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# Challenges for Behavioral Neuroscience: Prenatal, Postnatal, and Social Factors

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## Abstract

Behavioral medicine has neglected social aspects for a long time. In the pre- and postnatal context, these are especially important, as parental competencies in the relational objects of the infant may be compromised by both inner and outer factors, thus potentially compromising the infant's psychic development. The findings on pre- and postnatal stages of human development have shown that early psychosocial interventions can help out to some extent. Approaches for parents, which have mainly evolved from the findings of psychoanalysis and mother-infant research, must be augmented by a social perspective, just like postnatal concepts have been augmented by prenatal intervention approaches. The latter reach from how parents-to-be can be prepared for parenthood to how to support attachment and relation in infants, toddlers, and older children. Scientific behavioral reasoning, augmented by subjectivity- and objectivity-related concepts, provides a framework to work with, so that potential deprivation can be faced seriously. Intervention approaches focusing on bonding, on relational issues, and on educational practices are introduced, covering the most important time spans of psychic development from the mother-unborn period to the mother-infant period.

**Keywords:** prenatal, postnatal, social, interventions, mother-infant research

## 1. Introduction

Psychoanalysis and infant mental health research offer a large amount of knowledge about human development, pathology and interventions, which can partially be grounded in the findings of neuropsychology [1, 2]. These findings connect to what Stierlin conceptualized as relational individuation, or co-individuation ("Bezogene Individuation": the principle that "the higher the level of individuation in a family member, family, or group is, the higher the level of personal relating becomes, and is required at the same time") [3], a concept that originally aimed at psychic identities of members of a family system. The concept generally supports the principle of socialization modes in Lloyd deMause's approach of psychogenetic personality development [4, 5]. The psychogenetic personality concept illuminates the modes of manifestation of transgenerational psychodynamics, and even takes into account physiologically based premature birth in humans [6]. The concept hints at the mutual interaction of individual and societal development [7], which will show in subjectivity and in socialization modes. Illuminating their organic

substructure might be one of the challenges of future behavioral neuroscience, an interdisciplinary exchange of concepts and of mutual impregnation, the aim of future scientific cooperation. The question of how to bring together brain, mind, and the social will be one of the difficult tasks.

In the course of recent infant mental health research, fetal brain development has been examined from a bio-psychosocial perspective [8], as has been by Roth [9] from a neuroscientific one. In his depiction of prenatal and early postnatal processes of brain development, three levels in the limbic system correlate with temperament, with early experiencing, and with subsequent socialization, of which the latter may be responsive to compensatory intervention. Psyche, in the neuroscientific perspective, is strictly related to brain physiology, a controversial [10] still worthwhile approach, since it has been shown that early experiences will influence brain function and structure in humans [11]. What has mostly been accepted is that the concept of subject autonomy is generally challenged owing to Freud's observation, "Der Reflexvorgang bleibt das Vorbild auch aller psychischen Leistung (The reflex act remains the type of every psychic activity as well)," [12] which he stated to put psychic mechanisms in connection with automatic reflex processing, in order to emphasize the predominance of unconscious psychic processes. Around 100 years later, the findings about intuitive responses being in middle position between innate reflex behavior and seemingly more "rational" behavior, have been brought up thanks to video microanalyses of dyadic interaction of infants and parents. In this context, parental competencies are referred to as intuitive competencies [13–15]. These are elicited within a time frame of 200–600 ms. Not only mothers, also fathers, children, and other relational objects have been observed to show these; they are universal and to be found in persons of any age, any gender, and in any culture [16].

Spitz, in the 1960s, observed that the physical presence of the mother, i.e., of one relational object, is the basic precondition for successful infant mental development [17, 18]. Severe social deprivation in hospitalized and institutionalized children, which grew up without responses to their needs showed compromised development in many aspects [19, 20]. By now, diagnostic approaches and options of treatment of infants and toddlers even encompass a psychodynamic concept [21], focusing on conflict, structure, and relation perspectives, thus paving the way for developing a rather focus-oriented treatment approach. This will probably be used more frequently in the future, just like operationalized psychodynamics in OPD-2 has increasingly been used in studies of the last years [22]. Although operationalized psychodynamics has widely improved the clinical view of human development, misconceptions have not been avoided: specific cultural and social influences on the infant's development are still grossly neglected. Socioeconomic factors on mothers' sensitivity and on family functioning have only begun to be examined [23].

## **2. Anthropological basics and mother-infant research**

The intrauterine development of the cerebral cortex occurs in exact stages. Each developmental step is a vulnerable period, which is sensitive to insults rendering the brain susceptible to structural malformations and functional impairments [8]. Neurogenesis shows billions of neurons being produced during the development of the central nervous system. It mainly occurs at the inner edge of the neural tube wall, later ventricles, and spinal cord. Cell division begins once the neural tube has closed at 4–5 weeks after conception, which is 6–7 weeks of gestation. Most neurons are formed at 12–18 weeks of gestation. Around 200 billion neurons are produced in the human brain, and 40 billion in the neocortex alone, of which the half are

eliminated during the maturation process, resulting in a final number of 100 billion neurons at 40 weeks in full-term infants. Maternal stress during the first trimester has been linked to an increased risk of pathology, suggesting that the expression of genes in early fetal life is influenced by external factors, leading to behavioral and cognitive malfunction or to psychiatric disorder like schizophrenia [8]. Stress-induced reduction of neurons in late fetal life is probably associated with increased damage of neurons. Adding to it, the conspicuous findings on correlations of maternal mental disorders in pregnancy to the child's subsequent psychic development can be examined from different perspectives, as can psychic development within a broader context.

