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Department of Brain and Behavioral Sciences (DBBS)

MSc in Psychology, Neuroscience and Human Sciences



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**Assessing Sensory Processing Sensitivity in Childcare Settings:
An Exploratory Qualitative Study**

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Academic year 2025-2026

Acknowledge

I would like to express my deepest thanks to my gentil professor, who has provided me with endless support during this research journey, offering endless support and guidance.

In addition, I would want to appreciate my family and close friends and colleges for the encouragement and support I have received from each of them on this journey.

This work is dedicated to the brave people of my country, Iran, especially the incredible women who have been fighting for equal rights and freedom for years and years in an unjust battle and they never gave up. I'm so grateful for the chance to develop and learn that was given to me, knowing that any one of these incredible people deserves to be here in my place today. I hope for a world filled with freedom and peace. Women, life, freedoom

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Abstract

Environmental Sensitivity is a theoretical framework that explains individual differences in how people perceive and respond to environmental experiences. One of its most widely studied constructs, Sensory Processing Sensitivity (SPS), has primarily been assessed through parent-report and self-report measures, with limited attention given to educator-based assessment during early childhood. The present study aimed to explore the applicability of an educator-adapted measure of Sensory Processing Sensitivity for toddlers aged 18–36 months within early childhood educational settings.

A mixed-method pilot design was employed. An existing parent-report questionnaire was adapted for use by educators working in childcare settings. Six experienced educators completed the adapted questionnaire and subsequently participated in semi-structured interviews exploring the clarity, applicability, and observability of questionnaire items, as well as their perceptions of sensitivity-related behaviours in everyday educational practice. Interview data were analysed using thematic analysis to identify recurring patterns across participants' experiences and perspectives.

The findings indicated that educators perceived most sensitivity-related behaviours as readily observable within everyday childcare routines, particularly those related to sensory responsiveness, reactions to novelty, transitions, and attention to subtle environmental details. Participants also highlighted the unique contribution of educational settings as contexts in which repeated observation and shared routines facilitate the recognition of individual differences. At the same time, educators emphasised that some questionnaire items referred primarily to experiences occurring within family life and would benefit from contextual adaptation. Furthermore, participants consistently distinguished between observable behaviour and children's internal emotional experiences, recognising the limitations of behavioural observation while emphasising the complementary value of combining educator and parent perspectives.

Overall, the findings suggest that the educator-adapted questionnaire represents a promising approach for assessing Sensory Processing Sensitivity in toddlers within educational settings. Further research is needed to establish its psychometric properties and examine its validity in larger and more diverse samples.

Keywords: Environmental Sensitivity; Sensory Processing Sensitivity; Toddlers; Early Childhood Education; Educator Report; Questionnaire Adaptation; Thematic Analysis.

Chapter 1. Introduction

Children differ considerably in the ways they perceive, process, and respond to their environments from the earliest years of life. These individual differences become increasingly visible during toddlerhood, a developmental period characterised by rapid cognitive, emotional, and social change. Between 18 and 36 months of age, rapid advances in language, emotional regulation, and social understanding enable toddlers to engage with an increasingly complex world beyond their immediate family. Although these developmental transitions are common to most children, they are not experienced in the same way. Some toddlers adapt readily to novelty, routine changes, and social demands, whereas others respond with greater emotional intensity, heightened caution, or increased sensitivity to sensory stimulation. Understanding these individual differences has become a central concern of developmental psychology because children's responsiveness to their environments influences both their immediate adaptation and their longer-term developmental trajectories (Rothbart & Bates, 2006; Pluess, 2015).

Among the theoretical frameworks proposed to explain these individual differences, Environmental Sensitivity has emerged as one of the most influential (Belsky & Pluess, 2009; Pluess, 2015). It proposes that children differ in the extent to which they perceive and respond to environmental experiences. Within this framework, Sensory Processing Sensitivity (SPS) is conceptualised as a temperament trait characterised by heightened responsiveness to environmental stimuli and greater susceptibility to overstimulation under demanding conditions (Aron & Aron, 1997; Aron et al., 2012).

Although SPS has been studied extensively in adults and older children, comparatively little is known about how it manifests during toddlerhood. Because toddlers have limited verbal and reflective abilities, Environmental Sensitivity is expressed primarily through observable behaviour rather than self-report. Reactions to sensory stimulation, unfamiliar situations, transitions, emotionally significant events, or changes in routine may therefore provide important indicators of individual differences in environmental responsiveness. Because these behaviours emerge through continuous interactions between children and their environments, understanding Environmental Sensitivity requires attention to the contexts in which children develop (Greven et al., 2019; Lionetti et al., 2019). One of the most important developmental contexts during this period is the early childhood educational setting. For many children,

childcare represents their first sustained experience outside the family, exposing them to group routines, peer relationships, unfamiliar adults, and greater sensory and social complexity. Daily transitions, shared activities, and peer interactions require continuous emotional and behavioural adaptation, creating natural opportunities for individual differences in environmental responsiveness to become visible.

Educators occupy a unique observational position within these settings. Unlike parents, who primarily observe children in family life, educators repeatedly observe behaviour across structured routines, free play, peer interactions, emotionally demanding situations, and transitions. This perspective enables them to identify recurring behavioural patterns and interpret children's responses in relation to peers experiencing similar environmental demands. Educational settings therefore provide an ecologically valuable context for observing behaviours associated with Environmental Sensitivity that may be less apparent within the home environment.

Increasingly, developmental researchers recognise that understanding children's behaviour requires information from multiple contexts rather than a single informant. Parent reports provide valuable insight into children's behaviour within family life, whereas educator observations capture children's responses to group routines, peer interaction, and the sensory and social demands of educational settings. These perspectives should therefore be considered complementary, providing a broader understanding of children's behavioural functioning than either source alone (Greven et al., 2019; Kähkönen et al., 2024).

Despite substantial advances in Environmental Sensitivity research, important gaps remain. Existing evidence has focused predominantly on adults, adolescents, and school-aged children, while comparatively little attention has been devoted to children during the first three years of life. In addition, assessment has relied primarily on self-report and parent-report measures, which reflect children's behaviour within a limited relational context. This limitation is particularly relevant during toddlerhood, when children increasingly divide their time between home and childcare settings. Educational environments expose toddlers to experiences that differ substantially from those encountered within the family, including peer interactions, shared routines, frequent transitions, and heightened sensory stimulation, all of which may influence how Environmental Sensitivity is expressed. Consequently, relying exclusively on parent reports may provide only a partial understanding of children's environmental responsiveness. Recent literature has therefore emphasised the importance of

ecologically valid, multi-informant approaches that integrate observations across different developmental contexts (Greven et al., 2019; Kähkönen et al., 2024).

Despite this growing emphasis on ecological assessment, relatively little research has examined whether existing measures of Sensory Processing Sensitivity can be meaningfully applied within early childhood educational settings. Most available instruments have been developed for self-report or parent-report use, and only limited research has explored whether the behaviours they describe can be reliably observed by educators in everyday childcare practice. Educators observe children daily across situations involving sensory stimulation, emotional challenges, peer interactions, frustration, cooperation, and adaptation to shared routines. These repeated observations place educators in a unique position to recognise stable behavioural patterns that may reflect individual differences in Environmental Sensitivity.

Addressing this gap has implications for both research and educational practice. Extending assessment beyond the family environment may contribute to a more comprehensive understanding of how Environmental Sensitivity manifests during toddlerhood while supporting more nuanced interpretations of children's behaviour in childcare settings. Behaviours such as heightened caution, withdrawal, or intense emotional responses may reflect environmental responsiveness as well as behavioural difficulties, highlighting the importance of interpreting children's behaviour within a broader developmental and contextual framework. In light of these considerations, the present study explores the observability and applicability and contextual relevance of an educator-adapted version of a parent-report questionnaire assessing Sensory Processing Sensitivity in toddlers aged 18–36 months within early childhood educational settings. Rather than evaluating the psychometric properties of the instrument, the study examines whether educators perceive the questionnaire items as understandable, observable, and contextually appropriate within everyday educational practice, while also exploring how they interpret behaviours associated with Environmental Sensitivity.

An exploratory mixed-method feasibility design was adopted to address these aims. Quantitative questionnaire ratings provided an overview of educators' evaluations of the questionnaire items, while qualitative semi-structured interviews explored their professional experiences and interpretations. Together, these methods enabled an examination of both the questionnaire's applicability within educational settings and the contextual factors influencing educators' observations.

More broadly, this study contributes to the growing interest in ecologically valid and multi-informant approaches to the assessment of Environmental Sensitivity. By examining educator perspectives, it recognises that children's behaviour cannot be fully understood within a single context and that parent and educator reports provide complementary insights into children's environmental responsiveness during early childhood. The findings may provide preliminary evidence to inform the refinement and future validation of educator-report measures while contributing to a better understanding of how Environmental Sensitivity manifests within everyday childcare settings. Ultimately, this may support more responsive educational practices and a more individualised understanding of young children's developmental needs.

Chapter 2: Literature review

2.1 Temperament and Individual Differences in Early Development

Understanding why children differ substantially in their responses to environmental experiences has long represented a central question in developmental psychology. From the earliest stages of life, children show considerable variability in emotional reactivity, attentional patterns, behavioral regulation, sensory responsivity, and adaptation to contextual demands. While some children appear highly reactive to changes in their environments and strongly affected by interpersonal and sensory experiences, others seem comparatively less responsive and more behaviorally stable across situations. These differences have traditionally been examined within the broader framework of temperament.

Temperament generally refers to biologically rooted individual differences in emotional, motor, attentional, and behavioral tendencies that emerge early in life and show relative continuity across development (Rothbart & Derryberry, 1981; Rothbart & Bates, 2006). Contemporary developmental approaches conceptualize temperament not as a rigid or deterministic structure, but as the product of continuous interactions between biological predispositions and environmental experiences. Within this perspective, temperament reflects constitutionally based differences in reactivity and self-regulation that influence how children perceive, process, and respond to environmental stimuli (Rothbart & Bates, 2006).

Historically, developmental researchers became increasingly interested in understanding why children exposed to similar environmental conditions often demonstrated remarkably

different developmental outcomes. Early temperament theories therefore attempted to identify stable patterns of emotional and behavioral functioning observable from infancy onward. Rather than conceptualizing development exclusively in terms of learning or environmental influence, temperament research emphasized the role of biologically based individual differences in shaping children's interactions with their surroundings.

Historically, temperament theories emphasized dimensions such as emotionality, activity level, adaptability, sociability, inhibition, and sensory responsiveness. One of the earliest influential contributions was provided by Thomas and Chess (1977), whose longitudinal studies highlighted substantial interindividual variability in children's behavioral styles. Their work identified dimensions including intensity of reaction, adaptability, threshold of responsiveness, mood, and rhythmicity, suggesting that children differ not only in the intensity of their emotional and behavioral reactions but also in their sensitivity to environmental stimulation.

Importantly, Thomas and Chess also introduced the influential concept of "goodness of fit," proposing that developmental outcomes emerge through the interaction between children's temperamental characteristics and environmental expectations. This perspective represented an important shift away from simplistic interpretations of temperament as inherently adaptive or maladaptive and instead emphasized the relational and contextual nature of development.

Subsequent developmental models further expanded these ideas by conceptualizing temperament primarily through the dimensions of reactivity and self-regulation (Rothbart & Derryberry, 1981). Reactivity refers to the excitability and responsiveness of emotional, physiological, and attentional systems, whereas self-regulation involves processes modulating these responses, including attentional control and behavioral inhibition (Rothbart & Bates, 2006). Within this framework, children differ significantly in the degree to which they respond to emotional, sensory, and relational experiences. The distinction between reactivity and self-regulation became increasingly important within developmental psychology because it provided a more dynamic understanding of children's emotional and behavioral functioning. Highly reactive children may experience emotional and sensory stimuli more intensely, whereas self-regulatory capacities influence how effectively these responses are organized, modulated, and expressed. Developmental outcomes therefore appear to emerge not solely from the intensity of children's reactions, but from the continuous interaction between reactivity, regulatory processes, and environmental conditions.

Importantly, contemporary developmental literature increasingly recognizes that heightened reactivity should not automatically be interpreted as pathological. Earlier developmental perspectives often conceptualized heightened emotional responsiveness primarily in terms of vulnerability, risk, or maladjustment. However, growing empirical evidence progressively challenged exclusively deficit-oriented interpretations of reactivity by demonstrating that highly reactive children did not uniformly experience negative developmental outcomes.

Rather, variability in environmental responsiveness may reflect adaptive differences in how individuals interact with their surroundings. Certain children appeared particularly vulnerable within stressful or emotionally inconsistent environments while simultaneously demonstrating exceptionally positive functioning within supportive and emotionally responsive contexts. These findings contributed to a gradual theoretical shift from vulnerability-focused models toward perspectives emphasizing developmental plasticity and environmental sensitivity. This transition represented a broader conceptual change within developmental psychology. Increasingly, researchers began moving beyond categorical distinctions between “difficult” and “easy” children and instead focused on understanding how biological predispositions interact dynamically with environmental experiences across development. Consequently, developmental outcomes came to be understood less as fixed consequences of temperament itself and more as the result of ongoing interactions between children’s individual characteristics and contextual environments.

These perspectives became especially relevant as empirical findings progressively demonstrated that some children appeared disproportionately affected by environmental experiences. Certain children seemed particularly vulnerable under stressful conditions while simultaneously demonstrating exceptionally positive outcomes within supportive and emotionally responsive environments. Such findings challenged traditional vulnerability-based models and contributed to the emergence of broader theoretical frameworks centered on environmental sensitivity. The study of environmental sensitivity is particularly relevant during early childhood. The first years of life are characterized by rapid neurological, emotional, sensory, social, and relational development. During toddlerhood, children progressively acquire capacities related to emotional regulation, social engagement, sensory integration, and adaptive functioning while simultaneously becoming increasingly exposed to complex environmental demands.

Importantly, children do not respond uniformly to these developmental challenges. Some toddlers appear highly affected by sensory stimulation, emotional climates, interpersonal tensions, transitions, routines, and contextual changes, whereas others appear comparatively less reactive to the same environmental conditions. Such differences suggest that children vary substantially in their responsiveness to environmental experiences from very early developmental stages. During toddlerhood, these differences may become especially visible because children are simultaneously developing emotional regulation capacities while increasingly encountering environments characterized by novelty, sensory stimulation, social complexity, and separation from primary caregivers. Emotional and behavioral reactions during this developmental period may therefore provide particularly important insights into individual differences in environmental responsiveness.

Over recent decades, increasing attention has therefore been devoted to understanding the mechanisms underlying interindividual differences in environmental responsiveness. Developmental psychologists, psychiatrists, neuroscientists, and behavioral geneticists progressively began investigating why some individuals appear more sensitive to both adverse and supportive environmental influences than others. This line of inquiry led to the development of several interconnected theoretical models focused on environmental sensitivity and developmental plasticity.

2.1.1 Socio-Emotional Development Between 18 and 36 Months

The developmental period between 18 and 36 months represents a particularly significant stage in socio-emotional development. During this phase, children undergo rapid transformations in emotional awareness, relational functioning, communication abilities, autonomy, behavioral organization, and social engagement. At the same time, toddlers remain highly dependent on external regulation and emotionally responsive caregiving environments.

Developmental literature increasingly emphasizes that toddlerhood should not be conceptualized merely as a transitional phase between infancy and preschool age. Rather, it represents a foundational developmental period during which children begin constructing early forms of emotional understanding, self-awareness, interpersonal expectations, and regulatory capacities (Sroufe, 1996).

One of the most important developmental processes emerging during toddlerhood concerns the progressive differentiation and organization of emotional experiences. Compared to infancy, toddlers demonstrate increasing awareness of emotional states and begin expressing

a wider range of emotions through facial expressions, vocalizations, gestures, symbolic behaviors, and language. At the same time, emotional experiences during this stage are often characterized by high intensity and limited self-regulatory capacities. Frustration, separation distress, overstimulation, fear, excitement, anger, and emotional dependency frequently coexist with growing desires for autonomy and exploration.

Importantly, emotional development during toddlerhood occurs within highly relational contexts. Children continue relying heavily on caregivers and educators to help organize emotional experiences, reduce distress, and support regulation processes. Consequently, emotional development during this period cannot be understood independently from co-regulation and relational responsiveness.

The developmental emergence of self-awareness also becomes increasingly evident between 18 and 36 months. Toddlers progressively begin recognizing themselves as separate individuals with independent intentions, emotions, and desires. This developmental achievement contributes to increasing autonomy but may simultaneously generate emotional conflicts related to frustration, dependency, separation, and behavioral control.

During this stage, toddlers also experience significant advances in language development and symbolic communication. The emergence of language plays an especially important role in emotional development because it gradually allows children to express internal experiences, communicate needs, and participate in increasingly complex social interactions.

However, language abilities during toddlerhood remain relatively immature. Consequently, many emotional experiences continue to be expressed behaviorally through crying, aggression, withdrawal, emotional outbursts, oppositional behaviors, or dysregulation. This aspect is particularly relevant when considering environmental sensitivity because highly sensitive toddlers may express emotional overwhelm behaviorally before possessing sufficient verbal capacities to communicate internal distress effectively. Social development also expands rapidly during this period. Toddlers progressively develop greater awareness of peers, social interactions, emotional reciprocity, and interpersonal dynamics. Although parallel play remains common, children increasingly demonstrate curiosity toward peers and begin engaging in more emotionally complex social interactions.

Importantly, these social experiences may be particularly intense for highly sensitive toddlers. Group interactions often involve unpredictability, sensory stimulation, emotional contagion, frustration, and relational negotiation, all of which may strongly affect environmentally

sensitive children. Another major developmental process characterizing toddlerhood concerns separation and adaptation to environments outside the family system. Many children between 18 and 36 months begin attending childcare or educational settings during this period, requiring adaptation to unfamiliar routines, group environments, peer interactions, and separation from primary caregivers.

The transition into childcare environments may represent a particularly emotionally demanding experience for highly sensitive children because of heightened responsiveness to novelty, sensory stimulation, relational changes, and emotional climates. Sensitive toddlers may therefore require longer adaptation periods, greater relational predictability, and increased emotional support during transitions into educational contexts. At the same time, supportive educational environments may also represent important developmental opportunities for highly sensitive children. Emotionally responsive relationships with educators may facilitate emotional security, social confidence, regulation capacities, and adaptive functioning within group settings.

Importantly, developmental trajectories during toddlerhood are strongly influenced by the interaction between children's temperamental characteristics and environmental conditions. This interactional perspective aligns closely with Environmental Sensitivity frameworks emphasizing that developmental outcomes emerge through continuous interactions between individual responsiveness and contextual quality (Pluess, 2015; Greven et al., 2019).

From this perspective, toddlerhood represents a particularly relevant developmental period for studying SPS because environmental sensitivity may become increasingly visible through children's emotional, sensory, relational, and behavioral responses to rapidly expanding environmental demands.

