Women and men scientists' notions of the good life: A developmental approach

A Dissertation Presented
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This dissertation investigated scientists' notions of the good life within the framework of adult cognitive developmental psychology. Subjects were 200 former postdoctoral fellows (92 men, 108 women) of National Science Foundation, the National Research Council, or the Bunting Institute at Radcliffe College, who responded to open-ended questions about the good life and the bad life.

For the developmental analysis of these narratives, Armon's (1984) developmental hierarchy of good-life stages was used. The scoring methodology was modified according to the General Stage Scoring System (Commons et al., 1992).

Contrary to the popular stereotype of scientists as "nerds"– highly developed in their scientific pursuits but developmentally handicapped in other areas of life – all subjects scored in the two highest stages of Armon's good-life hierarchy. The hypothesis that women scientists would score higher than men on the developmental good-life scale was not corroborated in this sample, although the women did have a higher average than the men. Hence, this result differed significantly from earlier research findings for other populations, where women scored slightly lower than men. Career outcomes were found to be unrelated to good-life stage; and there was interaction between gender and career outcomes.

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CHAPTER 1
INTRODUCTION

1.1 The Research Problem

The chief purpose of this dissertation is to investigate how scientists think about the good life, and how women scientists' notions of the good life differ from men's. The framework for this investigation is that of adult cognitive developmental psychology. Women and men scientists' notions of the good life were analyzed and contrasted according to a developmental hierarchy of good-life stages, which was devised by Armon (1984).

I tackled this research problem in the following steps. First, I set my approach apart from other scholarly approaches to the good life (Chapter 2.1). Because the good life has primarily been the topic of philosophical and religious, and to some extent of sociological, discourses, these discourses formed the background for my developmental approach to the good life.

Second, I reviewed theories of adult development (Chapter 2.2). Whereas the classical developmental theories of Freud and Piaget terminated before the beginning of adulthood, there has been in recent years a movement toward formulating theories about positive development during adulthood in a variety of domains (one of which is people's notions of the good life).

Third, I discussed how the developmental theory of the good life grew out of this wider movement of theories of adult development (Chapter 2.3).

Fourth, I described the methodology of assessing developmental good-life stage, because this dissertation proposes a methodological innovation--a reformulation of Armon's (1984) methodology according to the General Stage Scoring System (Commons, et al. 1992) (Chapter 3.1).

Fifth, I described my sample and methods (Chapter 3.2).

Chapter 4 presents the results, and Chapter 5 discusses them, draws conclusions, sets the results in the context of theory and previous research, and notes avenues of further research.

1.2 Hypotheses

Specifically, I tested three main hypotheses about the scientists' good-life notions:

1. Women scientists' good-life notions are more complex than men's (i.e., women scientists score higher on the good-life developmental scale than men scientists do, on the average).

Women may be socialized to care more than men for others (Gilligan, 1982). Moreover, the division of gender roles in this society clearly gives women the prime responsibility for the family. Women scientists, as a group, may thus be less likely than men scientists to develop an extremely narrow focus on scientific pursuits that disregards all other aspects of life. Women scientists may have a less constricted and more balanced view of the good life and might, consequently, score higher on the good life scale than men.

2. Among academic scientists, career success is negatively related to good-life scores. Similarly, current scientists score lower than former scientists who left science.

When it comes to evaluating academic scientists (for instance for hiring, promotion, and tenure decisions), the length of a candidate's publication list is often a key indicator of performance. The present system of science appears to reward those who work hard and with a single-minded focus. If successful scientists tend to subordinate all aspects of life to their scientific pursuits, they might be less "well-rounded" and have a less developed concept of the good life.

3. There is an interaction between gender and success in the prediction of good life scores.

Women scientists who are very successful may have assumed characteristics of the male scientist and may have been completely assimilated into the monomaniacal life style of the successful scientist. Thus, there may be little difference in the notions of the good life between the successful women and men scientists. By contrast, among the less successful scientists, the gender gap may be more pronounced. The less successful women scientists may have struck a compromise between career success and other aspirations, which would show up in higher good life scores than the successful scientists would have, whereas the less successful male scientists might still subscribe to the same notions of the good life as the more successful male scientists.

Because the developmental theory of notions of the good life is relatively new, there are hardly any findings about factors facilitating or hampering development in this area. However, it appears plausible to assume that socialization has an impact on the development of good-life notions. Therefore, I attempted to determine how strongly socialization factors are related to stage scores. One socialization factor was the socio-economic background. Within a Maslowian framework, one might expect that growing up in a privileged environment that provides all basic necessities of survival facilitates the attainment of higher notions of the good life, whereas those who grow up in a deprived environment are too preoccupied with survival to develop more advanced notions of the good life. More specifically, the degree to which their family supported the respondents may be important. Those who acknowledge support from their families may have developed a more advanced view of the good life, balancing

science pursuits and social interactions, than those who report that they pursued their scientific interests without support from their families.