From a psychoanalytic perspective, there is a perinatal constant of originary separation as inscription of lack within the ego. It is a separation of the ego from the developing subject through "objet petit a." The object, the so-called other, is the object-cause of desire. It is the driving force, which makes the subject seek something, organically mirrored in the mesocortical and mesolimbic seeking systems of the frontal lobe. The subject in encountering the object experiences entering the Real beyond symbolization. If it was not for physiological prematurity in humans [24], one might argue that human seeking is merely for reasons of expansion, or exploring. Still, it is originary separation adding to physiological prematurity, which seems to induce primary "homelessness" in *Homo sapiens* [7]. The subject comes to exist through seeking only.

While German pioneer of psychosomatics Thure von Uexkuell gave point to the tuning of inner and outer world in animal life, in humans the relation to nature is flawed, or altered ("altéré"). It is altered, Lacan noticed, "through a certain dehiscence (*déhiscence*) of the organism internal, through a primordial discord (*discord*) (...), as is shown in the signs of discontent and in physical incoordination in the first months of the newborn. The objective rationale of the anatomical imperfectness of the pyramidal system (...) confirms this view, which we formulate as obtaining true specific prematurity of birth in humans" [25]. Along such an anthropological constant, it should be common ground to assume biological and sociopsychological aspects to be relevant to human development.

The biological aspect refers to instinctual life in connection with separation. Anxiety is the most basic of experiences and can be reactualized at any time. Such a reactualization of anxiety figures in anxiety of the cut ("coupure"): it is in cutting, dissociation, separation [26], which is first and foremost in birth, and then in castration and punishment. Although the latter belong to the sphere of the Symbolic, they actualize the first, stemming from the sphere of the Imaginary. As Catherine Malabou points out, death is prefigured in castration. Castration anxiety does not primarily represent the loss of a specific object but rather the indeterminate threat of separation, of a cut. In connection with repetition compulsion and the "fort/da" game in "Beyond the Pleasure Principle" [27], the anticipation of separation from the self is a primal motive ("Ur-Angst"). Any trauma experienced is in terms of such psychodynamics, namely since probably "all events—even 'real' or traumatic events—ultimately occur at the heart of the psyche's separation from itself (...)" [26].

The psychological aspect refers to symbolization through employing language in human development after the early mother-infant stage has been passed through. At that stage, it is about basic trust ("Ur-vertauen") in order to overcome mechanistic thinking ("pensée opératoire") and alexithymia in the infant, and the Imaginary has provided space for the infant to develop. Symbolization will increasingly enter the Imaginary, over-writing the experiences the infant has made before. Ludwig Janus has called attention to the concept of transcription, or transliteration ("Umschrift"), occurring from one developmental stage to another, which Freud in a letter to Wilhelm



Fliess remarked in 1896 [28]. However, the failing of symbolical over-writing, i.e., of restructuring or rewriting of the Imaginary, can be a marker of psychosis [29], or, on the imaginary-organic pole, of asymbolic conversion [30]. In “The Interpretation of Dreams” [12], Freud describes dreams as expressions of the primary process, in which wish fulfillment is executed. Thus, dream, delusion, and confabulation and other psychosis-like disorders of thinking can be viewed as working temporarily in lieu of the demands of the frontal lobe control system.

From a psychoanalytic perspective, disorder is the result of quite a normal struggle for conflict solution in differing gradations of primary, i.e., preverbal, processual thinking, and secondary, i.e., verbal, processual thinking. Pathology can be read in gradations of normalcy. Outer stressors can trigger a reactualization of preverbal, i.e., pre- and postnatal affects [7]. These encompass many factors contributing to compromise conflict solution. Disorder will take the very gradation the subject is susceptible of, only to produce as little conflictive tension as possible. At preverbal stages, disorder will mainly be body disorder; conversion can take place before any symbolization is possible.

At this point, the seemingly societal decline of symbolic references might make any structural framing, i.e., inner positioning, difficult to achieve [29]. Inner positioning can be taken as being connected to outer positioning in its literal sense: as an example, the ancient Greek “polis” would be a place of enabling positioning for—a few select—people to grow into thinkers like Plato and Aristotle. For them, it would provide space and structure to developing thought and concept. A frame would be provided in which personal relations could grow into becoming the background of successful development [31]. In contrast, today’s ever-existing interpellation to people manifests in a very concrete societal trend of commodified relations calling for even less inner positioning, adding to, and retroacting on, the withdrawal of sustained societal structure, rendering more and more impossible people participate in major social achievements [32]. Such a trend might also compromise psychic functioning of parents and mothers-to-be severely. It might be the phenomenon of “new morbidity” in infants, which is in the trend toward early functional and psychic disorders and toward chronification, closely associated with this societal trend. At any rate, biological and psychological aspects of human development show humans to be prone to dysfunctional internal conflict processing, probably even more when obscure personality traits seem to be promoted [33], while virtual media foster the loss of sense of reality [34]. Such depravation can be seen in the phenomenon that present-day western societies increasingly call for behavioral and experiential conformity: changing its character, the issue of diversity becomes an interpellation of conformity. Depravation retroacting on poor psychic structure in people might prevail for generations [15], especially when a societal mode of too much freedom in some areas and too much restraint in others takes effect. It would be worthwhile examining how the organic substructure of psychological functioning and societal superstructure are intertwined, and how the “culture of commodification” [35] affects the mother-infant relationship. Looking at research on mirror neurons [36], it is not out of the question that such processes affect subject development on a macrolevel beyond the microlevel of mother-infant relations.

On a microlevel, especially postpartum depression in mothers has been the subject of extensive research investigations [37–39]. As is widely known by now, in interaction with their newborns depressive mothers show decreased responsiveness, increased passivity and/or intrusiveness, increased withdrawal, and decreased expression of positive emotions, and they tend to regulate the effects of their newborns in an insufficient way. Moreover, Papoušek and von Hofacker [40] have generally pointed out the connection between psychopathology traits in mothers and maladaptive patterns in their intuitive competencies. Correlations of maternal

mental disorders in pregnancy to the child's subsequent psychic development [41] are often conspicuous, yet by no means automatic. Such are certainly individual and can be influenced. Infant mental health observations could show slight but distinct negative influences of infant crying and sleeping problems on the child's subsequent social development [42]; infants' regulatory problems contribute substantially to external and internal psychic problems in early childhood [43]. Adding to recent behavioral oxytocin research [44] of the human "attachment system," from a perspective of behavioral neuroscience, it would be worthwhile exploring the testosterone-perspective of the human "lust system," and the dopamine-perspective of the human "love system."

