian Centre for Research Data.

Participants

The present study used the T1 data (baseline data) from the electronic questionnaires that were filled out by the professional caregivers who had the closest relationship with the child. A total of 1,472 children (746 boys, 726 girls) aged 7 months to 37 months ($M = 21.4$ months, $SD = 6.1$) who were part of one of the 184 units/groups in 78 ECEC centers, were answered by a professional caregiver on the LICW-D.

Measures

Well-Being

The 12 items of the LICW-D (De Schipper et al., 2004b) were used to measure children's well-being. The LICW-D was translated from English to Norwegian and then translated back from Norwegian to English. In Norwegian, the distinction between the answer categories "regularly" and "often" was

not clear. Therefore, a 5-point Likert-scale was used in the present study: 1 (*never*), 2 (*seldom*), 3 (*sometimes*), 4 (*often*), 5 (*always*), instead of the 6-point Likert-scale that was proposed by De Schipper et al. (2004b).

Indicators of Concurrent Validity

Difficult temperament

Two scales, frustration and soothability, from The Early Childhood Behavior Questionnaire (ECBQ) short version (Putnam et al., 2010) were used to assess children's difficult temperament. These scales are part of the larger negative affect factor in the ECBQ short version. Frustration was assessed by six items that focused on negative affect related to interruption of ongoing tasks or goal blocking. Soothability was assessed by five items that focused on the rate of recovery from peak distress, excitement, or general arousal. Questions were answered on a 7-point Likert-scale ranging from 1 (*never*) to 7 (*always*) in addition to *does not apply*. The internal consistency ranged from acceptable to good with a Cronbach's alpha of 0.70 for the soothability scale, and 0.88 for the frustration scale.

Problem behavior

The Child Behavior Checklist Teacher Report Form for Ages 1.5–5 (CBCL-TRF/11/2-5) (Achenbach and Rescorla, 2000) was used to measure internalizing, externalizing, and total behavior problems of the children. Internalizing problems were assessed by a total of 36 items divided over the four subscales: emotionally reactive, anxious/depressed, somatic complaints, and withdrawn. Externalizing problems were assessed by a total of 24 items divided over the two subscales: attention problems and aggressive behavior. For the total problems (99 items), the scales sleep problems and other problems are assessed in addition to the internalizing and externalizing problems. The professional caregivers responded to the items on a scale from 0 (*not true*) to 2 (*very true or often true*). The internal consistency ranged from good to excellent with a Cronbach's alpha of 0.88 for the internalizing, 0.90 for the externalizing, and 0.95 for the total behavior problems scale.

Analysis

To examine the factorial validity and gender invariance of the LICW-D, we conducted a CFA, multigroup CFA, and CFA with a covariate (MIMIC; multiple indicators, multiple causes). Alternative models were explored by exploratory factor analysis (EFA). The concurrent validity of the LICW-D was investigated by means of bivariate correlations. All analyses were conducted with Mplus Version 8 (Muthén and Muthén, 2017).

Factor Structure

Initial data diagnostics showed that the observed responses on the LICW-D were discrete realizations of a limited number of categories on most items. Thus, the assumption of continuity was broken, and data was handled as categorical by using a weighted least square estimator (WLSMV) (Flora and Curran, 2004; Nussbeck et al., 2006). The one-factor model, and alternative models were evaluated by using four commonly reported indices: comparative fit index (CFI), Tucker-Lewis index (TLI), root mean

square error of approximation (RMSEA), and standardized root mean square residual (SRMR). Since the Chi-square is highly sensitive to sample size, trivial discrepancies can lead to the rejection of a highly satisfactory model (Brown, 2015). Therefore, this statistic should be interpreted with caution when examining the overall fit of the LICW-D. Good model fit was defined as CFI > 0.95, TLI > 0.95, RMSEA ≤ 0.05, and SRMR ≤ 0.05, and acceptable model fit was defined as CFI and TLI 0.90 – 0.95, RMSEA 0.06 – 0.10, and SRMR 0.06 – 0.08 (e.g., MacCallum et al., 1996; Hu and Bentler, 1999). To evaluate factor loadings of each item we used the R^2 estimates (≥ 0.25) and standardized factor loadings (≥ 0.40); a low R^2 indicates a high level of error for an item (Brown, 2015). Factor loadings of 0.32 were rated as poor, 0.45 as fair, 0.55 as good, 0.63 as very good, and 0.71 and above as excellent (Comrey and Lee, 1992). A low R^2 indicates a high level of error for an item (Brown, 2015). For the CFA of the one-factor solution we also examined the modification indices (MI) above 10 coupled with high-expected parameter change (EPC ≥ 0.40). A large modification index indicates that removing the equality constraint or freeing the parameter could result in a better model fit (Muthén and Muthén, 2017). To identify acceptable EFA solutions we used the following criteria: Each factor should have an eigen-value of 1 or above (Kline, 2016), each factor should be significantly loaded by a minimum of three variables, each variable should not load significantly on multiple factors, the internal consistency of each factor should be ≥ 0.70 , and all factors should be theoretically meaningful (Fabrigar and Wegener, 2012).

Factorial Invariance Across Gender

We studied the factorial invariance across gender by conducting a multigroup CFA. A Chi-square difference test was calculated with the WLSMV estimator, to examine the fit of nested CFA models (Muthén and Muthén, 2017). To further study gender invariance, gender was used as a covariate in an MIMIC analysis.

Concurrent Validity

Concurrent validity was examined by bivariate correlations between a child's well-being, difficult temperament, and behavior problems. Cutoff values for the interpretation of the correlations were tiny (<0.10), small (0.10 – 0.29), medium (0.30 – 0.49), and large (≥ 0.50) (Field, 2018).

RESULTS

Factor Structure

Examining the one-factor model originally proposed by De Schipper et al. (2004b), the CFA indicated a poor model fit on all fit indices, except the SRMR, which was acceptable ($\chi^2(54) = 1850.402$, $p < 0.00001$, CFI = 0.88, TLI = 0.86, RMSEA = 0.15, SRMR = 0.07). A closer look at the parameter estimates showed that the standardized factor loadings ranged from 0.59 to 0.79 and the R^2 from 0.35 to 0.62. Item 7 (“This child has difficulty saying goodbye to the parent, he/she is distressed or inconsolable”) had the lowest values on the parameter estimates, and item 10 (“This child does not feel at ease in the group”) had

the highest. Nevertheless, none of the items violated the cutoff values for standardized factor loadings and R^2 .

Test for Alternative Measurement Model

To discover the cause of the poor model fit, we conducted subsequent CFAs. However, the model fit might be affected by sample-specific variance when single-sample *post hoc* modifications are conducted. Therefore, we split our large sample in two random halves: Sample A ($n = 748$ children) and B ($n = 724$ children). We were thus able to explore modifications of the LICW-D model in one half (Sample A) followed by a cross-validation of the final model in the second half (Sample B) and the whole sample.

Although the initial LICW-D was developed to identify a four-factor structure (De Schipper et al., 2004b), there have been no reports of testing a multifactor solution of the 12-item LICW-D scale. We therefore based our test for alternative measurement models on the originally suggested one-factor solution first.

We started by testing the original model in half of the sample (Sample A). The model fit was poor to acceptable ($\chi^2(54) = 864.055$, $p < 0.00001$, CFI = 0.91, TLI = 0.89, RMSEA = 0.14, SRMR = 0.06), and similar to the one found in the whole sample. Standardized factor loadings ranged from 0.62 to 0.80 and the R^2 from 0.38 to 0.64. Again, item 7 had the lowest values on the parameter estimates, and item 10 and 4 (“This child trusts all the children at the daycare center”) had the highest. Inspection of the MI as a guide in search of model misspecification indicated that allowing the measurement error of item 7 (“This child has difficulty saying goodbye to the parent, he/she is distressed or inconsolable”) and item 5 (“This child is sometimes reluctant to attend the daycare center”) to be correlated was associated with the largest MI (185.40) and EPC (0.54). We also allowed correlations between the measurement error of item 11 (“This child actively seeks the company of other children”) and item 6 (“This child tends to avoid contacts with other children”) (MI = 104.04, EPC = 0.41); item 12 (“This child really enjoys the games and play material at the daycare center”) and item 11 (MI = 115.64, EPC = 0.48); and item 4 (“This child trusts all the children at the daycare center”) and item 2 (“This child does not feel at ease with some of the children”) (MI = 69.84, EPC = 0.40). Taken together, as **Table 1** shows, these four changes resulted in an acceptable fit for Sample A regarding the TLI and RMSEA, and good regarding the CFI and SRMR. **Table 1** also shows that this modified measurement model replicated relatively well in Sample B and the whole sample. In Sample B all fit indices were acceptable, except the RMSEA. In

TABLE 1 | Fit indices of modified model for the different samples.

Sample	χ^2 (df)	CFI	TLI	RMSEA	SRMR
Sample A ($n = 748$)	427.792 (50)*	0.96	0.94	0.10	0.05
Sample B ($n = 724$)	551.492 (50)*	0.93	0.90	0.12	0.06
Whole sample ($n = 1,472$)	916.701 (50)*	0.94	0.93	0.11	0.05

χ^2 = Chi-Square; df = degrees of freedom; CFI, comparative fit index; TLI, Tucker-Lewis Index; RMSEA, root-mean-squared error of approximation; SRMR, standardized root-mean-squared residual, * $p < 0.00001$.

the whole sample, the RMSEA was also non-acceptable, but the CFI and TLI were acceptable, and the SRMR was good. **Table 2** presents factor loadings and R^2 of the modified models for all three samples. Items 2, 7, and 11 showed the lowest values, but none of the items violated the cutoff values for low factor loadings (<0.40) and very low R^2 estimates (<0.25). The LICW-D showed good internal consistency with a Cronbach's alpha of 0.87.

To be sure that items 2, 7, and 11 did not cause the poorer model fit, we took out these items one by one to see if the model improved. We removed item 7 because this item had the lowest values on the parameter estimates compared to items 2 and 11. After removing item 7, the model fit ($\chi^2(44) = 1405.541$, $p < 0.00001$, CFI = 0.90, TLI = 0.88, RMSEA = 0.15, SRMR = 0.06) did not improve compared to the original 12-item one-factor model ($\chi^2(54) = 1850.402$, $p < 0.00001$, CFI = 0.88, TLI = 0.86, RMSEA = 0.15, SRMR = 0.07). The internal consistency slightly decreased with a Cronbach's alpha of 0.86. Next, we removed item 11 since this item had the second lowest values on the parameter estimates. Again, the model fit ($\chi^2(35) = 990.627$, $p < 0.00001$, CFI = 0.93, TLI = 0.90, RMSEA = 0.14, SRMR = 0.06) did not get better compared to the original model, and the internal

consistency decreased slightly with a Cronbach's alpha of 0.85. Finally, we removed item 2, which did not improve the model fit ($\chi^2(27) = 641.895$, $p < 0.00001$, CFI = 0.94, TLI = 0.93, RMSEA = 0.12, SRMR = 0.05), and the internal consistency became slightly lower with a Cronbach's alpha of 0.84. We therefore kept all 12 items for the next analyses.

Even though there are no reports of testing a multi-factor solution of the 12-item LICW-D scale, we conducted an EFA to further examine the factor structure of these 12 items, both in Sample A and in the whole sample. First, we conducted an EFA in Sample A. The results showed that only the one-factor solution met all criteria as outlined by Fabrigar and Wegener (2012) and Kline (2016) to identify an acceptable EFA solution. Although multiple factor solutions showed a better model fit, all of them had several items that loaded significantly on multiple factors. In addition, in all solutions with three or more factors, factor three and four had an eigen-value below 1 and/or consisted of only one or two items. Therefore, we continued to explore the two-factor model only. The two-factor model had five items that loaded significantly on both factors. Item 8 was loading almost equally on both factors. We retained these items on the factor with the highest loading. The two-factor model showed that items 2, 4, 6, 8, 9, 10, 11, 12 loaded on one factor and had a good internal consistency with a Cronbach's alpha of 0.84, which represented the items that are mainly focusing on how comfortable the child feels at the center and in interactions with peers and professional caregivers. Items 1, 3, 5, 7 focus on the child's well-being during arrival and attendance at the ECEC center and were loading on the other factor (see **Table 2** for a description of the items). These items showed good internal consistency with a Cronbach's alpha of 0.78. Nevertheless, the model fit of the two-factor model ($\chi^2(43) = 521.828$, $p < 0.00001$, CFI = 0.95, TLI = 0.92, RMSEA = 0.12, SRMR = 0.06) was not better than the model fit of the modified one-factor model ($\chi^2(50) = 916.701$, $p < 0.00001$, CFI = 0.94, TLI = 0.93, RMSEA = 0.11, SRMR = 0.05). Next, we conducted an EFA in whole sample as well, but we found similar results as in Sample A. The model fit of the two-factor model in the whole sample ($\chi^2(43) = 1043.025$, $p < 0.00001$, CFI = 0.94, TLI = 0.90, RMSEA = 0.13, SRMR = 0.06) was similar to the two-factor model in Sample A and the modified one-factor model.

To further examine the potential of a two-factor solution, we conducted a two-factor CFA in Sample B. However, the model fit was not better ($\chi^2(53) = 626.695$, $p < 0.00001$, CFI = 0.92, TLI = 0.90, RMSEA = 0.12, SRMR = 0.06) compared to the two-factor model in Sample A and the modified one-factor model. Considering that the two-factor model did not show a better model fit in any of the samples and had items that loaded significantly on both factors, we decided to continue our analyses with the 12-item modified one-factor model.

