

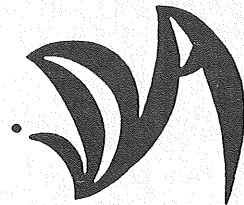
Reports from the project

Individual Development and Adaptation

**A HOLISTIC PERSON APPROACH FOR RESEARCH
ON POSITIVE DEVELOPMENT**

**David Magnusson
Joseph L. Mahoney**

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**IDA / Department of Psychology
STOCKHOLM UNIVERSITY
106 91 STOCKHOLM, SWEDEN**

Viera Dornic, Copy Editor

TEL +46 8 16 3962
FAX +46 8 15 9342

Principal investigator: Professor Lars R. BERGMAN

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- No. 72 Publications 1961 - 2000. (*December 2000*)
- No. 73 Zettergren, P. Peer rejection and future school adjustment. A longitudinal study. (*October 2001*)
- Nr. 74 Wulff, C. Begåvningsprofiler som avviker från vad som anses könstypiskt. Betydelse för anpassning och yrkespreferenser. (*Oktober 2001*)
- No. 75 Wångby, M., & Stattin, H. Self-perceived psychological health among Swedish teenage girls: 1. Adjustment problems in a 1996 school cohort. (*November 2001*)
- No. 76 Magnusson, D., & Mahoney, J.L. A holistic person approach for research on positive development. (*November 2001*)

A b s t r a c t

After a period during which the focus of much developmental research has been concerned with negative aspects of individual development and functioning, an increasing number of researchers point to the need to investigate positive aspects. It is argued in this report that research in this new field has to build on an analysis of general principles and mechanisms working in individual developmental processes. Basic characteristics of such processes, of particular importance for research on positive development, are reviewed and methodological implications discussed.

Key words: positive development, holistic perspective, person approach, integration, patterns, synchronization, crystallization.

I n t r o d u c t i o n

Human strength represents a relatively new area of empirical study. After a period during which the focus of much developmental research has been concerned with negative aspects of individual functioning and its developmental background, an increasing number of researchers have pointed to the need for research on positive aspects (e.g. Cowen, 1991; Ryff & Singer, 1998). This state of affairs forms the ideal situation for a discussion of basic requirements for success in further empirical research in this area.

In principle, the basic question of how individual functions can be analyzed and investigated from three different perspectives; a current, synchronic perspective, a developmental, diachronic perspective, and an evolutionary perspective. (The evolutionary perspective is not dealt with here).

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Joseph L. Mahoney, Department of Psychology, Yale University, New Haven, CT, USA.

The synchronic perspective analyzes and explains why individuals function as they do in terms of their current psychological and biological dispositions. The accounts are framed independently of the developmental processes that might have led to the present state of affairs. The diachronic perspective, on the other hand, analyzes and explains current functioning in terms of an individual's developmental history. Such models are concerned with the ontogeny of relevant aspects of the individual, the timing and expression of significant environmental events in his/her past and present, and the ways these factors operate in an interactive process leading to current functioning.

The current and the developmental perspectives imply partly different models and methods for scientific inquiry. A characteristic feature of the ongoing discussion and empirical research of human strengths is an emphasis on the current, synchronic perspective. For a fuller understanding of human strength and its role in individuals' lives and in the society, a developmental, diachronic perspective is motivated, as demonstrated, for example, in the seminal work on successful aging by Baltes and Baltes (1990). Thus, the focus of this essay is positive development; that is, human strength from a developmental perspective. It should be kept in mind, however, that the two perspectives are not contradictory; they are complementary. Proper models for positive individual development, as it will be discussed here, presupposes reference to models for current functioning.

The claim for the establishment of a new area of research requires a discussion of three issues: (a) a definition of the concept used for delineation of the space of phenomena that is the target of investigation, (b) a careful descriptive analysis of the character of the space of phenomena, and (c) an explicit formulation of a theoretical framework which can hold together studies on specific issues so that they can contribute to a synthesis of knowledge in the field.

Hitherto most of the contributions in the field of positive development are theoretical discussions and propositions under different headings. They have lacked a commonly agreed upon definition of what constitutes "positive" functioning. Consequently, the proponents of research on positive development have discussed and applied the concept in different ways. In empirical research this has led to a fragmented picture of results from well-planned and implemented analysis and studies on specific aspects of human strengths, such as resilience and ego-control (see e.g., Block & Block, 1980; Luthar, Cicchetti, & Becker, 2000), competence (Strayhorn, 1988), self-efficacy (Bandura, 1997), and other studies on so called protective factors. A commonly accepted definition of the concept of positive development would promote scientific progress by making the debate on theoretical issues more constructive and the design, implementation, and interpretation of empirical studies more coherent.