In addition to socialization, marital and parental status may be related to good-life stage. Married scientists and those who have children have to reconcile conflicting demands of the various aspects of their life, and this may facilitate a more advanced view of the good life, compared with those who are able to channel all their energy into their work.

Because so little is known about people's good-life notions, I followed a descriptive approach as a first step before the developmental analysis. This allows us, at least, to know what scientists talk about when they are asked about the good life. In a content-analysis of the good-life narratives, I determined the themes that, at the content level, were prominent in the participants' responses.

1.3 Importance of This Research

Why should one study scientists' good-life notions? This issue is important for scientific and practical reasons. At the scientific level, this study contributes to the fledgling developmental theory of the good life. Within the theories of adult development, the theory of the good life is a very small and new branch. Armon (1984) has laid the theoretical foundations for a developmental theory of good-life notions, but there is a great dearth of empirical knowledge about it as yet. This is only the third empirical study on the developmental theory of the good life, and, in terms of subjects, it is by far the largest ever undertaken. Moreover, this study specifically addresses the gender issue in adult development, which has attracted a great deal of attention, particularly in connection with Carol Gilligan's (1982) work on moral development. Gilligan argued that the developmental trajectories are qualitatively different for males and females. Her work posed the question of gender bias in some theories of adult development: are such theories portraying a typically "male" developmental pattern as the general pattern of development? Moreover, even if females are included at the theoretical or empirical levels, a key issue for the study of gender in adult development is the extent to which gender differences in development can be attributed to a societal division of roles and statuses along gender lines. For example, representative groups of men and women are bound to differ on potentially important characteristics, such as educational background, profession, and familial roles. By controlling for educational and professional background, this study allows me to pinpoint gender differences in developmental good-life notions more accurately. More specifically, whereas women scored lower than men, on the average, in previous research on developmental good-life notions, I expected women in this controlled sample to score higher than men because they may be less susceptible than men to the developmental delays of the "nerd syndrome."

This is the popular preconception of scientists as "nerds" who are extremely advanced in cognitive domains but retarded in other domains. Such an imbalance indeed emerged in depictions of the archetypical "nerd" avantegarde among scientists--the computer "hackers" (Levy, 1984; Hafner & Markoff, 1991). A study of the good-life conceptions of scientists can contribute to an examination of this alleged "nerd-syndrome."

At the practical level, the findings of this study may be of importance for policy makers in the area of science and higher education, as well as for counselors and therapists who work with scientists or aspiring scientists. Knowing more about scientists' ideas of the good life, policy makers may be able to make the reward structure of scientific careers more responsive to what scientists want out of life. And, with the knowledge of such ideas, counselors or therapists may be better able to assist individuals, scientists or aspiring scientists, in their personal struggles for a good life.

1.4 A Definitorial Note

Two central concepts in this dissertation are "development" and "stage." Because these concepts are controversial in the areas with which I will be dealing, I should add a short clarification of what is meant by development and stage in this dissertation.

A potential source of confusion is that the term "development" has some normative flavor. Saying that something--or someone!--is more developed often implies that it--or the person--is "better" in a normative sense. I do posit that there is a non-arbitrary way of classifying subjects' notions of the good life along a developmental hierarchy, but it is unnecessary for this argument to pass a value judgment on development as such.

My thinking about these concepts is strongly inspired by the General Stage Model (Commons & Richards, 1984a,b), which in turn was informed by Piagetian notions about cognitive development. In my understanding, the concepts of development and developmental stages have the following minimum requirements: To speak of development, its course must be invariant, i.e, the developmental stages follow each other in an invariant sequence. Secondly, development has a "positive" direction; it is an increase by some stated criterion. My criterion is complexity. High development is characterized by more complexity in thought than low development. In order to speak of developmental stages (and not of continuous development), the stages have to be qualitatively different from each other, rather than reflecting merely a gradual increase in some property (in my case, complexity). My stages are defined as coordinating elements of the prior stage in a systematic fashion. These definitions are not unusual in the field of developmental psychology, but reflect the mainstream of research in this area (e.g., Kegan,

1982).

1.5 Methodological Approach

In terms of methodology, I modified Armon's (1984) Good Life scoring manual in a more structural direction, by applying the General Stage Scoring System (Commons, et al., 1992) to the domain of the good life (see Appendix). The reason for this modification was to eliminate the rest of the content-scoring and to make the scoring truly structural.