2.1.2 Goodness of Fit and Temperament–Environment Interactions

One of the most influential concepts within temperament research concerns the notion of “goodness of fit,” originally proposed by Thomas and Chess (1977). This concept refers to the degree of compatibility between children's temperamental characteristics and the demands, expectations, and characteristics of their environments.

According to the goodness-of-fit perspective, developmental outcomes are influenced not only by children's temperamental traits themselves but also by how effectively environmental conditions accommodate and respond to those traits (Thomas & Chess, 1977).

Importantly, this perspective represented a major shift away from simplistic interpretations of temperament as inherently adaptive or maladaptive. Instead, the developmental significance of temperamental characteristics depends largely on the interaction between children and their environments. For example, a child characterized by high activity levels may function adaptively within environments allowing movement, exploration, and flexibility while experiencing difficulties within highly restrictive contexts. Similarly, highly sensitive children may function particularly well within emotionally responsive, predictable, and low-overstimulation environments while becoming overwhelmed within chaotic, emotionally dysregulated, or excessively stimulating settings.

The concept of goodness of fit is highly relevant for understanding SPS because environmental sensitivity appears especially dependent on contextual quality. Highly sensitive children may not experience difficulties because sensitivity itself is dysfunctional, but rather because certain environments fail to adequately support their emotional, sensory, or regulatory needs. Within supportive contexts characterized by emotional attunement, predictability, responsiveness, and appropriate stimulation levels, highly sensitive children may demonstrate empathy, attentiveness, emotional awareness, creativity, and strong relational functioning.

Conversely, environments characterized by excessive stimulation, emotional inconsistency, unpredictability, or limited relational responsiveness may increase emotional overwhelm, withdrawal, dysregulation, or stress among highly sensitive children. Importantly, the goodness-of-fit perspective strongly aligns with Differential Susceptibility and Environmental Sensitivity frameworks. Contemporary sensitivity theories increasingly emphasize that developmental outcomes emerge not from sensitivity alone but from the interaction between sensitivity and environmental quality (Belsky & Pluess, 2009; Pluess, 2015).

This perspective is particularly important within educational settings. Early childhood educational environments differ substantially in terms of:

- sensory stimulation,
- emotional climate,
- relational responsiveness,
- flexibility,

- routines,
- and individualized caregiving practices.

Consequently, educational environments may vary considerably in their capacity to support highly sensitive children.

Educators therefore play an especially important role in facilitating goodness of fit for environmentally sensitive toddlers. Emotionally responsive educators may help sensitive children regulate emotional arousal, tolerate stimulation, adapt to routines, and feel emotionally secure within group environments.

This may involve:

- providing predictable transitions,
- reducing excessive stimulation,
- offering emotional reassurance,
- supporting gradual adaptation,
- and recognizing children's individual sensory and emotional needs.

Importantly, goodness of fit does not imply eliminating all stress or stimulation from children's environments. Rather, it involves creating developmentally appropriate conditions supporting children's capacities for adaptation and regulation while respecting interindividual differences in environmental responsiveness.

From this perspective, understanding environmental sensitivity within educational settings requires considering not only children's characteristics but also the quality and responsiveness of the environments in which development occurs.

2.2 Environmental Sensitivity: Theoretical Perspectives

Environmental sensitivity broadly refers to interindividual differences in the capacity to perceive, process, and respond to environmental stimuli (Pluess, 2015). Although all individuals are influenced by their environments to some extent, empirical evidence consistently suggests that some individuals are substantially more responsive to contextual influences than others. Importantly, heightened responsivity appears to involve sensitivity not only to adverse environments but also to positive and supportive experiences.

Contemporary theories of environmental sensitivity emerged through contributions from developmental psychology, evolutionary theory, behavioral genetics, psychiatry, and neuroscience. Although these frameworks differ in terminology and explanatory emphasis, they converge around the assumption that individuals vary significantly in their responsiveness to environmental conditions.

2.2.1 Diathesis–Stress Model

One of the earliest and most influential frameworks addressing differential responsivity to environmental conditions was the diathesis–stress model. Emerging primarily from developmental psychopathology and psychiatric research, this perspective attempted to explain why some individuals appeared more vulnerable than others when exposed to stressful or adverse life experiences (Monroe & Simons, 1991).

According to the diathesis–stress perspective, individuals characterized by biological, psychological, or temperamental vulnerabilities are more likely to develop maladaptive outcomes when exposed to stressful environments. Within this framework, heightened sensitivity was conceptualized primarily in terms of vulnerability and risk. Environmental adversity was therefore viewed as particularly problematic for individuals characterized by elevated reactivity or pre-existing susceptibility factors.

Importantly, the diathesis–stress model represented a significant contribution to developmental research because it emphasized that developmental outcomes emerge through interactions between individual predispositions and environmental experiences rather than through environmental exposure alone. The model therefore contributed substantially to understanding variability in developmental psychopathology and individual differences in adaptation to stress. At the same time, however, the model remained largely deficit-oriented in its conceptualization of heightened sensitivity.

Highly reactive individuals were viewed primarily as vulnerable to negative outcomes under adverse conditions, whereas comparatively limited attention was devoted to the possibility that the same individuals might also benefit disproportionately from supportive environments. Over time, empirical findings increasingly challenged exclusively vulnerability-based interpretations of sensitivity. Researchers began observing that some highly reactive children not only demonstrated elevated risk within stressful environments but also showed exceptionally positive developmental outcomes within emotionally supportive and enriching contexts.

Such findings appeared difficult to reconcile fully with traditional diathesis–stress perspectives because the model primarily emphasized vulnerability rather than broader environmental responsiveness. These limitations contributed to the gradual emergence of broader theoretical frameworks conceptualizing heightened sensitivity not only as vulnerability but also as increased openness and responsivity to environmental conditions more generally.

2.2.2 Differential Susceptibility Theory

One of the most influential contemporary frameworks emerging from these theoretical developments is Differential Susceptibility Theory, which proposes that some individuals are generally more susceptible to environmental influences “for better and for worse” (Belsky, 1997; Belsky & Pluess, 2009).

Unlike traditional vulnerability-based approaches, Differential Susceptibility Theory suggests that highly susceptible individuals are not only more negatively affected by adverse experiences but also more positively influenced by supportive and enriching environments. Within this perspective, heightened sensitivity reflects increased developmental plasticity rather than exclusively vulnerability. This represented an important conceptual shift within developmental psychology. Rather than conceptualizing highly reactive children primarily as “at risk,” Differential Susceptibility Theory proposed that the same characteristics associated with vulnerability under adverse conditions may also confer enhanced capacity to benefit from positive relational and environmental experiences.

Importantly, the theory is strongly informed by evolutionary reasoning. According to this perspective, variability in environmental responsiveness may represent an adaptive developmental strategy maintained through natural selection because different levels of sensitivity may be advantageous under different environmental conditions (Belsky & Pluess, 2009). From this viewpoint, heightened sensitivity is not conceptualized as dysfunctional in itself but rather as a form of increased responsiveness to contextual quality.

The theory therefore shifted scientific attention away from purely pathological interpretations of sensitivity by emphasizing that heightened responsiveness may simultaneously increase vulnerability under adverse conditions and developmental benefits within supportive contexts. Consequently, developmental outcomes associated with heightened sensitivity appear to depend not solely on individual characteristics themselves but on the interaction between those characteristics and environmental quality. Differential Susceptibility Theory

also contributed substantially to contemporary developmental perspectives emphasizing plasticity, context-dependence, and interindividual variability in environmental responsiveness. This theoretical shift laid important foundations for later Environmental Sensitivity frameworks.

2.2.3 Biological Sensitivity to Context

Another influential framework emerging within this broader theoretical movement is Biological Sensitivity to Context, which focuses specifically on physiological and neurobiological responsiveness to environmental conditions (Boyce & Ellis, 2005).

Whereas Differential Susceptibility Theory primarily emphasized developmental plasticity and environmental responsiveness at the behavioral and developmental level, Biological Sensitivity to Context focused more specifically on underlying biological mechanisms potentially contributing to differential susceptibility. According to this perspective, individuals differ in the reactivity of stress-response systems, including autonomic, neuroendocrine, and immune functioning. Highly reactive individuals are thought to respond more strongly to environmental conditions overall, becoming particularly vulnerable within stressful contexts while simultaneously benefiting more substantially from supportive environments (Boyce & Ellis, 2005).

Importantly, this model conceptualizes heightened physiological reactivity not solely as pathology but as a form of biological responsiveness shaped through developmental experiences. Biological reactivity therefore becomes meaningful primarily in interaction with environmental conditions rather than as an isolated risk factor. Biological Sensitivity to Context contributed significantly to integrating biological, developmental, and contextual perspectives within environmental sensitivity research. It also reinforced the idea that heightened responsiveness should not automatically be interpreted negatively, since the same physiological characteristics associated with vulnerability in adverse contexts may also support adaptive functioning within supportive environments.

Together, Differential Susceptibility Theory and Biological Sensitivity to Context contributed to a broader reconceptualization of sensitivity as a context-dependent developmental characteristic associated with increased environmental responsiveness overall.

2.2.4 Vantage Sensitivity

More recently, the concept of Vantage Sensitivity was introduced to explain interindividual differences specifically in responsiveness to positive experiences (Pluess & Belsky, 2015). Whereas Differential Susceptibility Theory addresses responsiveness to both positive and negative environmental influences, Vantage Sensitivity focuses specifically on why some individuals benefit disproportionately from supportive experiences, positive relationships, and interventions.

The development of Vantage Sensitivity represented another important step away from exclusively deficit-oriented models of reactivity and vulnerability. Earlier theoretical frameworks focused predominantly on explaining why some individuals developed difficulties under adverse conditions. In contrast, Vantage Sensitivity emphasized that certain individuals may be especially capable of benefiting from emotionally supportive environments, positive educational experiences, therapeutic interventions, and protective relational conditions. Research within this framework suggests that highly sensitive individuals often demonstrate particularly positive responses to emotionally supportive relationships, interventions, and educational environments (Pluess & Boniwell, 2015).

These findings further reinforce the idea that heightened sensitivity should not be conceptualized exclusively in terms of vulnerability. Importantly, Vantage Sensitivity also contributed to expanding developmental research beyond psychopathology-oriented perspectives by emphasizing positive adaptation, flourishing, and developmental potential. This perspective aligns closely with contemporary approaches conceptualizing sensitivity as increased openness to environmental influences more broadly rather than as simple risk.

2.2.5 Environmental Sensitivity as an Integrative Framework

As empirical findings progressively converged, broader integrative frameworks capable of encompassing Differential Susceptibility, Biological Sensitivity to Context, Vantage Sensitivity, and related theories were increasingly proposed. Researchers progressively recognized that these perspectives shared a common underlying assumption: individuals differ substantially in the degree to which they perceive, process, and respond to environmental experiences. One influential contribution conceptualized Environmental

Sensitivity as an overarching framework integrating multiple theories concerned with interindividual differences in environmental responsiveness (Pluess, 2015).

Rather than treating Differential Susceptibility, Biological Sensitivity to Context, and Vantage Sensitivity as isolated theoretical models, Environmental Sensitivity frameworks conceptualize them as complementary perspectives addressing different aspects of the same broader phenomenon. Environmental Sensitivity has therefore been conceptualized as an umbrella framework integrating Differential Susceptibility, Biological Sensitivity to Context, and Sensory Processing Sensitivity theories (Pluess, 2015; Greven et al., 2019). Within this perspective, environmental sensitivity refers broadly to the capacity to perceive and process environmental stimuli, with individuals differing significantly in the degree to which they respond to contextual experiences.

Importantly, contemporary Environmental Sensitivity frameworks emphasize that heightened sensitivity increases responsiveness to both adverse and supportive conditions rather than functioning solely as vulnerability (Greven et al., 2019). Developmental outcomes are therefore understood as emerging through continuous interactions between individual responsiveness and environmental quality. Within this broader framework, Sensory Processing Sensitivity emerged as one of the most influential constructs specifically developed to operationalize environmental sensitivity at the psychological and behavioral level (Aron & Aron, 1997; Greven et al., 2019).

SPS provided researchers with a more directly observable and measurable construct through which environmental sensitivity could be investigated across developmental stages and relational contexts. More recent research has increasingly emphasized the importance of ecologically valid and multi-informant approaches for assessing environmental sensitivity across developmental contexts, including interview-based and school-context assessments (Kähkönen et al., 2024). These developments further reinforce contemporary perspectives conceptualizing environmental sensitivity as a context-dependent and relationally embedded developmental characteristic rather than a fixed and uniformly expressed trait.

2.2.6 Conceptual Differences Between Environmental Sensitivity Models

Although Diathesis–Stress, Differential Susceptibility, Biological Sensitivity to Context, Vantage Sensitivity, and Sensory Processing Sensitivity all address interindividual differences

in responsiveness to environmental conditions, these frameworks differ in important conceptual assumptions.

Traditional Diathesis–Stress models conceptualize heightened reactivity primarily as vulnerability, whereas Differential Susceptibility Theory conceptualizes sensitivity as increased developmental plasticity associated with responsiveness to both adverse and supportive environments (Belsky & Pluess, 2009). Similarly, Biological Sensitivity to Context focuses specifically on physiological responsiveness and stress-response systems, while Vantage Sensitivity emphasizes differential responsiveness to positive experiences and interventions (Boyce & Ellis, 2005; Pluess & Belsky, 2009). Environmental Sensitivity frameworks were later proposed as integrative approaches capable of encompassing these different models within a broader conceptual structure (Pluess, 2015; Greven et al., 2019). Importantly, Sensory Processing Sensitivity differs from these broader theoretical frameworks because it represents a specific psychological construct operationalizing environmental sensitivity at the behavioral and temperamental level (Aron & Aron, 1997). Overall, contemporary sensitivity research increasingly conceptualizes heightened responsiveness as a context-dependent developmental characteristic associated with both increased vulnerability and increased developmental potential.

2.2.7 Critiques and Debates Within SPS Research

Despite the increasing popularity of SPS and Environmental Sensitivity research, several conceptual and methodological debates remain present within the literature.

One important critique concerns the overlap between SPS and related personality constructs such as neuroticism, introversion, behavioral inhibition, and negative emotionality. However, empirical findings generally support the distinctiveness of SPS despite moderate correlations with related personality dimensions (Greven et al., 2019).

Another important debate concerns the dimensional versus categorical nature of environmental sensitivity. Although contemporary literature generally conceptualizes sensitivity as dimensional, the increasing use of orchid–tulip–dandelion models has sometimes contributed to oversimplified categorizations of children into fixed sensitivity types. Researchers therefore emphasize that such categories should be interpreted cautiously

and understood as heuristic representations rather than rigid classifications (Lionetti et al., 2018; Greven et al., 2019).

Methodological limitations also remain important within SPS research. Much of the literature relies heavily on self-report and parent-report measures, potentially increasing the influence of subjective bias and contextual interpretation. This issue appears especially relevant during childhood, where sensitivity may manifest differently across home, educational, and social environments. Recent studies have therefore increasingly emphasized the importance of multi-informant and interview-based approaches capable of capturing context-specific manifestations of environmental sensitivity across developmental settings (Kähkönen et al., 2024).

Another limitation concerns the relative scarcity of observational studies investigating environmental sensitivity during early developmental stages. Although SPS has increasingly been studied among school-age children and adolescents, comparatively limited research has focused specifically on toddlers and early educational contexts. Cross-cultural considerations also remain relatively underdeveloped because most SPS studies have been conducted within Western populations, raising questions regarding the universality of current conceptualizations of environmental sensitivity. Despite these limitations, contemporary literature increasingly supports the developmental relevance and scientific validity of SPS and Environmental Sensitivity frameworks (Greven et al., 2019).

2.3. Sensory Processing Sensitivity (SPS)

2.3.1 Origins of the SPS Construct

Sensory Processing Sensitivity (SPS) was originally introduced as a biologically based individual difference reflecting heightened sensitivity to environmental stimuli (Aron & Aron, 1997). The construct emerged from observations that some individuals appeared more deeply affected by sensory, emotional, interpersonal, and contextual experiences than others. Importantly, SPS was proposed as a distinct temperament trait rather than merely a manifestation of introversion, shyness, or emotional instability.

According to the original conceptualization, highly sensitive individuals tend to process information more deeply, demonstrate heightened awareness of environmental subtleties, respond more intensely to emotional experiences, and become more easily overstimulated

under conditions of excessive stimulation (Aron & Aron, 1997). SPS represented an important conceptual shift by framing heightened responsiveness as a potentially adaptive characteristic associated with deeper environmental processing rather than solely as vulnerability or pathology (Aron & Aron, 1997).

To operationalize the construct, the Highly Sensitive Person Scale (HSP Scale) was developed as the first psychometric instrument specifically designed to assess individual differences in environmental sensitivity (Aron & Aron, 1997). Initial findings suggested that approximately 15–20% of the population could be characterized by particularly high levels of sensitivity. Over time, SPS progressively became one of the most influential constructs within Environmental Sensitivity literature and stimulated increasing research across developmental psychology, neuroscience, psychiatry, genetics, and education (Greven et al., 2019).

2.3.2 Core Characteristics of SPS

Contemporary conceptualizations describe SPS as a multidimensional temperament trait characterized by depth of processing, emotional responsiveness, awareness of subtleties, empathy, and ease of overstimulation (Aron et al., 2012; Greven et al., 2019).

One of the central characteristics of SPS concerns depth of processing. Highly sensitive individuals tend to process environmental information more thoroughly and reflectively than less sensitive individuals, engaging in more elaborate cognitive and emotional processing of experiences (Aron et al., 2012). This deeper processing may involve heightened attention to contextual nuances, emotional subtleties, interpersonal dynamics, and sensory details.

Another defining feature of SPS is increased emotional responsiveness. Individuals high in SPS frequently report stronger reactions to emotionally salient experiences and appear more responsive to interpersonal interactions, sensory stimulation, and emotional climates (Greven et al., 2019). Highly sensitive individuals often react strongly to interpersonal conflict, criticism, overstimulation, and emotionally intense situations while also deriving substantial benefits from supportive relationships and positive emotional experiences (Aron et al., 2012).

Highly sensitive individuals also tend to demonstrate greater awareness of environmental subtleties, including changes in emotional atmospheres, tones of voice, facial expressions, and interpersonal dynamics (Aron & Aron, 1997). Such heightened awareness may contribute to empathy and increased sensitivity to relational contexts. Finally, SPS is characterized by

ease of overstimulation. Because highly sensitive individuals process environmental information deeply and respond intensely to stimulation, they may become overwhelmed more easily under conditions involving excessive sensory, emotional, or social input (Greven et al., 2019). Together, these dimensions contribute to understanding SPS as a multidimensional temperament trait shaped by the interaction between individual responsiveness and environmental conditions.

2.3.3 SPS as a Distinct Temperament Trait

An important issue within SPS literature concerns its distinction from related constructs such as introversion, shyness, neuroticism, and psychopathology. Although SPS partially overlaps with introversion and behavioral inhibition, the constructs are not identical (Aron & Aron, 1997). SPS includes broader dimensions related to emotional processing, sensory awareness, empathy, and responsiveness to environmental stimuli.