Given the state of the art, the aim of this essay is to contribute to the other two requirements for progress in empirical research on what has been designated positive development in very general terms. Both sound scientific theorizing and the choice and application of research strategies and methodological tools should be grounded in an understanding and careful description of the nature of the phenomena being investigated. Accordingly, we first present a descriptive analysis of the structures and processes in individual development being the target of our interest. It serves as a basis for a discussion of three issues:

- (1) the task for research on positive development
- (2) a holistic theoretical framework needed to meet the challenges of this task, and
- (3) the methodological and research strategy consequences of that perspective.

The individual as the organizational principle for scientific inquiry defines the space of phenomena of interest in research on positive development. This principle, that forms the essence of what has been designated a “person approach”, is basically the same as the one proposed for research on “normal” as well as negative aspects of individual development (Magnusson, 1999). Therefore, most of what we propose with respect to the character of the structures and processes under investigation, the theoretical framework, and the implications for research strategy and methodology is generally valid for research on different aspects of individual development, regardless of how positive development is defined. However, we present our propositions with an emphasis on what may be particularly important for research on positive development. We are convinced that these propositions will facilitate the conduct of productive research and will help us to avoid some of the pitfalls in research on other aspects of individual development that have resulted from lack of careful analysis of the phenomena under investigation.

In the space available, we offer a programmatic analysis of positive development rather than an overview and discussion of current empirical research in this area (see, for example, Kahneman, Diener, & Schwartz, 1999; Seligman & Csikszentmihayli, 2000). Making explicit the basic conditions for research in any field forms an important basis for empirical research that can contribute to real scientific progress (Magnusson, 1992).

Basic Propositions on the Phenomena being Investigated in Research on Positive Development

Empirical research that aims to contribute scientifically solid knowledge to the field must be designed, implemented and interpreted with reference to an understanding of the nature of the phenomena under investigation. The following basic descriptive propositions about the nature of the phenomena being the concern in research on positive development form the starting point for our further remarks.

Proposition 1. The individual functions and develops as an active, intentional part in an integrated, complex, dynamic, and adaptive person-environment system. The character of this system changes through the life course of the individual as a result of individual developmental processes, of societal changes, and of continuous individual-environment interaction processes.

Proposition 2. The individual develops as an integrated, undivided organism in a complex, dynamic, and adaptive process of maturation and learning over time. Mental, biological, and behavioral factors in the individual and social, cultural, and physical properties of the environment are involved in this process.

Proposition 3. For the development of human strengths in positive development, the conditions that the individual's environment offers, and the potentialities, restrictions, demands, and expectations it places on the individual, are important.

Our main concern is the individual. However, positive development of an individual cannot be understood separately from the environment in which he/she lives. The implication is that theorizing and empirical research on human strengths must center on a person who functions and develops as an active part of an integrated person-environment system. To use a metaphor: The individual is the cell of the societal body. The better we understand the functioning of the cell the better we understand the functioning of the body and understanding the functioning of the cell presupposes consideration to the framework of the body to which it belongs. (Accordingly, a definition of positive development cannot be made with reference to individual characteristics only; it must be formulated with reference to the characteristic features, resources and restrictions of the individual considered and the social, cultural, physical, and historical contexts in which he or she is embedded.)

With reference to the view expressed above, our programmatic discussion here concerns models and methods which can contribute to the understanding of the individual's ability to adapt to environmental opportunities, demands, and restrictions in a way that best satisfies the individual's own needs and also benefits society, given the resources of the individual.

I n d i v i d u a l D e v e l o p m e n t

The extent to which human strengths characterize an individual's functioning at a certain age level is the result of a developmental process that starts at conception. From the beginning, constitutional factors contribute to form the potentialities and set the restrictions for nested developmental processes of maturation and learning (experiences). However, the early-established system is not closed; it is open for change across the life span. The characteristic features of developmental changes occur in a continuous process of interaction among mental, biological, and behavioral factors in the individual and social, cultural, and physical factors in the environment.

Two characteristics make the complex, dynamic, and adaptive processes involved in the development of individual strengths accessible to scientific analysis.