CHAPTER 2
LITERATURE REVIEW

2.1 Scholarly Thinking About the Good Life, Science, and Gender

What is a good life? Few individuals would deny that this question has agitated them at one time or another during their lives. And even when this question is not pondered explicitly, the idea of the good life is implicit in a great number of people's day-to-day actions and plans. Most persons incessantly strive to have a good life or, at least, to make their lives better. The notion of the good life is thus central to human existence; and it has an immensely practical, as opposed to theoretical, flavor. When people ask about the good life, they typically expect some guidance about what a good life should be--answers that would establish the normative meaning of life with some authority.

The main arenas in which the good life has been discussed have therefore been religion and ethics, and the chief goal of these discussions has been to justify particular prescriptive ideas of the good life. Comparatively less interest has been devoted to the notion of the good life at the empirical level. In the latter approach, the chief goal has been to determine empirically what notions of the good life people actually hold, as well as what the antecedents and the effects of these notions are. Rokeach (1976), for instance, has studied the degree of congruence among the different elements of belief and value systems as well as the congruence between values and behavior. The question of the good life thus becomes a sociological or a psychological issue; and it is the psychological aspects of the notion of the good life that this dissertation addresses.

Within the framework of developmental psychology, I empirically examine a particular detail of the wider issue of good-life notions: the developmental stage of scientists' notions of the good life, with a particular focus on potential gender differences. This line of research (the developmental psychology of good-life notions) is very new. I know of only two studies, and literature searches have found no other previous research on this topic. The two precursor studies (Armon, 1984; Commons, et al., 1989) of course receive detailed attention further below. But rather than turning immediately to these studies, the novelty of the topic suggests first to place this dissertation in its wider context. I will survey the largely disjointed areas of empirical research which this study brings together. The dissertation is located at the intersection of the study of values, the study of scientists, and the study of gender differences. My starting point, however, will be the philosophy of the good life.

2.1.1 The Philosophy of the Good Life

To provide a theoretical background for the presented research, as well as to present ideas about the good life, which in modified or simplified forms appear in regular people's notions of the good life, I now review the philosophical ideas of the good life.

2.1.1.1 Pleasure and Duty

As societies develop, the sources of the normative good-life notions also change (Bellah, 1970; Comte, 1975; Habermas, 1979). In "primitive" societies, magical beliefs, myths, and rituals form the main roots of normative ideas of the good life. These ideas "are concerned with the maintenance of personal, social, and cosmic harmony and with attaining specific goods--rain, harvest, children, health" (Bellah, 1970, p. 23). In the course of societal development, a more and more formalized religion becomes the typical arena for formulating normative ideas about the good life. There, good-life notions derive from the will of God, which has been revealed to humankind through holy texts, such as the Bible or the Koran, through enlightened prophets, or through the clergy in general. In the early feudal societies of Europe, for example, the notions of the good life were almost exclusively defined by Catholicism.

In the framework of religion, the good life is a pious life, a life lived in accordance with religious precepts. And the greatest rewards for a good life will, in many religions, be reaped after one's death--in the Christians' Heaven, for example, or in the Buddhists' Nirvana. Whereas a religion is able to provide relatively clear-cut normative ideas of the good life, its authority is linked to the belief in that religion, i.e., the belief that God exists and that this particular religion contains an accurate representation of his will.

In modern times, such religious beliefs have come under increasingly critical scrutiny. Whereas various religions still guide the good-life notions of a great number of Americans, highly educated and intellectually active individuals often consider the reference to religion or God an unsatisfactory basis for normative ideas of the good life. They are skeptical about "revealed truths" and instead turn to human reason for normative notions of the good life. Such skepticism is, for instance, illustrated in the American Constitution's strict division of church and state. The Constitution allows individuals freely to chose any religious notion of the good-life as their guiding principles, but it does not submit the notion to an obligatory standard of religious good-life notions.

It thereby acknowledges the lack of inter-individual argumentative force of religious good-life notions.

Philosophy, particularly its subfield of ethics, approaches the issue of the good life by ways of reasoning. Designing systematic and rational concepts of the good life has been one of the central concerns of a great number of philosophers. Among the many diverse systems of the good life developed by these philosophers, a major distinction can be drawn between hedonist (from the Greek word for pleasure) and perfectionist notions of the good life (Armon, 1984) or, in Art's (1994) terminology, between the pleasure seeker and the moralist. The hedonists emphasize the pleasurable consequences of actions and choices. Life is good when it provides a high amount of pleasure (defined in various ways) to individuals (or to society). The perfectionists, by contrast, emphasize the perfection of the self, society, or the world as an end in itself. For instance, they postulate certain values toward which individuals should strive, or goals or potentials that should be fulfilled. Life is good when these values, goals, or potentials are realized and perfected.