Similarly, SPS differs from shyness and behavioral inhibition. Shyness generally refers to fear or discomfort in social situations, whereas SPS concerns heightened responsiveness to environmental experiences more broadly.

Highly sensitive individuals may react strongly to sensory stimulation, emotional climates, or relational dynamics independently of social fearfulness. Another important distinction concerns neuroticism. Neuroticism primarily reflects tendencies toward negative emotionality and emotional instability, whereas SPS involves responsiveness to both positive and negative experiences (Greven et al., 2019). Consequently, SPS should not be conceptualized exclusively as vulnerability or emotional dysfunction.

SPS has also been distinguished from psychopathology. Although heightened sensitivity may increase vulnerability under stressful or overstimulating conditions, SPS itself is not considered a disorder (Greven et al., 2019). Rather, it represents a temperament trait associated with increased environmental responsiveness. This distinction is particularly relevant in developmental and educational contexts, where highly sensitive children may sometimes be misunderstood as anxious or behaviorally dysregulated rather than environmentally sensitive.

2.3.4 SPS Across Development

Although SPS was initially studied primarily in adults, increasing research has progressively extended the construct to childhood and adolescence. Developmental studies suggest that environmental sensitivity can be observed early in life through emotional, sensory, behavioral, and relational patterns (Pluess et al., 2018; Lionetti et al., 2019).

Highly sensitive children often appear more emotionally reactive, more attentive to environmental subtleties, and more responsive to contextual and interpersonal changes than less sensitive peers. Importantly, manifestations of sensitivity may vary depending on developmental stage, environmental conditions, and relational contexts.

During infancy and toddlerhood, heightened sensitivity may manifest through strong emotional reactions, sensory sensitivities, and increased responsiveness to environmental stimulation. Research also suggests that highly sensitive children may demonstrate stronger responsiveness to parenting quality, emotional climates, educational contexts, and relational experiences (Slagt et al., 2018; Lionetti et al., 2019). Importantly, SPS appears relatively stable across development while still being shaped by environmental experiences.

Developmental studies increasingly emphasize the importance of examining sensitivity within ecologically meaningful contexts, recognizing that manifestations of SPS may differ substantially across home, educational, relational, and social environments.

2.3.5 Dimensional and Categorical Perspectives on SPS

Another important issue within SPS literature concerns whether environmental sensitivity should be conceptualized as a continuous dimension or as a categorical characteristic distinguishing highly sensitive individuals from non-sensitive individuals.

Contemporary evidence generally supports a dimensional conceptualization of sensitivity, suggesting that environmental sensitivity is distributed along a continuum throughout the population (Greven et al., 2019). Individuals therefore differ in the degree rather than the presence or absence of sensitivity. At the same time, more recent studies have identified distinguishable sensitivity profiles within this continuum. One particularly influential contribution was provided through latent class analyses identifying three sensitivity groups commonly referred to as orchids, tulips, and dandelions (Lionetti et al., 2018).

Within this framework, orchid children appear highly responsive to environmental quality, flourishing within supportive environments while demonstrating increased vulnerability within adverse contexts. Dandelion children appear comparatively resilient and less affected by contextual variability, whereas tulip children occupy an intermediate position between these extremes (Lionetti et al., 2018). Importantly, these profiles should not be interpreted as rigid categories but rather as patterns within a broader continuum of environmental sensitivity. This model contributed significantly to developmental sensitivity research by emphasizing that children differ substantially in their responsiveness to emotional, sensory, relational, and educational experiences.

2.3.6 Contemporary Developmental Perspectives on SPS

Recent years have witnessed substantial expansion in developmental research on SPS, particularly through the work of Lionetti and colleagues. These contributions have played a major role in refining contemporary conceptualizations of sensitivity by integrating developmental, relational, emotional, and contextual perspectives.

Contemporary developmental findings increasingly suggest that environmental sensitivity may manifest through multiple emotional, sensory, behavioral, and relational patterns rather than through a single identifiable profile (Lionetti et al., 2018; Lionetti et al., 2019). Highly sensitive children may demonstrate heightened emotional, sensory, and relational responsiveness across developmental contexts.

Importantly, manifestations of sensitivity may vary substantially depending on contextual conditions. A highly sensitive child may appear emotionally regulated and socially engaged within supportive environments while simultaneously becoming overwhelmed or withdrawn within emotionally dysregulated or highly stimulating contexts.

Developmental studies also suggest that highly sensitive children may be particularly responsive to caregiving quality. Parenting behaviors, emotional climates, caregiver responsiveness, and relational consistency appear to influence sensitive children more strongly than less sensitive peers (Lionetti et al., 2019; Slagt et al., 2018).

Recent research has further emphasized the interaction between SPS, attachment representations, and emotion regulation competencies (Sperati et al., 2024). Findings suggest that emotional outcomes associated with SPS are strongly shaped by relational experiences.

Highly sensitive children characterized by positive attachment representations demonstrated more adaptive emotional regulation competencies, whereas less supportive relational representations were associated with greater emotional difficulties.

Another important contribution of contemporary developmental research concerns the increasing emphasis on observational and context-sensitive assessment approaches. Earlier SPS research relied predominantly on self-report and parent-report methodologies; however, recent perspectives increasingly recognize that environmental sensitivity may manifest differently across contexts and therefore requires ecologically valid observational approaches (Lionetti et al., 2019).

This issue appears especially relevant during toddlerhood, when children's verbal capacities remain limited and emotional experiences are frequently expressed behaviorally rather than verbally. Observational approaches may therefore provide particularly valuable insights into manifestations of environmental sensitivity during early childhood.

Contemporary developmental perspectives increasingly conceptualize sensitivity not simply as a vulnerability factor but as a developmental characteristic associated with heightened openness to environmental influences overall (Lionetti et al., 2018; Greven et al., 2019). Consequently, emotionally responsive environments may play a particularly important role in shaping developmental outcomes among highly sensitive children.

While the previous sections focused primarily on SPS as a temperament trait and developmental construct, the following section examines the neurobiological and genetic mechanisms potentially underlying individual differences in environmental sensitivity.

2.4 Neurobiological and Genetic Foundations of Sensory Processing Sensitivity

One of the most important developments in contemporary SPS research concerns the investigation of the neurobiological and genetic mechanisms potentially underlying environmental sensitivity. Although SPS was initially conceptualized primarily at the behavioral and psychological level, more recent studies have explored whether heightened sensitivity may also reflect differences in neural processing, physiological responsivity, and biological reactivity (Aron et al., 2012; Greven et al., 2019).

Current theoretical perspectives suggest that highly sensitive individuals may possess a more reactive and responsive nervous system, leading to deeper processing of sensory, emotional, and interpersonal information (Aron et al., 2012; Greven et al., 2019). Contemporary literature conceptualizes these biological differences not as pathological abnormalities but as naturally occurring interindividual variability in environmental responsiveness.

Neuroscientific studies have provided support for the hypothesis that highly sensitive individuals process environmental stimuli differently from less sensitive individuals. Neuroimaging findings have shown increased activation in brain regions associated with emotional processing, empathy, awareness, attention, and sensory integration among individuals scoring high on SPS measures (Acevedo et al., 2014).

Similarly, contemporary reviews have linked SPS to cognitive, emotional, and sensory processing mechanisms in the brain, suggesting that heightened awareness of subtleties and increased emotional responsiveness may reflect enhanced neural sensitivity to environmental input (Greven et al., 2019).

Research has also examined possible genetic contributions to environmental sensitivity. Current evidence suggests that SPS is moderately heritable and may involve multiple genetic systems associated with emotional and environmental responsivity (Greven et al., 2019). However, environmental sensitivity cannot be reduced to the presence of a single “sensitivity gene.” Rather, SPS likely reflects the interaction of multiple genetic, neurobiological, developmental, and environmental processes.

Importantly, Environmental Sensitivity frameworks do not conceptualize biology as deterministic. Biological predispositions interact continuously with environmental experiences across development, influencing responsiveness to relational, emotional, sensory, and contextual conditions without directly determining developmental outcomes.

This interactional perspective appears particularly relevant during childhood, when environmental experiences strongly shape emotional and developmental functioning. At the same time, heightened sensitivity should not be pathologized. Although highly sensitive individuals may become more easily overwhelmed under highly stimulating conditions, the same biological responsiveness may also contribute to empathy, attentiveness, emotional awareness, and deep processing (Aron et al., 2012).

Consequently, neurobiological findings reinforce one of the central assumptions of Environmental Sensitivity frameworks: sensitivity amplifies responsiveness to environmental quality overall rather than functioning solely as a vulnerability factor (Pluess, 2015; Greven et al., 2019).

2.5 Sensory Processing Sensitivity, Emotional Reactivity, and Emotion Regulation

One of the most developmentally relevant aspects of SPS concerns emotional functioning. A growing body of research suggests that highly sensitive individuals tend to experience emotional events more intensely and respond more strongly to emotionally salient stimuli (Aron et al., 2012; Greven et al., 2019). Importantly, emotional reactivity should not automatically be interpreted as maladaptive. Emotional responsiveness may facilitate empathy, emotional awareness, interpersonal understanding, and social connectedness.

At the same time, heightened emotional processing may increase vulnerability to emotional overwhelm under highly stimulating or stressful conditions. Research involving adults consistently demonstrates associations between SPS and stronger emotional responses to interpersonal conflict, sensory overload, criticism, social evaluation, and emotionally intense situations (Aron et al., 2012). However, highly sensitive individuals also appear particularly responsive to positive emotional experiences, emotionally supportive relationships, and aesthetic experiences.

These findings align with Differential Susceptibility frameworks suggesting that sensitivity increases responsiveness to environmental influences overall rather than exclusively to adverse experiences (Belsky & Pluess, 2009).

The relationship between SPS and emotion regulation has become increasingly important within developmental research. Emotion regulation generally refers to the processes through which individuals monitor, modulate, and manage emotional experiences and expressions (Gross, 1998). During childhood, regulation capacities progressively develop through interactions among neurological maturation, relational experiences, and environmental support.

Highly sensitive children may encounter particular challenges in emotion regulation because of the intensity with which they process emotional and sensory information. Greater

awareness of emotional cues, heightened arousal, and deeper processing of experiences may increase the complexity of regulating emotional responses effectively.

At the same time, contemporary literature increasingly emphasizes that emotional outcomes associated with SPS are strongly influenced by environmental quality. Sensitive children may demonstrate increased emotional difficulties within stressful or inconsistent environments while simultaneously showing adaptive emotional functioning within supportive contexts (Greven et al., 2019).

Several developmental studies support this perspective. For example, highly sensitive preschool children have been shown to respond more strongly to variations in parenting quality than less sensitive peers (Slagt et al., 2018). Negative caregiving environments were associated with increasing behavioral difficulties, whereas supportive caregiving contexts predicted particularly positive developmental outcomes among highly sensitive children. Similarly, SPS has been found to moderate the effects of parenting quality on both internalizing and externalizing behaviors during childhood, suggesting that highly sensitive children are especially responsive to caregiving environments (Lionetti et al., 2019).

An especially important contribution in this area was provided through research examining the interaction between SPS, attachment representations, and emotion regulation competencies in school-age children (Sperati et al., 2024). Findings suggested that emotional regulation difficulties were not predicted by SPS alone. Instead, environmental sensitivity interacted significantly with children's relational representations. Highly sensitive children characterized by less supportive attachment representations demonstrated poorer emotional regulation competencies, whereas highly sensitive children with positive attachment representations showed more adaptive emotional functioning. These findings reinforce the idea that emotional outcomes associated with SPS emerge through the interaction between individual sensitivity and environmental quality rather than from sensitivity alone.

2.5.1 Developmental Emergence of Emotion Regulation During Toddlerhood

The developmental period between 18 and 36 months represents a particularly important phase for the emergence of emotion regulation capacities. During toddlerhood, children progressively acquire increasing abilities related to emotional expression, attentional control, frustration tolerance, behavioral organization, and social adaptation. At the same time, toddlers remain highly dependent on adults for emotional support and co-regulation.

Consequently, emotion regulation during early childhood should not be conceptualized solely as an intrapersonal process but rather as a developmental achievement emerging through repeated relational experiences. The transition from infancy to toddlerhood is characterized by substantial developmental changes. Children progressively develop greater motor autonomy, expanding language abilities, and increasing social awareness. However, these newly emerging capacities are often accompanied by heightened emotional intensity and relatively immature self-regulatory abilities.

Toddlers frequently experience frustration related to separation from caregivers, transitions between activities, sensory overstimulation, difficulties communicating needs, and social conflicts. Because regulatory capacities are still developing, young children often rely heavily on emotionally responsive adults to organize emotional experiences and reduce distress. Within this developmental context, environmental sensitivity becomes particularly relevant. Highly sensitive toddlers may perceive emotional, sensory, and interpersonal experiences more intensely and therefore become more easily overwhelmed under highly stimulating conditions.

They may react strongly to loud noises, crowded environments, abrupt transitions, emotional tension, or changes in routines while simultaneously responding particularly positively to emotionally attuned interactions and predictable environments. Developmental literature increasingly suggests that emotion regulation capacities emerge through repeated experiences of co-regulation. Emotionally responsive caregivers help children identify emotions, reduce distress, regulate arousal, and gradually internalize regulatory strategies. Consequently, highly sensitive toddlers may be especially dependent on emotionally attuned caregiving relationships because of their heightened responsiveness to environmental stimulation.

This perspective strongly aligns with Environmental Sensitivity frameworks proposing that highly sensitive individuals are more strongly affected by contextual quality overall (Belsky & Pluess, 2009; Pluess, 2015). While the previous section focused primarily on emotional functioning and regulation processes associated with SPS, the following section examines the relational contexts through which regulation capacities develop, with particular attention to attachment and co-regulation processes during early childhood.

2.6 Attachment, Co-Regulation, and Relational Contexts

Attachment theory represents one of the most influential developmental frameworks for understanding the role of early relationships in shaping emotional regulation, socio-emotional functioning, and psychological development (Bowlby, 1969). According to attachment theory, children develop internal working models of relationships based on early interactions with caregivers. These internal representations influence children's expectations regarding emotional availability, relational safety, support, and interpersonal responsiveness (Bowlby, 1969).

Sensitive and emotionally responsive caregiving relationships contribute to secure attachment and support the development of emotional regulation capacities, whereas inconsistent, neglectful, or emotionally dysregulated caregiving may contribute to insecurity and emotional difficulties (Ainsworth et al., 1978).

The relationship between SPS and attachment has received increasing empirical attention within recent developmental literature. Although SPS is conceptualized as a biologically grounded temperament trait, contemporary research increasingly suggests that relational environments strongly influence how sensitivity manifests across development. Highly sensitive children appear particularly responsive to caregiving quality because they process emotional and interpersonal information deeply.

Consequently, caregiver availability, emotional attunement, relational consistency, and emotional climates may play especially important roles in shaping developmental outcomes among sensitive children. Research examining the interaction between attachment representations and SPS suggests that relational experiences significantly influence emotional regulation competencies among highly sensitive children (Sperati et al., 2024). Highly sensitive children exposed to supportive attachment relationships demonstrated more adaptive emotional functioning, whereas less supportive relational representations were associated with greater emotional difficulties.

Importantly, attachment-related processes appear especially relevant during toddlerhood. Children between 18 and 36 months are still developing foundational capacities related to emotional regulation, interpersonal trust, behavioral organization, and social adaptation. During this developmental stage, children remain highly dependent on adults to help regulate emotional arousal and manage stressful experiences. Highly sensitive toddlers may therefore be particularly dependent on emotionally responsive co-regulation processes. Predictable

routines, emotionally attuned caregiving, and supportive emotional climates may help reduce overstimulation and facilitate adaptive emotional functioning, whereas emotionally chaotic or inconsistent environments may contribute to emotional dysregulation.

Importantly, attachment and co-regulation processes are not restricted exclusively to parent–child relationships. As toddlers progressively enter educational settings, educators increasingly become important relational figures involved in emotional support and regulation processes.

2.6.1 Co-Regulation and the Role of Educators in Early Childhood Settings

Contemporary developmental literature increasingly recognizes that co-regulation processes also occur within educational and caregiving environments. As toddlers progressively enter childcare settings, educators become important relational figures involved in emotional support, regulation processes, and socio-emotional development. During early childhood, educators frequently help children navigate emotionally demanding experiences including separation from caregivers, peer conflicts, frustration, sensory overload, transitions, and adaptation to routines.

Co-regulation within educational settings may therefore be especially important for highly sensitive children, who process emotional and sensory experiences more intensely and may require greater emotional attunement, predictability, and relational support during stressful situations. Emotionally responsive educators may help sensitive children regulate emotional arousal, tolerate frustration, adapt to transitions, and develop feelings of emotional safety within group environments. Conversely, emotionally dysregulated or highly chaotic educational environments may increase emotional overwhelm among highly sensitive toddlers. Educational settings are also characterized by substantial sensory and social complexity.

Compared to home environments, childcare contexts often involve continuous social interaction, multiple simultaneous stimuli, background noise, group routines, rapid transitions, and reduced individualized attention. Such environments may therefore be particularly demanding for children characterized by heightened environmental sensitivity.

At the same time, supportive educational contexts may provide especially positive developmental opportunities for highly sensitive children. Warm educator–child

relationships, emotionally responsive caregiving, predictable routines, and individualized approaches may facilitate emotional security, empathy, attentiveness, and adaptive functioning. Importantly, educators may also occupy a uniquely valuable observational position. Unlike parents, educators observe children across group contexts involving peer interactions, frustration tolerance, sensory stimulation, emotional regulation, and relational adaptation. Consequently, some manifestations of environmental sensitivity may become particularly visible within educational environments rather than home settings.

For example, educators may observe overstimulation during group activities, heightened distress during transitions, emotional sensitivity to peer conflicts, sensory discomfort, or withdrawal within chaotic environments. Educational settings therefore represent not only important developmental contexts but also ecologically meaningful environments for observing manifestations of environmental sensitivity during early childhood.

2.7 Sensory Processing Sensitivity in Early Childhood Educational Settings

The developmental period between 18 and 36 months represents a particularly important phase for studying environmental sensitivity. During toddlerhood, children experience rapid neurological, emotional, social, cognitive, and relational development while simultaneously adapting to increasingly complex environmental demands. Importantly, toddlers progressively encounter environments outside the family context, particularly educational and childcare settings. These environments expose children to group interactions, transitions between activities, sensory stimulation, peer negotiation, structured routines, separation from caregivers, and relational interactions with educators. Such experiences may be especially significant for highly sensitive children.

From an ecological perspective, childcare environments represent highly complex developmental contexts in which emotional, sensory, social, and relational experiences occur simultaneously. Compared to home environments, educational settings are characterized by greater group complexity, increased sensory stimulation, continuous interpersonal interactions, and reduced opportunities for individualized regulation. Consequently, manifestations of environmental sensitivity may become particularly visible within educational contexts.