First, developmental change is regulated by specific psychological and biological principles. Among other things, these principles serve to maintain the individual's integrity as a biological and psychological being in the processes of developmental change across the life span. A central task for research on positive development is to identify the specific principles and mechanisms guiding these processes.

Second, individual developmental processes go on within structures that are organized in such a way that they best serve the functioning of the integrated organism as a whole. This functional organization is a characteristic of individual structures and processes at all levels including mental structures and processes, biological structures and processes, and behavior. The organism's striving for maintaining organization is a

prerequisite for developmental processes that function well and are adaptive to situational conditions. The development of functionally organized systems that preserve the integrity of the individual's total functioning is guided by the well-documented principle of self-organization. Self-organization is a characteristic of open systems and refers to a process by which new structures and patterns emerge. Self-organization serves as a guiding principle from the outset of the developmental process. The operating components of each subsystem organize themselves to maximize the functioning of each subsystem with respect to its purpose in the total system. At higher levels subsystems organize themselves in order to fulfill their role in the functioning of the totality. The self-organization principle has been applied in discussions of developmental processes (e.g., Thelen, 1989), the organization of the brain (Schore, 1997), the development of temperament (Derryberry & Rothbart, 1997), and the development and functioning of the sensory and cognitive systems and manifest behavior (Carlson, Earls, & Todd, 1988).

In empirical research on positive development, two characteristic features of developmental processes have to be considered: 1) the holistic nature of the processes, and 2) the principle of synchronization of operating elements in the processes. Both have specific and fundamental implications for strategy and methodology in research on positive development.

The holistic, integrated nature of developmental processes. The integrated nature of developmental processes implies that they are holistic, that is, they function and develop as irreducible wholes. This characteristic holds at all levels of the total person environment system, from the cellular level and upwards in the system. At each level, a system derives its characteristic features and properties from the interaction of the elements involved, not from the effect of each isolated part on the totality. At the individual level, each aspect of the structures and processes that are operating (in the brain and the physiological system, perceptions, plans, values, goals, motives, conduct, etc.), as well as each aspect of the proximal and distal environment, takes on meaning from its role in the total functioning of the individual. A certain element derives its significance, not from its structure, but from its functional role in the system of which it forms a part (Magnusson, 1990).

The holistic, indivisible nature of individual developmental processes implies, among other things, that they cannot be determined by a single factor. If that would happen, for example by the influence from a single gene or as the result of poisoning, the processes would go astray and lead to pathological processes in other systems. Accordingly, the normal functional role of a single variable in the processes of positive development cannot be understood by studying it in isolation from other, simultaneously operating factors. Although most of the research on individual development has focused on the role of single variables, it is only the integrated individual that remains distinct and identifiable across time. This holds also when the focus of analysis is human strength and positive development.

Synchronization of processes. In the developmental processes of an individual an enormous number of dynamic, interacting elements are involved. A prerequisite that these processes go on and change in an effective way that maintains the psychological and biological integrity of the organism is that the functioning of all elements are

appropriately synchronized. Synchronization is a basic principle in the interactive processes within subsystems, between subsystems at the same level, and between systems at different levels. Individual positive development is dependent on how well the process of synchronization between the mental, biological, and behavioral aspects of individual functioning, on the one hand, and the opportunities, demands, rules, and regulations set by the environment, on the other hand, function.

A good illustration of the holistic nature of developmental processes and of the important role of synchronization in such processes is the period of transition from childhood to adulthood in adolescent girls. Girls differ remarkably with respect to the timetable for biological maturation. Thus, girls of the same chronological age but at very different biological maturation levels have different biologically and psychologically motivated goals, needs and motives with respect to ways of living, not least social and sexual relations (e.g., Magnusson, Stattin, & Allen, 1986; Stattin & Magnusson, 1990). However, they are expected to adapt to the same societal system of social regulations based on chronological age (e.g., attending the same class at school), and to the same expectations and norms with regard to appropriate and acceptable behaviors (e.g. with respect to sexual relations and social relations in general). The integration and synchronization of mental, biological, and behavioral aspects of the girl and social and cultural aspects of the environment during this period become critical for her positive development. The way the environment functions and the role it plays in this synchronization process vary across societies and cultures. As a consequence, the organization and integration of developmental processes and the way the principle of synchronization functions in these processes varies between societies and cultures.