Familial strain of different kinds can lead to dysfunctional relational patterns; missing or inadequate internal educational models in parents can have a similar effect [45]. As to intuitive parental competencies, it has become evident that intrapsychic and interpersonal factors can compromise the expression of these. Likewise, it must be assumed that the level of expressing such competencies might be dependent on social factors. This issue has widely gone unrecognized [15, 46]. Social factors viewed from a microperspective give way to a questionably individualized concept in which societal motion, e.g., toward fragmentation and irrationality through anomic tendencies, is neglected. It should not be surprising to see irrationality increase with too many choices [47]; any compromising of the formation of psychic function will lead to people's attempts at escaping mentalization. Given mentalization is the key to at least some of parental competencies issues, more are still pending; e.g., the capability of executing ego-functions may have developed in an individual, but may not be expressed. At any rate, in a perspective of mentalization as basic ego-function, such capability is a precondition of role-taking and changing of perspectives. Empathy corresponds with this function and is often missing, especially in somatoform disorder. In practice, somatoform disorders are often diagnosed as functional syndromes [48]; i.e., somatization shows in body disorder. Alexithymia often accompanies somatoform disorder; it should also be viewed in a context of societally induced personality issues.

Parents' cause attributions often reveal such a connection. In general somatoform disorder, from both older children and parents, psychosocial cause attributions are more often the case than in, e.g., asthma bronchiale to which rather genetic, external, and somatic causes are attributed [49]. Also, there are only moderate matches of subjective disorder beliefs in older children and parents: preframed attribution questionnaires generate higher scores of matches than half-open qualitative explorations do [50]. Generally, high diversity in parents' knowledge and cause attributions of their children's symptoms [51] invites to improve communication on many levels. Although it is obvious that pathological personality traits are associated with the ability to understand emotional states of others [52], social cognition aspects, of which mentalization is mostly in focus, are on a microperspective of family interaction. Although subscribing to a psychodynamic perspective, hereby only a small aspect is examined. In case that identity issues play a significant role, identification presupposes an original to identify by [53]. It has to meet requirements of highly differing concern [54] and has to do with subjective experience of identity [55].

### **3. Development and pathology**

Fedor-Freybergh, from a prenatal viewpoint, has rehearsed the problematic nature of increasing discontinuities emerging from social destabilization reaching

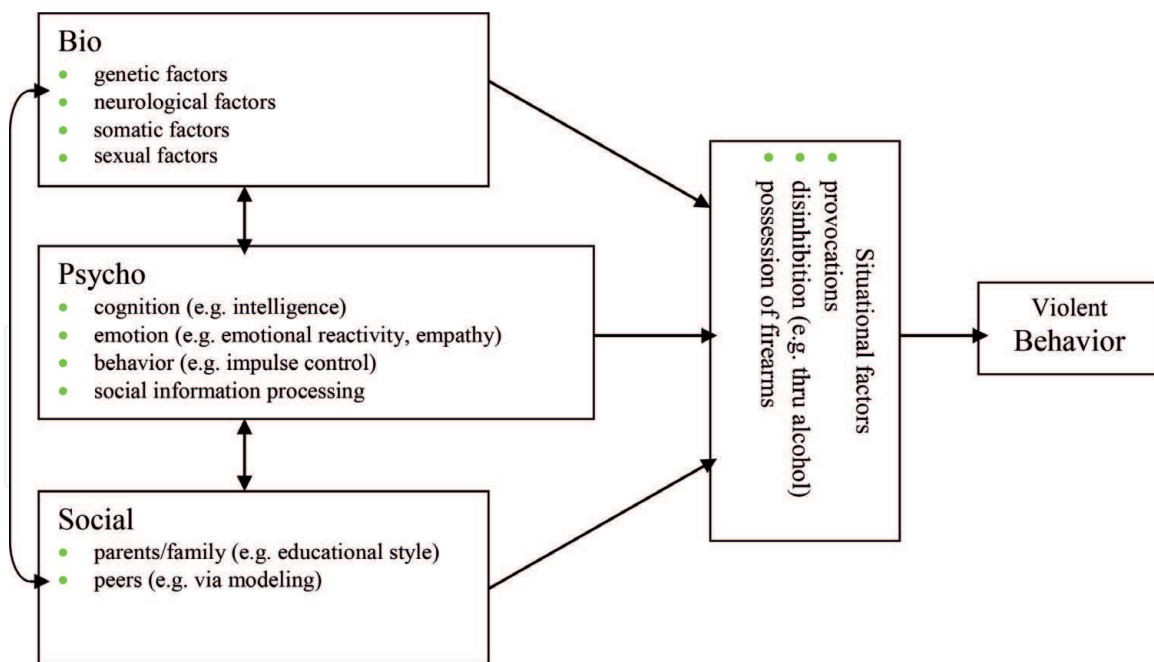
back to early prenatal traces of memory [56, 57]. The general message seems to be that through the processes of neuronal migration, organization, wiring, myelination, shaping and eliminating of excess neurons [8], even earliest information is sustained. Still, an approach of the earlier the better in several aspects of intervention has not yet been fully realized, as can be derived from the findings of epigenetics and fetal programming [58].