As examples of the hedonist concepts of the good life, I give brief sketches of Epicurus' and Mill's philosophies, and as examples of the perfectionist concepts, I mention Aristotle's and Kant's philosophies. These sketches can, of course, not claim to represent thorough treatments of these thinkers' complex philosophies--an endeavor far beyond the scope of this psychological dissertation. The purpose here is to highlight the two basic philosophical positions of the good life in order to provide a background for the ensuing psychological research.

2.1.1.2 Epicurus

We know Epicurus' philosophy mainly through the work of the Roman poet Lucretius, but philological research has also discovered some of what is considered Epicurus' (1979) original writing. His philosophy is based on the senses. Pleasurable sensations are good, whereas painful sensations are evil. The good life, thus, is one that maximizes pleasure and minimizes pain. "... we call pleasure the beginning and the end of the blessed life. For we recognize pleasure as the first good innate in us, and from pleasure we begin every act of choice and avoidance, and to pleasure we return again, using the feeling as the standard by which we judge every good" (Epicurus, 1979, p. 87).

Whereas the hedonist good life is often taken to consist of a great amount of immediate sensual pleasures, such as sexual ecstasy or gluttony, Epicurus interestingly advocates moderation in such pursuits. These pleasures, he says, are fleeting and the greater the pleasure, the greater will be the subsequent pain. A night of drinking will be followed by a hang-over, drug consumption by addiction, etc. On balance, thus, one is better off avoiding these immediate pleasures and the related pains. "And since pleasure is the first good and natural to us, for this very reason we do not choose every pleasure, but sometimes we pass over many pleasures, when greater discomfort accrues to us as the result of them. ... When, therefore, we maintain that pleasure is the end, we do not mean the pleasures of profligates and those that consist in sensuality, as is supposed by some who are either ignorant or disagree with us or do not understand, but freedom from pain in the body and from trouble in the mind. For it is not continuous drinking and revellings, nor the satisfaction of lusts, nor the enjoyment of fish and other luxuries of the wealthy table, which produce a pleasant life, but sober reasoning, searching out the motives for all choice and avoidance, and banishing mere opinions, to which are due the greatest disturbance of the spirit" (Epicurus, 1979, pp. 87-91). Epicurus much prefers a state of equilibrium and peace of mind (called ataraxia), in which pain and immediate pleasure are absent, to the roller-coaster of intense momentary pleasure and intense pain. Overcoming irrational fears of gods and of death is a major step toward this peaceful state.

Not all pleasures are fleeting and associated with pains. Epicurus favors mental pleasures, because they lack bad consequences. Stimulating conversations with friends come close to his idea of the good life. "Of all the things which wisdom acquires to produce the blessedness of the complete life, far the greatest is the possession of friendship" (Epicurus, 1979, p. 101).

2.1.1.3 Mill

Whereas Epicurus' version of hedonism is radically individualist and only focusses on an individual's balance sheet of pleasures and pains as the determinant of the good life, John Stuart Mill's (1895, 1975) philosophy extends hedonism to the social level.

According to Mill, happiness is the ultimate goal of human existence and thus the key ingredient of the good life. "... actions are right in proportion as they tend to promote happiness, wrong as they tend to produce the reverse of happiness. By happiness is intended pleasure, and the absence of pain; by unhappiness, pain, and the privation of pleasure. ... pleasure, and freedom from pain, are the only things desirable as ends; and ... all desirable things (which are as numerous in the utilitarian as in any other scheme) are desirable either for the pleasure inherent in themselves, or as means to the promotion of pleasure and the prevention of pain" (Mill, 1895, pp. 9-10).

Like Epicurus, Mill also emphasized the pleasures of the intellect over the more immediate pleasures--"It is better to be a human dissatisfied than a pig satisfied ..." (Mill, 1895, p. 14). Individuals are happy if they realize their life plans that take the individuals' interests, desires, and capacities into account. Going beyond Epicurus' individualism, Mill notes that the individuals' good lives are intricably linked with each other and with society. A civilized and liberal society--one

that provides education for the individuals and allows them to pursue their individual and idiosyncratic life plans--is a necessary precondition of the individuals' good lives.

Moreover, Mill, who in this aspect follows Jeremy Bentham, an earlier utilitarian philosopher and friend of his father's, aggregates the individuals' good lives and thus derives a utilitarian social morality. Its "standard is not the agent's own greatest happiness, but the greatest amount of happiness altogether (Mill, 1895, p. 16). For Mill, the greatest happiness of the greatest number of people conceptualizes the good life at the societal level (and this then can serve as a moral yardstick for individuals' actions, who in some cases may be required to forgo parts of their own happiness to further societal happiness). "Utilitarianism, therefore, could only attain its end by the general cultivation of nobleness of character" (Mill, 1895, p. 16).