Individual Differences

Thus far, we have argued that human strengths should be conceptualized from a holistic, interactionistic developmental perspective. From this perspective, a fundamental basis for scientific analysis of developmental processes is that they go on within structures that are organized and function according to specific psychological and biological principles in a way that facilitates developmental change while maintaining the individual's integrity. The important information about an individual is therefore found in the special organization of patterns of functioning; that is, typical configurations of operating mental, biological, and behavioral factors at different levels of individual functioning. Patterning of operating factors is a characteristic of psychological and biological systems both in current functioning and in developmental processes. Thus, at all levels of organization, individual developmental processes go on and change in terms of patterns of operating factors, not in terms of single variables that operate independently of other, simultaneously working variables.

This perspective advocates studying patterns of individual functioning over time rather than measuring predictive relations between discrete variables. In identifying the relevant operating factors in positive functioning, their interrelations, and patterning, it is important to recognize that patterns of positive behavior may show qualitatively different forms from both non-negative and problematic adjustment patterns (Cowen, 1994).

An empirical longitudinal study of the developmental background of adult social behavior may elucidate this issue. The study showed that a strong majority of boys who later became persistent criminals, i.e., registered for crime up to the age of 30, already at 12 to 13 years of age, had a characteristic pattern of lack of concentration, motor restlessness, and low sympathetic nervous system activity, as measured by adrenaline excretion in natural stressful and non-stressful situations at school (Magnusson, af Klinteberg, & Stattin, 1994). This pattern was not found for boys who were never registered for crime up to the age of 30 or for boys who were only registered during the teenage years. This raises two related, critical questions for research on human strength and positive development:

- (1) Are the life trajectories for persons who are characterized by positive functioning at adult life different from the life trajectories of other individuals?
- (2) If so, what are the characteristic patterns of operating factors in the life trajectories of those individuals who demonstrate human strengths and positive functioning?

In a discussion of the implications of this study for developmental research, a key assumption was that basic properties of the organism are the result of a coherent process that starts at conception and extends from the prenatal period onward (Magnusson, 1996a). Patterns of perceptions, cognitions, emotions, and behavior are established early during the fetal and infant period. From the beginning they are the joint result of interactive processes between psychological and biological factors in the individual and the proximal social environment, particularly the way it functions in the infant-environment interaction process. It was further assumed that the early organization of individual capabilities - and particularly the organization of the brain as the central organ for interpretation and appraisal of external information, for attaching emotions and values to this information, and for activating biological autonomic, endocrine, and muscular systems - forms the platform for developmental processes in the future and has consequences for the life course of the individual. However, there is also inherent plasticity in the functioning of the organism that makes it possible to overcome early deficits stemming from the individual, the environment, or the individual-environment interactions. Of interest for research on positive development is newly presented results that indicate that the brain is particularly open to change during the adolescent period (Spear, 2000).

Theoretically, the hypothesis of *personality crystallization* may help to shed light on the issue of different developmental paths for individuals characterized by human strengths and positive development. The hypothesis implies that the developmental process of individuals whose systems organization differ at a certain point in time, as a result of different constitutional factors, maturation, and experiences, will take partly different directions in the next step. With reference to what was proposed above, the early establishment of the integrated psychobiological system is particularly important as the basis for further developmental processes. Each step confirms future developmental alternatives and eventually more stable "types" will emerge over time. If this view is correct, it should show up in clearer homogenization within categories of individuals and more clear differentiation among categories of individuals across time.

The above description implies a basic difference between the developmental processes taking place in the early establishment of the psychobiological system and the developmental processes over time during childhood, adolescence, and adulthood. The early establishment of the psychobiological system takes place on the basis of a very open biological system during a relatively short period of time. These processes are different from developmental processes during childhood, adolescence, and adulthood that occur on the basis of an established psychobiological system. When the psychobiological system has been established the individual develops under the correlated constraints of the existing features and properties of the total person-environment system. For understanding developmental processes in general, and in this case positive development, the two kinds of processes require partly different analyses.

It should be made clear at this point that we do not suggest or adhere to a view of positive development limited to exceptional ability. In line with our earlier comments, we suggest that positive functioning involves an individual whose overall pattern of functioning is indicative of an unusually favorable developmental trajectory, given the resources of the individual. In this view, some of the most prominent individuals in the history of science would not be referred to as examples of positive development, in spite of their exceptional achievements in specific areas. Positive functioning is attainable for all persons, but the specific pattern of operating factors involved and their meaning is certain to vary as a function of individual resources and abilities, and social-cultural conditions. Indeed, from a holistic interactionistic perspective, any single aspect or behavior gains meaning from its relation to other aspects in the developing system. This implies, among other things, that the interpretation of whether a given behavior or characteristic is indicative of positive functioning will vary across persons and contexts. It is an important task for researchers interested in positive development to identify the homogeneity of patterns of positive functioning that applies to different sub-groups of persons, and how these patterns may differ across social-cultural conditions and historical time.