Educational environments may represent both important developmental opportunities and potential sources of overstimulation. Highly sensitive toddlers may react intensely to crowded spaces, abrupt transitions, emotionally dysregulated environments, or high levels of sensory stimulation within group contexts. At the same time, emotionally supportive educational environments may facilitate emotional security, empathy, attentiveness, social competence, and adaptive regulation among highly sensitive children. Group dynamics appear especially important in this regard. Within childcare settings, toddlers are frequently required to navigate emotionally complex interpersonal situations involving peer interactions, waiting for attention, negotiating shared spaces, tolerating interruptions, adapting to collective routines, and responding to the emotional behaviours of other children. Such situations may be particularly demanding for highly sensitive toddlers because of their heightened responsiveness to emotional climates, interpersonal tensions, unpredictability, and sensory stimulation.

Research increasingly emphasises the importance of emotionally responsive educational contexts in supporting socio-emotional development. Warm, predictable, and emotionally attuned educator-child relationships may therefore play a particularly important role in helping sensitive children regulate emotional arousal and adapt successfully to group environments. This perspective is consistent with research on teacher-child interactions, which has demonstrated that high-quality interactions between educators and young children promote children's emotional security, behavioural regulation, and social competence (Pianta, 1999; Pianta et al., 2008). Within the Classroom Assessment Scoring System (CLASS), Pianta and colleagues conceptualise emotionally supportive educator-child interactions as a central feature of effective early childhood education, emphasising educators' sensitivity and responsiveness to children's emotional and developmental needs (Pianta, La Paro, & Hamre, 2008). Although the CLASS framework was developed to evaluate the quality of educational interactions rather than individual child characteristics, it provides an important theoretical rationale for considering educators as reliable observers of children's everyday behavioural functioning. Through repeated interactions across daily routines, educators become familiar with children's typical behavioural patterns and are therefore well positioned to recognise consistent individual differences in emotional, social, and behavioural responses within natural educational environments.

Educational settings also provide valuable opportunities for observing manifestations of environmental sensitivity. Educators interact with children daily across situations involving

sensory stimulation, emotional demands, peer interactions, transitions, routines, frustration tolerance, and social adaptation. Consequently, educators may observe aspects of sensitivity that are less visible within home environments. Recent research has increasingly highlighted the importance of integrating educator and school-context perspectives into the assessment of environmental sensitivity across developmental settings (Kähkönen et al., 2024).

For example, educators may notice heightened distress during transitions, sensitivity to sensory input, emotional overwhelm within group settings, strong empathy toward peers, cautiousness in unfamiliar situations, or withdrawal within emotionally chaotic environments. Furthermore, educators frequently observe children in comparison with peers of similar developmental age, potentially facilitating recognition of interindividual differences in environmental responsiveness.

Importantly, manifestations of environmental sensitivity may differ substantially between home and educational contexts. Some children may appear emotionally regulated within familiar and predictable family environments while becoming overwhelmed within group settings characterised by novelty, sensory load, peer interactions, and reduced individualized attention. Conversely, some highly sensitive toddlers may demonstrate strong attentiveness, empathy, and adaptive engagement within emotionally supportive educational environments despite showing greater reactivity in other contexts. These contextual differences further reinforce the importance of ecologically sensitive and multi-informant approaches to understanding environmental sensitivity during toddlerhood.

Despite the developmental importance of educational settings, much of the existing SPS literature has focused predominantly on parent-report measures and family environments. Comparatively limited research has examined how sensitivity manifests specifically within early educational contexts during toddlerhood. This limitation appears particularly important considering that toddlers spend increasing amounts of time within childcare environments during a developmental period characterised by rapid emotional, sensory, and relational development. Consequently, understanding how SPS manifests within educational settings may contribute to more individualised caregiving practices, prevention of overstimulation, emotionally responsive educational approaches, and the promotion of socio-emotional well-being among highly sensitive children.

2.7.1 Sensory Stimulation and Overstimulation in Childcare Environments

Within early childhood educational settings, sensory stimulation represents one of the primary pathways through which individual differences in Sensory Processing Sensitivity become observable. Compared to home environments, childcare contexts are often characterised by substantially higher levels of sensory, emotional, and social stimulation. Young children are frequently exposed to continuous background noise, group interactions, rapid transitions, visual stimulation, physical proximity to peers, emotionally intense situations, and multiple simultaneous environmental demands. Although such experiences may support social learning and developmental growth, they may also represent important sources of overstimulation for highly sensitive children.

The sensory load associated with childcare environments is particularly relevant for understanding how Sensory Processing Sensitivity manifests during early childhood. Unlike home environments, where sensory stimulation is often more predictable and can be individually regulated, educational settings require toddlers to process multiple simultaneous sensory, emotional, and interpersonal experiences. Noise levels, movement, transitions, collective activities, emotional contagion, and limited opportunities for withdrawal may cumulatively increase emotional and physiological arousal among highly sensitive children.

Overstimulation generally refers to situations in which environmental input exceeds an individual's regulatory capacities. Because highly sensitive children process environmental information more deeply and respond more intensely to stimulation, they may become overwhelmed more easily within highly stimulating settings (Aron et al., 2012; Greven et al., 2019). Rather than reflecting an inherent vulnerability, overstimulation can be understood as the outcome of a mismatch between the intensity of environmental demands and the child's capacity to regulate sensory and emotional input at a particular moment.

Importantly, overstimulation may manifest behaviourally in different ways. Some highly sensitive toddlers may become emotionally dysregulated, irritable, impulsive, or tearful, whereas others may respond through withdrawal, avoidance, freezing, or reduced social engagement. Within childcare environments, overstimulation may occur during group activities, transitions, emotionally chaotic situations, or prolonged sensory exposure. Highly sensitive children may also demonstrate heightened responsiveness to emotional contagion within group settings. Emotional tensions, peer conflicts, crying children, or emotionally

dysregulated environments may strongly affect sensitive toddlers because of their increased awareness of emotional and interpersonal cues.

Group environments may therefore amplify emotional and sensory demands in ways that are particularly significant for environmentally sensitive children. Importantly, overstimulation should not be interpreted simply as behavioural difficulty or poor adaptation. Rather, it may reflect the interaction between heightened environmental sensitivity and demanding sensory or emotional contexts. This distinction is especially important because highly sensitive children may otherwise be misunderstood as oppositional, anxious, dysregulated, or socially withdrawn when they may instead be experiencing excessive sensory or emotional overload.

Educational environments characterised by predictable routines, emotionally responsive caregiving, lower levels of environmental chaos, and opportunities for emotional regulation may therefore be particularly important for highly sensitive toddlers. Strategies such as gradual transitions, emotionally predictable routines, quiet spaces, individualised emotional support, and responsive co-regulation practices may help reduce overstimulation and support adaptive functioning. The importance of such responsive educational practices is consistent with Pianta's conceptualisation of emotionally supportive educator-child interactions, which emphasises educators' sensitivity and responsiveness to children's individual emotional and developmental needs (Pianta et al., 2008). Within this perspective, educators not only promote children's learning but also provide the relational support that enables young children to regulate emotional arousal and adapt successfully to challenging educational environments.

Importantly, supportive educational environments do not necessarily imply the absence of stimulation. Rather, developmentally appropriate educational contexts involve balancing stimulating learning experiences with opportunities for emotional safety, co-regulation, and secure educator-child relationships. For highly sensitive toddlers, optimal development is therefore not achieved by eliminating sensory experiences but by ensuring that stimulation occurs within emotionally supportive and predictable relational contexts.

Understanding overstimulation within childcare settings is therefore essential for studying Sensory Processing Sensitivity during toddlerhood. Educational environments represent major developmental contexts in which sensitivity-related behaviours become particularly visible while simultaneously offering opportunities for supportive educator-child interactions that may buffer the effects of excessive sensory and emotional stimulation. Consequently,

recognising overstimulation as an expression of individual differences in environmental sensitivity, rather than as behavioural maladjustment, may contribute to more responsive educational practices, more accurate identification of highly sensitive children, and the development of educational environments that support the well-being and adaptive functioning of all children.

2.8 Assessment of Sensory Processing Sensitivity

The increasing empirical interest in Sensory Processing Sensitivity (SPS) has generated growing attention toward the development of reliable and valid assessment methods capable of identifying individual differences in environmental responsiveness across developmental stages. The first instrument specifically developed to assess SPS was the Highly Sensitive Person Scale (HSP Scale), introduced to operationalize environmental sensitivity as a measurable temperament trait (Aron & Aron, 1997).

The scale included dimensions related to emotional responsiveness, awareness of subtleties, depth of processing, sensory sensitivity, and ease of overstimulation. The development of the HSP Scale represented an important contribution because it transformed SPS from a predominantly descriptive construct into an empirically measurable dimension of individual variability (Aron & Aron, 1997; Greven et al., 2019).

Subsequent research supported the psychometric validity of the construct and contributed substantially to legitimizing SPS as an empirical domain of developmental and personality research (Greven et al., 2019). Over time, increasing empirical evidence suggested that environmental sensitivity could also be observed during childhood and adolescence through emotional, sensory, behavioral, and relational patterns. As interest in developmental manifestations of SPS progressively increased, assessment tools were adapted for younger populations. One of the most important developments in this area was the introduction of the Highly Sensitive Child Scale (HSC Scale), designed to assess environmental sensitivity among children and adolescents (Pluess et al., 2018).

The development of the HSC Scale represented a significant advancement in developmental sensitivity research because it allowed researchers to investigate SPS within childhood populations using developmentally appropriate measures. Importantly, studies using the HSC Scale also contributed to identifying different sensitivity profiles among children, including

low-sensitive, medium-sensitive, and high-sensitive groups, commonly conceptualized through the orchid–tulip–dandelion framework (Lionetti et al., 2018).

These findings reinforced the conceptualization of environmental sensitivity as a measurable developmental characteristic associated with differential responsiveness to environmental conditions. At the same time, contemporary literature increasingly emphasizes that the assessment of SPS presents important methodological and conceptual challenges.

One major limitation concerns the strong reliance on self-report and parent-report methodologies within SPS research. Although these approaches provide valuable information regarding emotional responsiveness, sensory sensitivities, and behavioral tendencies, they may also be influenced by subjective interpretations, parental expectations, emotional stress, cultural beliefs, and contextual biases. This issue becomes particularly relevant during early childhood. Parents primarily observe children within family environments and may not fully capture how sensitivity manifests across broader ecological contexts such as educational settings, peer interactions, group routines, or emotionally demanding social situations. Furthermore, children aged 18–36 months are still developing verbal communication and reflective capacities. Consequently, highly sensitive toddlers may express emotional overwhelm behaviorally rather than verbally through crying, withdrawal, irritability, clinginess, emotional outbursts, avoidance, or dysregulated behaviors. Importantly, such manifestations may vary significantly depending on contextual conditions. For example, a child who appears emotionally regulated at home may become overwhelmed within highly stimulating group environments characterized by sensory overload, peer interactions, transitions, and emotionally complex situations.

Similarly, some children may demonstrate heightened sensitivity specifically during social interactions, separation experiences, educational routines, or emotionally intense group contexts. These findings suggest that relying exclusively on parent-report perspectives may limit ecological understanding of environmental sensitivity during toddlerhood.

Contemporary developmental perspectives increasingly emphasize that environmental sensitivity should not be conceptualized as a fixed and uniformly observable characteristic independent of context. Rather, manifestations of SPS appear strongly influenced by relational climates, sensory demands, interpersonal dynamics, emotional safety, and situational conditions (Greven et al., 2019; Lionetti et al., 2019). Consequently, children may express sensitivity differently across home, educational, and social environments.

This contextual variability highlights the importance of ecologically valid assessment approaches capable of capturing children's behaviors across multiple developmental contexts. Ecological validity appears especially important within SPS research because highly sensitive children may react differently depending on environmental stimulation, relational predictability, emotional climates, and caregiving quality. Assessment methods limited to a single relational environment may therefore provide only partial representations of children's environmental responsiveness.

Recent developmental literature has increasingly emphasized the importance of multi-informant and observational approaches to SPS assessment (Greven et al., 2019; Lionetti et al., 2019; Kähkönen et al., 2024). Multi-informant approaches recognize that different caregivers and observers may access different aspects of children's functioning depending on the contexts in which interactions occur. Parents, educators, and clinicians may therefore contribute complementary perspectives regarding emotional responsiveness, sensory sensitivities, relational functioning, and behavioral regulation.

Recent interview-based approaches have further highlighted the importance of integrating multiple observational perspectives in the assessment of environmental sensitivity during development (Kähkönen et al., 2024). Compared to standardized questionnaires alone, interview and observational methods may allow more nuanced exploration of context-specific manifestations of sensitivity, including relational adaptation, emotional regulation patterns, sensory overstimulation, and interpersonal responsiveness. Within this perspective, educational settings represent particularly important observational contexts. Childcare environments expose toddlers to complex emotional, relational, and sensory experiences that may reveal manifestations of environmental sensitivity less visible within home environments. Group interactions, transitions between activities, background noise, sensory stimulation, peer conflicts, emotionally demanding situations, and adaptation to routines may all contribute to making environmental sensitivity more observable within educational settings.

Educators may therefore represent especially valuable informants for the assessment of SPS during early childhood. Unlike parents, educators observe children daily across multiple emotionally and sensorily demanding situations involving peer interactions, transitions, frustration tolerance, sensory stimulation, emotional regulation, and social adaptation. Furthermore, educators interact simultaneously with multiple children of similar

developmental age, potentially facilitating comparative observation of interindividual differences in environmental responsiveness.

Importantly, educator-report approaches may also contribute to distinguishing environmental sensitivity from behavioral dysregulation or generalized emotional difficulties. Highly sensitive toddlers may sometimes appear overwhelmed, withdrawn, irritable, or emotionally reactive within highly stimulating environments. Without contextual understanding of sensitivity, such behaviors may risk being interpreted exclusively as oppositionality, anxiety, poor adaptation, or emotional dysregulation. Observational perspectives sensitive to contextual conditions may therefore facilitate more accurate and developmentally informed interpretations of children's behaviors.

Educator-based observational approaches may therefore contribute to:

- broader ecological understanding of SPS,
- improved identification of highly sensitive children,
- increased recognition of contextual variability,
- more individualized educational approaches,
- and developmentally responsive caregiving practices.

Importantly, identifying environmental sensitivity should not aim to pathologize children's behaviors. Contemporary Environmental Sensitivity frameworks increasingly emphasize that heightened responsiveness represents a naturally occurring developmental characteristic associated with both increased vulnerability and increased developmental potential depending on environmental quality (Pluess, 2015; Greven et al., 2019).

From this perspective, assessment approaches should aim not only to identify potential difficulties but also to better understand children's emotional, sensory, relational, and contextual needs. Within educational settings, improved identification of environmental sensitivity may facilitate emotionally responsive caregiving practices, prevention of overstimulation, individualized support strategies, and developmentally appropriate co-regulation. Consequently, expanding educator-based and observational approaches to SPS assessment during toddlerhood appears particularly relevant for advancing both developmental research and educational practice.

2.9 Conceptual Rationale, Research Gap, and Study Aim

The literature reviewed throughout this chapter suggests that children differ substantially in the way they perceive, process, and respond to environmental experiences. Contemporary developmental perspectives increasingly conceptualize such variability through frameworks of Environmental Sensitivity and Sensory Processing Sensitivity (SPS), emphasizing that heightened responsiveness reflects a biologically grounded yet context-dependent developmental characteristic (Pluess, 2015; Greven et al., 2019).

Research consistently suggests that highly sensitive individuals process information more deeply, respond more strongly to emotional and sensory experiences, and become more affected by both adverse and supportive environmental conditions (Aron & Aron, 1997; Aron et al., 2012). Importantly, developmental outcomes associated with SPS appear strongly shaped by relational and environmental quality. Parenting, attachment security, emotional responsiveness, educational climates, and co-regulation processes all appear particularly important for highly sensitive children (Slagt et al., 2018; Lionetti et al., 2019; Sperati et al., 2024).

At the same time, contemporary literature increasingly highlights the developmental significance of educational settings during toddlerhood. Children aged 18–36 months progressively encounter emotionally and sensorily complex group environments while still relying heavily on adult co-regulation and emotional support. Within these settings, educators may occupy a uniquely valuable position in observing emotional responsiveness, sensory sensitivities, relational adaptation, behavioral regulation, and contextual reactions among toddlers.

Despite the growing body of research on SPS and Environmental Sensitivity, several important limitations remain within the current literature. Existing studies have focused predominantly on adults, adolescents, and school-age children, while comparatively limited attention has been dedicated to the manifestation of environmental sensitivity during toddlerhood, particularly among children aged 18–36 months.

In addition, most SPS assessment approaches have relied primarily on self-report and parent-report measures. Although parent-report instruments provide important information regarding children's emotional and behavioral functioning, they may not fully capture how sensitivity manifests across broader relational and educational contexts. This limitation appears especially relevant during toddlerhood, a developmental period characterized by rapid

emotional, sensory, social, and relational development as well as increasing participation in childcare and educational settings.

Educational environments expose toddlers to complex sensory, emotional, and interpersonal experiences that may reveal manifestations of environmental sensitivity less visible within family contexts. Educators interact with children daily across situations involving peer relationships, transitions, frustration tolerance, sensory stimulation, emotional regulation, and group adaptation. Consequently, educators may occupy a particularly valuable observational position in identifying manifestations of environmental sensitivity during early childhood.

Recent developmental literature has increasingly emphasized the importance of ecologically valid, multi-informant, observational, and interview-based approaches to Environmental Sensitivity assessment (Greven et al., 2019; Lionetti et al., 2019; Kähkönen et al., 2024). However, comparatively limited research has investigated educator-report SPS assessment during toddlerhood and within early childcare settings. Furthermore, few studies have explored whether parent-report SPS questionnaires can be meaningfully adapted for educators working with children between 18 and 36 months of age.

Considering the contextual nature of environmental sensitivity and the developmental importance of educational environments during toddlerhood, adapting an educator-report measure appears particularly relevant. Such an approach may contribute to improving ecological assessment of environmental sensitivity, supporting individualized educational practices, facilitating emotionally responsive caregiving, and expanding understanding of how SPS manifests within early educational contexts.

For these reasons, the present study aims to explore the applicability of an educator-adapted version of a parent-report questionnaire assessing Sensory Processing Sensitivity in toddlers aged 18–36 months within early childhood educational settings.

More specifically, the study seeks to examine whether educators can meaningfully observe and report behaviors associated with environmental sensitivity and whether the adapted questionnaire appears understandable, contextually appropriate, and observationally applicable within childcare environments.

Research Questions

1. To what extent is a linguistically adapted parent-report SPS questionnaire perceived by educators as understandable, observable, and applicable within early childhood educational settings?
2. Which questionnaire items present the greatest challenges regarding clarity, observability, or contextual relevance in childcare settings?
3. How do educators interpret behaviours associated with environmental sensitivity within the educational context, and what contextual factors influence these interpretations?
4. What opportunities and limitations emerge when considering educator observations as a complementary source of information for assessing environmental sensitivity during toddlerhood?