Factorial Invariance Across Gender

Based on previous research, we hypothesized that there would be no differences between boys and girls on the LICW-D. Therefore, the modified LICW-D model was used in a multigroup CFA to study the equivalence of factorial validity across gender. First, we tested the measurement invariance

TABLE 2 | Standardized factor loadings and R^2 of the modified measurement model for the different samples.

LICW-D item number and descriptions	Sample A (n = 748)	Sample B (n = 724)	Whole sample (n = 1,472)
1. This child enjoys attending the daycare center	0.79 (0.63)	0.77 (0.60)	0.78 (0.61)
2R. This child does not feel at ease with some of the children	0.60 (0.36)	0.57 (0.33)	0.59 (0.35)
3. This child is happy to see the professional caregiver(s) when he/she is dropped off	0.73 (0.54)	0.66 (0.44)	0.70 (0.49)
4. This child trusts all the children at the daycare center	0.78 (0.61)	0.72 (0.51)	0.76 (0.57)
5R. This child is sometimes reluctant to attend the daycare center	0.66 (0.43)	0.61 (0.38)	0.63 (0.40)
6R. This child tends to avoid contacts with other children	0.64 (0.41)	0.69 (0.48)	0.66 (0.44)
7R. This child has difficulty saying goodbye to the parent, he/she is distressed or inconsolable	0.56 (0.31)	0.50 (0.25)	0.53 (0.28)
8. This child feels at ease with all the professional caregivers	0.65 (0.43)	0.62 (0.39)	0.64 (0.41)
9R. This child does not feel comfortable outside the playground	0.73 (0.53)	0.69 (0.47)	0.71 (0.50)
10R. This child does not feel at ease in the group	0.82 (0.67)	0.81 (0.65)	0.81 (0.66)
11. This child actively seeks the company of other children	0.60 (0.36)	0.53 (0.28)	0.57 (0.32)
12. This child really enjoys the games and play material at the daycare center	0.66 (0.44)	0.69 (0.48)	0.67 (0.45)

R = reversed for analyses. All standardized factor loadings were significant at $p < 0.001$. R^2 is presented in parentheses.

to assess the psychometric equivalence across gender. The model fit indices of the invariance analyses are presented in **Table 3**. The configural invariance model showed a marginally acceptable fit, because of the high RMSEA. The metric and scalar invariance models both showed an acceptable fit. Since the scalar invariance model was significantly worse than the metric invariance model, we checked for partial scalar invariance by following the procedures mentioned by several studies (Schmitt et al., 2011; Jung and Yoon, 2016; Putnick and Bornstein, 2016). We applied the forward approach by adding item intercept constraints and retesting the model. Constraining individual item intercepts did not significantly worsening the model fit, but the fully constrained model was significantly worse compared to the unconstrained model. Then we applied the backward process by constraining all items and compared the intercepts of boys and girls to identify the items that differed the most between the groups, and sequentially releasing them. The model fit was significantly worse than the unconstrained model, leading us to conclude that there was no partial scalar invariance.

We applied the modified one-factor CFA model to boys ($n = 746$) and girls ($n = 726$) separately to see if the model was acceptable in both groups. **Table 4** shows a slightly better model fit for boys than girls, but not significantly. Both models were good on the SRMR and acceptable on all other fit indices, except the RMSEA for girls. In addition, the CFI for boys was good. Therefore, the model fit for boys was considered as acceptable and the model fit for girls as marginally acceptable. The LICW-D showed good internal consistency with a Cronbach's alpha of 0.86 for boys and 0.87 for girls. **Table 5** presents factor loadings and R^2 of the modified models for both boys and girls, which also shows factorial invariance across gender.

The next step was to conduct a simultaneous analysis of equal form, which means a least restricted solution. This resulted in an acceptable model fit ($\chi^2(131) = 985.500, p < 0.00001, CFI = 0.95, TLI = 0.95, RMSEA = 0.09, SRMR = 0.05$). The SRMR was good. All other fit indices were acceptable. We then restricted the factorial means by setting them to 0 for boys, which assumes non-equality. The equality constraint on the means of the factor well-being did not significantly alter the model fit, which means that boys and girls did not differ on well-being, ($\chi^2(11) = 10.012, p > 0.05, CFI = 0.96, TLI = 0.96, RMSEA = 0.08, SRMR = 0.05$).

To further establish the gender invariance, gender was used as a covariate in the MIMIC analysis. A non-significant effect of gender on well-being was found ($\beta = -0.03, p > 0.05$), which means that boys and girls had a similar factor mean on well-being. This result confirmed findings of previous research and

also our hypothesis that there is no difference between boys and girls on the LICW-D.

Concurrent Validity

As hypothesized, we found a significant but tiny negative correlation between well-being and frustration ($r = -0.09, p < 0.01$) and a significant small positive correlation between well-being and soothability ($r = 0.29, p < 0.001$). The soothability scale was positively oriented, which explains the positive correlation. In addition, we found a significant small negative correlation with externalizing problems ($r = -0.14, p < 0.001$), a significant medium negative correlation with internalizing problems ($r = -0.49, p < 0.001$), and with total behavior problems ($r = -0.34, p < 0.001$). These findings confirmed our hypotheses that children who score high on well-being score low on difficult temperament and the different types of behavior problems that were measured.

DISCUSSION

This study examined the validity of the LICW-D in a large Norwegian ECEC toddler sample using CFA. In addition, the factorial invariance across gender and concurrent validity were examined. The study found a marginally acceptable fit for the hypothesized one-factor model. Additionally, although the fit of the modified LICW-D was slightly better for boys than girls, factorial invariance across gender was confirmed. Lastly, the modified model showed a satisfactory concurrent validity. Children with a high score on well-being scored lower on difficult temperament and internalizing, externalizing, and total behavior problems. These findings might form the starting point for further research and development of the LICW-D.

Although the first hypothesis was confirmed, the measurement errors of four item pairs were allowed to correlate to reach a marginally acceptable model fit. The definition of the modified LICW-D model as "marginally acceptable" was mainly caused by the non-acceptable RMSEA. An explanation for the high RMSEA could be that RMSEA measures absolute fit and does not have any corrections based on how simple or complex a model is. A one-factor model provides limited possibilities to find out why the RMSEA is high. However, exploring the two-factor model did not improve the RMSEA. In addition, we studied the main potential sources of misspecifications, such as the number of factors, the indicators, and the error theory in the one-factor model (Brown, 2015). None of these additional analyses provided a statistical explanation for a potential misspecification. Our

TABLE 3 | Fit indices for the invariance analyses for the modified model for boys and girls.

	χ^2 (df)	CFI	TLI	RMSEA	90% CI	SRMR	$\Delta\chi^2$ (df)	p
Configural invariance	945.271 (100)*	0.95	0.93	0.11	–	0.05	–	–
Metric invariance	819.181 (111)*	0.96	0.95	0.09	0.087, 0.099	0.05	9.003 (11)	0.6216
Scalar invariance	783.989 (142)*	0.96	0.96	0.08	0.073, 0.084	0.05	69.901 (31)	0.0001

χ^2 , Chi-Square; df, degrees of freedom; CFI, comparative fit index; TLI, Tucker-Lewis Index; RMSEA, root-mean-squared error of approximation; CI, confidence interval; SRMR, standardized root-mean-squared residual, * $p < 0.00001$.

TABLE 4 | Fit indices for the modified model for boys and girls.

Sample	χ^2 (df)	CFI	TLI	RMSEA	SRMR
Boys (n = 746)	414.260 (50)*	0.96	0.94	0.10	0.05
Girls (n = 726)	532.828 (50)*	0.94	0.92	0.12	0.05

χ^2 , Chi-Square; df, degrees of freedom; CFI, comparative fit index; TLI, Tucker-Lewis Index; RMSEA, root-mean-squared error of approximation; SRMR, standardized root-mean-squared residual, * $p < 0.00001$.

TABLE 5 | Standardized factor loadings and R^2 of the modified measurement model for boys and girls.

LICW-D item number and descriptions	Boys (n = 746)	Girls (n = 726)
1. This child enjoys attending the daycare center	0.81 (0.65)	0.76 (0.58)
2R. This child does not feel at ease with some of the children	0.59 (0.35)	0.59 (0.35)
3. This child is happy to see the professional caregiver(s) when he/she is dropped off	0.70 (0.49)	0.70 (0.49)
4. This child trusts all the children at the daycare center	0.76 (0.57)	0.76 (0.57)
5R. This child is sometimes reluctant to attend the daycare center	0.62 (0.39)	0.66 (0.43)
6R. This child tends to avoid contacts with other children	0.64 (0.41)	0.68 (0.47)
7R. This child has difficulty saying goodbye to the parent, he/she is distressed or inconsolable	0.52 (0.27)	0.55 (0.30)
8. This child feels at ease with all the professional caregivers	0.67 (0.45)	0.61 (0.38)
9R. This child does not feel comfortable outside the playground	0.67 (0.45)	0.75 (0.56)
10R. This child does not feel at ease in the group	0.80 (0.63)	0.83 (0.69)
11. This child actively seeks the company of other children	0.52 (0.27)	0.61 (0.37)
12. This child really enjoys the games and play material at the daycare center	0.67 (0.45)	0.67 (0.45)

R , reversed for analyses. All standardized factor loadings were significant at $p < 0.001$. R^2 is presented in parentheses.

findings showed that items 2, 7, and 11 had the lowest factor loadings and R^2 . These items were also part of the four item pairs that were allowed to correlate. Moreover, item 11 was part of two item pairs. The item pairs were often measuring the “extremes” of the same concept. For example, if the child actively seeks the company of the other children (item 11) and if the child tends to avoid contacts with other children (item 6). The involvement of these three items in the highest measurement errors might influenced the model fit as well. However, after taking these items out one by one, the model fit did not improve. Moreover, the internal consistency was still good, but with a slightly lower Cronbach’s alpha of 0.84 compared to the original 12-item LICW-D with a Cronbach’s alpha of 0.87. Considering these findings and the fact that these items did not exceed the cutoff values, we had no reason to remove them. Nevertheless, there is room for improvement of the LICW-D. Therefore, we began to reevaluate the items from a more theoretical and conceptual perspective.

First, we argue that a one-factor structure with 12 items is too simple to grasp such a complex theme as children’s well-being. There is a lengthy debate regarding the definition of well-being (Dodge et al., 2012), and different concepts are

used interchangeably to describe well-being, such as quality of life and wellness (Cooke et al., 2016). Moreover, most well-being theories and measurements focus on adult well-being (Røysamb, 2014). Examination of children’s well-being asks for a different approach, however, as children are more dependent on a nurturing and supportive environment, which affects their well-being and later life outcomes (Moser et al., 2017). We therefore speculate that a more in-depth study is needed on the definition of children’s well-being to reevaluate the definition in Van IJzendoorn et al. (1998) and to examine whether more items are needed to study children’s well-being in ECEC.

Second, some of the current items might be subject to multiple interpretations. For example, item 2 focuses on whether the child does not feel at ease with some of the children. Previous research (Howes, 1987; Borge, 2014) showed that peer relations are important for children’s well-being and positive adjustment. However, even during the first years of life, children show a preference for one or two children within a larger peer group. They differentiate between available playmates and often maintain established relationships and routines with their friends (Howes, 1983, 1987). As a result, children may not interact with some of the children in the group. In addition, the established friendships are a protective factor, which means that even if a child does not feel at ease with some of the children in the group, he/she might still have a strong sense of well-being (Borge, 2014). Therefore, item 2 needs to be reevaluated.

Item 7, which focuses on whether the child has difficulty saying goodbye to the parent and is distressed or inconsolable, might not be a representation of the child’s actual level of well-being at the ECEC center. This separation situation is a complex interplay between children, parents, and professional caregivers, and children are more sensitive to what is happening when they feel vulnerable and insecure (Klein et al., 2010). It does not provide insights on children’s feelings toward a caregiver in a diversity of situations and during the day. For this reason, item 1, assessing whether the child enjoys attending the daycare setting, provides a better representation of a child’s actual well-being at the ECEC center.

Last, some of the items do not take individual and cultural differences into account. An example is item 11, assessing whether the child actively seeks the company of other children. In Norway, children’s choices and autonomy are highly valued and on the political agenda. Autonomy might promote learning motivation, self-regulation, self-control, development, and later life outcomes (Organization for Economic Co-operation and Development [OECD], 2015). Children’s well-being in ECEC in Norway is related to the opportunity to participate, to be active, and to be responsible, which also means that children have a large degree of freedom to choose their activities (Storli and Sandseter, 2019). This means that if children prefer to play alone, they are allowed to do that. Children not actively seeking the company of other children might still have a strong sense of well-being. Therefore, an item could be included assessing whether the child likes to play alone. Considering these potential limitations of items 2, 7, and 11, which had the lowest factor loadings and R^2 in this study, we recommend that future studies examine the applicability of these items and the potential need for additional items.