The Goal for Research on Positive Development The Need of a Synthesis

As described above, a holistic perspective on positive development necessitates an integrated consideration of mental, biological, and behavioral aspects of the individual, and social, cultural, and physical aspects of the environment, functioning simultaneously. In spite of attempts towards integration in psychological research, for example, in the interface of research on the biology of the brain and on mental factors, a characteristic feature of the field is that of fragmentation. This is reflected in differences with respect to theoretical models, to conceptual spaces, and to research designs. Fragmentation has resulted in empirical studies on specific aspects of individual development that are essentially conducted and interpreted in different scientific worlds. The lack of a common theoretical framework for design and interpretation of investigations on developmental processes, including those pertaining to human strengths is an impediment to understanding and explaining the development of integrated organisms.

One reason for this state of affairs concerns the purported goal for scientific psychology and of the criterion for scientific success that has dominated empirical research during the last century. In defending psychology as a natural science, James Watson in 1913 formulated the scientific goal for psychological research as being “to predict and control” behavior. Since then high prediction has been regarded as the final criterion for success in psychological research in general including developmental research. In empirical research on developmental processes, for example, the study of single variables by the statistical relation to a certain outcome reflects this attitude. To some extent a lack of distinction between statistical prediction in an experimental design, on the one hand, and prediction over the life course of individuals, on the other hand, has contributed to this state of affairs.

However, the complex, dynamic nature of developmental processes does not permit strict prediction of individuals’ life courses over time. Most developmental researchers nowadays agree that the final goal of research on developmental issues is to identify the principles and mechanisms underlying and guiding developmental processes. A necessary prerequisite for meeting that goal is a synthesis of knowledge from all fields concerned with factors involved in individual developmental processes. We cannot finally understand and explain developmental processes at a certain level of the total person-environment system without an integrated synthesis of knowledge about all simultaneously operating factors at that level. A synthesis of knowledge about different aspects is necessary to reflect the essential characteristics of a process, namely that the whole is more than the sum of the parts. A synthesis is something more and different than mere accumulation of facts about details. The synthesis of knowledge is a necessity if we want to overcome the detrimental effects of fragmentation and contribute to a better understanding of how and why individuals function and develop as totalities in the processes of positive development.

Two seemingly obvious comments are appropriate here. First, the proposition that strict prediction of individual life courses is in principle not possible is not, of course, contradictory to investigating the power of statistical prediction in experimental designs. Second, too easily and often, a statistically significant relation between a predictor and a criterion over time is interpreted as indicating the identification of a developmental principle without reference to a general theoretical framework. It should be clear that a significant correlation between a predictor variable and a criterion within a longitudinal design is not sufficient to establish a developmental principle.

The Task for Research on Positive Development

The descriptive analysis of structures and processes involved in positive development that we have briefly presented in the earlier sections leads to the following interrelated questions to be answered in empirical research.

- (1) How and under what conditions is the integrated individual system of mental, biological, and behavioral aspects that forms the platform for further developmental processes established early in the lives of individuals? What role does the early established system play for the development of human strengths in the subsequent developmental processes of the individual?

- (2) How and under what conditions are positive developmental processes facilitated and maintained in the life course of an individual? What kind of individually bound factors drive the emergence and maintenance of positive functioning?
- (3) To what extent is the early integration of mental, biological, and behavioral factors of an individual open to change in a positive direction during the life course? Conversely, to what extent do life course trajectories that have started in a positive direction provide resistance to change in a negative direction?
- (4) Which are the relevant patterns of positive functioning that apply to subgroups of individuals and how do those patterns differ across social-cultural conditions and historical time?

Scientifically sound, empirically based answers to these questions require:

- (1) a coherent theoretical framework, and
- (2) the application of appropriate methodological tools and research strategies.

These issues will be briefly discussed in the following sections.

A Theoretical Framework for Empirical Research on Positive Development

What we have briefly described so far about developmental processes leads to the following basic general propositions for research on positive development.