Chapter 3: Methodology

3.1 Study Design

This study employed an exploratory mixed-method feasibility design to investigate whether a linguistically adapted parent-report questionnaire assessing Sensory Processing Sensitivity (SPS) could be meaningfully applied within early childhood educational settings for toddlers aged 18 to 36 months. Rather than examining the psychometric properties of the instrument, the study focused on exploring the extent to which the questionnaire items were understandable, observable, and applicable from the perspective of educators working in childcare settings. The present study was conducted as part of a broader research project developed in collaboration with the University of Chieti-Pescara "Gabriele d'Annunzio". The results presented in this thesis relate specifically to the educator-focused qualitative.

The rationale for adopting a mixed-method design was that evaluating the applicability of an existing parent-report instrument required both structured quantitative feedback and an in-depth exploration of educators' professional experiences. Quantitative data provided an initial overview of educators' judgments regarding the observability and applicability of individual questionnaire items, whereas qualitative interviews offered contextual explanations for these

ratings and allowed participants to discuss the opportunities and challenges associated with observing behaviours related to environmental sensitivity in everyday educational practice.

The study was conducted in three sequential phases. During the first phase, educators completed a linguistically adapted version of the original parent-report SPS questionnaire by referring to a toddler aged 18 to 36 months with whom they had worked for at least three months. At this stage, participants had not yet received any information regarding the theoretical construct of Sensory Processing Sensitivity and were therefore asked to complete the questionnaire solely based on their everyday observations of the child.

Following completion of the questionnaire, participants received a nine-page educational document introducing the concept of Sensory Processing Sensitivity, its theoretical foundations, and its behavioural manifestations during early childhood. Educators were given sufficient time to read the material and ask questions before proceeding to the second phase of the study.

In the second phase, participants completed a separate evaluation of the questionnaire, this time focusing on the instrument itself rather than on an individual child. Using a Likert-type scale, educators rated the extent to which each questionnaire item was observable, and assessable within the childcare context. This step aimed to explore whether the behaviours described in the parent-report questionnaire could be meaningfully assessed within an educational environment characterised by different routines, opportunities for observation, and educator-child interactions.

Finally, individual semi-structured interviews were conducted to obtain a more comprehensive understanding of educators' perspectives. Interview questions explored the reasons underlying their questionnaire ratings, particularly for items receiving lower applicability scores, while also inviting all participants to reflect on the clarity of the items, the influence of contextual factors on behavioural observation, and the perceived strengths and limitations of using an educator-report approach to assess behaviours associated with environmental sensitivity during toddlerhood.

The integration of quantitative questionnaire ratings and qualitative interview data provided a comprehensive understanding of the feasibility of transferring a parent-report SPS instrument to the educational context. Rather than determining whether educators could diagnose or identify highly sensitive children, the study sought to examine whether the behavioural indicators included in the questionnaire could be meaningfully observed and interpreted

within everyday childcare settings, and to identify contextual factors that may facilitate or limit their assessment.

3.2 Participants

The study included seven female early childhood educators recruited from three childcare centres located within the same province in Italy. The participating centres represented both public and private educational settings. All participants completed every stage of the study, including both questionnaire administrations and the semi-structured interview. A convenience sampling strategy was adopted, with participants recruited directly by the researcher. Participation was entirely voluntary. Before taking part in the study, all educators received information about the study and provided written informed consent. Participants were informed that they could withdraw from the study at any time without providing a reason and without any negative consequences.

To be eligible for participation, educators were required to be currently working with children aged 18 to 36 months in an early childhood educational setting. All participating educators held at least a bachelor's degree and had more than four years of professional experience; however, professional experience was not considered an inclusion criterion for participation. Educators who were not currently working with the target age group or who did not complete all stages of the study were excluded.

During the first phase of the study, each educator completed the questionnaire with reference to one child aged between 18 and 36 months whom they had known for at least three months. Children could be either male or female but were required to have no known developmental diagnosis. This criterion was established to ensure that educators based their responses on sustained observations of typically developing children within their everyday educational practice. Although questionnaire responses referred to individual children during the initial phase of the study, the unit of analysis was the educators' evaluations and perspectives regarding the questionnaire and its applicability within early childhood educational settings.

3.3 Instrument

3.3.1 Linguistically Adapted HSC Questionnaire

The study employed a linguistically adapted version of the parent-report Highly Sensitive Child (HSC) Scale (Pluess et al., 2018). The original instrument was developed to assess Sensory Processing Sensitivity (SPS) in children and was adapted for use in this study by making minor linguistic modifications that shifted the observational perspective from parents to educators while preserving the conceptual meaning of the original items. For example, references to "your child" were replaced with "the child," without altering the content or intent of the items. No modifications were made to the content, number, or theoretical structure of the questionnaire. The linguistic adaptations were introduced solely to ensure that the wording was appropriate for educators working with toddlers aged 18–36 months in early childhood educational settings. The questionnaire consisted of 30 items describing behaviours associated with environmental sensitivity, including emotional responsiveness, sensory sensitivity, awareness of subtleties, depth of processing, and susceptibility to overstimulation. Responses were recorded using the original 7-point Likert scale.

3.3.2 Educational Material

A nine-page educational document was developed by the researcher to provide participants with an overview of Sensory Processing Sensitivity. The material introduced the theoretical foundations of SPS, its core characteristics, and its behavioural manifestations during early childhood. The document was designed to establish a shared conceptual understanding of the construct before educators evaluated the questionnaire items in terms of their clarity, observability, and applicability within early childhood educational settings.

3.3.3 Semi-Structured Interview

Qualitative data were collected through individual semi-structured interviews developed specifically for this study. The interview guide consisted of five open-ended questions designed to explore educators' perceptions of the questionnaire items, including their clarity, observability, contextual relevance, and applicability within childcare settings. The complete interview guide is provided in Appendix.

3.4 Procedure

Following recruitment and the provision of written informed consent, participants received a link to the first online questionnaire. During this phase, educators were asked to complete the linguistically adapted HSC questionnaire by referring to one child aged between 18 and 36 months whom they had known for at least three months. The purpose of this initial administration was to familiarise educators with the questionnaire through its application to a child they knew well, allowing them to consider each item within a real observational context before evaluating the instrument itself.

Then, participants received a nine-page educational document developed by the researcher, introducing the concept of Sensory Processing Sensitivity (SPS), its theoretical foundations, and its behavioural characteristics during early childhood. Reading the material required approximately 20 to 30 minutes. Participants were given the opportunity to ask questions for clarification before proceeding to the next phase of the study.

Immediately after reviewing the educational material, educators completed a second online questionnaire. Rather than evaluating an individual child, participants were asked to judge the extent to which each questionnaire item could be meaningfully assessed within an early childhood educational setting. Responses were recorded using a Likert-type scale ranging from "completely observable and assessable" to "not observable and assessable at all."

Individual semi-structured interviews were conducted approximately after completion of the second questionnaire. Depending on participants' availability, interviews took place either in person or online and lasted approximately 30 minutes. The interviews explored educators' perspectives on the applicability of the questionnaire items within educational settings, the reasons underlying items perceived as difficult to assess, and the contextual factors that influenced their evaluations. Additional questions invited participants to reflect on the strengths and limitations of using an educator-report questionnaire to assess behaviours associated with environmental sensitivity during toddlerhood.

Interview responses were documented through detailed note-taking during each interview. To ensure participants' anonymity, pseudonyms were assigned throughout the analysis and reporting of the findings.

3.5 Data Analysis

Data obtained from the second questionnaire and the semi-structured interviews were analysed using complementary quantitative and qualitative approaches.

Responses to the second questionnaire were analysed descriptively. As the purpose of the questionnaire was to explore educators' perceptions of the observability and assessability of each item within early childhood educational settings, no inferential statistical analyses were conducted. Instead, the frequency of responses for each item was calculated to identify behaviours that educators consistently perceived as more or less observable and assessable in the educational context. Data from the initial questionnaire administration were not included in the analysis, as this phase served solely to familiarise participants with the instrument prior to evaluating its applicability.

Qualitative data obtained from the semi-structured interviews were analysed using an inductive thematic analysis following the approach described by Braun and Clarke (2006). Interview notes were read repeatedly to achieve familiarity with the data. Initial codes were then generated by identifying recurring ideas and meaningful patterns across participants' responses. Similar codes were subsequently grouped into broader categories, from which preliminary themes were developed. These themes were reviewed and refined to ensure that they accurately reflected the educators' perspectives and addressed the research questions. Finally, each theme was clearly defined and named before being presented in the Results section.

The integration of the descriptive findings from the questionnaire and the qualitative themes derived from the interviews enabled a comprehensive exploration of educators' perspectives regarding the applicability of the questionnaire within early childhood educational settings.

Appendix A presents the semi-structured interview guide used during data collection.

Appendix B presents the focused coding framework developed through the thematic analysis. Following familiarisation with the interview data, initial codes were generated inductively across the dataset to capture meaningful features relevant to the research questions. These initial codes were subsequently reviewed, compared, and conceptually refined into a smaller set of focused codes representing recurring patterns across participants. The focused codes were then organised into the final themes presented in the Results chapter.

The purpose of this appendix is to provide a transparent overview of the analytical framework underpinning the findings and to illustrate the relationship between the focused codes and the final themes. Illustrative quotations are not included in this appendix, as its primary purpose is to present the structure of the analytical framework. Selected quotations are presented within the Results chapter to support the interpretation of the findings.

Appendix A. Interview Guide

1. Overall, how clear and understandable did you find the questionnaire? Were there any items that you found ambiguous or difficult to interpret?
2. Do you think the behaviours described in the questionnaire are observable and applicable in childcare settings for children aged 18 to 36 months?
3. Did any of the items seem to you to be more relevant to the home environment than to the educational setting? If so, what types of behaviours?
4. In your opinion, do children with higher sensitivity display different behaviours in childcare settings? If so, how do these differences typically manifest?
5. In your opinion, could some children's behaviours be interpreted as behavioural difficulties when they might instead be related to high sensitivity?

Appendix 2.

Table 1. Theme 1: Observable manifestations of SPS in everyday childcare practice

Description	Focused Code
Educators frequently described children's behavioural responses to sensory stimuli, including noise, tactile experiences, music, and highly stimulating environments, as among the most readily observable manifestations of Sensory Processing Sensitivity within everyday childcare practice.	Sensory responsiveness is readily observable in childcare settings
Several educators reflected that children's reactions to novelty, transitions between activities, and changes in daily routines represented one of the most observable expressions of individual differences in sensitivity within the childcare setting.	Responses to novelty and daily transitions are easily observable
Several educators reported a behavioural pattern in which children preferred to observe the environment, peers, or educators before actively participating in unfamiliar activities	Some children consistently observe before engaging in activities
Interviewees frequently described that some children consistently noticed subtle details and small environmental changes that frequently went unnoticed by their peers.	Attention to subtle environmental details is observable
Most participants indicated that reliable identification of sensitivity-related behaviours depended on repeated observations across different situations and over extended periods rather than isolated incidents.	Repeated observation supports recognition of stable behavioural patterns
Interviewees commonly perceived the childcare setting as offering frequent opportunities to observe behaviours associated with Sensory Processing Sensitivity because daily routines repeatedly exposed children to transitions, peer interactions, sensory experiences, and group activities.	Everyday childcare routines provide rich opportunities for observing SPS-related behaviours

Table 2. Theme 2: Educational Settings as a Distinctive Context for Observing Sensitivity

Description	Focused Code
Participants frequently described the childcare setting as a unique observational context in which children's individual differences become particularly visible because they encounter shared routines, common environmental demands, and comparable developmental experiences.	The childcare environment provides unique opportunities for observing individual differences
Educators highlighted that observing many children within the same daily routines allows behavioural differences to emerge more clearly because children experience comparable environmental demands.	Shared routines allow educators to compare children's responses under similar conditions
The interviews frequently indicated that observing children over extended periods increased educators' confidence when evaluating children's behaviour.	Longitudinal relationships enhance the quality of behavioural observation
Educators noted that the educational setting reveals behavioural differences that may not become equally visible in other contexts because children encounter shared routines, peer interactions, and common environmental demands daily.	The educational context reveals behavioural differences that may not emerge in other settings
Educators generally described observing many children of a similar age as an important part of their professional experience and as a useful basis for comparing children's behavioural responses.	Observing multiple children supports professional judgement

Note. This table presents the focused codes included under Theme 2. Illustrative quotations can be reported separately if a fuller audit trail is required.

Table 3.

**Theme 4: Family and Educational Contexts Provide Complementary Information
About Children's Sensitivity**

Description	Focused Code
Educators consistently reported that several questionnaire items referred to behaviours that were difficult or impossible to observe within childcare because they primarily occurred within everyday family life.	Some SPS-related behaviours are more observable in the family context than in childcare settings
Participants explained that the organization and routines of childcare settings naturally limited opportunities to observe certain behaviours because many relevant situations occurred infrequently or did not occur within everyday educational practice.	Routine characteristics of childcare limit opportunities to observe some behaviours
Educators generally recognised that children's behaviour may vary across home and childcare environments and viewed observations from both contexts as contributing different but equally valuable information about children's sensitivity.	Children's behaviour may differ across family and educational contexts
Participants generally described parent and educator observations as complementary, indicating that combining both perspectives provides a more comprehensive understanding of children's sensitivity than either context alone	Parent and educator perspectives are complementary rather than interchangeable

Note. This table presents the focused codes included under Theme 3. Illustrative quotations can be reported separately if a fuller audit trail is required.

Table 4.

Theme 4: Challenges in Interpreting Children's Internal Experiences

Description	Focused Code
Through interviews, educators appear to be consistent that distinguish between observing children's behaviour and understanding their internal emotional experiences. Although behavioural reactions were readily observable, participants emphasised that children's thoughts, feelings, and emotional intensity could only be inferred rather than directly observed.	Internal emotional experiences are difficult to observe directly
Educators repeatedly emphasized that the same observable behaviour may reflect different internal emotional experiences, making behavioural interpretation inherently uncertain.	The same behaviour may reflect different internal experiences
Several educators explained that children's behaviour should be interpreted within its broader developmental, relational, and situational context rather than based on isolated observations.	Behavioural observation requires contextual interpretation
Participants reported that toddlers' limited verbal abilities increased educators' reliance on behavioural observation because children were often unable to describe their own internal experiences.	Limited verbal abilities increase reliance on behavioural observation
Educators described behavioural cues such as facial expressions, crying, body posture, tone of voice, and other observable reactions as valuable but incomplete indicators of children's internal emotional experiences.	Behavioural cues provide only partial access to children's emotional experiences

Note. This table presents the focused codes included under Theme 4. Illustrative quotations can be reported separately if a fuller audit trail is required.

Table 5.

Theme 5: Awareness of Environmental Sensitivity Broadens Behavioural Interpretation

Description	Focused Code
Most participants reflected that becoming familiar with Sensory Processing Sensitivity led them to reconsider behaviours they had previously observed, assigning new meanings to familiar behavioural patterns rather than identifying entirely new behaviours.	Knowledge of SPS encourages educators to reinterpret previously observed behaviours
Educators generally noted that familiarity with Sensory Processing Sensitivity broadened their interpretations of children's behaviour by encouraging consideration of sensitivity-related explanations alongside other possible interpretations.	SPS provides an alternative explanation for behaviours that might otherwise be misunderstood
It seems rather than changing what educators observed, knowledge of Sensory Processing Sensitivity primarily influenced how educators responded to children's behaviours within everyday educational practice.	Greater awareness promotes more reflective educational responses

Note. This table presents the focused codes included under Theme 5. Illustrative quotations can be reported separately if a fuller audit trail is required.

Table 6.

Theme 6: Value and Applicability of Educator-Based Assessment

Description	Focused Code
Educators generally perceived the adapted questionnaire as appropriate for use in childcare settings because most items referred to behaviours that naturally occurred during everyday educational routines and could be evaluated through regular professional observation.	Educators considered the questionnaire applicable to everyday childcare practice
Although educators generally considered the questionnaire appropriate for childcare settings, they identified a small number of items that appeared to benefit from adaptation because they referred primarily to experiences occurring within family life.	Some questionnaire items require contextual adaptation for educational settings
Interviewees commonly viewed their observations as providing information that complements parental perspectives. Rather than considering one source superior to the other, participants emphasised that combining observations across contexts would provide a more comprehensive understanding of children.	Educator observations complement rather than replace parent reports
Educators described professional experience and prolonged contact with children as important when evaluating children's behaviour using the questionnaire.	Professional experience strengthens educators' confidence in behavioural assessment

Note. This table presents the focused codes included under Theme 6. Illustrative quotations can be reported separately if a fuller audit trail is required.

3.6 Ethical Considerations

The present study forms part of a broader research project investigating Environmental Sensitivity during toddlerhood in early childhood educational settings. The project was conducted through a collaboration between the University of Pavia and the University "G. d'Annunzio" of Chieti-Pescara and received ethical approval from the Ethics Committee of the University "G. d'Annunzio" of Chieti-Pescara prior to data collection.

Participation in the study was entirely voluntary. Before data collection began, all participants received written information describing the aims and procedures of the study and provided written informed consent. Educators were informed that they could withdraw from the study at any time without providing a reason and without any negative consequences.

The study collected data exclusively from educators. During the first phase of data collection, participants completed the questionnaire with reference to a child they knew well; however, no identifying information about the child was collected or recorded at any stage of the study. Children therefore remained completely anonymous and served solely as a reference for educators' observations.

To ensure confidentiality, educators' identities were protected through the use of pseudonyms during data analysis and the reporting of findings. All data were stored anonymously, securely, and were accessible only to the researcher.

All research procedures were conducted in accordance with the approved ethical protocol and with internationally recognised ethical principles governing research involving human participants, including informed consent, confidentiality, voluntary participation, and respect for participants' privacy.

Chapter 4: Results and Qualitative Analysis

4.1 Overview of the Qualitative Findings

This chapter presents the qualitative findings of the exploratory phase of the study. The aim of this phase was to explore educators' perceptions of the applicability and observability of an educator-adapted version of a parent-report questionnaire assessing Environmental Sensitivity in toddlers aged 18–36 months within early childhood educational settings.

The qualitative data were collected through individual semi-structured interviews conducted after educators had completed the educator-adapted questionnaire and reviewed a brief educational resource introducing the concept of Environmental Sensitivity. Educators first completed the questionnaire based on their professional observations of a child in their care and, following the educational session, were invited to reflect on the questionnaire items, their observability and assessability within the childcare context, and their understanding of the underlying construct.

The interviews explored educators' perceptions of the questionnaire items, with particular attention to their observability, assessability, and contextual relevance within early childhood educational settings. Participants were also invited to discuss which items they considered easier or more difficult to evaluate, the reasons underlying these perceptions, and whether some behaviours appeared more closely associated with family contexts than with educational environments.