2.1.1.4 Aristotle

Aristotle's (1955) theory of the good life focuses on the perfection of human functions. His starting point is to discern which human functions are uniquely human. Perfecting such uniquely human functions is then considered the essence of the good life. It is first necessary to "grasp what is meant by the 'function' of a human being. If we take a flautist or a sculptor or any craftsman--in fact any class of men at all who have some special job or profession--we find that his special talent and excellence comes out in that job, and this is his function. ... The mere act of living is not peculiar to man--we find it even in the vegetable kingdom--and we are looking for something peculiar to him. We must therefore exclude from our definition the life that manifests itself in mere nurture and growth. A step higher should come the life that is confined to experiencing sensations. But that we see is shared by horses, cows, and the brute creation as a whole. We are left, then, with a life concerning which we can make two statements. First, it belongs to the rational part of man. Secondly, it finds expression in actions" (Aristotle, 1955, pp. 37-38).

In other words, reason is the uniquely human function that needs to be perfected in the good life. "The function of man is a certain form of life, namely an activity of the soul exercised in combination with a rational principle or reasonable ground of action. The function of a good man is to exert such activity well" (Aristotle, 1955, pp. 38-39).

Having meaningful work

eater detail particular virtues that are to be perfected in the good life. The two main groups of virtues

are based on theoretical and practical reason, respec tively. "Some [virtues] are called 'intellectual', as

wisdom, intelligence, prudence. Others are 'moral',

as liberality and temperance" (Aristotle, 1955, pp. 5

3-54).

A central position among the virtues is taken by "megalopsychia," for which there is no good English translation (Thomson translates it as 'greatness of soul'). "... greatness of soul is the beautiful completion of the virtues, for it adds to them its own greatness and is inseparable from them" (Aristotle, 1955, p. 122). Megalopsychia is possessed by individuals who are excellent in all the other virtues and assert their superiority.

"... a great-souled or superior man is one who claims, and is entitled to claim, high consi

deration from his fellows. . . .

The man who makes small claims for himself when his merits deserve these an

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rest on greatness, just as personal beauty requires that one should be tall; little people may have charm

and elegance, but beauty--no." (Aristotle, 1955, p. 120).

One should note that, for Aristotle, perfection of virtues means the right measure, not the maximum amount: Too much of courage, for instance, would turn into foolhardiness. "It is in the nature of moral qualities that they can be destroyed by deficiency on the one hand and excess on the other" (Aristotle, 1955, p. 58).

2.1.1.5 Kant

For Immanuel Kant (1993), the good will is the only thing that is good without qualification. "There is no possibility of thinking of anything at all in the world, or even out of it, which can be regarded as good without qualification, except a good will" (Kant, 1993, p. 7).

All other things that are often considered part of the good life are only good contingent on the will that exercises them. Intelligence or courage, for instance, although generally desirable, might also be bad if employed by a gangster. The good will, the basic ingredient of the good life, is independent of its effects and outcomes. "A good will is good not because of what it effects or accomplishes, nor because of its fitness to attain some proposed end; it is good only through its willing, i.e., it is good in itself" (Kant, 1993, p. 7).

The good will is produced by practical reason--by applying the categorical imperative: "But what sort of law can that be the thought of which must determine the will without reference to any expected effect, so that the will can be called absolutely good without qualification? Since I have deprived the will of every impulse that might arise for it from obeying any particular law, there is nothing left to serve the will as principle except the universal conformity of its actions to law as such, i.e., I should never act except in such a way that I can also will that my maxim should become a universal law" (Kant, 1993, p. 14).

For Kant, thus, the good life merges with the moral life. In the good life, people act out of a sense of moral duty, rather than out of any other motivation, such as pleasure, compassion, and self-interest.

In fact, only if people do what is their duty exclusively out of a sense of duty (and not because they like doing it anyway), do they fulfill Kant's idea of the good life. "To be beneficent where one can is a duty; and besides this, there are many persons who are so sympathetically constituted that, without any further motive of vanity or self-interest, they find an inner pleasure in spreading joy around them and can rejoice in the satisfaction of others as their own work. But I maintain that in such a case an action of this kind, however dutiful and amiable it may be, has nevertheless no true moral

worth" (Kant, 1993, p. 11). Kant has thus completely reversed the hedonist position: pleasure has turned into an impediment for the good life.

2.1.1.6 Conclusion

In sum, for hedonists, pleasure is the ultimate basis of the good life (although hedonist philosophers definitely prefer the "higher" pleasures). For the perfectionists, the good life is to fulfill certain potentials, values, or duties (even at the cost of forgoing some personal pleasures).