Proposition 4. Amalgamation of results from empirical research on positive development into a synthesis of knowledge presupposes that studies on specific aspects are designed, implemented and interpreted in the same overriding theoretical framework.

Proposition 5. Any general theoretical model which seeks to contribute to an understanding and explanation of the processes guiding positive development of an individual must incorporate into a single integrated model mental, biological, and behavioral aspects of the individual, and physical, social, and cultural aspects of her or his environment. These factors function simultaneously in an interactionistic synchronized process and need to be placed in a coherent theoretical framework.

These formulations of a holistic-interactionistic theoretical framework for research on individual positive development are consequences of the description of the main features of the phenomena that are our concern. They form the theoretical framework for meeting effectively the challenges of the tasks for research on positive development proposed in the earlier sections (see, e.g., Magnusson 1988, 1995, and 1999 for more elaborated discussions).

The role of a holistic theoretical framework in research on positive development.

A common holistic theoretical framework serves two overriding, interrelated purposes in research on human strengths and positive development.

- It serves as the framework for the identification and formulation of the research problem and the design, implementation, and interpretation of empirical studies on specific issues. Through interpretation under a common theoretical frame of reference, results from such studies can be amalgamated and contribute to the synthesis of results that is needed for real understanding and explanation of principles and mechanisms guiding positive development. In this way, the acceptance and application of a holistic theoretical framework will help us to overcome the detrimental effects of fragmentation.
- It offers a common conceptual framework for scientifically fruitful communication between researchers representing different sub-fields of research on developmental processes.

The importance of a common theoretical framework for empirical research on specific aspects of complex, dynamic systems is demonstrated in the natural sciences. General theoretical models of nature have served the two purposes summarized above and have been major prerequisites for the remarkable scientific progress in these fields.

In order to avoid misinterpretation of the role of a holistic perspective for research on positive development a point of clarification is pertinent. A holistic model does not, of course, imply that the entire individual system has to be the target of study in each case. In natural sciences, the acceptance of a common model of nature has never implied that the whole universe should be investigated in every study. Indeed, real scientific progress often necessitates empirical studies on specific mental, biological, and behavioral aspects of development. Thus, for example, the studies in developmental research on different protective factors that promotes resilience offer real contributions to research on positive development. Mayr's (1976) warning with respect to biology is equally applicable to research on positive development: "The past history of biology has shown that progress is equally inhibited by an anti-intellectual holism and a purely atomistic reductionism" (p. 72). The essence of the message here is that results from such studies (a) gain a surplus meaning, and (b) contribute more effectively to understanding the processes involved in positive development if they are designed, implemented, and interpreted within the theoretical framework of a common, holistic perspective.

Commentary on a holistic theoretical perspective. A common attitude towards the claim for a holistic theoretical framework for psychological research including developmental research is that it is too general, self-obvious and even trivial to serve as a meaningful framework for conducting empirical research. Since this attitude is common and questions the relevance of what we regard as an important framework for real scientific progress in research on positive development, the following comments are in order.

First, either the basic propositions about the nature of the phenomena that are our main concern in research on individual development and the theoretical implications summarized above are incorrect or they reflect the real nature of the phenomena. If they are incorrect, it is up to those who criticize them to argue for their standpoint and demonstrate empirically that they are false. If the propositions are accepted, (and it seems as if the critics do so to the extent that they regard them as self obvious) the true scientific attitude is to analyze and take seriously their research strategy and methodological implications.

Second, the claim that the integrated, dynamic, complex, and adaptive processes of individual development are accessible to systematic, scientific analysis is based on the fact that these processes are not random; they follow basic specific principles and proceed within functionally organized structures. These circumstances make developmental processes in general - including processes underlying human strengths and positive development - a natural target for scientific analysis.

One possible reason for downgrading the role of a holistic theoretical framework has been that subsystems operate interdependently but often on different spatial and temporal scales and at different levels in the complex, interactive, and adaptive processes. This makes the identification of operating mechanisms and underlying principles extremely difficult. However, this circumstance must not deter empirical studies on specific aspects of the processes, applying the general rules for scientific inquiry. The holistic model formulates specific demands on the application of methodological tools and research strategies in developmental research and these specifications differ in some important respects from those that are commonly applied. They have been dealt with at length in other connections (see, e.g., Bergman, Magnusson, & El-Khouri, in press). Here we draw attention to points that are of special relevance for research on positive development.