The qualitative analysis was conducted using an exploratory thematic approach. Rather than evaluating the psychometric properties of the questionnaire, the analysis aimed to identify recurring patterns in educators' experiences and reflections regarding the use of an educator-adapted measure of Environmental Sensitivity. The themes were interpreted in relation to the study objectives, namely exploring whether educators perceive behaviours associated with Environmental Sensitivity as observable within childcare settings and whether a parent-report questionnaire can meaningfully inform educator-based assessment.

Across interviews, educators consistently described many behaviours associated with Environmental Sensitivity as observable within everyday educational practice. In particular, participants referred to children's responses to sensory stimulation, transitions, unfamiliar situations, emotionally significant events, peer interactions, and changes in routine. At the same time, educators identified several challenges related to the assessment process. Items requiring inferences about children's internal emotional experiences or referring to behaviours primarily occurring within family routines were consistently perceived as more difficult to evaluate in educational settings.

The thematic analysis generated six interconnected themes:

1. Observability of SPS-Related Behaviours in Childcare Settings
2. Educational Settings as a Distinctive Context for Observing Sensitivity
3. Family Context versus Educational Context
4. Challenges in Interpreting Children's Internal Emotional Experiences
5. Awareness of Environmental Sensitivity Broadens Behavioural Interpretation
6. The Perceived Value of Educator-Based Assessment

Taken together, these themes suggest that educators perceive themselves as well positioned to observe many behavioural manifestations of Environmental Sensitivity during toddlerhood, particularly within group routines, peer interactions, transitions, and sensory-rich educational environments. At the same time, the findings indicate that educator-based assessment is influenced by the specific characteristics of the educational context and that the observability and assessability of questionnaire items vary according to the opportunities educators must observe behaviours in everyday practice.

4.2 Theme 1: Observability of SPS-Related Behaviours in Childcare Settings

One of the most prominent themes emerging from the interviews concerned the observability of behaviours associated with Sensory Processing Sensitivity (SPS) within early childhood educational settings. Across participants, there was broad agreement that many behaviours commonly associated with Environmental Sensitivity appeared to be observable through everyday interactions with toddlers in childcare settings.

Following completion of the educator-adapted questionnaire and the educational session on Environmental Sensitivity, educators reflected on the extent to which the behaviours described in the questionnaire corresponded to situations they encountered in their daily professional practice. Participants identified reactions to noise, adaptation to unfamiliar situations, emotional responsiveness, sensitivity to changes in routine, and observation before participation as behaviours that could be readily observed during everyday activities within the childcare setting.

Maria explained:

"May notice a new person joining the group, alterations in daily routines, or changes in the physical setting before other children do."

Similarly, Giada stated:

"Some children immediately begin to cry when listening to or dancing to music, even in situations that are generally perceived as enjoyable and entertaining. They often calm down as soon as the music stops or when they are taken to a quieter room without auditory stimulation."

Educators frequently described children who appeared particularly attentive to subtle changes in their surroundings and who, in some situations, seemed to notice environmental modifications before their peers. These observations appear to be consistent with one of the behavioural characteristics commonly associated with Environmental Sensitivity, namely heightened awareness of environmental subtleties (Aron et al., 2012; Greven et al., 2019). Notably, participants described these behaviours spontaneously, relying on examples drawn from everyday educational practice rather than theoretical terminology. After reviewing the educational material, educators did not report observing new behaviours; instead, they described a shift in how they interpreted behaviours that had already been part of their routine observations. Rather than viewing these reactions as isolated characteristics, participants increasingly considered them as possible manifestations of a broader pattern of Environmental Sensitivity.

Similarly, participants consistently identified children's responses to sensory stimulation as among the most observable behaviours within childcare settings. Noise sensitivity emerged as one of the examples mentioned most frequently. Several educators described children who appeared overwhelmed during highly stimulating situations, such as group activities, free play, or periods characterised by elevated levels of noise and movement.

As one participant noted:

"During noisier moments, some children seem to become tired much more quickly or show signs of discomfort earlier than other children."

These observations appear to be consistent with previous research describing heightened sensory responsiveness and susceptibility to overstimulation as characteristics of Environmental Sensitivity (Aron et al., 2012; Greven et al., 2019). Across interviews, educators generally described sensory responsiveness as one of the behaviours that appeared easiest to

observe within childcare settings. Although participants referred to different situations, ranging from reactions to music and noise to distress during highly stimulating group activities, participants generally agreed that these behaviours were relatively easy to recognise during everyday educational routines.

Another frequently identified aspect concerned children's responses to novelty. Educators consistently reported that some children appeared to require more time before engaging in unfamiliar situations. Rather than immediately participating in a new activity, these children often preferred to observe their surroundings before becoming actively involved.

Giulia described this process as follows:

"Alcuni bambini preferiscono guardare per un po' prima di partecipare. Quando si sentono più sicuri, entrano nell'attività in modo molto tranquillo."

Similarly, Morena noted:

"Some children require additional time to adjust when they encounter unfamiliar people, such as volunteer readers or psychomotricity practitioners, or when they are introduced to unfamiliar spaces within the childcare setting. During these situations, they may become distressed, cry, or seek physical closeness and comfort from a trusted educator."

Several participants reported that these behaviours had often been interpreted as hesitation, lack of interest, or reluctance to participate. Following the educational session, however, many educators reported reconsidering these behaviours as possible strategies through which children gathered information and achieved a greater sense of emotional security before engaging with unfamiliar situations. This pattern appears to be consistent with previous descriptions of highly sensitive individuals as showing greater caution and increased information processing when encountering novelty (Aron et al., 2012; Greven et al., 2019). Importantly, educators generally did not report observing new behaviours after becoming familiar with the concept of Environmental Sensitivity. Rather, they described a change in the meaning they attributed to behaviours that had already been part of their everyday professional experience.

Although participants referred to different educational situations, including the arrival of unfamiliar adults, changes in classroom environments, and participation in new activities, a common pattern emerged across interviews. Observation before participation was frequently described as a behavioural strategy that allowed some children to become familiar with the

environment before actively engaging. Rather than viewing delayed participation exclusively as avoidance, educators increasingly considered it as a potentially adaptive response to uncertainty and environmental demands.

This finding is consistent with previous literature describing deeper processing of novel experiences as a characteristic of Environmental Sensitivity (Pluess, 2015; Greven et al., 2019). The educators' reflections may suggest that behaviours associated with cautious engagement are not only theoretically meaningful but also observable within everyday childcare practice, particularly during transitions and encounters with unfamiliar situations.

Emotional responsiveness was reported by all participants, although it was expressed through different examples. Some educators emphasized children's reactions to peers' distress, whereas others focused on emotional responses to conflicts, separation, or changes within the group. Despite these contextual differences, participants generally described emotionally responsive children as appearing more deeply affected by everyday experiences than their peers. This observation appears to be consistent with previous research identifying heightened emotional responsiveness as a core characteristic of Environmental Sensitivity (Greven et al., 2019; Lionetti et al., 2019).

Several educators noted that emotionally responsive children appeared particularly affected by the emotional climate of the group. Situations involving crying peers, interpersonal conflicts, or emotionally charged interactions were frequently described as contexts in which individual differences became especially evident. Participants suggested that the group setting may provide valuable opportunities to observe children's emotional reactions as they unfolded naturally during everyday educational activities.

These observations also highlight the distinctive characteristics of the childcare environment. Because children are continuously exposed to peers' emotions, social interactions, and shared routines, educators reported having repeated opportunities to observe differences in emotional responsiveness across multiple situations. Such observations may support the view that educational settings offer a rich context for identifying behavioural manifestations of Environmental Sensitivity during toddlerhood.

Overall, the findings suggest that educators perceived many behaviours associated with Environmental Sensitivity as observable within early childhood educational settings. Across interviews, participants frequently identified heightened attention to environmental changes, sensory responsiveness, cautious responses to novelty, and emotional responsiveness as

behaviours that could be recognised through routine observation. These behavioural domains appear to correspond closely with characteristics of Environmental Sensitivity described in previous empirical and theoretical literature (Aron et al., 2012; Pluess, 2015; Greven et al., 2019).

At the same time, educators consistently emphasized that observing a behaviour did not necessarily mean understanding the psychological processes underlying it. While participants generally agreed that many manifestations of sensitivity were readily observable, they also acknowledged greater uncertainty when attempting to interpret children's internal emotional or cognitive experiences. This distinction between behavioural observability and psychological interpretation emerged repeatedly across interviews and appeared to provide a foundation for the following theme, which explores the challenges educators reported when interpreting children's internal emotional experiences.

4.3 Theme 2: Educational Settings as a Distinctive Context for Observing Sensitivity

A second major theme concerned the unique observational opportunities provided by early childhood educational settings. While participants acknowledged that parents possess extensive knowledge of their children across a wide range of everyday situations, educators generally emphasized that childcare environments offer opportunities to observe behaviours and responses that may be less evident within family contexts.

Across interviews, educators described the childcare setting as a particularly rich environment for observing individual differences in children's responses to environmental demands. Participants referred to the combination of sensory stimulation, frequent peer interactions, daily routines, transitions between activities, and emotionally meaningful situations that characterise everyday life in early childhood education. Several educators suggested that these contextual characteristics may make individual differences in responsiveness particularly visible. This observation appears to be consistent with previous literature emphasizing that the expression of Environmental Sensitivity is influenced by the characteristics of the surrounding environment and becomes particularly apparent in contexts that involve multiple sensory and social demands (Pluess, 2015; Greven et al., 2019).

As Maria explained:

"In the childcare setting, children constantly encounter new experiences. They need to participate in group activities, share common spaces, wait their turn, and adapt to changes in daily routines. It is often in these situations that individual differences among children become especially noticeable."

Participants repeatedly identified transitions as one of the situations in which manifestations of sensitivity appeared to become particularly evident. Moving from one activity to another, preparing for meals, transitioning to nap time, or adapting to unexpected changes in routine were consistently described as moments that highlighted individual differences in children's responses.

Giada reflected:

"Transitions are probably the situations in which I observe the greatest differences among children. While some children move smoothly from one activity to another, others appear to require additional time and preparation to adjust to the change."

These observations appear to be consistent with previous research describing adaptation to change and responses to novelty as important behavioural manifestations of Environmental Sensitivity (Aron et al., 2012; Greven et al., 2019). Rather than describing isolated reactions, participants consistently referred to transitions as recurring situations that provided repeated opportunities to observe how children responded to changes in their environment.

One educator described a child who, during periods of heightened noise or overstimulation, would climb into a large box filled with cushions, cover themselves completely, and temporarily withdraw from the surrounding environment. After spending a few minutes in this quiet space, the child would spontaneously rejoin the group and resume participation in the ongoing activities. Following the educational session, the educator reflected that this behaviour might represent an attempt to reduce sensory stimulation and regulate the child's emotional state. She further explained that this new understanding encouraged her to reconsider the educational environment by introducing additional resources and quiet spaces that could better support children's individual self-regulation needs.

A similar observation was reported by another educator, who recalled having worked with several children over the course of her professional experience who would begin sucking their thumb whenever they encountered unfamiliar situations or when the classroom

environment became particularly noisy or overstimulating. Rather than interpreting this behaviour simply as a habit, she reflected that it could represent another self-regulatory strategy through which some children coped with heightened emotional or sensory demands.

These examples may illustrate how increased awareness of Environmental Sensitivity influenced not only educators' interpretation of children's behaviour but also their reflections on the educational environment itself. Rather than viewing sensitivity solely as an individual characteristic, participants occasionally described the educational context as something that could be adapted to better respond to children's diverse sensory and emotional needs. Observation was therefore often described not only as a means of understanding children's behaviour, but also as a basis for reflecting on educational practice and considering environmental adaptations that could better support children's emotional and sensory regulation.

Another aspect frequently highlighted by participants concerned the role of group dynamics in making manifestations of Environmental Sensitivity more observable. Educators reported that observing children within peer groups allowed them to identify behaviours and emotional responses that might not emerge during one-to-one interactions with adults.

Several participants noted that some children who they perceived as highly sensitive appeared particularly responsive to the emotional atmosphere of the group. Situations involving peer conflict, crying children, or emotionally charged interactions were repeatedly described as contexts in which individual differences became especially apparent.

As Giulia explained:

"When a child cries or a situation of tension arises within the group, some children appear to be significantly more emotionally affected and involved than their peers."

Participants suggested that these reactions might be less evident in contexts where children are not regularly exposed to large peer groups. Consequently, educators generally considered the childcare setting to provide unique opportunities for observing children's responses to the emotions and behaviours of others. This finding appears to be consistent with previous literature describing heightened emotional responsiveness and increased sensitivity to social cues as central characteristics of Environmental Sensitivity (Greven et al., 2019; Lionetti et al., 2019).

Across interviews, educators consistently described peer interactions as an important source of observational information. Although participants referred to different situations, including peer conflicts, emotional contagion, cooperative play, and children's reactions to classmates' distress, they generally agreed that observing children within a group offered insights that would be difficult to obtain in more individual contexts. Rather than focusing on isolated behaviours, educators described children's responses as unfolding within ongoing social interactions, allowing them to observe how different children reacted to similar emotional situations.

A further element emerging from the interviews concerned the sensory richness of educational settings. Participants described childcare environments as characterised by multiple simultaneous sources of stimulation, including sounds, movement, visual information, interpersonal interactions, and frequent changes in activities. Several educators reported that some children appeared noticeably more affected than others by these environmental conditions.

Noise sensitivity was frequently identified as one of the most observable manifestations of Environmental Sensitivity. However, educators rarely described noise as an isolated stimulus. Instead, they portrayed sensory experiences as embedded within a broader context of simultaneous social, emotional, and environmental demands. This observation appears to be consistent with theoretical perspectives suggesting that Environmental Sensitivity reflects children's responses to the cumulative characteristics of their environment rather than to individual sensory stimuli alone (Pluess, 2015; Greven et al., 2019).

As one educator stated:

"During more chaotic moments, some children seem to lose energy much more quickly than others or spontaneously seek out quieter places."

Rather than interpreting these behaviours solely as reactions to noise, participants frequently described them as responses to the overall complexity of the educational environment, where sensory, emotional, and interpersonal demands occur simultaneously throughout the day.

An additional advantage identified by participants concerned educators' opportunity to observe multiple children of similar developmental age within the same educational environment. Unlike parents, who primarily observe one or a few children, educators

routinely observe larger groups of children exposed to comparable routines, activities, and environmental conditions.

Several participants emphasized that this comparative perspective appeared to facilitated the recognition of individual differences that might otherwise be interpreted as typical developmental variation.

Maria explained:

"Working with many children of the same age makes certain individual differences easier to observe. Some children respond very differently to the same stimuli."

Participants generally described this comparative perspective as one of the strengths of educator-based observation. Rather than comparing children against normative expectations, educators explained that observing multiple children experiencing similar routines and environmental demands enabled them to recognise recurring individual differences in children's behavioural and emotional responses.

As Morena said:

"When you work with many children of the same age, you realise that some behaviours are common to almost everyone, while others keep appearing in the same children. That's when you start thinking is it just a developmental phase or something else"

This perspective appeared to be particularly valuable for distinguishing behaviours reflecting common developmental characteristics from those representing more stable individual patterns of responsiveness. These observations appear to be consistent with previous literature highlighting the value of multiple observational contexts and informants in the assessment of Environmental Sensitivity across development (Greven et al., 2019; Kähkönen et al., 2024).

Overall, the findings suggest that educators perceived childcare settings as distinctive and valuable contexts for observing manifestations of Environmental Sensitivity. Across interviews, participants frequently described transitions, group dynamics, sensory stimulation, peer interactions, and opportunities for comparison across children as providing rich observational contexts in which individual differences appeared to become particularly visible. These observations appear to be broadly consistent with previous research suggesting that the behavioural expression of Environmental Sensitivity may be influenced by

environmental characteristics and may become particularly apparent in contexts characterised by multiple simultaneous sensory and social demands (Pluess, 2015; Greven et al., 2019).

At the same time, participants' reflections extended beyond identifying children's behaviours. Across interviews, educators described how increased familiarity with the concept of Environmental Sensitivity encouraged them to reconsider the educational environment itself and to reflect on how routines, spaces, and everyday practices might be adapted to better support children's individual sensory and emotional needs. Rather than viewing observation solely as a means of understanding children's behaviour, participants often portrayed it as a resource for informing educational practice and creating environments that may be more responsive to individual differences. This broader perspective provides a transition to the following theme, which explores the similarities and differences between family and educational contexts in the observation of Environmental Sensitivity.

4.4 Theme 3: Family Context versus Educational Context

A third major theme emerging from the interviews concerned the distinction between family and educational contexts in the observation of Environmental Sensitivity. Although participants generally considered the educator-adapted questionnaire relevant and meaningful, they consistently identified several items that appeared to refer to experiences occurring more frequently within the family environment than within childcare settings.

Across interviews, educators emphasized that their observations are inevitably shaped by the contexts in which they interact with children. While they spend many hours with children each day, they acknowledged that their opportunities for observation differ substantially from those of parents. Consequently, participants reported that some questionnaire items were easier to evaluate from a parental perspective than from an educational one.

As Roberta explained:

"When I read some of the questions about clothing or accessories, I immediately thought that parents would know much more than I do. Children usually arrive wearing comfortable clothes, and we rarely change them during the day. So it's hard for us to know whether things like clothing labels, sock seams, or certain fabrics bother them."

Several educators specifically referred to items concerning clothing preferences, tactile sensitivities, and sensory experiences associated with everyday family routines. Behaviours such as discomfort caused by clothing labels, seams in socks, rough fabrics, hats, or accessories were repeatedly described as difficult to evaluate within the childcare context. These observations appear to be consistent with the contextual nature of Environmental Sensitivity, suggesting that opportunities to observe specific behaviours may depend not only on the characteristic itself but also on the environment in which the child is observed (Greven et al., 2019; Kähkönen et al., 2024).

As Giulia noted:

"Some girls strongly disliked having their hair tied with hairbands or clips. Even when I tried to make the experience more appealing or playful, they rarely changed their minds. On the occasions when they agreed to wear a hairband or clip, they would often remove it again after only a few minutes."

However, she also pointed out that opportunities to observe this type of behaviour were relatively limited, as accessories were generally not used within the childcare setting and observations mainly concerned hairbands or hair clips, making them applicable to only a small number of children, primarily girls.

Importantly, participants did not question the relevance of these behaviours to the construct of Environmental Sensitivity. Rather, they questioned whether educators had sufficient opportunities to observe them directly. Across interviews, a clear distinction emerged between the theoretical relevance of a behaviour and its contextual observability. Educators consistently acknowledged that clothing-related sensitivities could represent meaningful manifestations of Environmental Sensitivity, while simultaneously recognising that such behaviours occurred infrequently within educational settings. This distinction may suggest that participants evaluated questionnaire items primarily in terms of their suitability for the educational context rather than questioning their conceptual relevance to the construct itself.

Similarly, educators expressed uncertainty regarding items referring to personal sensory preferences, such as enjoyment of particular tastes, food preferences, or tactile experiences. Although these behaviours could occasionally be observed during meals or play activities, participants generally felt that opportunities for observation were often too limited to allow confident evaluations.