In prenatal stages of increased neuronal plasticity, milieu factors influence protein synthesis and program reference input in biological systems such as the HPA axis. While early postnatal epigenetic alterations are still partially influenceable [59, 60], the Barker hypothesis [61–63] postulates highly probable influences from the fetal period on cardio-metabolic functioning [62] and on brain functioning [64]. Some pregnancy-associated disorders have shown to connect to fetal experiencing [65], which also hints at the fetal period to be highly important for psychosomatic development. At least, it can be said to be responsible for the development of an archetypal mode of bonding and ambivalence (“Urbindung” and “Urambivalenz”). Taking into account that regulatory disorders in infants are obviously correlated with insufficient dealings within the family system, especially the family but also institutional surroundings of early childhood like kindergarten and preschool play a significant role in influencing personality. Research findings on regulatory disorders [66–70] provide dyadic insights but do not tend to regard triads [71], let alone setting, context, or background [72]; that is why many findings of attachment research [73] need to be augmented by a more panoramic view of relations. Also, an intergenerational perspective of trauma impact [74] carries weight since it provides vertical insight into modes of re-traumatization.

The pivotal role in human developmental pathology is certainly played by violence, as it shows in externalized action with huge destructive potential. Individuals with violent behavior inflict injuries on others, either physically, psychically, or both. Individual; i.e., subjective violent behavior, as social scientists like Hurrelmann [75] have shown, is mainly to be understood as generated by intrapsychic, interpersonal and social conflicts. Still, even an obvious inclination to aggression must not be assessed pathological in general; aggression encompasses a zestful constituent part [76]; it goes heavy on libido, i.e., on the dopaminergic system. That is why violence must not be confused with aggression in the shape of expansion and initiative, which belong to the individual developmental process. In contrast, violence as a mode of destructive aggression will have to undergo a transformation into pro-social modes before it is realized. As is often the case, etiopathology of psychic disorders can only partially be traced back [77]. Yet, concepts of phenomenology like, e.g., pathogenetic situation [10, 39], can reasonably be applied, and diverse traits of complex trauma can be observed out of which violence emerges [78]. Traumatized children have problems with changing perspectives since persisting stress from complex trauma has severely compromised their modes of experiencing, adding to lifelong trauma-associated conditions like dissociation [78, 79]. Presently, a phenotypical similarity in dissociation and severe psychopathology like schizophrenia is being discussed [80].

It is obvious that high levels of interdisciplinary exchange will be necessary to meet the challenges of brain, mind, and social factors (cp. **Figure 1**). In order to conceptualize further research on their intertwining, subjectivity formation and social objectivity have to be differentiated. The following concepts are thus not along the differentiation of subjective and objective aspect in dual-aspect monism as in the conception of Kessler et al. [81] but describe the subject in a grid of collective predisposition into which it has to develop.





**Figure 1.**  
*Bio-psychosocial factors model of violent behavior, modified after Schick 2017.*

### 3.1 Subjectivity formation

The mirror stage in the infant's development provides no coherent experience of the image in the mirror. Anamorphic as it is, it tends to convey rather fragmented than coherent aspects of the personality-to-be. That is why Lacan considered coherence an illusion, also owing to the fact that infantile dependence and helplessness are not conveyed in the mirror image. In referring to physiological prematurity, Lacan is close to Otto Rank's concept in which the whole self ("Total-Ich") precedes the partial self ("Partial-Ich"). Anything which is postnatal will only remain partial. Along birth, any wholeness will inevitably be lost: this is what humans will have to accept in life [82]. Here, we have a deceptive case of anthropology: there is not any totality possible. Infantile identification with the mirror image brings about alienation, or alteration, to the emerging subject, as well as dehiscence and discord—seemingly biological yet a specifically human feature [83]. Basic vulnerability stems from this stage; it can shake the infant when it is confronted with outer objects. Any identification, e.g., with parents, siblings, or teachers bears refractions.

When the mother reflects the infant, the infant creates an imaginary space through projecting his own reflected bodily self [30]. It is eventually connected to the fantasy, or anticipation, of separation by a cut. This phenomenon is linked to the illusion of coherence, which provides stability; on the other hand, there is a subversion-proneness due to an inherent amount of fictitiousness and externality within the developmental process. In the course, the outer world is perceived more coherent, more indisputable than it really is. More often than not, those objects out there are experienced as identifiable egos having unity, permanence and, first of all, substance. But those objects generally comprise a fair share of ourselves, which we tend to have abdicated ambivalence and fragmentation: after all, we wonder why those objects are that fragile. So, imaginary coherence provides people with anxiety too. The earliest developmental stages, pre- and postnatal, are gateways to imaginary formations of ideals via identification and reproduction of social roles. Taking on societal relations that begin at this point, the subject remaining is prone to ideological indoctrination. Social environment might fill the subjects' fantasies at worst distracting the subject from recognizing reality,