Methodological Implications

A necessary condition for empirical research to contribute solid knowledge about principles and mechanisms involved in the processes of human strength and positive development is a strong link between the methodology applied for elucidation of a specific problem, on the one hand, and the character of the structures and processes involved, on the other. This implies that the measurement models, the type of data collected, and the methods for data treatment must match the psychological model for the phenomena under consideration.

Pattern analysis. A basic proposition for the discussion in this essay is that subsystems at different levels, as well as the individual as a whole, function and develop as organized, integrated, and indivisible patterns of operating factors. Accordingly, a process cannot be understood by adding results from studies on single, isolated aspects. In the final analyses of human strength and positive developmental processes, the simultaneous synchronized functioning of factors involved must be considered by studying patterns of operating factors at the appropriate level. The study on the developmental background of antisocial behavior among males briefly summarized on page 7 offers a good example. In the first stages of that study, standard methods for the

study of the statistical relation between data for each of the variables (i.e., lack of concentration, motor restlessness, and sympathetic activity) and data for registered crime were investigated at the group level. However, the most interesting results with respect to long-term antisocial behavior were found only when the patterning of data for the three variables was used to characterize individual functioning.

A consequence for further research on positive development is that we need to complement the traditional approach with measurement models, and models and methods for data treatment, that are more appropriate with respect to the specific character of developmental phenomena. This implies a need for methodological tools for the study of individual differences in terms of characteristic patterns of data for relevant variables (see, e.g., Bergman, 1998; Magnusson, 1998). Subgroups of individuals with distinct profiles of psychological, biological, social, and demographic characteristics relevant to the phenomenon of interest can be identified early in the developmental process and tracked forward in time (e.g. Bergman & Magnusson, 1991; Magnusson & Bergman, 1988). These subgroups could then be linked to the future attainment of positive functioning and the processes by which individuals in a given subgroup develop strength mechanisms could be evaluated (Gest, Mahoney, & Cairns, 1999; Mahoney, 2000). On this score, it is encouraging to note that person-centered and pattern-oriented approaches to the study of positive functioning have been successfully employed (e.g. Singer, Ryff, Carr, & Magee, 1998).

In sum, methods for studying patterns of individual functioning over time will need to be taken seriously in any attempt to understand and synthesize the knowledge base on positive development. In the absence of a holistic, developmental approach to studying human strengths, individual functioning is measured and interpreted in terms of isolated variable relationships at one or few occasions. A primary danger in relying exclusively on a variable-based, cross-sectional approach is the potential for oversimplification of more complex, interactive processes that operate differently depending on the individual, context, and developmental time frame that is considered. We have argued that it is necessary to view positive adaptation as an ongoing process, and to assess that process in terms of individual patterns of interdependent biological, psychosocial, and contextual factors operating over time.

Longitudinal investigation of developmental processes. The existing research on human strengths typically begins by identifying persons who are already functioning positively in some area. This permits the correlates of positive functioning to be identified and provides clues as to how positive functioning may or may not be maintained over time, but the conditions that give rise to positive functioning remain largely unaccounted for. This will remain the case until representative samples of persons are followed over time and the emergence of positive functioning is assessed from a developmental perspective (e.g. Horowitz & O'Brien, 1985). Thus, conducting longitudinal studies of processes that drive the emergence of human strengths is a primary task for research on positive human development. Current positive functioning cannot be understood and promoted until its developmental course is investigated and understood.

A longitudinal design for successful research on positive development is a necessity for two interrelated reasons.

- It is implicit in the character of processes that they must be followed over time: a picture does not tell the whole story of a process. If a historian claimed that he or she could understand and explain historical processes by cross tabulation of data from papers in samples of countries a certain day and using multidimensional scaling to identify the main operating factors in the process, he or she would only become the target of mockery; no one would take it seriously. But that is what we really do when we take for granted that we can understand and explain developmental processes using results from cross-sectional studies of individuals. Cross-sectional studies are necessary for many purposes in research on positive development, but they must be complemented with longitudinal designs.
- The character of individual development brings two fundamental elements of developmental processes into focus: time and change. Over time, developmental changes occur with respect to: (a) which factors are involved and operating, (b) the relative role of single factors in the total functioning of the individual, and (c) the way the factors involved operate together simultaneously and are functionally synchronized. As a consequence such central issues as stability and change and causal mechanisms in individual positive development cannot be investigated without observing the individual over time.