A key difference between these two philosophical notions of the good life is the extent to which the "just life" is part of it. For hedonists, justice is certainly not a main constituent of the good life, which, as mentioned, is grounded in pleasure or happiness, although they do advocate a just life. In a hedonist framework, justice appears as a secondary consideration--inasmuch as it contributes to, or detracts from, happiness. For many perfectionists, the good life must be moral, it must perfect certain moral values. Kant is an extreme example of making the just life coterminous with the good life. For most perfectionists, such as Aristotle, the good life is more comprehensive than the just life, because there are also non-moral values and capacities to be perfected. In their view, a just life is considered a necessary, but not sufficient constituent of the good life.

A common characteristic of all the noted philosophical systems of the good life is that they proscribe what the good life ought to be. They typically base their reasoning on grand assumptions about human nature, but do not investigate to what extent these assumptions are true empirically. Scientists who study the good life, by contrast, operate within the wider framework of an empirical theory of values. The psychological approach to the good life, for instance, examines the notions of the good life that people--regular people, not only philosophers--actually hold. Such an empirical study of values examines the distributions of notions of the good life among various groups and populations.

The individuals' notions are of course informed and influenced by contemporary philosophical views. It seemed necessary at least to sketch some important philosophical views because, in often rudimentary or simplified forms, these philosophical views re-appear in individuals' beliefs about the good life.

An empirical treatment of the good life suggests a relativistic stance toward the content of good-life beliefs. A key doctrine of scientists is to remain value-neutral in their research. In contrast with philosophers, psychologists studying the good life would not normally label certain good-life notions as appropriate and others as inappropriate (in a non-clinical setting). There are two strands of scholarship, however, that somehow appear to fuse normative and empirical elements in the study of values, and more specifically of the good life. Some sociologists give values that support a strong well-integrated society a more or less implicit positive evaluation. And then there are theories in developmental psychology which postulate a sequence of developmental levels or stages. As to the second strand, I have already pointed out that a developmental hierarchy is not necessarily identical with a
normative hierarchy, although these two often appear to blend together.

2.1.2 The Sociology of the Good Life

From a sociological perspective, values, such as those expressed in good-life notions, appear as an input into societal structures (e.g., Parsons, 1951). In other words, values are viewed as the glue that holds a society together. This is the starting point for a relatively common type of social criticism that diagnoses value changes and then characterizes them as some kind of degeneration or decadence. The hidden normative assumption that gives this type of sociology its critical edge is that a well-integrated and powerful society is good. The typical baseline concept of the good life and other values, against which changes are measured and criticized in this strand of sociological scholarship, is the "work ethic" or what Weber (1958) described as the "protestant ethic." This type of outlook on life originated in Europe after the conclusion of the Middle Ages and, at least in Weber's opinion, was instrumental in bringing about modern industrial society. In this ethic, the central tenets of the good life are industriousness and asceticism. Economic profits have to be reinvested rather than to be spent in leisure activities. The accumulation of productive capital signifies those who have been chosen by God to go to heaven. The idea that the good life consists of a lot of hard work and of few, if any, pleasures came to America with the colonists. For Weber (1958), Benjamin Franklin's concept of the good life epitomized this work ethic. As illustration, Weber cited some of Franklin's famous adages, for instance, "Remember that time is money. He that can earn ten shillings a day by his labour, and goes abroad, or sits idle, one half of that day, though he spends but sixpence during his diversion or idleness, ought not to reckon that the only expense; he has really spent, or rather thrown away, five shillings besides." (Weber, 1958, p. 48)

The common lament of social critics is that this notion of the good life that had helped make American society predominant in the world has been eroding--that Americans are going "soft" and are desiring a life of material luxury for which they want to work as little as possible. Lasch (1979) thought that, as the work ethic erodes, Americans are becoming narcissistic, and Postman (1986) described the American society as becoming increasingly obsessed with the consumption of television entertainment. In a sociological classic, Riesman (1950) depicted the transition from an "inner-directed" to an "other-directed" social character. Bell (1979) explicitly argued that the loss of the work ethic has brought about a crisis in contemporary American society. "In

effect the Protestant ethic as a social reality and a life-style for the middle class was replaced by a materialistic hedonism, and the Puritan temper by a psychological eudaemonism" (Bell, 1979, p. 71).

To repeat, in these approaches, values are of interest as a social resource ensuring societal stability and national power. Beyond this, there is little justification of why the work ethic should be good and its demise bad. In other words, there is little interest in an intrinsic hierarchy of values. Such a hierarchy has become a topic in developmental psychology, where researchers have devised various hierarchical schemes of values and related concepts.