The LICW-D correlated in the hypothesized ways with the soothability and frustration scales of the ECBQ short version, and the internalizing, externalizing, and total behavior problems scales of the CBCL-TRF/11/2-5. However, some of the scales had different correlation sizes in this study compared to previous research (De Schipper et al., 2004a,b; Gevers Deynoot-Schaub and Riksen-Walraven, 2006). In this study, the correlation with the frustration scale was tiny compared to the small correlation that was found with difficult temperament in the studies by De Schipper et al. (2003, 2004a). An explanation for our smaller correlation could be that we used a different instrument to measure difficult temperament than De Schipper et al. (2003, 2004a), who used the Infant Characteristics Questionnaire (ICQ) (Bates et al., 1979). Even though both instruments were developed to measure difficult temperament, it could be that the scales have a slightly different focus. It seems that the frustration scale of the ECBQ short version focuses on negative affect related to interruption of ongoing tasks or goal blocking, whereas the ICQ focuses mainly on difficulty to adapt to novelty, in addition to irritable distress. Another explanation might be that in our study, professional caregivers rated children's difficult temperament, whereas in De Schipper et al. (2003, 2004a), mothers rated children's difficult temperament. However, the soothability scale showed a small and similar correlation compared to scale that was used by De Schipper et al. (2003, 2004a). Nevertheless, in addition to previous research, the present study showed tiny to small correlations between difficult temperament and children's low level of well-being, even though difficult temperament was measured using different scales and by different raters than in previous research.

Moreover, both previous research and this study confirmed that children's behavior problems are correlated with children's low level of well-being, even though there was a difference in the correlation size on the internalizing scale and small incongruence between some studies on the externalizing behavior problems scale. The higher correlation for internalizing behavior problems than for externalizing behavior problems suggests that internalizing problems are a better indication of low well-being. Moreover, these results show that a distinction can be made between children's low level of well-being and the different types of problem behaviors.

A strength of this study is the large sample that allowed for rigorous testing of the LICW-D within a CFA framework. However, there are some limitations worth mentioning. One limitation is that children's well-being is not measured directly, as we could not use children as respondents. This is a common limitation when studying young children. Knowing something about how the children view their well-being in addition to the correlations found would have offered valuable information about the concurrent validity of the LICW-D. Given the young age of the children, we were dependent on the ratings by professional caregivers, however. We recommend that future studies with older children in ECEC include children's perspectives as well.

Another limitation is that we did not have information on the professional caregivers that filled out the questionnaires for the children. Professional caregivers' characteristics may have possibly influenced the way they see the child and as a result

might have affected their responses. Therefore, future research should include professional caregivers' characteristics to study the potential effect of respondents' characteristics.

Even though there are some limitations, our findings show that the LICW-D has the potential to become a well-validated instrument to map the level of well-being for children in ECEC. However, as our findings demonstrate, some adaptations might be needed. Therefore, future research should study the LICW-D in other countries as well to examine cross-cultural validity. In addition, we recommend reexamination of the definition of children's well-being, followed by extension of the LICW-D to include extra items to study children's well-being in ECEC even more accurately. Moreover, the applicability of items 2, 7, and 11 needs to be reconsidered. Further development of the LICW-D might form the base for a well-validated tool that can be used by national and international researchers, policy makers, and practitioners to measure children's well-being in ECEC.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the data analyzed in this study is subject to the following licenses/restrictions: We are not allowed to share data outside the key personnel for the grant by the Norwegian Centre for Research Data (NSD). Requests to access the datasets should be directed to ES: elisabet.solheim@r-bup.no.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Regional Committees for Medical and Health Research Ethics South East Norway (REK 2017/430) and by the Norwegian Centre for Research Data (NSD 332636) and is registered at clinicaltrials.gov, identifier NCT03879733. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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Study 2

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The Association Between Toddlers' Temperament and Well-Being in Norwegian Early Childhood Education and Care, and the Moderating Effect of Center-Based Daycare Process Quality

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Children who experience well-being are engaging more confidently and positively with their caregiver(s) and peers, which helps them to profit more from available learning opportunities and support current and later life outcomes. The goodness-of-fit theory suggests that children's well-being might be a result of the interplay between their temperament and the environment. However, there is a lack of studies that examined the association between children's temperament and well-being in early childhood education and care (ECEC), and whether this association is affected by ECEC process quality. Using a multilevel random coefficient approach, this study examines the association between toddlers' ($N = 1,561$) temperament (shyness, emotionality, sociability, and activity) and well-being in Norwegian ECEC and investigates whether process quality moderates this association. Results reveal an association between temperament and well-being. Staff-child conflict moderates the association between shyness and well-being, and between activity and well-being. Moreover, high emotional behavioral support moderates the association between activity and well-being. Extra attention should be paid by the staff to these children's needs.

Keywords: temperament, well-being, process quality, ECEC, Norway, toddlers

INTRODUCTION

Children's social-emotional well-being ("well-being") promotes children's current and later developmental and learning outcomes (Mashford-Scott et al., 2012). Well-being is to a large extent determined by children's experiences in their environment. The neuroplasticity of the brain causes children to be highly sensitive to the level of support from their environment, especially during their first years of life (Blakemore and Frith, 2005; National Scientific Council on the Developing Child, 2007). As a result, a strong feeling of well-being supports children to engage more confidently

and positively with their environment, which helps them to profit more from available learning opportunities (Department for Education and Child Development, 2016; La Paro and Gloeckler, 2016). Children spend considerable time in early childhood education and care (ECEC) settings (Council of the European Union, 2019). In Norway, 85.4% of the children aged 1–2 years attended an ECEC center in 2020. Most of these children (96.3%) spend 41 h or more per week in the ECEC center (Statistics Norway, 2021). This high fulltime attendance rate underlines the importance of studying children's well-being and its predictors in ECEC. Well-being is a key concept in many (inter)national ECEC quality frameworks and guidelines (Mashford-Scott et al., 2012; Council of the European Union, 2019). ECEC plays a key role in children's lives by building a foundation for health, well-being, higher level competence development, and educational success (Council of the European Union, 2019). Previous studies have shown that high-process-quality ECEC (e.g., high-quality staff-child interactions) supports children's current and later well-being directly (e.g., Helmerhorst et al., 2014; Melhuish et al., 2015).

Other studies, building on theoretical frameworks, suggest that children's outcomes might be a result of the interplay between children's characteristics and their environment. For instance, Thomas and Chess (1977) argued that goodness-of-fit is the compatibility between a child's temperament and the environment, whereas pooriness-of-fit occurs when there is a discrepancy between a child's temperament and the environmental expectations and opportunities. Rothbart and Bates (1998) defined children's temperament as constitutional individual differences in self-regulation, attentional, emotional, and motor reactivity. Considering the goodness-of-fit theory and the importance of well-being for children's current and later life outcomes, more studies are needed to gain knowledge about how children's well-being is affected by both children's temperament and ECEC process quality. The present study therefore examines the association between children's temperament and well-being in Norwegian ECEC, and the possible moderating effect of ECEC process quality. The findings will provide insights on which children with certain temperamental styles might need extra attention if they are to experience a high level of well-being, and on how ECEC process quality can promote these higher levels of well-being.

Most studies that examined the interplay between children's temperament and the environment in developmental outcomes have focused on school-aged children (e.g., Holder and Klassen, 2010) or on outcomes such as social-emotional development (e.g., Hipson and Séguin, 2016). Holder and Klassen (2010) found that, depending on the measures, temperament accounted for 9–29% of the variance in happiness in children aged 9–12 years. Children who were less shy, anxious, and emotional, and more active and social were happier (Holder and Klassen, 2010). Both happiness and temperament are partially heritable and relatively stable but also follow a developmental process through experience, which might cause some changes in the level of temperament and happiness (Buss and Plomin, 1984;

Shiner, 1998; Røysamb et al., 2014; Nes and Røysamb, 2017). However, studies on the youngest children and the association between their temperament and well-being in ECEC are underrepresented. To our knowledge, only two studies by De Schipper et al. (2003, 2004) examined the role of children's temperament in relation to children's well-being in ECEC. Both studies used the Leiden Inventory for the Child's Well-Being in Day Care (LICW-D) to measure four aspects of well-being in day care: general well-being, well-being with professional caregivers, well-being in the physical setting of the ECEC center, and well-being with peers. The inventory was based on the Well-being Scale used in an earlier study by Van IJzendoorn et al. (1998). De Schipper et al. (2003) found that children (aged 6–30 months) with a more difficult temperament (e.g., more difficulty to adapt to novelty and showing more irritable distress) showed a lower level of well-being. In addition, based on the same sample, De Schipper et al. (2004) found that children with an easier temperament showed more well-being.

Studies that focused on the direct effect of ECEC process quality on young children's well-being found that staff-child interactions, relations with peers (Björge, 2015; Sandseter and Seland, 2017), and environmental chaos (Werner et al., 2015) had an effect on well-being. Groeneveld et al. (2010) found that caregiver sensitivity had a positive effect on children's well-being in home-based childcare but not in center care; this could be explained by the fact that children in center care have more than one caregiver, and the individual differences of caregivers were not taken into account. Nevertheless, De Schipper et al. (2004) found that children with a more easy-going temperament showed more well-being and also that greater availability of trusted professional caregivers affected the association between children's temperament and well-being in ECEC, as this helped children adapt more easily to the care setting. Thus, considering Thomas and Chess' (1977) goodness-of-fit-theory and the studies mentioned above, it might be that the potential association between children's temperament and well-being in ECEC is affected by ECEC process quality. However, as argued by Chess and Thomas (1984), to be able to reach goodness-of-fit, the caregivers should create an environment for the child that matches the child's temperament. Children might attempt to change the environment to suit their own temperament, which is a behavioral strategy and attempt to cope with a stressful conflict that they cannot master directly. Therefore, caregivers should be responsive to children's needs and modify the environment if needed (Chess and Thomas, 1984).

This study investigates the association between children's temperament and well-being in ECEC in a large sample of young children aged 1–3 years in ECEC centers (center-based daycare) in Norway. Using a multilevel random coefficient modeling approach, we examine the following research questions: (1) Is there an association between children's temperament and well-being in Norwegian ECEC?, and (2) Does ECEC process quality moderate the association between children's temperament and well-being in Norwegian ECEC? We expect to find that children who are less shy and emotional and more social and active experience more well-being. In addition, we expect that process quality—namely, staff-child relationship,

emotional and behavioral support, and chaos in the group—moderates the association between temperament and well-being.

MATERIALS AND METHODS

Recruitment and Participants

The data for the present study were derived from the first round of data collection (baseline data) from the larger Thrive by 3 study (Tryggvør 3) (Lekhal et al., 2020). Thrive by 3 is a cluster randomized controlled trial studying a multicomponent professional development intervention that was developed to enhance process quality in toddler classrooms in Norwegian ECEC centers. As a result of enhanced process quality, the goal is to strengthen the mental health, development, and well-being of children aged 1–3 years. Four municipalities/city districts in Eastern Norway and three in Central Norway were invited and consented to participate in the study. The managers of the ECEC centers, professional caregivers, parents, and children were invited by e-mail (or letter, if needed) with an electronic link to the written consent form. The managers of the ECEC decided on the ECEC center's participation and their own participation. A total of 78 ECEC centers and 187 units/groups agreed to participate. In addition, the managers forwarded, on behalf of the Thrive by 3 study, the written consent form to all professional caregivers, parents, and children at the center. Parents consented on behalf of their children; both parents needed to consent. A written consent was provided for 1,561 children (800 boys, 761 girls), aged 7 to 43 months ($M = 21.4$ months, $SD = 6.2$), who were part of 185 units/groups. The study was approved by the Regional Committees for Medical and Health Research Ethics South East Norway and by the Norwegian Centre for Research Data.

The first data collection round took place at the beginning of the childcare year (September 2018), and some of the children had just started in ECEC. The professional caregiver who knew the child best filled out an electronic questionnaire on the child's well-being and the staff-child relationship. One of the parents (1,114 mothers and 447 fathers) filled out the electronic questionnaire on child and family characteristics and the child's temperament. The process quality in the classroom was measured using both questionnaire data from the staff in the unit/group and observations by external observers who also work in ECEC.

Non-response

As we collected data from multiple respondents using differing questionnaires, we had missing at random (MAR) (Rubin, 1976). The missing patterns were tested with IBM SPSS Statistics Version 27.0 (IBM Corporation, 2020) and showed that 1,264 children (81% of 1,561 children) had complete data on all variables. The most common missing patterns were caused by missings on the temperament scales or child and family variables. This was often because the parent did not fill out the questionnaire for the child. **Table 1** shows the descriptives, including the number of missings for each variable. Data

was not imputed; instead, maximum likelihood with robust standard errors (MLR) was used as an estimation method to cope with missings.

Measures

Temperament

Emotionality, Activity, Sociability (EAS) temperament survey for children

Children's temperament was studied using the EAS Temperament Survey for Children (EAS; Buss and Plomin, 1984) filled out by the parent. The questionnaire consisted of four subscales: shyness (e.g., child becomes shy easily; trusts strangers very easily), emotionality (e.g., child cries easily; gets flustered easily), sociability (e.g., child likes being with other people; does not like being alone), and activity (e.g., child is always on the go; is full of energy). Each subscale was assessed by 5 items answered on a 5-point Likert scale ranging from 1 (*very typical*) to 5 (*not at all typical*). A high score on shyness, emotionality, sociability, and activity meant that the child was more shy, emotional, social, and active. For the subsequent analyses, the individual mean scores on each scale of the EAS were group mean centered (score of the child compared to the other children in their unit/group) for the within level and aggregated (mean score for the whole unit/group) for the between level. The latter was used to control for the between level.