Most of the participants reflected that one aspect that makes them question some of the items related to food preferences and taste sensitivities is the feedback we receive from parents. Parents sometimes report that their child refuses certain foods at home, while the same child eats them without difficulty in the childcare setting. Their impression is that eating in a group, observing peers, and receiving encouragement from educators may lead children to accept a wider variety of foods and flavours than they would in other contexts.

These reflections illustrate how children's behavioural responses may vary across contexts. Rather than interpreting these inconsistencies as evidence against the relevance of the questionnaire items, educators frequently viewed them as further indication that the expression of Environmental Sensitivity may be influenced by environmental conditions. Group mealtimes, peer modelling, established routines, and educator support were repeatedly identified as contextual factors capable of shaping children's behavioural responses. This observation appears to be consistent with previous literature emphasising that Environmental Sensitivity reflects the interaction between individual characteristics and environmental experiences, rather than a fixed pattern of behaviour expressed identically across contexts (Pluess, 2015; Greven et al., 2019).

These reflections also highlight an important distinction that emerged consistently throughout the interviews. Participants appeared to differentiate between whether a behaviour represented a meaningful indicator of Environmental Sensitivity and whether educators had sufficient opportunities to observe that behaviour within everyday educational practice. Most participants appeared to agree that the questionnaire items were theoretically relevant, while recognising that some behaviours occurred primarily within family routines and therefore could not always be evaluated confidently in childcare settings.

Across interviews, educators appeared comfortable accepting that some manifestations of sensitivity were better suited to parental observation without questioning their importance for understanding the broader construct. Rather than viewing these items as problematic, participants regarded them as reflecting the complementary perspectives offered by parents and educators, each of whom observes the child within different everyday contexts.

Interestingly, educators frequently contrasted these family-oriented items with behaviours they perceived as highly compatible with observation in childcare settings. Reactions to noise, adaptation to transitions, emotional responses to peers, participation in group activities,

and responses to unfamiliar situations were repeatedly described as behaviours that could be observed with confidence during everyday educational practice.

As several educators explained, they felt more confident answering questionnaire items referring to children's behaviour within the group, as well as their responses to environmental changes and sensory stimulation.

Across interviews, educators' confidence in evaluating questionnaire items appeared closely related to the frequency with which the corresponding behaviours occurred during ordinary childcare routines. Behaviours involving peer interactions, responses to environmental changes, sensory stimulation, and participation in group activities were generally described as easier to evaluate because educators encountered them repeatedly throughout the day. In contrast, behaviours associated with family routines were tended to be perceived as less accessible, not because they were considered less relevant to Environmental Sensitivity, but because opportunities to observe them were substantially more limited.

These findings appear to be consistent with previous research highlighting the importance of context-sensitive and multi-informant approaches to the assessment of Environmental Sensitivity (Greven et al., 2019; Kähkönen et al., 2024). Rather than expecting the same behaviours to be equally observable across all settings, participants generally recognised that different environments provide access to different manifestations of children's sensitivity.

Several educators explicitly suggested that information provided by parents and educators should be viewed as complementary rather than interchangeable. Parents were considered to have greater access to behaviours embedded within home routines and family relationships, whereas educators were thought to have unique opportunities to observe children's responses to peer interactions, group dynamics, transitions, and everyday educational demands. Participants emphasised that combining observations from both contexts might provide a more comprehensive understanding of children's Environmental Sensitivity than relying on a single informant.

Overall, the findings suggest that educators distinguished between family and educational contexts when reflecting on the questionnaire items. While many manifestations of Environmental Sensitivity were perceived as readily observable within childcare settings, others appeared to be more closely linked to experiences occurring within family routines. Rather than questioning the relevance of these behaviours to the construct itself, participants generally emphasised the importance of considering contextual opportunities for observation

when adapting parent-report measures for educator use. Taken together, these reflections appear to support the value of context-sensitive assessment and may provide further rationale for exploring educator-report as a complementary perspective in the assessment of Environmental Sensitivity during toddlerhood.

4.5 Theme 4: Challenges in Interpreting Children's Internal Emotional Experiences

One of the most consistently reported challenges concerned educators' perceived difficulty in interpreting children's internal emotional experiences. Although participants generally considered many behaviours associated with Environmental Sensitivity observable within childcare settings, they consistently distinguished between observing a child's behaviour and understanding the psychological processes underlying that behaviour.

Across interviews, educators reported feeling confident when evaluating behaviours that were directly observable, such as children's responses to noise, transitions, unfamiliar situations, or peer interactions. Greater uncertainty emerged, however, when questionnaire items appeared to require inferences about children's thoughts, emotions, or subjective experiences.

As Giada explained:

"I can observe how a child reacts, but I cannot know with certainty what they are experiencing internally or how intensely they are living a particular experience."

This distinction appeared consistently across interviews. Participants generally agreed that educational observation is primarily based on children's observable behaviours and that internal emotional experiences cannot be accessed directly. Although educators often formulated hypotheses about children's emotions, they acknowledged that these interpretations remained tentative. This finding appears to be consistent with previous literature emphasising the distinction between behavioural observation and interpretation when assessing Environmental Sensitivity (Greven et al., 2019; Kähkönen et al., 2024).

Several educators specifically identified questionnaire items referring to emotional depth or the intensity of children's positive and negative emotions as more difficult to evaluate than items describing concrete, observable behaviours.

Participants also considered this challenge to be particularly relevant when working with children aged 18 to 36 months. At this stage of development, children's language abilities are

still emerging, making it difficult to determine whether a behavioural reaction reflects a stable individual characteristic or a temporary developmental or situational condition.

As Giulia explained:

"I can see that a child appears to be strongly affected by something, but it is much more difficult to determine how deeply they are experiencing that emotion. It is not always clear whether the reaction reflects a characteristic of the child, such as high sensitivity, or whether it is related to other developmental changes, for example irritability associated with recent weaning or another temporary transition."

Similar reflections were reported across interviews. Educators repeatedly described the challenge of distinguishing temporary developmental changes from more stable individual characteristics. Rather than relying on isolated observations, participants emphasised the importance of observing recurring behavioural patterns across different situations before attributing behaviours to Environmental Sensitivity.

Another pattern that emerging across the interviews concerned educators' awareness that the same behaviour could reflect multiple underlying processes. Rather than attributing children's reactions to a single cause, participants frequently considered several possible explanations simultaneously.

For example, educators suggested that behaviours such as emotional withdrawal, hesitation, or avoidance could reflect sensory overstimulation, fatigue, developmental transitions, physical discomfort, separation-related distress, or heightened sensitivity. This cautious approach to interpretation may indicate that educators were reluctant to assign psychological meaning to behaviour without considering the broader context in which it occurred.

Several participants explained that interpretation was not based on isolated observations but developed gradually through repeated interactions with the child. Instead of seeking immediate explanations, educators described an ongoing process of observing behaviour across different situations and considering alternative hypotheses before reaching conclusions.

This perspective was reflected in the comment of several participants:

"A single situation is almost never sufficient. It is by observing the child across different situations and moments that we begin to understand whether certain behaviours occur consistently over time."

Repeated observation appeared to be one of the most frequently mentioned strategies for increasing confidence in behavioural interpretation. Participants explained that observing children across different routines, social situations, and periods of development appeared to enable them to distinguish recurring behavioural patterns from temporary situational responses. This observation appears to be consistent with previous literature emphasising that behavioural manifestations of Environmental Sensitivity should be interpreted within the broader context of repeated observations rather than isolated events (Greven et al., 2019).

Rather than viewing uncertainty as a weakness of educational observation, participants generally described it as an inherent part of professional practice. Across interviews, educators generally emphasised the importance of remaining open to multiple interpretations and avoiding premature conclusions, particularly when working with very young children whose behaviour may fluctuate considerably over short periods of development.

Importantly, participants did not consider these interpretative challenges a reason to disregard educator observations. Instead, they viewed observation as one component of a broader assessment process in which information from different informants could contribute to a more comprehensive understanding of the child.

As Morena explained:

"I believe that educators' observations are very valuable, but they likely become even more meaningful when considered alongside those of parents."

Across interviews, educators generally described parent and educator observations as complementary rather than competing sources of information. Participants emphasised that parents and educators observe children in different environments and under different conditions, potentially allowing each to access behaviours that may not be equally evident in the other context. This finding appears to be consistent with previous research highlighting the value of multi-informant approaches in the assessment of Environmental Sensitivity (Greven et al., 2019; Kähkönen et al., 2024).

A further distinction may suggest between the observability of behaviour and the interpretation of its psychological meaning. While educators generally agreed that many behaviours associated with Environmental Sensitivity could be readily observed within childcare settings, they consistently reported greater uncertainty when attempting to explain the emotional or psychological processes underlying those behaviours. This distinction suggests that observability and interpretability represent related but separate dimensions of educator-based assessment.

Participants also reflected on the implications of this distinction for the questionnaire itself. Items requiring educators to infer children's internal emotional experiences were consistently perceived as more challenging than those referring to directly observable behaviours. In contrast, questionnaire items describing concrete behavioural responses were considered easier to evaluate because they relied on repeated observations during everyday educational activities.

Overall, the findings suggest that educators considered children's internal emotional experiences to be only partially accessible through observation. Although participants generally felt confident identifying behavioural indicators potentially associated with Environmental Sensitivity, they appeared considerably more cautious when interpreting their underlying psychological meaning. Taken together, these reflections highlight the importance of distinguishing between behavioural observation and behavioural interpretation when adapting parent-report measures for educator use and appear to further support the potential value of combining educator observations with information provided by parents to achieve a more comprehensive understanding of children's Environmental Sensitivity.

4.6 Theme 5: Awareness of Environmental Sensitivity Broadens Behavioural Interpretation

A fifth theme concerned educators' reflections on the potential risk of misinterpreting behaviours associated with Environmental Sensitivity within educational settings. After becoming familiar with the concept of Environmental Sensitivity, many participants described reconsidering behaviours that they had previously interpreted as problematic or difficult to manage.

Across interviews, educators reported that children's behaviour may often be interpreted based on its observable consequences rather than the underlying processes that may contribute to it. As a result, children who respond more intensely to sensory, emotional, or social stimulation may sometimes be perceived as difficult, anxious, shy, oppositional, or poorly adapted.

Maria reflected:

"Before becoming more familiar with the concept of high sensitivity, some behaviours simply seemed difficult to manage or were described as tantrums. Now I wonder whether, in some cases, the child was simply reacting to something that felt too intense for them."

One of the most frequently discussed examples concerned children's responses to transitions and unfamiliar situations. Several participants referred to children who appeared hesitant, reluctant, or resistant when introduced to new activities. Rather than describing newly observed behaviours, educators consistently reported that the educational material had changed how they interpreted behaviours they had already encountered in their daily practice.

Before becoming familiar with the concept of Environmental Sensitivity, these behaviours were often interpreted as a lack of cooperation, limited motivation, or unwillingness to participate. Following the educational session, however, participants described increasingly considering alternative explanations for the same behaviours.

As explained an educator:

"I have often viewed a child who spends a long time observing before joining an activity, or who shows little interest in participating in certain activities, as a child who is simply not interested. I have to admit that I sometimes made judgments about these children and often tried to persuade them to take part. Now, however, I find myself wondering whether some of them simply needed more time to feel safe before engaging, or whether the activity itself may have been emotionally intense or overwhelming for them."

Across interviews, educators frequently described observation-before-participation as a possible strategy through which children may gather information, regulate uncertainty, and achieve a greater sense of emotional security before engaging with unfamiliar situations. This interpretation appears to be consistent with previous descriptions of cautious responses to novelty as a characteristic of Environmental Sensitivity (Aron et al., 2012; Greven et al., 2019). Rather than changing what educators observed, the educational material appeared to broaden the range of explanations they considered when interpreting children's behaviour.

A second area frequently discussed by participants concerned children's responses to sensory stimulation. Educators described situations in which children became distressed, withdrew from group activities, or appeared emotionally overwhelmed during highly stimulating moments. Several participants acknowledged that such behaviours could easily be interpreted as behavioural difficulties if considered without attention to the surrounding context.

As Roberta reflected:

"When a child withdraws from the group or appears distressed by noise, the first impression may be that something is wrong. I must admit that over the years I have often heard colleagues quickly associate these kinds of behavioural differences with conditions such as autism, and there is often a tendency to place the behaviour within a diagnostic category. However, after reading the educational materials on high sensitivity, I began to wonder whether, in many cases, these reactions might simply reflect the child's response to an overwhelming amount of sensory stimulation rather than a sign of a disorder."

Similar reflections were reported across interviews. Participants did not reject the possibility that some children might have neurodevelopmental conditions; rather, they emphasised the importance of considering Environmental Sensitivity as one of several possible explanations before reaching conclusions about children's behaviour. This cautious approach appears to be consistent with previous literature highlighting that Environmental Sensitivity represents a normal dimension of individual variation and should not be confused with psychopathology or neurodevelopmental disorders (Greven et al., 2019; Pluess, 2015).

Emotional responsiveness represented another area in which educators reported reconsidering their interpretations. Children who reacted strongly to peer conflict, criticism, frustration, or the distress of others had previously been described as overly emotional, fragile, or less resilient. After becoming familiar with the concept of Environmental Sensitivity, participants increasingly reported questioning whether these reactions should automatically be interpreted as indicators of poor emotional regulation.

Educators also reflected on the implicit expectations that shape behavioural interpretation within childcare settings. Across interviews, participants referred to educational environments in which rapid participation, flexibility, emotional independence, and tolerance of sensory stimulation were often viewed as indicators of successful adaptation. Consequently, children whose behavioural style differed from these expectations appeared to be particularly vulnerable to misunderstanding.

Rather than viewing these children as less adaptable, several participants reported becoming more aware that some behaviours might represent alternative ways of responding to environmental demands. Participants generally reported that this shift did not alter educators' expectations regarding children's participation; instead, it encouraged them to consider a broader range of explanations for behaviours that initially appeared problematic.

Participants highlighted that the training prompted a shift in perspective, leading them to focus less on the behaviour itself and more on the possible underlying processes or reasons behind it. This change in perspective was reported across many interviews. Rather than focusing solely on whether a behaviour was problematic, educators described becoming more interested in understanding the processes that might underlie children's responses.

Participants generally described this change as a refinement of their professional reasoning rather than a change in the behaviours they observed or in their educational expectations.

Several educators emphasised that becoming familiar with the concept of Environmental Sensitivity appeared to be encouraged them to generate multiple hypotheses before interpreting children's behaviour. Instead of relying on first impressions, they described considering whether a child's reaction might reflect sensory overstimulation, heightened emotional responsiveness, developmental factors, or other contextual influences. This finding appears to be consistent with previous literature describing Environmental Sensitivity as a framework that may broaden professionals' understanding of individual differences without replacing other possible explanations (Greven et al., 2019; Pluess, 2015).

Importantly, participants also stressed that recognising Environmental Sensitivity does not imply attributing every behavioural difficulty to high sensitivity. Across interviews, educators repeatedly emphasised the importance of maintaining a balanced and cautious interpretative approach.

As one of the participants explained:

"I don't think everything can be explained by high sensitivity. Last year, I had a child who cried every day for about six months, from the moment they arrived until they went home. Even very small changes would make them cry. I remember that sometimes I would simply change the way I was sitting, and they would immediately start crying. But I do understand the importance of considering high sensitivity as one possible explanation before labelling a behaviour as problematic."

Participants generally described Environmental Sensitivity as one possible perspective within a broader process of behavioural interpretation rather than as a universal explanation for children's behaviour. They emphasised the importance of repeated observation, consideration of contextual factors, and openness to multiple explanations before drawing conclusions.

Overall, the findings suggest that becoming familiar with the concept of Environmental Sensitivity may have influenced educators' interpretative framework more than their observational practices. Rather than reporting that they observed new behaviours, participants generally described recognising behaviours that were already familiar while considering a broader range of possible explanations for them. Taken together, these reflections suggest that increased awareness of Environmental Sensitivity may contribute to more nuanced, context-sensitive, and individualised interpretations of children's behaviour within early childhood educational settings.

4.7 Theme 6: The Perceived Value of Educator-Based Assessment

The final theme concerned educators' perceptions of their potential contribution to the assessment of Environmental Sensitivity during toddlerhood. Across interviews, participants generally described educator observations as a valuable source of information, particularly when children are observed repeatedly within everyday educational contexts.

Although educators acknowledged the challenges associated with interpreting children's internal emotional experiences, they nevertheless generally considered themselves well positioned to identify behavioural patterns potentially associated with Environmental Sensitivity. Participants emphasised that their role allows them to observe children across a wide range of situations involving sensory stimulation, peer interactions, emotional challenges, daily routines, and transitions.

As Silvia explained:

"We spend many hours each day with children and observe them across a wide range of situations. This allows us to notice aspects of their behaviour and functioning that may not always emerge in other contexts."

Several educators identified repeated observation over time as one of the main strengths of their professional role. Unlike brief assessments conducted in unfamiliar settings, educational contexts provide opportunities to observe children across days, weeks, and sometimes years. Participants generally described observation as a cumulative process in which behavioural patterns gradually become evident through repeated encounters across different situations. This observation appears to be consistent with previous literature highlighting the importance of repeated observations and multiple contexts when assessing Environmental Sensitivity during development (Greven et al., 2019; Kähkönen et al., 2024).

Maria reflected:

"I believe that one of the strengths of our role is the opportunity to observe children over time. We are not limited to witnessing a single episode or isolated situation; rather, we observe children across extended periods, often for more than a year. This allows us to see behaviours that recur repeatedly and to distinguish between patterns that are consistent over time and reactions that are temporary or situation specific."

Across interviews, participants generally reported that recurring behavioural patterns were considered more informative than isolated behaviours when attempting to understand individual differences among children.

A second advantage identified by participants concerned the opportunity to observe children within peer groups. Educators repeatedly referred to their ability to compare children's responses to similar routines, activities, and environmental conditions while recognising the considerable variability in individual behaviour.

Participants generally described this comparative perspective as particularly valuable because they routinely observe multiple children of similar developmental age within the same educational environment. Rather than comparing children against normative expectations, educators explained that these observations helped them recognise recurring individual differences in how children responded to comparable situations. This finding appears to be consistent with previous literature emphasising the value of multiple informants and observational contexts in the assessment of Environmental Sensitivity (Greven et al., 2019; Kähkönen et al., 2024).

Educators also highlighted the characteristics of childcare settings as particularly favourable for observing manifestations of Environmental Sensitivity. Peer interactions, group activities,

sensory stimulation, emotional conflicts, and daily transitions were frequently described as situations in which individual differences appeared to become especially apparent.

Participants therefore generally considered educational settings to provide opportunities for observing behavioural responses that may be less evident in other contexts.

At the same time, educators did not consider their observations sufficient in isolation. Instead, participants consistently emphasised the importance of integrating information obtained from different observers when attempting to understand children's behavioural characteristics.