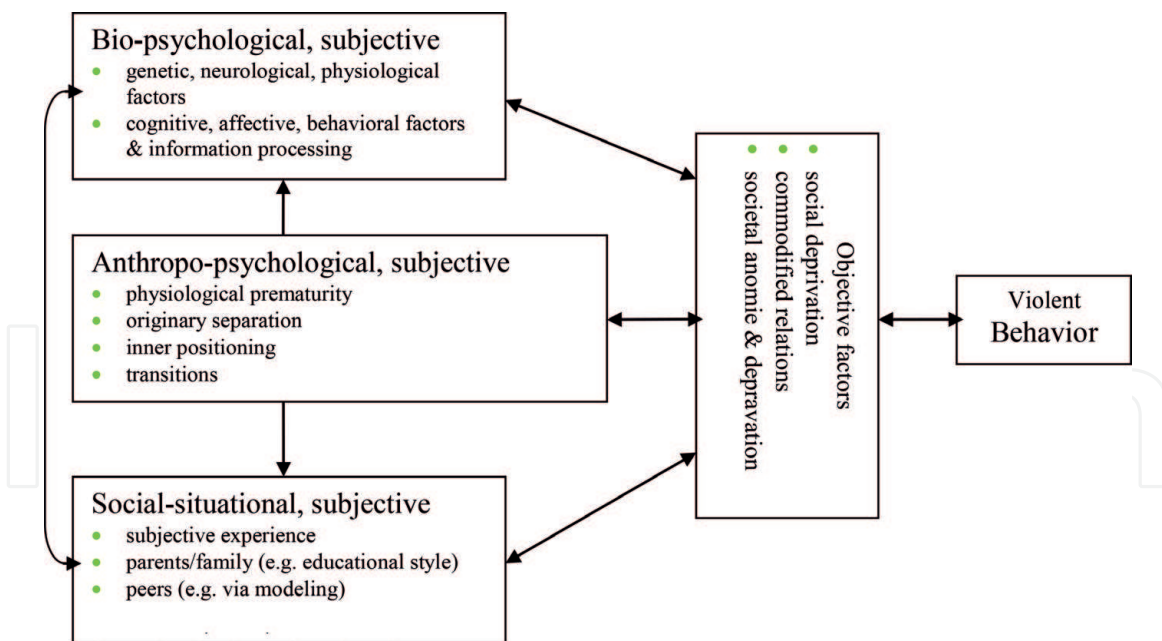


eventually leading to escapism [84]. The infant's bewilderedness at that stage makes for irritation, and for readiness to fetch interpellation.

Violent behavior is to be called subjective violence, as it is clearly visible and shows in acts of crime. Yet, the location of subjective conflict is not necessarily identical with the location of expressed violence. Children often enact at-home-conflicts in school or kindergarten. Experiences of victimization and conflict may be brought back home, leading to aggressive behavior, e.g., in sibling or in parent interaction. At any rate, violent behavior may be used as a personal solution within a given structure, thus subjective acting manifests as violent acting. What is known is that in families with high psychic dysfunctionality parents are not capable of taking enough care of their children, either physically or psychically. Subjectively violent individuals often seem to have such a background [85], and they have often been victims of violence themselves [86]. Sometimes there has been a lack of attachment in mother-infant-relations existing from birth onwards, or there are disorders of early attachment that have developed in the infant's first year of age, or different sorts of subjective psychopathology in parents affect the infant's emotional development. Still, social status and the status of societal development may compromise psychic competencies, as can be concluded from very different research perspectives [33, 34, 87]. Dysfunctional and noncoherent educational practices in some families, which can puzzle and disturb children and direct their development toward dysfunctional modes of behavior may even be amplified by the loss of societal structure; at least it may disturb families in developing consistent educational modes [15, 46]. Some findings on subjective violence indicate an early lack of empathy in children, a lack of impulse control, and a lack of anger management in connection with early deprivation phenomena. Deviant behavior in the shape of criminal behavior can be viewed as developmental pathology, especially if lack of empathy or lack of emotional reactivity [88] can be diagnosed. Even when in offenders lack of reflective functioning [89] seems to be the key to their violent acting, and their experiences of abuse and violent behavior can be linked to their lack of individual mentalization [90], an important role in socialization must also be seen in educational institutions' repressive force, which mostly will not support empathy but competition. Competition may not be bad, still empathy needs to be supported as levels of empathy indicate the levels of pro-social behavior [91]. Moreover, any subjective behavior can be viewed as a solution-type compromise that is workable on a personal level and is due to the dialectics of acquiescence and resistance in the process of subjectivity formation. Even when such behavior may only be one among several psychic solutions of the individual, it cannot be surprising when some children react violently according to their personal biographic experiencing (cp. **Figure 2**)—which would be a long-term and somewhat functional mode of behavior [92].

### **3.2 Social objectivity**

While zestful aggression makes for what can be called anthropology of the political [76] that does not deny subjective libidinous aggression aspects, violence must be viewed from a perspective of multifactorial subjective and objective connection. Objective violence is to be differentiated from the subjective kind [93, 94]. Contrary to subjective violence, which is committed by individuals and groups, objective violence emerges through objective reality itself; it is systemic, anonymous violence that is seemingly without reason but conceptual, more uncanny than direct precapitalist socioideological violence, which could be imputed to individuals' intentions [94]. Objective violence stems from the generated frame in which people exist and act. It is the societal background in which ideology evolves in the



**Figure 2.**  
*Subjective and objective factors model of violent behavior.*

subject. Individuals expressing subjective violence in this context have to be viewed being subjectively and objectively motivated. From an objective perspective, violent acts might be an attempt at realizing representation [32]; from a subjective perspective that would be the wish for reality—which turns out to be second reality [32, 34]. That would be a matter of substructure hitting upon superstructure, as is brain hitting upon societal commodification demands [95]. The contours of society are not only shaped by continuous interpellation through societal systems of economics and politics but the seemingly smooth functioning of society is at the same time obliged to generate outbursts of individual, i.e., subjective violence. What may be conceptualized as personal shortcomings in individuals can also be traced back to objective violent structure characterized by societal deprivation. What may appear as solely internal conflicts the subject has to solve seems co-determined by the ideological structure that dominates their surroundings.

As there are cultural differences in societies, which are said to be quite similar—a mundane example is that Americans show higher scores of body image dissatisfaction than Italians [96]—it is that what may look like internal processes only should also be viewed as the result of internalized societal relations of which an individually processed relation of the subject to their surroundings is formed. This relation may either, more or less, remain on a fantasmatic level tending to repress reality, or develop toward a rather realistic level. More than enough, human readiness for projective processing [97], i.e., for fantasmatic modes of creating personal reality, is an anthropological constant, which seems due to physiological prematurity in humans in the course of evolution. Adding severely to it, subject-object-differentiation nowadays is increasingly blurred owing to the loss of representation in virtualized surroundings [32]. That is why it is not possible to retrieve authenticity, if ever there was one. As people tend to hang on to the concept of authenticity especially in highly virtualized surroundings, “one always wishes to see the other act naturally, but this eludes him and thus becomes an object of fetish and intrigue” [55].