Well-Being in Early Childhood Education and Care

Leiden inventory for the child's well-being in daycare

The LICW-D (De Schipper et al., 2004) filled out by the professional caregiver who knew the child best was used to assess children's well-being in ECEC. The 12 items were answered on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*), and the questionnaire had been validated in an earlier Norwegian study (Van Trijp et al., 2021). The LICW-D items assess children's general well-being (e.g., child enjoys attending the daycare center), and how comfortable the child is with the professional caregiver(s) (e.g., child is happy to see the professional caregiver(s) when he/she is dropped off), peers (e.g., child trusts all the children at the daycare center), and the physical setting of the center (e.g., child really enjoys the games and play material at the daycare center). A higher score meant a higher level of well-being. For subsequent analyses, the individual mean scores were used for each child on the whole scale of the LICW-D.

Early Childhood Education and Care Process Quality

Student teacher relationship scale – short form

The Student Teacher Relationship Scale – Short Form (STRS-SF; Pianta, 2001), a teacher report instrument, was filled out by the professional caregiver who knew the child best and assessed the relationship. The questionnaire consisted of two subscales: closeness (8 items, e.g., I share an affectionate, warm relationship with this child; when I praise this child, he/she beams with pride), and conflict (7 items, e.g., this child and I always seem to be struggling with each other; the child easily becomes angry at me). Items were answered on a 5-point Likert scale ranging from 1 (*definitely does not apply*) to 5 (*definitely applies*). A high score on closeness meant that the professional caregiver had a

TABLE 1 | Descriptives: child and family characteristics, temperament, ECEC process quality, and child well-being variables.

	%/M	SD	n	n missing	Cronbach's alpha
Level 1					
Gender			1,561	0	
Boys	51.2%		800		
Girls	48.8%		761		
Age in months	21.4	6.2	1,558	3	
Language			1,365	196	
Norwegian	91.4%		1,247		
Minority language	8.6%		118		
Hours per day in ECEC ¹	2.12	0.41	1,354	207	
Family gross income ²	5.00	1.22	1,358	203	
Staff-child relationship, closeness scale	4.35	0.50	1,471	90	0.71
Staff-child relationship, conflict scale	1.50	0.54	1,471	90	0.74
Well-being	4.45	0.45	1,472	89	0.82
Shyness	2.45	0.64	1,321	240	0.74
Emotionality	2.73	0.67	1,321	240	0.79
Sociability	3.64	0.53	1,321	240	0.58
Activity	3.93	0.57	1,322	239	0.71
Level 2					
Emotional and behavioral support	5.84	0.71	185	0	0.88
Environmental chaos in the group	2.07	0.38	185	0	0.87

Internal consistency based on Cronbach's alpha (α): $\alpha < 0.50$ unacceptable; $0.50 \leq \alpha < 0.60$ poor; $0.60 \leq \alpha < 0.70$ acceptable; $0.70 \leq \alpha < 0.90$ good; $\alpha \geq 0.90$ excellent.

¹ Answer categories 1 = less than 6 h, 2 = 6–8 h, and 3 = more than 8 h.

² Answer categories 1 = under 200,000, 2 = 200,000–399,000, 3 = 400,000–599,000, 4 = 600,000–799,000, 5 = 800,000–999,000, and 6 = over 1,000,000 Norwegian kroner.

close relationship with the child; a high score on conflict meant that there was a conflictual relationship between the professional caregiver and child. For subsequent analyses, the individual mean scores for both the closeness and conflict scale were group mean centered for the within level and aggregated for the between level.

Classroom assessment scoring system

The quality of the staff-child interactions in the groups was assessed by an observation instrument, the Classroom Assessment Scoring System (CLASS), Toddler version (La Paro et al., 2012). The observations were made by 24 trained and certified CLASS Toddler observers. Each observation consisted of three rounds of 15 min, starting at 8:30 a.m. All three rounds were scored separately by the same observer. CLASS Toddler consists of two domains: (1) emotional and behavioral support, and (2) engaged support for learning. For the present study, we focused only on the emotional and behavioral support domain, as earlier studies showed that well-being is affected by relations with others and the atmosphere in the group rather than by learning dimensions (Groeneveld et al., 2010; Bjørgen, 2015; Werner et al., 2015; Sandseter and Seland, 2017). This domain consisted of five dimensions: positive climate, negative climate (reversed), teacher sensitivity, regard for child perspectives, and behavior guidance. All dimensions were rated on a 7-point scale ranging from low to high. A high score meant a higher level of emotional and behavioral support in the group, and thus better staff-child interactions on the group level. Eighteen units/groups (10.3% of the total observations) were observed by two observers.

The interrater reliability for observations with two observers was 88.3% for the emotional and behavioral support domain. The mean scores of the five dimensions were computed to a total mean score for the emotional and behavioral support domain. The total mean score was grand mean centered (score of the child compared to the whole sample) for the moderation analyses.

Life in early childhood programs

The Life in Early Childhood Programs (LECP; Kontos and Wachs, 2000), filled out by the professional caregivers in the child's unit/group, was used to examine the environmental chaos in the group. The level of chaos in the group was calculated by the mean score of all professional caregivers answered that for a certain group. The 16 items were answered on a 5-point Likert scale ranging from 1 (*not true*) to 5 (*very often true*) and asked for professional caregivers' views on the degree of organization and control in the group (e.g., degree of consistency or routines; whether things are placed in the same place), use of space, group density, and environmental traffic (whether many people come and go). A higher score meant a higher level of chaos in the group. We computed the mean scores of the 16 items to a mean score for LECP. This mean score was grand mean centered for the moderation analyses.

Child Characteristics

For the first research question, we controlled for the following child characteristics that were filled out by the parent: Child's gender (0 = boys, 1 = girls), child's age in months, whether the child has a Norwegian or other linguistic background (answer

categories 1 = Norwegian, 2 = minority language from a Western country in Europe or North America, 3 = minority language from a non-Western country), and the number of hours in the ECEC center per day (answer categories 1 = less than 6 h, 2 = 6 h, 3 = 6–8 h, and 4 = more than 8 h). For subsequent analyses, the answer categories of linguistic background (0 = Norwegian, 1 = minority language) and the number of hours in the ECEC center (1 = less than 6, 2 = 6–8 h, 3 = more than 8 h) were computed. In addition to the child's language, the child's gender was treated as a dummy variable. The child's age in months and number of hours in the ECEC center per day were grand mean centered, because we wanted to compare the child's score to the whole sample.

Note that we also collected data on if the child has any kind of disability (0 = no, 1 = yes), which was filled out by the parent. However, out of the 1,365 parent answers, only 1.5% of the children were answered with 'yes'. We conducted initial analyses to examine if we should include the child's disability as a control variable for research question one, but the results showed that there was no effect of this variable. Due to these findings and the low prevalence of children with a disability, we decided not to include the 'child's disability' as a control variable.

Family Characteristics

In addition to the child's characteristics, we controlled for one family characteristic that was filled out by the parent, namely: What the family's total gross year income is (answer categories 1 = under 200,000, 2 = 200,000–399,000, 3 = 400,000–599,000, 4 = 600,000–799,000, 5 = 800,000–999,000, and 6 = over 1,000,000 Norwegian kroner). This variable was grand mean centered for subsequent analyses.

Analyses

The research questions were tested using multilevel random coefficient modeling with the MLR estimator in Mplus Version 8 (Muthén and Muthén, 2017). For our first research question, we were interested in the within level effect of children's temperament on well-being. Both the outcome variable children's well-being and the predictors shyness, emotionality, sociability, and activity were level 1 variables (child level). To test the strength of this association, we wanted to add control variables. Following recent recommendations on inclusion of meaningful control variables (Bernerth and Aguinis, 2016; Sturman et al., 2021), we examined the correlations between child and family characteristics, the different temperament scales and well-being to identify demographic variables that showed significant correlations with either the predictors and/or outcome variable (see Table 2). Those variables were included in a subsequent model as control variables. This resulted in two models: Model 1 was uncontrolled, and model 2 was controlled for all child and family characteristics that are presented in Table 2. In addition, following recommendations by Preacher et al. (2016) we separated within- and between-level effects by person-mean centering all variables at the child level and including group means at the between level.

Moreover, the model fit was tested to see if the model improved after controlling for more variables. Good model fit was defined as CFI > 0.95, TLI > 0.95, RMSEA ≤ 0.05,

TABLE 2 | Correlations between child and family characteristics, temperament, ECEC process quality, and child well-being variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Level 1														
1 Gender	–													
2 Age in months	0.01	–												
3 Language	–0.03	< –0.02	–											
4 Hours per day in ECEC	0.01	0.11***	–0.04	–										
5 Family's gross income	–0.02	–0.05	–0.24***	0.13***	–									
6 Staff-child relationship, closeness scale	0.04	–0.22***	–0.10***	0.08**	0.08**	–								
7 Staff-child relationship, conflict scale	–0.02	0.14***	0.02	0.03	–0.02	–0.21***	–							
8 Well-being	–0.02	0.11***	–0.07*	0.12***	0.07**	0.43***	–0.24***	–						
9 Shyness	0.03	0.08**	0.08**	–0.02	–0.05	–0.07*	–0.03	–0.20***	–					
10 Emotionality	0.05	0.03	< –0.01	0.04	–0.06*	0.01	0.04	–0.09***	0.29***	–				
11 Sociability	0.09**	–0.15***	–0.05	–0.03	0.07*	< –0.01	0.01	0.10***	–0.43***	–0.03	–			
12 Activity	–0.07**	–0.08**	–0.05*	0.05	< –0.01	–0.04	0.05	0.05	–0.27***	0.02	0.30***	–		
Level 2														
13 Emotional and behavioral support	0.05	–0.01	–0.04	0.01	–0.02	0.01	–0.03	–0.03	0.04	0.01	–0.05	–0.02	–	
14 Environmental chaos in the group	–0.02	0.08**	–0.04	< 0.03	–0.06*	–0.06*	0.14***	–0.15***	0.03	–0.01	–0.04	–0.01	–0.17***	–

*p < 0.05, **p < 0.01, ***p < 0.001 (two-tailed). Correlations at the within level are presented below the diagonal, and correlations at the between level above the diagonal.

and $SRMR \leq 0.05$, and acceptable model fit was defined as CFI and TLI.90 -0.95 , RMSEA.06 -0.10 , and SRMR.06 -0.08 (e.g., MacCallum et al., 1996; Hu and Bentler, 1999). The Akaike information criterion (AIC) and Bayesian information criterion (BIC) were also examined regarding the model fit. If a new model had lower values for AIC and BIC compared to another model, then the model fit was better (Finch and Bolin, 2017). The predictors were analyzed with their group mean centered values, whereas the control variables were either treated as a dummy variable (child's gender and linguistic background), or grand mean centered (age in months, hours in ECEC, family's total gross year income). To control for the between level, the predictors were aggregated.

For the second research question, we included both level 1 (child level) and level 2 (unit/group level) ECEC process quality to study their potential moderating effect on the relation between children's temperament and well-being. All ECEC process quality measures were analyzed separately in a model with one moderator. The predictors were group mean centered, the potential level 1 moderators were group mean centered, and level 2 moderators were grand mean centered. To control for the between group effect, the predictors and level 1 moderators were aggregated. Finally, for the significant interactions, simple slope analyses were conducted to describe the associations between the different scales of temperament and well-being by using $\pm 1 SD$ of both the predictor and moderator.

RESULTS

Preliminary Analyses

Before turning to our research questions, we examined the within- and between group variance components for children's well-being. The results showed an intraclass correlation coefficient (ICC) of 0.074. This means that 7.4% of the variance in children was due to variance between groups. As this exceeded the suggested 5% threshold (Raudenbush and Liu, 2000; Hox et al., 2018), multilevel analyses were used. The difference between groups is also shown in the significant effects of the intercepts in **Tables 3, 4**.

Table 2 shows the correlations between all variables on both the within and between level. All potential level 1 demographic control variables correlated significantly with a predictor and/or outcome variable at least once. Therefore, all control variables were used in analyzing the relationship between children's temperament and well-being in ECEC.

Temperament and Well-Being

Table 3 shows the results for our first research question concerning the association between children's temperament and well-being in ECEC. A significant negative relationship was found between children's shyness and well-being and between emotionality and well-being. Children who were more shy or emotional showed a lower level of well-being in ECEC. There was a significant positive relationship between children's sociability and well-being. Children who were more social

showed a higher level of well-being in ECEC. There was no significant relationship between children's activity and well-being.

As a final step, an inspection of the model fit revealed a good model fit for all models (CFI = 1.00, TLI = 1.00, RMSEA = 0, SRMR = 0). **Table 3** shows the model fit regarding the AIC and BIC, which became better when the model included a predictor and was controlled for multiple variables.

The Role of Early Childhood Education and Care Process Quality

For the second research question, we examined the moderation effects of different level 1 and 2 ECEC process quality on the association between children's temperament and well-being in ECEC. We found three significant moderation effects, which **Table 4** shows.

Conflict in the relationship between the professional caregiver and child had a significant negative moderating effect on the association between children's shyness and well-being (estimate -0.17 , $p = 0.001$). Simple slope analyses revealed a significant negative effect, whereby children who were shy showed less well-being when they experienced a low (estimate = -0.06 , $p = 0.026$) or high (estimate = -0.24 , $p = \leq 0.001$) conflictual relationship with the professional caregiver. **Figure 1** provides an illustration. Subsequent analyses showed that the difference between low and high conflict was significant for both children scoring low on shyness (estimate = -0.12 , $p = 0.001$) and children scoring high on shyness (estimate = -0.34 , $p = \leq 0.001$), whereby the difference was larger for highly shy children.