As one participant explained:

"Parents and educators observe children in different contexts. I think you need both perspectives to really understand the child. Quite often, when we talk with parents, our observations are different, but once we put them together, the child's behaviour starts to make much more sense"

Across interviews, participants generally described parent and educator observations as complementary rather than competing sources of information. Parents were considered to have greater access to children's experiences within family routines, whereas educators perceived themselves as particularly well positioned to observe children's responses to peer interactions, sensory stimulation, and the everyday demands of educational environments. Participants therefore viewed collaboration between different informants as an important component of understanding Environmental Sensitivity during early childhood.

Interestingly, several educators reported that completing the questionnaire and reviewing the educational material encouraged them to reconsider behavioural patterns they had previously observed but had not explicitly associated with Environmental Sensitivity.

As Giulia reflected:

"After reading the training materials, I began to reconsider some of the children I had worked with in the past. Behaviours that I had previously viewed as separate or unrelated started to make more sense when understood within a broader framework."

Rather than reporting that they had begun to observe new behaviours, participants generally described a change in how they interpreted behaviours that had already been part of their everyday professional experience. Becoming familiar with the concept of Environmental Sensitivity appeared to provide educators with a broader interpretative framework through which previously unrelated observations could be understood more coherently. This finding appears to be

consistent with previous literature suggesting that increased knowledge of Environmental Sensitivity may facilitate the recognition of individual differences without changing the behaviours themselves (Greven et al., 2019).

Overall, the findings suggest that educators perceived their observations as a valuable contribution to the assessment of Environmental Sensitivity during toddlerhood. Participants identified several potential strengths associated with educator-based assessment, including repeated observation over time, opportunities to observe children within peer groups, comparison across children experiencing similar environmental conditions, and regular exposure to situations involving sensory, social, and emotional demands.

At the same time, participants acknowledged important limitations. Educators generally recognised that their observations were context-specific and that interpreting children's internal emotional experiences remained more challenging than observing their behaviour. For this reason, participants frequently emphasised that educator observations should complement, rather than replace, information provided by parents and other caregivers.

Taken together, these findings appear to support the potential contribution of educator-based assessment within a broader ecological and multi-informant approach to understanding Environmental Sensitivity during early childhood. By combining observations obtained across different contexts, parents and educators may provide complementary perspectives that contribute to a more comprehensive understanding of children's behavioural and emotional functioning.

Chapter 5: Discussion

5.1 Main Findings

The present study explored educators' perceptions of an educator-adapted measure of Environmental Sensitivity for toddlers aged 18–36 months and, more broadly, their views on the observability and contextual relevance of sensitivity-related behaviours within early childhood educational settings. Overall, the findings suggest four main conclusions. First, educators perceived many behaviours associated with Environmental Sensitivity as observable within everyday childcare practice. Second, participants consistently distinguished between observing children's behaviour and interpreting the internal emotional processes underlying those behaviours. Third, educators viewed their observations as complementary

to, rather than interchangeable with, those of parents, supporting the value of a multi-informant approach to assessment. Finally, becoming familiar with the concept of Environmental Sensitivity appeared to broaden educators' interpretative framework, encouraging them to reconsider behaviours they had previously interpreted as problematic or indicative of poor adaptation.

The finding that educators considered many manifestations of Environmental Sensitivity observable within early childhood educational settings extends previous research, which has relied predominantly on parent-report measures (Aron et al., 2012; Greven et al., 2019; Pluess, 2015). Participants consistently referred to children's responses to sensory stimulation, novelty, environmental changes, and emotionally salient situations as behaviours that could be recognised through routine observation, suggesting that educational settings may offer valuable opportunities for observing individual differences in sensitivity during toddlerhood.

At the same time, the findings highlight an important distinction between observing behaviour and interpreting its psychological meaning. Although educators generally felt confident identifying behavioural responses, they were considerably more cautious when inferring children's internal emotional experiences. This distinction suggests that the usefulness of educator-report assessment depends not only on the observability of behaviours but also on the extent to which questionnaire items require educators to interpret experiences that may not be directly accessible within educational settings. These findings therefore emphasise the importance of considering contextual observability when adapting parent-report instruments for educator use.

A further contribution of the present study concerns the potential role of professional knowledge in shaping behavioural interpretation. Rather than reporting that they had begun to observe new behaviours, educators consistently described reconsidering behaviours they had already encountered in their everyday practice after becoming familiar with the concept of Environmental Sensitivity. Although the present study cannot establish a causal relationship between awareness of Environmental Sensitivity and behavioural interpretation, these findings suggest that greater familiarity with the construct may encourage educators to consider alternative explanations before attributing behavioural difficulties to children, thereby reducing the likelihood of premature behavioural labelling.

Finally, participants consistently described educator and parent observations as complementary sources of information. Rather than viewing one perspective as more accurate than the other, educators recognised that family and educational contexts provide access to different aspects of children's everyday functioning. Taken together, these findings support the potential value of educator-report assessment as part of a broader, context-sensitive and multi-informant approach to understanding Environmental Sensitivity during toddlerhood.

5.2 Strengths of the Study

The present study has several strengths. To the authors' knowledge, it is among the first to explore the adaptation of a parent-report measure of Environmental Sensitivity for educators working with toddlers aged 18–36 months, addressing a developmental period that has received limited attention in previous research. A further strength lies in its methodological approach, which examined the contextual applicability and observability of questionnaire items before undertaking psychometric validation. The study also benefited from its ecological design, drawing on the experiences of educators who observe children repeatedly within natural educational settings. Finally, the qualitative approach provided insight not only into the observability of sensitivity-related behaviours but also into educators' interpretations of those behaviours, offering a valuable foundation for future research on educator-report assessment and context-sensitive approaches to Environmental Sensitivity during early childhood.

5.3 Limitations

The findings of the present study should be interpreted in light of several limitations. First, the study involved a relatively small sample of educators recruited from a limited geographical area. Although this is consistent with the exploratory nature of qualitative research, the findings may not fully reflect educators' perspectives across different educational and cultural contexts.

Second, the study focused exclusively on educators' perspectives. While this was consistent with the aim of evaluating the applicability of an educator-adapted measure, it does not allow conclusions about the extent to which educators' observations correspond with those of parents or other caregivers.

Finally, participants completed the questionnaire and received a brief introduction to the concept of Environmental Sensitivity before taking part in the interviews. Although this procedure was intended

to facilitate informed reflection on the questionnaire items, it may have influenced the way participants interpreted and discussed children's behaviours. In addition, the present study focused on the contextual applicability of the adapted questionnaire rather than its psychometric properties, which remain to be established in future research.

Despite these limitations, the study provides an important exploratory contribution by examining the feasibility of educator-based assessment of Environmental Sensitivity and offers a foundation for future research in this area.

5.4 Practical Implications and Future Directions

The findings of the present study have several implications for both educational practice and future research. First, educators consistently reported that becoming familiar with the concept of Environmental Sensitivity encouraged them to reconsider behaviours they had previously interpreted as problematic or indicative of poor adaptation. Although the present study cannot establish a causal relationship between increased awareness and changes in educational practice, these findings suggest that introducing educators to the concept may encourage more nuanced interpretations of children's behaviour and support more individualised educational responses.

Second, the findings reinforce the value of adopting a multi-informant approach to the assessment of Environmental Sensitivity. Participants consistently viewed educator and parent observations as complementary sources of information, each reflecting children's behaviour in different everyday contexts. The study also highlights the importance of considering contextual observability when adapting assessment instruments for educational settings, suggesting that successful adaptation requires attention not only to conceptual equivalence but also to the opportunities educators have to observe the behaviours described by questionnaire items.

Future research should build on these findings by examining the psychometric properties of the educator-adapted questionnaire in larger and more diverse samples, comparing educator and parent reports, and exploring whether increasing educators' knowledge of Environmental Sensitivity influences behavioural interpretation, educational practice, and children's experiences within early childhood settings.

5.5 Conclusion

The present study explored the applicability of an educator-adapted measure of Environmental Sensitivity for toddlers aged 18–36 months within early childhood educational settings. Overall, the findings suggest that educators perceive many behaviours associated with Environmental Sensitivity as observable in everyday childcare practice, while also recognising the importance of considering the contextual nature of children's behaviour and the limits of inferring their internal emotional experiences. The study further suggests that educators may represent a valuable source of information within a multi-informant approach, complementing rather than replacing parents' observations. Beyond supporting the adaptation of an educator-report measure, the findings indicate that familiarity with the concept of Environmental Sensitivity may encourage educators to adopt a broader and more nuanced interpretative perspective when reflecting on children's behaviour. Although further research is needed to examine the psychometric properties of the adapted questionnaire and the implications of educators' awareness for educational practice, the present study provides an initial contribution to the development of context-sensitive approaches for assessing Environmental Sensitivity during early childhood.

References

- Acevedo, B. P., Aron, E. N., Aron, A., Sangster, M. D., Collins, N., & Brown, L. L. (2014). The highly sensitive brain: An fMRI study of sensory processing sensitivity and response to others' emotions. *Brain and Behavior*, 4(4), 580–594. <https://doi.org/10.1002/brb3.242>
- Aron, E. N., & Aron, A. (1997). Sensory-processing sensitivity and its relation to introversion and emotionality. *Journal of Personality and Social Psychology*, 73(2), 345–368. <https://doi.org/10.1037/0022-3514.73.2.345>
- Aron, E. N., Aron, A., & Jagiellowicz, J. (2012). Sensory processing sensitivity: A review in the light of the evolution of biological responsivity. *Personality and Social Psychology Review*, 16(3), 262–282. <https://doi.org/10.1177/1088868311434213>
- Aron, E. N., & Lionetti, F. (2025). Six reasons for confusion about the trait of high sensitivity. *Current Psychology*, 45, 95. <https://doi.org/10.1007/s12144-025-08820-w>
- Assary, E., Zavos, H. M., Krapohl, E., Keers, R., & Pluess, M. (2021). Genetic architecture of environmental sensitivity reflects multiple heritable components: A twin study with adolescents. *Molecular Psychiatry*, 26, 4896–4904. <https://doi.org/10.1038/s41380-020-0783-8>
- Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2011). Differential susceptibility to rearing environment depending on dopamine-related genes: New evidence and a meta-

analysis. *Development and Psychopathology*, 23(1), 39–52.
<https://doi.org/10.1017/S0954579410000635>

Belsky, J. (1997). Variation in susceptibility to environmental influence: An evolutionary argument. *Psychological Inquiry*, 8(3), 182–186. https://doi.org/10.1207/s15327965pli0803_3

Belsky, J., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). For better and for worse: Differential susceptibility to environmental influences. *Current Directions in Psychological Science*, 16(6), 300–304. <https://doi.org/10.1111/j.1467-8721.2007.00525.x>

Belsky, J., Hsieh, K.-H., & Crnic, K. (1998). Mothering, fathering, and infant negativity as antecedents of boys' externalizing problems and inhibition at age 3 years: Differential susceptibility to rearing experience? *Development and Psychopathology*, 10(2), 301–319. <https://doi.org/10.1017/S095457949800162X>

Belsky, J., & Pluess, M. (2009). Beyond diathesis stress: Differential susceptibility to environmental influences. *Psychological Bulletin*, 135(6), 885–908.
<https://doi.org/10.1037/a0017376>

Boyce, W. T., Chesney, M., Alkon, A., Tschann, J. M., Adams, S., Chesterman, B., Cohen, F., Kaiser, P., Folkman, S., & Wara, D. (1995). Psychobiologic reactivity to stress and childhood respiratory illnesses: Results of two prospective studies. *Psychosomatic Medicine*, 57(5), 411–422. <https://doi.org/10.1097/00006842-199509000-00001>

Boyce, W. T., & Ellis, B. J. (2005). Biological sensitivity to context: I. An evolutionary-developmental theory of the origins and functions of stress reactivity. *Development and Psychopathology*, 17(2), 271–301. <https://doi.org/10.1017/S0954579405050145>

Brindle, K., Moulding, R., Bakker, K., & Nedeljkovic, M. (2015). Is the relationship between sensory-processing sensitivity and negative affect mediated by emotional regulation? *Australian Journal of Psychology*, 67(4), 214–221. <https://doi.org/10.1111/ajpy.12084>

Ellis, B. J., & Boyce, W. T. (2008). Biological sensitivity to context. *Current Directions in Psychological Science*, 17(3), 183–187. <https://doi.org/10.1111/j.1467-8721.2008.00571.x>

Ellis, B. J., Boyce, W. T., Belsky, J., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2011). Differential susceptibility to the environment: An evolutionary–neurodevelopmental theory. *Development and Psychopathology*, 23(1), 7–28.
<https://doi.org/10.1017/S0954579410000611>

Ellis, B. J., Essex, M. J., & Boyce, W. T. (2005). Biological sensitivity to context: II. Empirical explorations of an evolutionary-developmental theory. *Development and Psychopathology*, 17(2), 303–328. <https://doi.org/10.1017/S0954579405050157>

Greven, C. U., Lionetti, F., Booth, C., Aron, E. N., Fox, E., Schendan, H. E., Pluess, M., Bruining, H., Acevedo, B., Bijttebier, P., & Homberg, J. (2019). Sensory processing sensitivity in the context of environmental sensitivity: A critical review and development of research agenda. *Neuroscience and Biobehavioral Reviews*, 98, 287–305.
<https://doi.org/10.1016/j.neubiorev.2019.01.009>

- Hellwig, S., & Roth, M. (2021). Conceptual ambiguities and measurement issues in sensory processing sensitivity. *Journal of Research in Personality*, 93, 104130. <https://doi.org/10.1016/j.jrp.2021.104130>
- Hoffmann, A., Marhenke, R., & Sachse, P. (2022). Sensory processing sensitivity predicts performance in an emotional antisaccade paradigm. *Acta Psychologica*, 222, 103463. <https://doi.org/10.1016/j.actpsy.2021.103463>
- Kagan, J. (1994). *Galen's prophecy: Temperament in human nature*. Basic Books.
- Lionetti, F., Aron, A., Aron, E. N., Burns, G. L., Jagiellowicz, J., & Pluess, M. (2018). Dandelions, tulips and orchids: Evidence for the existence of low-sensitive, medium-sensitive and high-sensitive individuals. *Translational Psychiatry*, 8(1), 24. <https://doi.org/10.1038/s41398-017-0090-6>
- Lionetti, F., Aron, E. N., Aron, A., Klein, D. N., & Pluess, M. (2019). Observer-rated environmental sensitivity moderates children's response to parenting quality in early childhood. *Developmental Psychology*, 55(11), 2389–2402. <https://doi.org/10.1037/dev0000795>
- Lionetti, F., Klein, D. N., Pastore, M., Aron, E. N., Aron, A., & Pluess, M. (2022). The role of environmental sensitivity in the development of rumination and depressive symptoms in childhood: A longitudinal study. *European Child & Adolescent Psychiatry*, 31(11), 1815–1825. <https://doi.org/10.1007/s00787-021-01830-6>
- Lionetti, F., & Pluess, M. (2024). The role of environmental sensitivity in the experience and processing of emotions: Implications for well-being. *Philosophical Transactions of the Royal Society B*, 379(1908), 20230244. <https://doi.org/10.1098/rstb.2023.0244>
- Nocentini, A., Menesini, E., & Pluess, M. (2018). The personality trait of environmental sensitivity predicts children's positive response to school-based anti-bullying intervention. *Clinical Psychological Science*, 6(6), 848–859. <https://doi.org/10.1177/2167702618782194>
- Obradović, J., Bush, N. R., Stamperdahl, J., Adler, N. E., & Boyce, W. T. (2010). Biological sensitivity to context: The interactive effects of stress reactivity and family adversity on socioemotional behavior and school readiness. *Child Development*, 81(1), 270–289. <https://doi.org/10.1111/j.1467-8624.2009.01394.x>
- Pluess, M. (2015). Individual differences in environmental sensitivity. *Child Development Perspectives*, 9(3), 138–143. <https://doi.org/10.1111/cdep.12120>
- Pluess, M. (2022). Environmental sensitivity: The phenomenon, its development, and its implications. *Current Opinion in Behavioral Sciences*, 44, 101096. <https://doi.org/10.1016/j.cobeha.2022.101096>
- Pluess, M., Assary, E., Lionetti, F., Lester, K. J., Krapohl, E., Aron, E. N., & Aron, A. (2018). Environmental sensitivity in children: Development of the Highly Sensitive Child scale and identification of sensitivity groups. *Developmental Psychology*, 54(1), 51–70. <https://doi.org/10.1037/dev0000406>

- Pluess, M., & Belsky, J. (2013). Vantage sensitivity: Individual differences in response to positive experiences. *Psychological Bulletin*, 139(4), 901–916. <https://doi.org/10.1037/a0030196>
- Pluess, M., & Boniwell, I. (2015). Sensory-processing sensitivity predicts treatment response to a school-based depression prevention program: Evidence of vantage sensitivity. *Personality and Individual Differences*, 82, 40–45. <https://doi.org/10.1016/j.paid.2015.03.011>
- Pluess, M., Lionetti, F., Aron, E. N., & Aron, A. (2023). People differ in their sensitivity to the environment: An integrated theory, measurement and empirical evidence. *Journal of Research in Personality*, 104, 104377. <https://doi.org/10.1016/j.jrp.2023.104377>
- Rothbart, M. K. (2011). *Becoming who we are: Temperament and personality in development*. Guilford Press.
- Rothbart, M. K., & Bates, J. E. (2006). Temperament. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 99–166). Wiley.
- Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (Vol. 1, pp. 37–86). Erlbaum.
- Shonkoff, J. P., & Phillips, D. A. (Eds.). (2000). *From neurons to neighborhoods: The science of early childhood development*. National Academy Press.
- Slagt, M., Dubas, J. S., van Aken, M. A., Ellis, B. J., & Deković, M. (2018). Sensory processing sensitivity as a marker of differential susceptibility to parenting. *Developmental Psychology*, 54(3), 543–558. <https://doi.org/10.1037/dev0000431>
- Sperati, A., Spinelli, M., Fasolo, M., Pastore, M., Pluess, M., & Lionetti, F. (2022). Investigating sensitivity through the lens of parents: Validation of the parent-report version of the Highly Sensitive Child scale. *Development and Psychopathology*, 36(1), 415–428. <https://doi.org/10.1017/S0954579422001134>
- Tabak, B. A., Gupta, D., Sunahara, C. S., Alvi, T., Wallmark, Z., Lee, J., Fulford, D., Hudson, N. W., & Chmielewski, M. (2022). Environmental sensitivity predicts interpersonal sensitivity above and beyond Big Five personality traits. *Journal of Research in Personality*, 98, 104210. <https://doi.org/10.1016/j.jrp.2022.104210>
- Thomas, A., & Chess, S. (1977). *Temperament and development*. Brunner/Mazel.
- La Paro, K. M., Pianta, R. C., & Stuhlman, M. (2004). The Classroom Assessment Scoring System: Findings from the prekindergarten year. *The Elementary School Journal*, 104(5), 409–426.
- Pianta, R. C., La Paro, K. M., & Hamre, B. K. (2008). *Classroom Assessment Scoring System Manual: Pre-K*. Paul H. Brookes.