Fundamental issues of identification and representation still go unresolved [53]. Societal motion may seem detached from individual action at first but is not. It has strong effects on everyday dealings. Objective societal structure, at least in Western Europe, is currently dominated by high degrees of personal freedom and its concurrent, restraint, at the same time. The shibboleth of absolving societal structure

from its responsibility of taking effect on human living conditions [98] promotes such a motion. Instead, bio-psychosocial environment viewed as a result of early interaction combined with societal interpellation hitting upon organic substructure provides a reasonable framework to work with. Certainly, given the inevitable entanglement of the individual in the socialization process confronting multiple determinants [71], the question must be raised whether or not a subject can be a subject undamaged at all [99]. Peter Zima ascertains the subject to be inherently pending between rejection and indispensability, between subjugation and freedom [100]. Still, as Resch and Parzer point out, it is not subjective realities and interpretations that will prevail but phenomena like death, pain, and poverty. Such phenomena cannot be misread, cannot be reframed [101]. They belong to objectivity. Only some of deprivation phenomena are man-made, while others are not.

## **4. Pre- and postnatal interventions**

### **4.1 Findings**

Early communication influences development and learning processes in children [102]. On a microlevel, Papoušek has described the significance of communicative acting for early emotional relatedness [103]. On a macrolevel, phylogenetic human development concepts have augmented ontogenetic aspects of prenatal and perinatal development, broadening the concepts of postnatal development. Examples of how prenatal psychosomatic factors in mothers-to-be can affect their experiencing and retroact on gestation and delivery have often shown congruence, all the more those with a focus on imminent preterm delivery [65, 104], which is an issue with high significance as preterm infants require special treatment [105]. The issue of neurodevelopmental outcome in preterm newborns is still highly problematic and connected with new morbidity [70, 106–110], therefore new approaches in neonatal intensive care units have been developed and implemented [14, 70]. Recent findings that, e.g., preterm delivery correlates with infant eating disorders [111] should not be surprising; other findings indicate prenatal and perinatal factors in new morbidity [58]. Today's zeitgeist has only begun to be examined: it tends to favor noncommitment [101], pointing to the connection of new morbidity with societal motion [97].

Although for decades there have been efforts reaching out to prenatal aspects of mental health [112], structured programs are relatively new in Germany. As to overall parenting and early childhood, interdisciplinary and cross-cultural collaborations have emerged [113, 114]. On an individual level of childhood education, structured programs have successfully been established in many educational institutions in Germany [115–117]. The majority of early intervention programs available have mostly been adaptations from the USA. Comparisons between USA and German programs have proven to be difficult due to structural differences in health services [118]. In Germany, they mostly focus on the mother-infant-relationship [114], when a focus on postpartum depression and anxiety would be equally relevant. Recent meta-analyses show that programs starting during pregnancy were evaluated as the best when they had a high frequency of home visits [119, 120]. There are findings of advantages of close and personal relating to one another, which comes close to a therapeutic setting. Moreover, maternal symptom burden was relieved the most in a setting with psychotherapeutic elements established for mothers having to cope with preterm delivery [121]. Generally, maternal symptom burden relief has been the most observed effect in programs while there were only small effects in interventions on maternal competencies re-enforcement.



Also, only small effects on child development have been observed, and these have been lower and more heterogeneous than the effects on mothers-to-be. Then again, having more than 20 sessions has proven helpful for the infant's physical development [119].

The early intervention approaches depicted below are not supposed to be therapy for mothers and infants. Instead, these are psychodynamics-oriented programs and concepts, which focus on potentially significant topics in pre- and postnatal stages of development. They have evolved from many of the findings above and have purposely been designed to support mental health of parents and children: from the unborn during pregnancy to the newborn and after, and to parenting in general. The programs take care of the microlevel of inner family issues. Here they are presented in order of diachronic developmental aspects reaching from prenatal to postnatal development.

#### 4.1.1 “Mutter-Kind-Bindungsanalyse” (mother-infant bonding analysis)

Mother-infant bonding analysis [122, 123] is a procedure of accompanying women in pregnancy enabling them to get in contact with their unborn; an approach for which Phyllis Klaus's work paved the way [124]. It is not a structured program in the narrow sense of the word but a fairly structured interventional sequence of individual sessions. By these, early before delivery first steps of building a relation between mothers-to-be and their unborn are encouraged. Through relaxation on a couch, women focus on their perception of signals from the unborn. These will show in the shape of emotions, images, thoughts, and fantasies on a so-called “inner screen,” which both unborn and mother are related to. This communicative channel can be seen as “umbilical cord” of psyche, enabling a dialog, which is supposed to promote the intrauterine development of the unborn. The bonding analyst will support mothers-to-be get in contact with the unborn by encouraging them, by interpreting, and by helping to overcome blockades if necessary. Twenty to thirty sessions during the second half of pregnancy are usually taken, that is from twentieth to fortieth gestational week. Exactly this time frame is known as the unborn's highest brain sensitivity and vulnerability period [125]. The history of mother-infant bonding analysis goes back to the early 1990s when Budapest-based Jenő Raffai recognized in his work with patients the importance of the prenatal mother-unborn-relationship for the infant's and the adult's further development. Together with the Hungarian psychoanalyst György Hidas, he conceptualized a research and treatment method that developed into bonding analysis. Especially the focus on children's personality development through the well-being of mothers in pregnancy and birth-giving might serve as the prenatal reference to autobiographical memory [126].