Conflict also had a significant positive moderating effect on the association between children's activity and well-being (estimate = 0.12 , $p = 0.037$). Simple slope analyses revealed a significant positive effect of activity and well-being for high conflict (estimate = 0.11 , $p = 0.006$). This means that there was an association between children's activity and well-being only when the level of conflict in their relationship with the professional caregiver was high, whereby more active children showed more well-being. **Figure 2** presents an illustration. Subsequent analyses showed that the difference between low and high conflict was significant for both low active (estimate = -0.28 , $p = \leq 0.001$) and highly active children (estimate = -0.15 , $p = \leq 0.001$), whereby the difference was larger for low active children.

Emotional and behavioral support had a significant positive moderating effect on the association between children's activity and well-being (estimate = 0.10 , $p = 0.001$). Simple slope analyses revealed a significant positive effect for high emotional and behavioral support (estimate = 0.11 , $p = 0.001$). This means that there was an association between children's activity and well-being only when the level of emotional and behavioral support in the group was high, whereby more active children showed a higher level of well-being. **Figure 3** presents an illustration. Subsequent analyses showed that the difference between low and high emotional

TABLE 3 | Multilevel random coefficient modeling results and fit indices for children's temperament on well-being in ECEC.

	Well-being					
	Model 1 (n = 1,269) ¹			Model 2 (n = 1,267) ¹		
	Estimate (SE)	AIC	BIC	Estimate (SE)	AIC	BIC
Shyness	-0.14*** (0.02)	1,523.76	1,549.48	-0.14*** (0.02)	1,493.60	1,545.04
Intercept	4.83*** (0.15)			4.86*** (0.15)		
Emotionality	-0.07*** (0.02)	1,565.39	1,591.12	-0.07*** (0.02)	1,535.08	1,586.53
Intercept	4.55*** (0.18)			4.60*** (0.18)		
Sociability	0.08** (0.03)	1,562.93	1,588.66	0.09*** (0.03)	1,528.59	1,580.04
Intercept	3.90*** (0.25)			3.84*** (0.25)		
Activity	0.04 (0.02)	1,574.20	1,599.93	0.04 (0.03)	1,546.01	1,597.46
Intercept	4.32*** (0.28)			4.33*** (0.29)		

¹Children were part of 184 units/groups, and the samples of activity consisted of one more child due to less missings on the activity scale.

SE, standard error; AIC, Akaike information criterion; BIC, Bayesian information criterion.

p < 0.01, *p < 0.001 (two-tailed).

Model 1 was uncontrolled. Model 2 was controlled for children's and family characteristics. The intercept for model 0 (intercept-only) was 4.45 (0.02)*** for well-being (n = 1,472 children out of 184 units/groups), and AIC = 1,818.66; BIC = 1,834.54. In addition, all models were controlled for the between level.

TABLE 4 | Moderator models and fit indices: children's temperament and ECEC process quality on well-being in ECEC.

Effect	Well-being						
	Estimate	SE	95% CI		p	AIC	BIC
			LL	UL			
Shyness (n = 1,267) ¹	-0.153	0.022	-0.197	-0.110	<0.001		
Conflict	-0.228	0.032	-0.290	-0.166	<0.001		
Shyness × Conflict	-0.167	0.050	-0.264	-0.069	0.001	1,427.49	1,468.65
Intercept	5.111	0.179	4.760	5.463	<0.001		
Activity (n = 1,268) ¹	0.048	0.23	0.002	0.094	0.041		
Conflict	-0.213	0.032	-0.275	-0.151	<0.001		
Activity × Conflict	0.116	0.056	0.007	0.225	0.037	1,493.38	1,534.55
Intercept	4.561	0.270	4.032	5.091	<0.001		
Activity (n = 1,270) ¹	0.039	0.024	-0.007	0.086	0.097		
Emotional behavioral support (EBS)	-0.018	0.021	-0.060	0.024	0.392		
Activity × EBS	0.103	0.032	0.041	0.166	0.001	1,567.25	1,603.28
Intercept	4.323	0.278	3.778	4.868	<0.001		

¹Children were part of 184 units/groups.

SE, standard error; LL, lower limit; UL, upper limit; CI, confidence interval; AIC, Akaike information criterion; BIC, Bayesian information criterion.

and behavioral support was larger for low active children (estimate = -0.08, p = 0.006), whereas for highly active children the difference was not significant (estimate = 0.04, p = 0.149).

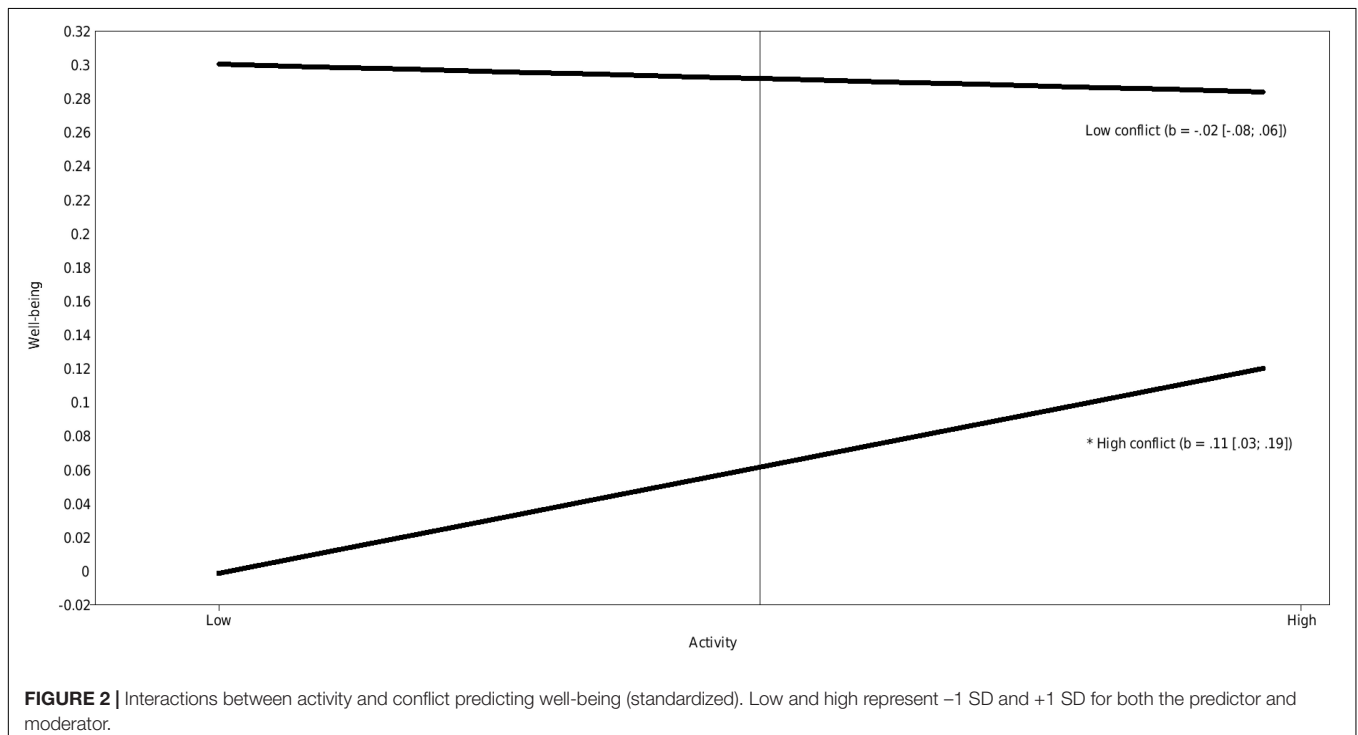
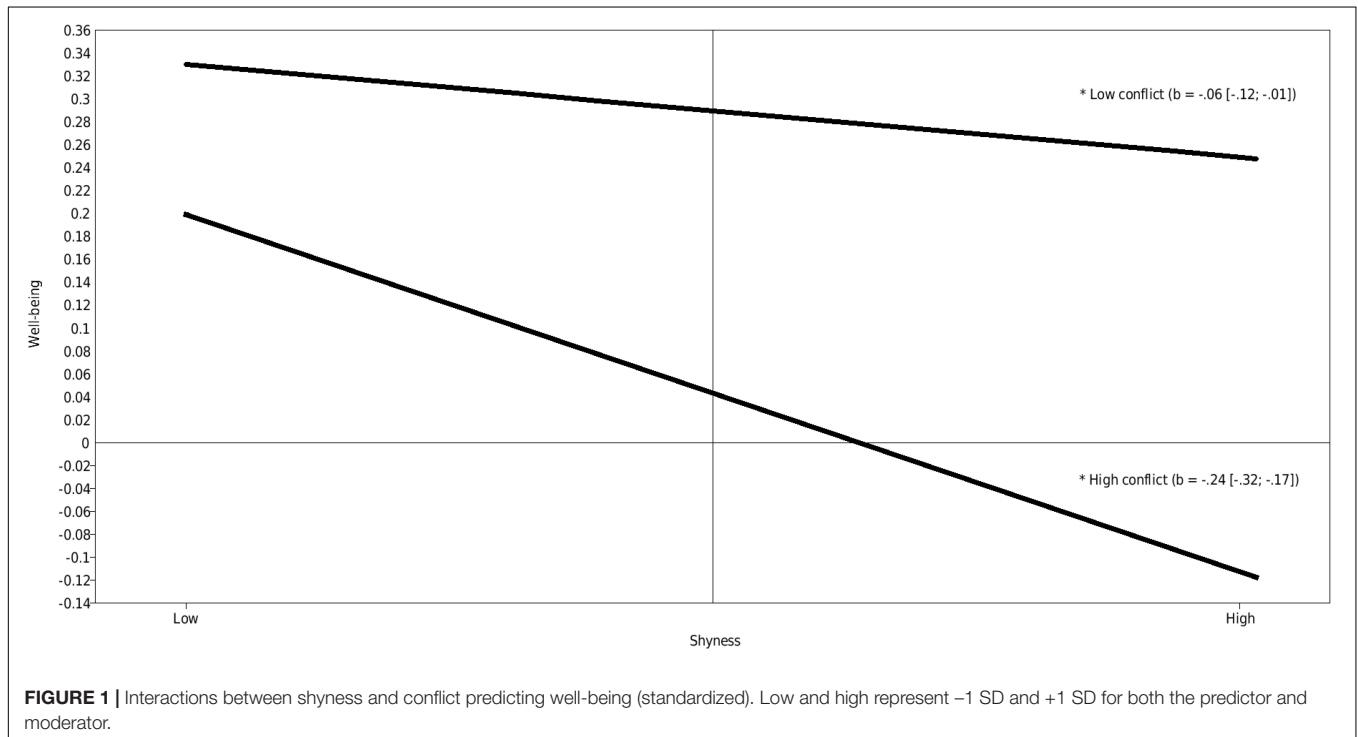
Finally, the model fit was checked and showed a good model fit for all significant models (CFI = 1.00, TLI = 1.00, RMSEA = 0, SRMR = 0). **Table 4** shows the model fit regarding the AIC and BIC, which became better when the moderator variables were included compared to the model fit of model 1, except that the BIC for moderating effect of emotional and behavioral support on the association between activity and well-being became slightly higher.

Alternative models testing moderations of the different temperament scales with staff-child relationship closeness and conflict scale, emotional and behavioral support, and

environmental chaos in the group that are not mentioned in **Table 4** did not yield significant results (all p > 0.05).