2.1.3 The Psychology of the Good Life

Because this dissertation is located in the field of psychological theories of adult development, a more detailed section will review a number of these theories below. At this point, I only briefly point out that the empirical study of values was also taken up by psychologists, some of whom devised developmental schemes of values and related concepts. Among the key figures of this movement, I mention Maslow (1964) with his hierarchy of needs, Loevinger (1976) with her theory of ego development, and Kohlberg (1981) with his theory of moral development. Building on Maslow's developmental hierarchy of needs, Inglehart's (1977) diagnosis of value change is very different from that of the theorists of decadence mentioned above; it identifies positive development. Inglehart's focus is on the increasing development of higher-level post-materialist values. These values that correspond to the higher stages of Maslow's hierarchy resulted, in Inglehart's opinion, from the post-World-War-II prosperity. People growing up in the affluence of the post-war years saw their basic Maslowian needs of physical security and material well-being being met without difficulty and therefore turned in increasing numbers to the higher, non-materialistic needs of self-actualization and fulfillment.

This is just an example of how psychologists have taken up the study of values and have examined their internal structure and sequence (which could then be used to increase our understanding of societal processes). I will come back to the psychology of the good life after reviewing the issues of science and gender.

2.1.4 Science

At the center of the scholarly interest in scientists has been, not surprisingly, the scientists' job of doing science. Again, there are normative and empirical strands. The first strand discusses how scientists should do their science (e.g., Popper, 1961). There have been huge philosophical debates about appropriate scientific methodology, especially in the social sciences. Within the second strand, some sociologists of science have focused on the close description of how scientists actually do their science (Latour & Woolgar, 1979; Knorr-Cetina, 1981). A related important issue in the sociology of science is how the social system of science is stratified, how some people succeed and others fail. Whereas this sociological approach concentrates on structural factors, such as the accumulation of advantages and disadvantages (Merton, 1973), psychologists have been interested in the internal make-up of scientists.

A body of literature has developed describing the psychological and personality characteristics of scientists. These studies were preoccupied with finding the personality ingredients conducive for scientific creativity. Creative scientists, according to an early factor-analytic profile (Cattell, 1962; Drevdal & Cattell, 1958), are more reserved and introverted, intelligent, emotionally stable, dominant, serious-minded, expedient, venturesome, sensitive, think more radically, and have a stronger and more exacting self-image than the general population. Barron (1962) and Eiduson (1962) found, among other things, that creative people are cognitively complex and able to tolerate ambiguity and complexity. They play with ideas without needing the reassurance of immediate verification and are thus able to suspend disbelief during the nascent phases of research. McClelland (1962) found a high need for achievement in scientists, paired with calculated risk-taking, which for him signified a re-directed aggressive drive (1962, p. 192). A more recent study (Rushton et al., 1987, p. 143) characterized creative (productive) researchers in psychology (mostly male) by the following traits: ambitious, enduring, seeking definiteness, dominant, showing leadership, aggressive, independent, not meek, nonsupportive.

These psychological studies were less interested, however, in what the general public views as one of the prime characteristics of scientists--what I will call the "nerd syndrome."

The popular concept of the nerd syndrome is essentially a naive developmental theory about scientists. Its central tenet is a developmental differential between the areas of cognition (highly advanced) and the areas of social interaction (retarded). Whereas the nerd syndrome contains a number of very superficial aspects, pertaining to the nerds' "un-cool" hairstyles, clothes, or interaction patterns (as the mainstream youth culture would describe it), the notion of the good life is also among the retarded areas. Because of their monomaniacal obsession with their scientific work, nerds are considered to fail to appreciate the more advanced issues of the good life.

The emblematic segment of nerds is probably the group of "computer hackers" whose idea of the good life is to spend most of their time with their computers. In his detailed description of computer hackers, Levy (1984) also outlined the hacker ethic, a central tenet of which advocated unlimited access to computers and data for hackers. The hackers did

not recognize any boundaries that others might set to their desires of programming computers. This hacker ethic led in some cases to electronic break-ins into computers and to the theft of stored information--grossly violating others' property and privacy rights (Hafner & Markoff, 1991). A serious deficiency in moral development endemic among the hackers is evidenced in the creation of computer viruses. Without any consideration of the damage it might cause others, some hackers have devoted themselves to the intellectual challenge of writing viruses that can paralyze individual computers or even whole computer networks. Disregard for others in the pursuit of one's own good life is, in Armon's (1984) developmental scheme of good-life notions, the hallmark of stage 2--a very early stage typically attained by children and some sociopaths.

The pervasiveness of the popular nerd stereotype can be gauged, for instance, from the success of the series of whimsical "Revenge of the Nerds" movies. These comedies draw most of their humor from partly embracing, partly debunking the nerd stereotype. The nerds in these movies, it turns out, have a much more highly developed sense of the good life than the "jock" or "yuppie" sections of the student population. At Harvard University, the nerd stereotype recently triggered the formation of a student society of nerds and geeks.