#### 4.1.2 “SAFE”

The structured program “SAFE”—Sichere Ausbildung für Eltern (Secure Education for Parents) [127] aims at what is best for mothers in pregnancy, during delivery, and in parenting issues. The main issue of the program is to avoid transferring of traumatic childhood experiences toward the infant. “SAFE” helps parents-to-be develop confidence in dealings with the infant. As early as in pregnancy they learn to recognize and react appropriately to the signals the infant shows. This is helpful in developing a secure mode of attachment in infants since securely attached infants show more capability of empathy, are more creative, and are more capable of cognitive processing, as well as they search easier for help when needed. The well-examined program also addresses real-life issues like; e.g. “do parents have to



be always present?” or, “what to do when parents are having different needs from those the baby does,” and “when does pampering start, and which limits does an infant need, and when?” The program is for parents-to-be up to the seventh month of pregnancy, and it is continued after delivery until baby’s first birthday; parents may continue up to the second or third birthday. There is a training of sensitivity toward the infant within a group in 10 days of class. Groups are run by two mentors in whole day seminars, 4 days during pregnancy, six after delivery. Stabilization and imagination exercises in stressful situations are conducted, especially in adaptation phase after delivery. A parental sensitivity training video supports the reading of signals and needs of the baby. A scientific foundation via attachment interviews with parents, diagnostic questionnaires, and other evaluation tools has recently led to first results [128].

#### 4.1.3 “Skin-to-skin-care”/“kangaroo care”

An early experience of the infant’s feedback is very important not only for intuitive parenting regulation but also for parental attachment behavior. The mother’s feeling of self-efficacy evoked by the infant’s feedback paves the way for relying on her intuitive competencies. One successful method to moderate early and unexpected separation of the infant from the mother’s body, which can make both child and parents tend to insecure modes of bonding [129], is “skin-to-skin care,” or “kangaroo care.” Kangaroo care originally stems from the 1970s when Colombian mothers were advised to take their babies home and carry them on their chests for days and weeks. Through this intervention, infants were supplied with warmth and fed with milk [130]. Adapted to newborn intensive care unit (NICU) application, and incorporated in the NICU setting, “kangaroo care” became one of the most important care standards in developed countries nowadays [14, 131]. In the meantime, there have been many findings on the advantages of continuous bodily contact and on interaction between infant and parents. Recent findings on oxytocin and bonding add to a perspective of incorporating bodily and psychic factors; a recent study found lower depression scores in parents after giving neonatal massage [132]. It seems that people’s ancient intuitive knowledge about bodily contact can be said to have been verified again and again; skin contact turned out to be highly important [58].

#### 4.1.4 “NIDCAP®”

“NIDCAP®,” i.e., Newborn Individualized Developmental Care and Assessment Program has been developed by Heidelise Als and her team members at Boston Children’s Hospital. By distinguishing normal from abnormal neonatal behavior and in trying to obtain some prognostic conclusions about long-term development from newborn period behavior, Als became aware of the enormous influence that intensive care does have on the behavior of full-term and preterm newborn infants. Starting with these observations, the entire concept that should enable optimal development of each premature infant through individual care, and in spite of interfering intensive care treatment influences, was developed and patented [133, 134]. Neonatal care according to “NIDCAP®” principles has become more and more popular all over the world; it has been imported and implemented in Europe and is applied in the NICU at the Neonatology Unit at the University of Heidelberg, Germany. It has been designed for professionals that deal with preterm infants and their parents; its main issue is “reading the preterm infant” [135]. The individual intervention consists of daily (7 days a week) observation and evaluation of the infant’s behavior, of support for care-givers in understanding the infant’s stress and

comfort signals, and of suggestions for parents and staff in terms of ways to support the infant's development, i.e., adjust their care according to these signals. The concept treats infants as active participants in the care provided, which is certainly most reasonable [14].

#### 4.1.5 “Das Baby verstehen” (*understanding your baby*)

“Das Baby verstehen” [136] is a structured program for expectant mothers and their partners. Couples are supported through a midwife who will focus on the overall life situation of the family-to-be. Everyday communication between parents and their babies is illustrated in the instructions. The “reading” of the infant is at the center of most of the course lessons. Live video tapes support the instructions. Playful exercises will focus on the personal well-being of parents-to-be as well as on how to remain a couple when there will be three of them. In 2003 and 2004 the program was developed at the University of Heidelberg, followed by a revision in 2005, with accompanying evaluation in a German county district. The strengths and shortcomings of the expert trainings as well as of the courses for parents were explored, aiming at an integrative package of counseling for parents with infants up to the age of three. In this way, potential development of dysfunctional interaction in families is avoided early in order to prevent bodily and mental disorders in infants. The underlying concept has been depicted in a textbook of basic findings [137].

#### 4.2 Approaching kindergarten age: “Faustlos”

Empathy as well as the competence to change one's perspective are key issues in the prevention of violent acting. In Germany, Mollenhauer et al. [54] elaborated on such in what can still be called a basic reference textbook on how socialization in family and society works, i.e., from a psychosocially integrated perspective. The second International Conference on Social-Emotional Learning, which took place at the University of Heidelberg [138] reactivated that perspective exploring both differences and similarities in countries and cultures, so that a multinational background makes sure concepts are compatible with each other [139].

A program for kindergartens like “Faustlos” [140–142], which has been designed for four-to-six-year-olds, seems to be most effective in preschoolers, yet even younger children participating in it will benefit as well. It is an adaptation of Seattle-based program, “Second Step” [143], translated to German-speaking countries as “no fists.” The program has been developed and evaluated at the University of Heidelberg [144, 145]; a pre/post randomized control trial behavioral study proved the program to be effective especially as to a decrease of verbal aggression in children [15, 115, 116, 146, 147]. Competencies of self-regulation turned out to be of paramount importance, something, which is especially difficult in traumatized and insecurely attached children. Though not replacing therapy, “Faustlos” offers a wide variety of techniques and strategies for children to learn how to cope with inner impulses. Also, the program is conducted by constant relational persons in a closed group cycle of 1 year. This gives children a secure realm of learning and transfer in which no-one is excluded from the group. Instead, children learn from one another how to apply “Faustlos” competencies and dicta in everyday life. In order to increase favorable effects intergenerationally, the program makes use of involving parents reaching out to improve dealings with their children, regardless of age. Social-emotional learning aims at skills and competencies to be learned within an interactional framework. At the heart of “Faustlos” there are three issues to be transferred to children: getting to know empathy and the training to be empathic,