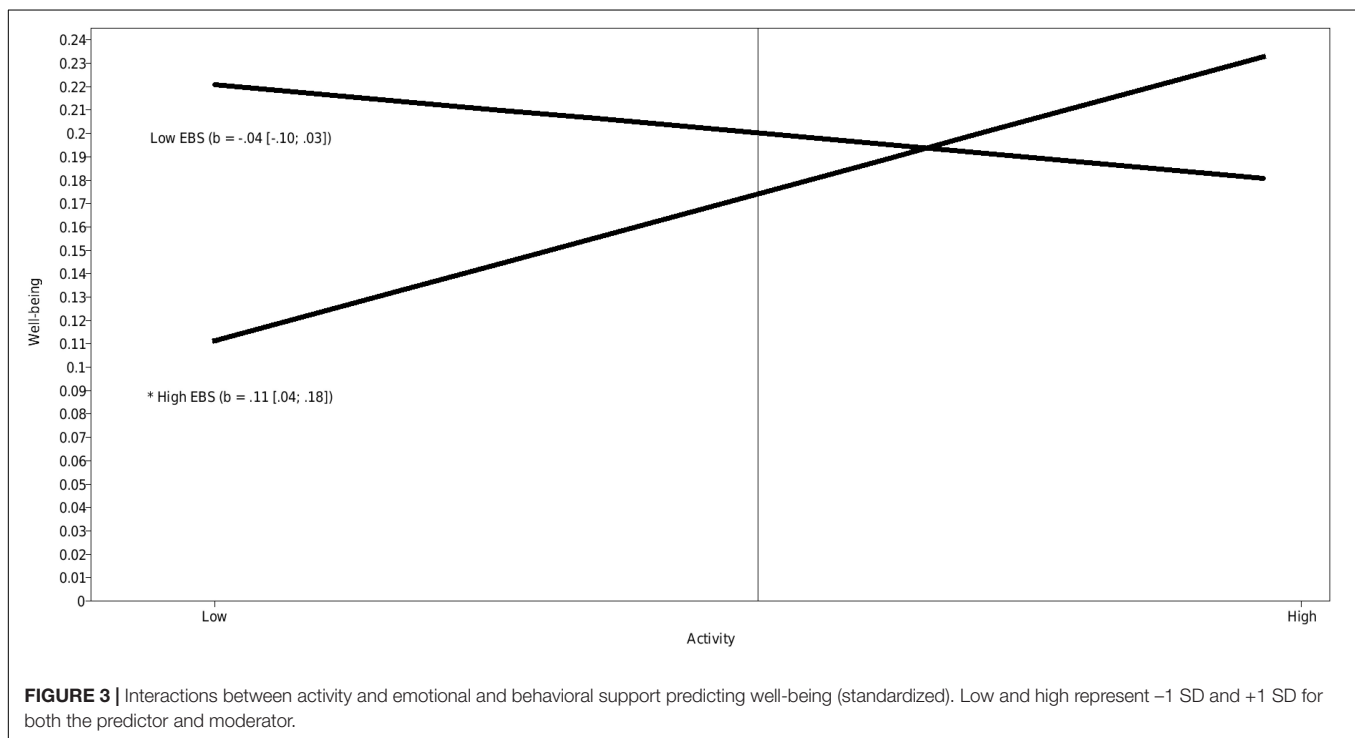
DISCUSSION

Our findings show that children's temperament is associated with children's well-being in ECEC and that the level of conflict in the staff-child relationship and a high level of emotional and behavioral support play a role in this association. Regarding the first research question, as to whether there is an association between children's temperament and well-being in Norwegian ECEC, this study finds that toddlers' shyness, emotionality, and sociability contribute to their level of well-being in ECEC. Studies on children in ECEC are lacking, but Holder and Klassen's (2010)



results on the relation between temperament and happiness (i.e., subjective well-being and life satisfaction) for children aged 9–12 years are similar to the results of this study. The developers of the EAS Temperament Survey (Buss and Plomin, 1984) suggested that low levels of shyness and high levels of sociability are related to adults' extraversion and that high levels

of emotionality are related to adults' neuroticism. Extraversion and neuroticism have been found to be strongly related to adults' happiness by multiple studies (e.g., Furnham and Cheng, 2000; Hills and Argyle, 2001). In addition, activity, or the level of energy, is related to extraversion as well (DeNeve and Cooper, 1998). In this study, the findings for toddlers are



to a large extent similar: Children's shyness and emotionality are negatively related to well-being in ECEC, and sociability is positively related to well-being. However, we did not find a significant association between activity and well-being in ECEC. It might be that less active children also experience well-being in ECEC, as Buss (1981) found that less active children have often more harmonious and peaceful interactions with caregivers.

Our findings are an addition to earlier studies (De Schipper et al., 2003, 2004) that looked at children in ECEC and found that children with a more difficult temperament (e.g., more difficulty to adapt to novelty and showing more irritable distress) showed less well-being in ECEC, whereas children with a more easy-going temperament showed higher levels of well-being. We found that shy and emotional children have more challenges to reach a high level of well-being at the beginning of the childcare year. Extra attention should be paid by the staff to these children's needs. It might be that some of the more shy and emotional children have difficulty interacting with peers or the staff, as they might be more introverted and susceptible to the atmosphere in the group, especially in novel situations and environments. It could be that these children need support from the staff to feel safe and confident to interact with the others but also need staff to keep track on their need for some time for individual play or for play with fewer peers. Moreover, the staff can help the child to regulate strong emotions and try to find the cause of these emotions. Possibly by discussing the child's behavior with the parents as well. Children who have an easier temperament by being less shy and emotional and being more social and active seem to have less challenges to reach a high level of well-being. Nevertheless, the staff should

also pay attention to more social and active children's needs. These latter children might cope better with novel situations and environments as they are more open to others, full of energy and/or moving around. This can result in a higher level of well-being at the beginning of the childcare year. Even though social and active children might seem doing fine, they can have periods with lower levels of well-being too. For example, they might need support while playing alone or to regulate their energy levels.

The potential moderating role of the environment brings us to the results pertaining to the second research question, as to whether ECEC process quality moderates the association between children's temperament and well-being in Norwegian ECEC. Our findings are in line with Thomas and Chess' (1977) goodness-of-fit theory, which states that children's outcomes are a result of the interplay between children's temperament and environment. We find an interplay between children's temperament and their ECEC environment, affecting children's well-being in ECEC. Regarding the environment, a distinction can be made between interpersonal relationships and the group. Specifically, this study finds that shy and active children are affected by interpersonal relationships with the staff. Rydell et al. (2005) found that shy children (aged 5 to 6 years) had less close relationships with the staff but also had less conflictual relationships with the staff. However, as this study shows, it might be that shy children experience anxiety at the slightest level of conflict, resulting in less well-being. Active children are typically more extroverted, have a higher energy level, and are searching for play and sensation (DeNeve and Cooper, 1998). This might exceed the caregiver's toleration threshold for intensity, which sometimes results in more conflictual

relationships compared to less active children (Buss, 1981). Nevertheless, even though there was a high level of conflict, more active children showed higher levels of well-being. These findings confirm that shy children are susceptible to the atmosphere and type of interactions with other people. The staff should pay attention when they interact with shy children, as they might feel uncomfortable when interacting with others and possibly do not always want to have an interaction. For highly active children, attention should be paid to the quality of the staff-child relationship as well, and conflict should be kept to a minimum.

In addition, low active children seem to profit less from the high emotional and behavioral support in their group, which suggests that they need more individual support to experience well-being in ECEC. This is in line with other studies that showed that high quality in the group does not always support all children, as children have personal needs (Phillips et al., 2012). These findings underline the need for professional caregivers to be responsive and modify the environment to the child's temperament and needs, and not the other way around (Chess and Thomas, 1984).

Considerable strengths of this study are that we used multiple informant data and multimethod data, which improved the validity. Both the professional caregiver who knew the child best and one of the parents filled out the questionnaires, and the observations were made by external trained and certified observers. In addition, we had a large sample of children, especially for Norwegian standards.

Even though our study has multiple strengths, some limitations need to be mentioned. One limitation is the answer categories for the control variable 'the child's number of hours in the ECEC per day'. These answer categories in the questionnaire consisted of both ranges and a specific number of hours. The reason for this is that most children spend at least 6 h per day in Norwegian ECEC centers, so we wanted to have 6 hours as a separate answer category and developed the ranges around these 6 h. However, we did overlook the fact that if a child spends 6 hours per day in ECEC, the parent could have answered the category '6 hours' or '6–8 hours'. Therefore, we had to compute these answer categories in our subsequent analyses, which resulted in a few categories with large ranges. This is a limitation, and it would have been better to have more detailed information about the number of hours the child spends in the ECEC center by having more answer categories with smaller ranges. Another limitation of our study is that our sample consisted of ethnic Norwegian children from mainly high-income families. Children from families with a lower income, with a minority language background, and mental/physical disabilities are underrepresented. The latter groups might face more challenges to experience a high level of well-being ECEC, as they might, for example, receive less support from their parents to learn Norwegian, feel excluded, or be restricted due to their disability. In addition, we should note that our sample was represented by children who expressed mainly a high to very high level of well-being.

Nevertheless, we do see associations and moderation effects. This underlines the interplay that exists between certain types of temperament and well-being, and the moderation effects of ECEC process quality. At last, the internal consistency of the sociability scale was poor. An explanation might be that some items might apply to both shyness and sociability, as these concepts are intertwined to some extent. Another explanation might be that the items that are focusing on the preference of being or playing alone might not represent "non-sociability." In Norway, it is common and supported that children explore and do activities on their own, as part of their development.

Future research should follow the children over a longer period as well, so that we can examine if temperament still affects children's well-being in ECEC over time. It seems more difficult for shy children in particular to experience a high level of well-being at the beginning of the childcare year, but it might be that they express more well-being as they become more familiar with the ECEC setting. In addition, we would be able to examine whether a conflictual staff-child relationship and emotional and behavioral support still moderate the associations or whether a close staff-child relationship or chaos in the group become more important over children's time in ECEC. Also, potential intervention effects might be investigated to see if the process quality improves in the intervention group compared to the control group, and if these effects moderate the association between children's temperament and well-being in ECEC.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the data analyzed in this study is subject to the following licenses/restrictions: We are not allowed to share data outside the key personnel for the grant by the Norwegian Centre for Research Data (NSD). Requests to access the datasets should be directed to EB: elisabet.solheim@r-bup.no.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Regional Committees for Medical and Health Research Ethics South East Norway and by the Norwegian Centre for Research Data (NSD), and is registered at clinicaltrials.gov, identifier NCT03879733. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

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Study 3

Van Trijp, C. P. J., Lekhal, R., Drugli M. B., Rydland, V., & Solheim Buøen, E.

Examining the longitudinal association between toddlers' early shyness and their well-being during their first year in Norwegian early childhood education and care.

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Examining the Longitudinal Association Between Toddlers' Early Shyness and Their Well-Being During Their First Year in Norwegian Early Childhood Education and Care

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Declaration of Interest Statement

No potential conflict of interest was reported by the authors.

Abstract

Using a multilevel random-coefficient approach, we examined the longitudinal association between toddlers' early shyness and their well-being during their first year in Norwegian early childhood education and care (ECEC) centres. We used data from two measurement points (preintervention and postintervention) from a larger cluster randomized controlled trial study, Thrive by 3. We followed 567 children (answered by 415 mothers and 152 fathers) who were younger than 19 months and had just started in ECEC at preintervention. Our findings indicate that toddlers' early shyness during their starting period in ECEC is associated with their well-being by the end of their first year in ECEC. Our findings highlight the importance of paying extra attention to shy toddlers, as they seem to show less well-being during their early period in ECEC.

Keywords: early shyness, well-being, longitudinal, ECEC, Norway, toddlers

Examining the Longitudinal Association Between Toddlers' Early Shyness and Their Well-Being During Their First Year in Norwegian Early Childhood Education and Care

Introduction

An increasing number of toddlers are spending considerable time in early childhood education and care (ECEC; Council of the European Union, 2019). In Norway, where we conducted the current study, 87% of 1–2-year-old children attend an ECEC centre, and most of these children (96.7%) spend 41 hr or more in a centre per week (Statistics Norway, 2022). Attending ECEC for the first time might be unsettling for young children, as they are separated from their parents and must adapt to a new care environment (Council of the European Union, 2019; Ereky-Stevens et al., 2018). Earlier studies have shown that a good transition from home to ECEC is important for children's current and later well-being and development in ECEC (Brooker, 2008; O'Connor, 2017). This transition period might be extra challenging for shy children, as they are more wary when they face social interactions with new peers and professional caregivers (Coplan & Arbeau, 2008). However, we do not know if toddlers' early shyness at the start in ECEC might predict their well-being by the end of their first year in ECEC.

Toddlers' Social–Emotional Well-Being in ECEC

Special interest in toddlers' social–emotional well-being (hereafter called “well-being”) in ECEC is needed because the ECEC context is, along with the home environment, one of the immediate environments that has a direct influence on children's development (i.e., microsystem; Bronfenbrenner, 1979). The well-being of a child in ECEC can be defined as the degree to which the child feels comfortable with the professional caregiver(s), peers, and within the physical setting of the centre (De Schipper et al., 2004), and is therefore different from the child's well-being at home. Earlier studies have shown that children who

express a strong sense of well-being in ECEC are often more confident and positive to explore and interact with their environment (Department for Education and Child Development, 2016; La Paro & Gloeckler, 2016). The importance of children's well-being for their current and later development and learning seems undisputed (Mashford-Scott et al., 2012). However, less is known about which role toddlers' early shyness at the start in ECEC might play for their well-being by the end of their first year in ECEC.

Shyness, Well-Being, and the First Year in ECEC

Social withdrawal can be defined as removing oneself from peer interactions (Rubin & Coplan, 2004). One of the motivations that a child might have to remove itself from interactions is fear or wariness of being with others. There are several subtypes of social withdrawal wherein the reason to withdraw is fear or social wariness, namely behavioural inhibition (i.e., fear of novelty), anxious solitude (i.e., wariness in familiar social situations), social reticence (i.e., showing onlooking and unoccupied behaviour), and shyness (i.e., wariness to social novelty and/or perceived social evaluation). All subtypes can lead to anxiety disorders and other developmental challenges. These subtypes are often used interchangeably, which makes it challenging to have conceptual clarity (Coplan & Rubin, 2010).