The implication is clear: what is needed for progress in research on positive development is more research concerned with the processes themselves as a basis for identifying and understanding the particular mechanisms involved and the specific principles guiding the synchronization process. The appropriate research strategy in each case will depend on the nature of the processes being studied. Techniques are now available for the study of short-term processes, e.g., in the individual brain and the individual fetus. For processes over longer periods of time, a longitudinal design is a prerequisite. This is a time consuming and difficult task but there is no alternative if we want to make real scientific progress on this issue.

Recent developments in the natural sciences for the study of dynamic, complex processes provides a natural basis for the development and application of models and methods for the study of the processes of positive development. However, processes involved in human development and those guiding physical systems differ in important ways. In particular, human development is best characterized as an adaptive process in which individual intentions, motivations, goals, and values play a critical role. It therefore becomes critical to understand and explain the processes by which these psychological aspects develop with reference to the patterning of the total developmental system. This requires that appropriate models and methods be developed that are aimed at understanding and explaining the principles and mechanisms underlying the adaptive features of human strength and positive development, including psychological processes and intentions.

Strategy Implications for Research on Positive Development

The holistic view on developmental processes has also substantive implications for strategies in research on human strength and positive development. The requirements in these respects follow from the nature of the developmental processes that we have briefly described above.

Cross-disciplinary research. One implication of a holistic perspective on the individual as an integrated organism is that research on positive development must necessarily go beyond what is represented in traditional developmental psychology. Knowledge is needed from all scientific fields concerned with different aspects of the processes involved in individual development including developmental psychology, neuroscience, molecular biology, genetics, physiology, social psychology, sociology, anthropology, and other neighboring disciplines. Knowledge from these fields must be integrated and synthesized in order to be able to contribute solid knowledge for understanding the processes of positive development. As a consequence, real progress in research on human strength and positive development requires close and continuous interdisciplinary collaboration. This proposition has led to the establishment of "developmental science" as a domain for scientific inquiry with its own needs for theory, methodology, and research strategy (Cairns, 2000; Magnusson, 2000; Magnusson & Cairns, 1996). The importance of planning research on developmental processes within the framework of developmental science was manifested in the organization of a Nobel symposium in Stockholm in 1994 under the auspices of the Royal Swedish Academy of Sciences (Magnusson, 1996b).

Cross-cultural and cross-generational research. A main characteristic of both current functioning of the individual and of his/her developmental processes is continuous interaction with the environment. The basic features of an individual's environmental system vary markedly across cultures and also over historical time. Because each element of the complex, adaptive process gets its meaning from the role it plays in the process to which it belongs, the role of cross-cultural research and cross-generational research is critical to understand more deeply the principles and mechanisms in positive development that can be generalized over time and place. A characteristic of western psychological research is its ethnocentrism. Too often the results obtained in the context of western culture(s) are assumed to hold for the rest of the world when, in fact, these conditions apply, at best, to as little as one-sixth of the global population. When studies performed in a western country on relations among relevant variables for a specific problem are replicated in other parts of the world, different relations are often found. A fairly common conclusion is that at least one of the two results must be questioned. Much of the time, however, the inconsistencies involve differences in the contextual factors that make up the total integrated process(es) of the specific phenomena being studied. Culture forms one critical element in the total process. Accordingly, the motivation for cross-cultural research in the holistic perspective is not merely cross validation of results obtained in one culture by results obtained in another. Rather, cross-cultural differences provide potentially important information that contributes to understanding both the role of contextual factors and the mechanisms and principles that guide the integrated processes of psychological, biological, and social factors in positive development. This conclusion also holds for

generalization across generations as demonstrated in the research presented by Elder and his colleagues (see e.g., Elder, Modell, & Parke, 1993).

A Final Comment

The idea of regarding the individual the undivided target for analysis in research and application has old roots. However, it is not until the last part of the twentieth century that the holistic model has been enriched by contributions from scientific sub-fields concerned with different aspects of developmental processes to the extent that it now offers a solid platform for empirical research on such processes, including those involved in positive development. For further constructive discussions about positive development - how its boundaries shall be defined, which research strategies and methodologies will give the most effective answers to relevant questions, and which means are appropriate to promote positive development - it is noteworthy that the formulation and application of a holistic framework to research on individual development is part of a broader scientific Zeitgeist. It falls into line with strong trends in other scientific disciplines concerned with dynamic, complex processes including biology, meteorology, ecology, and life sciences in general. Thus, a holistic perspective for theorizing and empirical research on positive development enables us to fall into step with recent developments in other disciplines in the life sciences.

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