learning to be capable of controlling one's impulses, and dealing with emotions of anger and rage. These issues are playfully dealt with by way of 28 continuous lessons. Each lesson contains a story that is told by the educator and is illustrated by an accompanying picture. Each lesson is structured the same way: at first, the topic of the lesson is outlined by playfully fantasizing what the lesson will bring. Moreover, hand puppets (a toy dog and a toy snail) open up getting in contact with each other, further illustrating the issue of the lesson to come. This is followed by the actual lesson in which the story is told, is shown in the picture, and is discussed with the group. Role-playing, or alternative exercises at the end of the lesson will make sure the transfer to everyday life of children is initiated. Additionally, the educator is advised to return to the contents of the lesson during the following week. Ideally, one lesson per week is conducted. Since children learn how to cope with inner impulses, the range of possible reactions in stressful and conflict situations is broadened. Moreover, the aspect of mastering transitional stages seems quite important to both boys and girls participating in the program, which in the face of missing rites has a point in its own right [148, 149]. While male and female processes of individuation as reflected in ancient robinsonades show the male one to be rather abrupt and sometimes revolutionary, the female rather processual and preserving—still it is transformation proper [7]—in programs like this, transition as a developmental process should be examined.

## **5. Evaluation**

Along the diachronic developmental perspective of the approaches depicted above, aside from “NIDCAP<sup>®</sup>,” the “Faustlos” program for children has probably been evaluated the most, leading to augmentations in elementary and secondary education [141, 150, 151]. As to the kindergarten curriculum, identifying emotions turned out to be easier for children who took part in the program than for those who did not; the same for pro-social dealings with conflicts. The change of perspective through stories seen from different personal viewpoints is strongly supported in the program; something which has regularly been reported as revelatory [152, 153] as it calls attention to divergent experiencing. Generally, a specific anxiety-reducing effect supporting the transfer of competencies to everyday life has been shown in the program [154], which is highly important since effects on the level of intrapsychic emotion entail even more appropriate interpersonal pro-social behavior [91, 153]. Moreover, it has widely been well-accepted and therefore has been implemented at many kindergartens in Germany.

Practically, maternal symptom burden relief remains a highly important goal of intervention in the other approaches above. As has been shown, symptom relief has direct impact on the infant's development [120]. Personal reactivation and repetition of one's own experiences, such as preverbal, maybe even intrauterine [123] strain and other conflict formations leave their imprint on mothers-to-be: what can be said is that programs starting prenatally will approach mothers-to-be relatively early. This holds true for “SAFE” and “Das Baby verstehen,” which are well-structured and designed for parents, and tend to address important everyday dealings with the infant such as the reading of signals in a closed or half-open group setting, with different emphases, respectively [128, 137]. Somewhat different from these, “Mutter-Kind-Bindungsanalyse” has been conceptualized as an individually shaped setting in which the emotionality of mothers-to-be and their empathic dealing with the unborn are approached in mid-pregnancy. Regarding this concept, the main case study results are promising [123, 155]. Especially combining of any of the structured programs with mother-infant bonding analysis would be worth



studied. As there is much diversity in parents' perceptions of cause of children's symptoms [51], especially an early introspective psychosomatic intervention like mother-infant bonding analysis is promising. It has been recommended in particular by neonatology experts that have intensely applied "skin-to-skin/kangaroo care" or "NIDCAP®" [8]. The most important benefit from "skin-to-skin/kangaroo care," as studies have shown, is a change in the mother's perception of her child, attributable to the skin-to-skin contact ("bonding effect"), which supports and promotes attachment between infant and mother. Mothers in "skin-to-skin/kangaroo care" feel more competent ("resilience effect") in stressful situations in the NICU [14, 156–158], and mother-infant relations develop better; a tendency to less interaction disorders and less crying at the age of 6 months has been observed.

"NIDCAP®" has shown to have numerous positive effects on both the somatic and the neurological short-term development as well as on long-term developmental outcome of preterm infants such as motor and mental development, development of intelligence, behavioral development, and mother-infant interaction [159–162]. It also showed the first in vivo evidence of positive effects of early postnatal experience on brain development, i.e., of enhanced brain function and structure [11, 14]. This study demonstrated that the quality of the unborn's experiencing influences brain development significantly. Recently, further studies in the field have been conducted, such as on the effects of music and the mother's voice [14, 131, 163].

## 6. Conclusion

From perspectives of pre- and postnatal development, further research should be in what Panksepp termed affective neuroscience [164], an approach that does not deny drive and instinct and is most compatible with a psychoanalytic perspective. The findings of psychoanalysis and mental health research view affect as pivotal driving force in human development. That is why an ethological perspective will be helpful too, like in attachment research [165], or in the behavioral biology of Csikszentmihalyi showing that psychic satisfaction is in the process of pursuing, i.e., in anticipation itself [166]. Savoring the anticipation of something ahead is constitutive of the psychoanalytic process [167]; it is in itself psychotherapeutic, and it might be an effective factor in the programs depicted above. Still cognitive perspectives must be taken into account, on grounds of relational and phenomenological approaches [168] in connection with setting, context, and background [72].

There have been illuminating descriptions of the processes taking place in psychoanalysis [29, 81, 167]; many of these might analogously be examined in order to conceptualize objective processes of how subjectivity formation is affected by social objectivity [95]. It is not out of the question that the findings on mirror neurons can contribute to depicting such connection [36]. It should also be obvious that both biological factors and cultural upbringing have effect on the subject's development. The well-known problems of recent subjectivity formation have been documented culturally and clinically. We are dealing with the paradox of an inherent incompatibility in the "subjectum," in that it is underlying and at the same time subjugated; this means any absolutization will lead to aporia [100]. The question of scientific approaches, which at the time are dominated by relatively strict empiricist accesses and default interpretive accesses reveals limitations. A good balancing of quantitative and qualitative findings will be necessary to meet what can truly be called comprehensive psychology of human behavior, which lies in a combination of neuroscience and interpretation on grounds of reasonable concepts.



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