Fear of strangers is part of normative development and decreases over time. Children have internal coping mechanisms when encountering (novel) situations. However, if learning to cope with social stresses takes too long, it can lead to social anxiety (e.g., the child will not like being with people they do not know well; Buss, 1986) and, as a result, to social-emotional and psychological difficulties (e.g., Abulizi et al., 2017; Booth-LaForce & Oxford, 2008). Shy children often need more time to adapt to a new environment than their non-shy peers. Shyness is a temperamental trait that can be defined as wariness, anxiety, and reticence in (novel) social situations as well as self-consciousness or embarrassment in response to

perceived social evaluation (Buss & Plomin, 1984; Coplan et al., 2004; Rubin et al., 2009). Shyness is sometimes referred to as low sociability. However, sociability is defined as the preference to be with others rather than being alone, whereas shyness refers to how a child behaves in social situations with strangers or casual acquaintances. When shy children are with people they know well, they often do not experience feelings of distress or the need to escape (Buss, 1991; Buss & Plomin, 1984). The transition from the home environment to the ECEC environment might be particularly challenging for shy children, as they have to cope with the stresses of the group environment (i.e., new professional caregivers, peers, and physical environment of the centre; e.g., Coplan & Arbeau, 2008; Kalutskaya et al., 2015). Norwegian ECEC centres focus extensively on providing an environment in which children have opportunities to play and form friendships, which are essential for children's well-being, development, and learning (Norwegian Directorate for Education and Training, 2017). However, shy children can be at risk for missing out on early play experiences with peers because with their feelings of anxiety and fear, they often end up as "onlookers" on other children's group play (Coplan et al., 2008; Jones et al., 2014). This tendency regularly results in them playing alone and trying to avoid social interactions even though some of these children have a desire to interact with others in ECEC settings (Asendorpf, 1990; Gazelle & Ladd, 2003; Rubin et al., 2009). A positive and close relationship with the professional caregivers might help shy children feel less lonely and reduce peer rejection and internalizing problems (Arbeau et al., 2010; Baardstu et al., 2022). However, studies have also shown that shy children generally have less close staff-child relationships but also fewer conflicts (Rudasill et al., 2006; Rydell et al., 2005; Wu et al., 2005). Moreover, studies have shown that high process quality at the group level (i.e., proximal daily experiences in ECEC, such as affectionate and responsive staff-child interactions and positive peer interactions) might not support all children, as individual children can experience the provided quality differently

than their peers (Melhuish et al., 2015; Phillips et al., 2012). In addition, shyness and the way children play with peers develop as children age. Infants express shyness mainly through great fearfulness and low sociability whereas self-consciousness begins at the age of 4–5 years (Buss & Plomin, 1984). Moreover, verbal interactions with peers become more important over time, and increased verbal skills can be beneficial for shy children (e.g., Asendorpf, 1994; Coplan & Armer, 2005). Therefore, professional caregivers must provide multiple types of support depending on the child's age. Meeting the needs of the youngest shy children is more challenging for professional caregivers, as toddlers have more difficulty expressing themselves (Eide et al., 2017). Therefore, toddlers are more dependent on the professional caregivers' observations (Moser et al., 2017), and research on the role of early shyness on toddlers' well-being is needed to provide insight into how shy children are doing during their first year in ECEC. Work focused on the association between children's shyness and well-being in ECEC is forthcoming (Van Trijp, Lekhal, Drugli, Rydland, Van Gils, Vermeer, & Solheim Buøen, 2021), but research on the longitudinal association between toddlers' early shyness and well-being during their first year in ECEC is lacking.

Longitudinal Association between Early Shyness and Well-Being in ECEC

Earlier studies on the predictor effect of early shyness mainly focused on older children in ECEC or on following children for multiple years in various contexts, such as ECEC and school (e.g., Abulizi et al., 2017; Bekkhus et al., 2021; Biederman et al., 2001; Booth-LaForce & Oxford, 2008; Bould et al., 2014; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000). Some of these studies have shown that shyness during early childhood seems to be a predictor for later psychological and social–emotional difficulties. Children who were more shy during their first years in life showed higher levels of depression, anxiety, and emotional problems; poorer social skills (e.g., Abulizi et al., 2017; Biederman et al., 2001; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000); and

decreased behavioural withdrawal (Booth-LaForce & Oxford, 2008) during childhood or adolescence. Bekkhus et al. (2021), on the other hand, did not find a clear predictor effect of early shyness on later social–emotional difficulties for 4–7-year-old children attending ECEC and elementary school, and neither did Bould et al. (2014) when they examined the association between 6-year-olds’ shyness and depression at the age of 18 years. These studies mainly focused on negative emotions and behaviours as outcomes (Stifter et al., 2020). However, more research is needed on younger children and their level of enjoyment and feeling of comfort during various daily situations, in social situations, and within the physical environment of the ECEC centre. The youngest children are of specific interest because, as previously outlined, 87% of 1–2-year-old children in Norway make the transition from the home environment to an ECEC centre and spend a considerable time there (Statistics Norway, 2022).

Some developmental processes that occur over time might explain the mixed findings across studies on the predictor effect of early shyness on later psychological and social–emotional difficulties. A study on elementary school children who were shy during preschool suggested that shy children might show less social withdrawal over time as they gain more experience in interacting with peers, thereby improving their confidence and social skills (Booth-LaForce & Oxford, 2008). In addition, there are signs that younger shy children also develop emotion-related skills (e.g., recognizing causes of emotions) and use adaptive emotion regulation strategies (e.g., problem solving and seeking social support) to cope with social stresses and promote positive interactions with peers and professional caregivers (Coplan et al., 2020). Moreover, studies have shown that shy children (age 3.5–5.5 years) probably can still learn from social interactions just by watching the interactions and play of peers instead of actively joining those interactions (Lane et al., 2013; Wellman et al., 2011). Similar results can be found regarding the youngest children in ECEC who had just started in

ECEC, as Chess and Thomas (1984) introduced the temperamental classification of “slow to warm up” infants. These children show mild intense negative responses to new stimuli but adapt slowly after repetitive exposure, showing interest and positive responses. Therefore, potential negative associations between toddlers’ early shyness and well-being in ECEC might weaken over time. However, this effect might not occur during the first year in ECEC, as not only the transition from the home environment to the ECEC environment but also the first full year in ECEC is challenging. Toddlers are more sensitive to what is happening in their environment than older children (Blakemore & Frith, 2005). Earlier studies showed that temperament traits, including shyness, are a product of complex interactions between genetic, biological, and environmental factors (Shiner et al., 2012). Temperament is relatively stable within a certain context and provides information about how children approach and react to their environment (Nigg, 2006). The unit/group wherein the child participates might affect how shy children are doing in the ECEC centre. Multiple studies on school-aged children have shown that shy children are especially at risk for adjustment difficulties when they participate in a group with negative emotional climates (i.e., conflicts between peers and/or staff-children, and peer exclusion) (e.g., Gazelle, 2006; Gazelle & Ladd, 2003). Whereas high-quality friendships might help shy children to thrive in the unit/group (Rubin et al., 2006). However, shy children often have close relationships with other shy children, which can be less supportive and intimate (Burgess et al., 2006; Rubin et al., 2009). Therefore, children’s shyness and how they react to their peers and professional caregivers might be affected by the unit/group wherein they participate. A new environment is generally more stressful for shy children, and they might miss out on early play experiences with peers due to their social anxiety. This can result in lower levels of well-being and cause them to need more than one year to adapt to ECEC.

The Present Study

We examined whether toddlers' early shyness predicts their well-being during their first year in Norwegian ECEC (centre-based day care). We followed a multilevel random coefficient modelling approach to examine the following research question: "Is there an association between toddlers' early shyness during the starting period in ECEC and their well-being by the end of their first year in the centre?" Based on previous studies (e.g., Abulizi et al., 2017; Chess & Thomas, 1984), we expect to find that toddlers' early shyness when they first enter ECEC predicts their well-being negatively by the end of their first year in ECEC.

Method

Procedures

The present study is part of the larger Thrive by 3 (Trygg før 3) study, which is a cluster randomized controlled trial regarding a 10-month multicomponent, in-service professional development intervention that was developed to promote the quality of staff-child interactions (i.e., process quality), and to strengthen 1- to 3-year-old children's well-being, mental health, and development in Norwegian ECEC centres (Lekhal et al., 2020). Currently, the intervention effect on the process quality has been examined by using the Classroom Assessment Scoring System Toddler version (CLASS-Toddler) (La Paro et al., 2012), and the intervention showed a positive significant effect on the staff-child interactions (Solheim Buøen et al., 2021). The Regional Committees for Medical and Health Research Ethics South East Norway and the Norwegian Centre for Research Data approved the study. The data for this study was derived from the preintervention (September 2018) and postintervention (June/July 2019) data collection rounds in the larger Thrive by 3 study.

In total seven municipalities/city districts, four in Eastern Norway and three in Central Norway, were invited and consented to participate in the study. The electronic link to the

written consent form was sent by e-mail (or letter, if needed) to the ECEC centres' managers to determine the centre's and their own participation. After consenting to the centre's participation, the managers forwarded, on behalf of the Thrive by 3 study, the email with the written informed consent form to all professional caregivers, parents, and children at the centre. A total of 187 units/groups in 78 ECEC centres agreed to participate. After stratified randomization using a random number generator, 39 centres including 87 units/groups were allocated to the intervention group (intervention started in September 2018), and 39 centres, including 100 units/groups, were allocated to the waitlist control group (intervention started in September 2019). The allocation was done for each municipality and the size (small versus large) of the centre was taken into account to ensure that all sizes were represented in both groups. Every unit/group had a staff-child ratio of at least one professional caregiver working with three children. The written consent for the child was only valid when both parents agreed on their child's participation. A written consent was provided for a total of 1,561 children (800 boys, 761 girls) age 8 to 34 months ($M = 21.4$ months, $SD = 6.2$), who were part of 185 units/groups, and 733 of the children (and 86 units/groups) were part of the intervention group.

Participants

In Norway, most children attend an ECEC centre for the first time around the age of 12 months because all children from the age of 1 year are entitled to a place in public subsidized ECEC centres (The Kindergarten Act, 2005). In the current study, we focused on children new to the ECEC setting and therefore included only children younger than 19 months at preintervention. Note that of the 580 children for whom we had written consent at preintervention, we excluded 13 children because they quit the ECEC centre or moved to another unit/group during their first year in ECEC. This exclusion resulted in 567 available children (288 boys, 279 girls from 163 toddler units/groups, $M = 14.6$ months, $SD = 2.2$) in

the current study. The professional caregiver who knew the child best filled out an electronic questionnaire regarding the child's well-being in ECEC during postintervention whereas we used electronic questionnaire data from one parent (415 mothers and 152 fathers) to study child and family characteristics and the child's shyness at preintervention. Most children attended the ECEC centre fulltime (6 hr or more per day), had Norwegian as their native language, and came from high-income families, as Table 1 shows.

[Table 1 near here]

Measures

Shyness

We examined children's shyness using parents' answers on the shyness subscale of the Emotionality Activity Sociability Temperament Survey for Children (EAS; Buss & Plomin, 1984) at preintervention. The shyness subscale consisted of five items assessing whether the child becomes shy easily, easily makes friends, is very sociable, takes a long time to feel comfortable with strangers, and trusts strangers very easily. The parents answered these items on a 5-point Likert scale ranging from 1 (*very typical*) to 5 (*not at all typical*). A high score on the shyness subscale indicated that the child was shyer. Table 1 presents this scale's descriptors. The shyness subscale showed a good internal consistency with a Cronbach's alpha of 0.75.

Well-Being in ECEC

Well-being in ECEC was measured by using the Leiden Inventory for the Child's Well-being in Day care (LICW-D; De Schipper et al., 2004), filled out by the professional caregiver who knew the child best during postintervention. This questionnaire has been validated in Norway in an earlier study using data from Thrive by 3 (Van Trijp, Lekhal,

Drugli, Rydland, & Solheim Buøen, 2021). It consisted of 12 items that can be answered on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*). The items assessed the child's general well-being (e.g., child enjoys attending the day care centre), how comfortable the child is with peers (e.g., child trusts all the children at the day care centre), how comfortable the child is with the professional caregiver(s) (e.g., child is happy to see the professional caregiver(s) when he/she is dropped off), and comfortability with the physical setting of the centre (e.g., child really enjoys the games and play material at the day care centre). A higher score indicates a higher level of well-being. Table 1 shows this scale's descriptors. The LICW-D showed a good internal consistency with a Cronbach's alpha of 0.79.

Child and Family Characteristics

To study the association between toddlers' early shyness and well-being by the end of their first year in ECEC, we controlled for the following preintervention child characteristics, which the parent reported: child's gender (0 = boy, 1 = girl), child's age in months, whether the child has a Norwegian or other linguistic background (1 = Norwegian, 2 = minority language from a Western country in Europe or North America, 3 = minority language from a non-Western country), and the number of hours in the ECEC centre per day (1 = less than 6 hr, 2 = 6 hr, 3 = 6–8 hr, and 4 = more than 8 hr). For subsequent analyses, we computed the answers for linguistic background (0 = Norwegian, 1 = minority language) and the number of hours in the ECEC centre (1 = less than 6 hr, 2 = 6–8 hr, 3 = more than 8 hr). We treated the child's gender and linguistic background as dummy variables.

We also controlled for family's preintervention gross income, which the parent reported (1 = under 200,000, 2 = 200,000–399,000, 3 = 400,000–599,000, 4 = 600,000–799,000, 5 = 800,000–999,000, and 6 = over 1,000,000 [in Norwegian kroners]). Table 1 presents the descriptors.

Analyses

Because the children are situated in units/groups, we first investigated the intraclass correlation coefficient (ICC) to determine to what extent the child measures are nested. The within- and between group variance components for children's well-being were tested by examining the ICC on the individual mean scores from the whole LICW-D scale (i.e., these scores are not centred). The ICC indicated that 22.9% of the variance in children's well-being at postintervention could be explained by the variance between groups. Because the suggested 5% threshold was exceeded (Hox et al., 2018; Raudenbush & Liu, 2000), we deemed multilevel analyses most appropriate.

Multilevel random coefficient modelling with the maximum likelihood with robust standard errors (MLR) estimator in Mplus Version 8 (Muthén & Muthén, 2017) was used to study the within-level effect of children's early shyness on their well-being by the end of their first year in ECEC. Both the dependent variable (i.e., children's well-being) and independent variable (i.e., child's shyness) were level 1 variables (child level). For multilevel analyses, the independent variable and covariates need to be group mean (i.e., child's score compared to the unit/group), or grand mean centred (i.e., child's score compared to the whole sample) (e.g., Finch & Bolin, 2017; Heck & Thomas, 2015). The covariates (i.e., child's age in months, number of hours in the ECEC centre per day, and family's gross income) were grand mean centred, whereas children's shyness was group mean centred. The choice to group mean centre children's shyness is based on earlier studies that showed that children's shyness can be affected by the unit/group wherein they participate (e.g., Gazelle, 2006; Ruben et al., 2006, 2009; Shiner et al., 2012). In addition to person-mean centring the above-mentioned variables at the child level, we followed the recommendation of Preacher et al. (2016) to control for the between-level effect of the unit/group by aggregating the mean score of the unit/group wherein the child participates.

We wanted to analyse uncontrolled and controlled models to examine the relationship's strength between children's early shyness and their well-being by the end of their first year in the centre. This procedure resulted in three models. Model 1 was uncontrolled, and Model 2 was controlled for child and family characteristics at the within level, and shyness at the between level. Because we drew the sample from a randomized controlled trial, we tested Model 3, in which well-being was regressed on the interaction term of shyness and the intervention in addition to the main effects of shyness (group-mean centred) and the intervention (dummy: 0 = control, 1 = intervention), and we controlled for the same variables as in Model 2. Table 2 shows an overview of the correlations between these variables at the within-level. We also examined the models' fit to determine whether the model improved after we controlled for additional variables. We used the Akaike information criterion (AIC) and Bayesian information criterion (BIC) to explore the model fit. The model fit was better if the new model had lower values for AIC and BIC compared to the former model (Finch & Bolin, 2017). The Chi-square is highly sensitive to sample size, and a highly satisfactory model can be rejected due to discrepancies (Brown, 2015). Therefore, this statistic should be interpreted with caution when examining the model fit. In addition, we defined the model fit as good if CFI > .95, TLI > .95, RMSEA \leq .05, and SRMR \leq .05, and we defined it as acceptable if CFI and TLI fell between .90 and .95, RMSEA fell between .06 and .10, and SRMR fell between .06 and .08 (e.g., Hu & Bentler, 1999; MacCallum et al., 1996).

[Table 2 near here]

Results

Non-Response

Collecting data from multiple respondents with different questionnaires during multiple data collection rounds resulted in missing at random (MAR) (Rubin, 1976). We tested the missing patterns using IBM SPSS Statistics Version 28.0 (IBM Corp, 2021) and found that 467 children (82.4% of 567 children) had complete data on all variables during the two data collection rounds. The missing patterns were mainly found at preintervention and were caused by missing values on the shyness scale (14.8%) and/or child and family characteristics variables (11.8%-12.9%) because the parent did not fill out the questionnaire for the child. Whereas 3.5% of the data was missing due to that the LICW-D was not filled out at postintervention. An overview of the number of missing cases is presented in Table 1. MLR was used as an estimation method to cope with the missing values. Therefore, the data was not imputed.

Early Shyness and Well-Being by the End of the ECEC Year

The results concerning the association between children's early shyness and well-being by the end of their first year in ECEC are presented in Table 3 and 4. A significant negative relationship was found for models 1 and 2 on children's early shyness at preintervention and well-being in ECEC at postintervention. Children who were more shy in the beginning of their period in ECEC showed a lower level of well-being by the end of their first year in ECEC. Note that the effect size of early shyness on well-being was small. No significant interaction effect was found on well-being ($p > .05$) in Model 3, suggesting that the results were not affected by any intervention effect.

In addition, we examined the model fit and found a good fit for all models (CFI = 1.00, TLI = 1.00, RMSEA = 0, SRMR = 0). The model fits for the AIC and BIC, which improved after we included the predictor in Model 1, are presented in Table 3. However, the

AIC and BIC in Model 2 became slightly worse when we studied the association between early shyness and well-being at postintervention by controlling for child and family characteristics.

[Table 3 near here]

We further examined models 1 and 2 for boys and girls separately. No significant differences were found between these groups ($p > .05$).

Discussion

To our knowledge, this study is the first focusing on the longitudinal association between toddlers' early shyness and well-being during their first year in ECEC. Our findings confirmed our hypothesis and showed that toddlers who were shy during their starting period showed less well-being by the end of their first year in ECEC. Earlier studies showed that a longitudinal association between shyness during early childhood can predict later psychological and social-emotional difficulties (e.g., Abulizi et al., 2017; Biederman et al., 2001; Karevold et al., 2009; Karevold et al., 2012; Prior et al., 2000). The current study confirmed that the longitudinal association between early shyness and well-being is already present for children under the age of 2 years who have recently started in ECEC. Not only the transition from the home environment to the ECEC environment may be challenging for shy children, but also their first year in ECEC.

Toddlers in general are more susceptible to what is happening in their environment (Blakemore & Frith, 2005), and fear of strangers is part of normative development and decreases over time (Buss, 1986). However, shy toddlers may need more time to adapt to the new stresses of the group environment in ECEC compared to their non-shy peers (e.g., Coplan & Arbeau, 2008; Kalutskaya et al., 2015). In Norwegian ECEC, there is a large focus

on play and friendship (Norwegian Directorate for Education and Training, 2017). However, shy children's wariness and anxiety can prevent them from playing with peers, which reduces the possibility of developing social skills and being assertive (Coplan et al., 2008; Jones et al., 2014). Watching other children play might not be enough to develop internal coping mechanisms for dealing with new stressors during the first year in ECEC. The lack of these social experiences can extend the time that shy toddlers need to adapt to the ECEC environment and can put them at risk of experiencing lower levels of well-being over a longer period. However, it could be that shy toddlers have a "slow to warm up" temperament, which means that they can show mildly intense negative responses to new stimuli but adapt slowly after repetitive exposure by showing interest and positive responses (Chess & Thomas, 1984). Shy children might need more support from professional caregivers during social interactions with peers to be able to cope with new stimuli and develop social skills. Support might be needed especially when approaching other children for play activities, as 2-year-olds express shyness mainly by high fearfulness and low sociability (Buss & Plomin, 1984). Earlier studies showed that high process quality at the group level might not support all children (Melhuish et al., 2015; Phillips et al., 2012), and therefore attention should be paid to shy children's individual needs and developmental age (e.g., Asendorpf, 1994; Coplan & Armer, 2005; Rimm-Kaufman et al., 2002).

Our findings also showed that the longitudinal association between toddlers' early shyness and well-being at the end of the first year was small. It could be, as Bekkhus et al. (2021) suggest, that early shyness is especially a risk factor when combined with other risk factors. In the current study, most children scored high to very high on well-being in ECEC, which makes it more difficult to study potential explanations for lower levels of well-being. It might be that the children were participating in groups with high process quality, which might serve as a protective factor for the association between early shyness and later well-

being. However, we still found an association with well-being at postintervention meaning that early shyness can challenge toddlers to thrive during their first year in ECEC.

A considerable strength of this study is that we had a large sample of children. In addition, we collected multiple informant questionnaire data from professional caregivers and parents. The professional caregivers had the best overview of the child's well-being in ECEC whereas the parent had the best overview of the child's temperament. However, some limitations should be mentioned as well. One limitation might be that the children scored high to very high on well-being in ECEC, which makes it challenging to examine explanations for children's lower levels of well-being. Another limitation is that our sample consisted of mainly ethnic Norwegian children from high-income families. Children with a minority language background and children from families with lower incomes were underrepresented. It could be that these groups of children face more challenges in terms of their well-being in ECEC, especially when they are shy (Le Pichon & De Jonge, 2016). It might be that they have more difficulties with the language and culture or are not used to having certain luxury goods, which can affect how they approach other children or are seen by other children. This could result in more (social) stress, and the association between their early shyness and well-being by the end of the first ECEC year might have been stronger. Although the study sample was relatively homogenous in terms of income and language background, we still found a longitudinal association between early shyness and well-being in ECEC. Another limitation could be the answer categories for the control variable "the child's number of hours in the ECEC per day." Most children spend 6 hr per day in ECEC. Therefore, we wanted to have "6 hr" as a separate answer category. The other answer categories were developed around this number. However, we did overlook that the parent could answer both the category of 6 hr and 6-8 hr when their child attends the centre 6 hr per day. Therefore, we computed the answer categories for our subsequent analyses, which

resulted in fewer categories with large ranges. This probably did not affect our results as most of the children were attending the centre fulltime. However, answer categories with smaller ranges would have provided us with more detailed information about the number of hours that the child spends in the ECEC centre.

Despite the aforementioned limitations, our findings indicate that extra attention should be paid to shy toddlers as soon as they start in ECEC to prevent lower levels of well-being during their first year. Children's first year in ECEC might be challenging for the professional caregivers as well because they need to become familiar with the child's needs. In the context of the Norwegian ECEC, we see that there is a need to include topics such as toddlers' development and learning and how to support them by departing from the child's own perspectives in the educational curriculum of professional caregivers (Solheim Buøen et al., 2021).

Future research should follow the children over a longer period to see how toddlers' early shyness at the start in ECEC might still affect their well-being after spending a few years in ECEC. In addition, children with a minority language background and from families with lower incomes should be examined to see if similar results are found. Finally, the effect of interpersonal staff-child interactions as well as the peer interactions of shy toddlers might be studied in more depth. Since high ECEC process quality at the group level might not support all children, more insight is needed into how caregivers can best support shy toddlers' individual needs and their interpersonal social interactions.

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Table 1*Descriptives: Pre-Intervention Child and Family Characteristics, Child's Shyness, and Post-Intervention Well-Being*

	%/M	SD	n	n missing	Cronbach's alpha
Intervention group (72 units/groups)	45.7%		259		
Control group (91 units/groups)	54.3%		308		
Gender			567	0	
Boys	50.8%		288		
Girls	49.2%		279		
Age in months	14.6	2.21	567	0	
Months in ECEC	1.07	1.33	531	36	
Language			500	67	
Norwegian	92%		460		
Minority language	8%		40		
Hours per day in ECEC			494	73	
Less than 6 hr	5.5%		27		
6-8 hr	82.2%		406		

More than 8 hr	12.3%	61	
Family gross income			72
Under 200,000 Norwegian kroner (NOK)	0.8%	4	
200,000–399,000 NOK	3.2%	16	
400,000–599,000 NOK	6.7%	33	
600,000–799,000 NOK	13.9%	69	
800,000–999,000 NOK	24.6%	122	
Over 1,000,000 NOK	50.7%	251	
Shyness	2.41	.64	84
Well-being	4.54	.38	20
		547	.79
		483	.75

Note. Internal consistency based on Cronbach's alpha (α): $\alpha < .50$ unacceptable; $.50 \leq \alpha < .60$ poor; $.60 \leq \alpha < .70$ acceptable; $.70 \leq \alpha < .90$ good;

$\alpha \geq .90$ excellent.

Table 2*Correlations between Intervention/Control Group, Child and Family Characteristics, Shyness, and Well-being Variables.*

Variables	1	2	3	4	5	6	7	8
Intervention/ 1 Control group	-							
2 Gender	-.02	-						
3 Age in months	<.01	<.01	.-					
4 Language	-.02	-.06	.06	-				
5 Time per day in ECEC	-.04	-.01	.14**	-.03	-			
6 Family's gross income	-.05	.04	-.07	-.28***	.05	-		
7 Shyness	.02	.02	.08	.08	-.05	-.07	-	
8 Well-being	-.06	.04	-.02	-.08	.02	.03	-.14**	-

Note. ** $p < .01$, *** $p < .001$ (two-tailed).

Table 3*Multilevel Random Coefficient Modelling Results and Fit Indices for Children's Early Shyness on Well-Being by the End of Their First Year in**ECEC*

	<i>N</i>	Units/groups	Estimate (<i>SE</i>)	χ^2 (<i>df</i>)	AIC	BIC
<i>Shyness – Well-being</i>						
Model 0	547	162			474.64	487.55
Intercept			4.54*** (.02)			
Model 1	468	158		11.679** (2)	410.31	431.05
Intercept			4.89*** (0.13)			
Model 2	467	158		11.907 (7)	418.90	460.36
Intercept			4.88*** (0.13)			

Note. *SE* = standard error; *AIC* = Akaike information criterion; *BIC* = Bayesian information criterion. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed). Model 0 is the intercept-only model. Model 1 was uncontrolled at within-level and controlled for shyness at between-level. Model 2 was controlled for child and family characteristics at within-level and shyness at between-level.

Table 4

Multilevel Random Coefficient Modelling Results for Children's Early Shyness and Covariates on Well-Being by the End of Their First Year in ECEC

		Well-being	
		Model 1	Model 2
		Estimate (SE)	Estimate (SE)
<i>Within level</i>			
Shyness		-.06* (.03)	-.06* (.03)
Gender			.01 (.03)
Age in months			< -.01 (.01)
Language			-.08 (.09)
Time per day in ECEC			-.01 (.04)
Family's gross income			-.01 (.02)
<i>Between level</i>			
Shyness		-.15* (.06)	-.14* (.06)

Note. SE = standard error. * $p < .05$ (two-tailed).