The theorists of value decline would easily interpret the existence of the popular nerd syndrome as a symptom of the demise of the work ethic within the population. The nerd syndrome could be seen merely as a vehicle for those who have already lost their dour industriousness to ridicule those who have not. In the view of these theorists, it is not the critic of nerds but the nerd who has the better sense of the good life.

A developmental theory of notions of the good life is necessary to provide a more solid foundation for evaluating particular notions of the good life as advanced or retarded. Armon's developmental theory of the good life makes it possible to gauge in a non-arbitrary manner if scientists are indeed nerds in terms of primitive notions of the good life.

A noted exception from the neglect among science studies of the nerd issue is Roe's (1952) classic work. Using a psychodynamic approach, Roe investigated the childhood of scientists and found that scientists typically were from their early youth socially withdrawn, interested in things rather than in people. Roe did not, however, put her research within the framework of a developmental theory of good-life notions. Moreover, all members of her sample were men. This leads to the third element of this dissertation: gender differences. Why is it particularly interesting to study gender differences in scientists' notions of the good life?

2.1.5 Gender and Science

Science is certainly one of the numerous fields of study in which the gender aspect has been sorely neglected for a long time. A specific cause for the absence of gender studies in science was of course that traditionally most scientists were male. Results found in samples of largely or exclusively male scientists were, without much reflection, generalized to scientists as such. More recently, however, gender studies in science have burgeoned. Radical feminists claim to have detected a male bias embedded in the epistemology of science (Keller, 1985). For instance, the theme of mastery and dominance over nature, which, according to Keller, has underlain modern science since the days of Francis Bacon, is viewed as typically male. Moreover, the progress of women scientists within the social system of science has been closely monitored. Since all formal barriers against women's careers in science (and other professional fields) were outlawed about two decades ago, women have made considerable headway into the once male domain of science, both in respect to women's numerical representation in science and to their career patterns (Sonnert, in press a,b). Still, full gender equality remains elusive. Disparities persist in many fields, in the form of higher attrition rates of females at all stages of the educational "pipeline" in the sciences as well as in the form of relatively less successful career patterns for the women who stayed in science. It is at the very top of the academic hierarchy--full professors at the most prestigious universities--where women's underrepresentation is the most severe (Sonnert, in press a,b).

The awareness of gender as an important variable in science has mushroomed in general (e.g., Gornick, 1983; Sonnert, in press a,b; Yentsch & Sindermann, 1992; Zuckerman, Cole, & Bruer, 1991). It has been pointed out that girls are socialized to interact in a style that de-emphasizes aggressiveness and competitiveness, whereas those characteristics are encouraged in boys and become embedded in a male interaction style (Tannen 1990). Chodorow (1974) traced gender differences in terms of women's greater connectedness with others and men's greater independence back to early childhood dynamics. In this view, processes of individuation and separation from the mother are more central for young boys (who need to form a different, male, identity) than for young girls.

Such socialization patterns tend to distance women from precisely the characteristics--such as ambition, self-confidence, resilience, aggressiveness, and competitiveness--that the current social system of science reinforces and rewards. For instance, a lack of these characteristics might contribute to the typically lower "productivity" rate, on average, for women scientists, which has been found repeatedly (e.g., Cole & Zuckerman 1984; Long 1992).

In the field of developmental theories, gender became a

contested issue when Gilligan (1982) severely criticized Kohlberg's theory of moral development. In some Kohlbergian studies of moral development, women scored lower than men, on the average. Pointing to the fact that Kohlberg had developed his theory on the basis of a male sample, Gilligan (1982) argued that the gender differential found in these studies was an artifact of his method. In Gilligan's view, Kohlberg's theory really described a pattern of typically male development, whereas women would follow a different pattern: In contrast to men's emphasis on rights and duties, women would approach moral issues with a logic of caring. No wonder then, Gilligan argued, that women score lower in what to them is an alien developmental hierarchy.

Gender differences on any kind of variable, be it moral development, IQ, or salary level, attract intense interest. In some cases, they may be the result of the particular design of the variable, but in other cases there may of course be real gender differentials. Armon's (1984) developmental theory of good-life notions was constructed using a balanced sample of males and females, so that potential developmental gender differences in that respect cannot be a priori be attributed to methodology. Whereas I do not want to deny that genetic differences may underlie real gender differences to some extent, social and cultural factors seem to be more important, considering the substantial historical fluctuations in gender roles. Within a few decades, for instance, our society went from upholding the ideal of the woman as housewife and mother to paving the way for women's participation in the labor force at a large scale.

In addition to socialization practices that may impede women in achieving success or deter them from its pursuit in any professional field, there are cultural beliefs about science and scientists that may distance women from science in particular. Science is commonly perceived as a thoroughly male domain. Scientific textbooks have reinforced this notion (at least until recently) by mentioning and picturing men almost exclusively and by showing the few women who do appear in gender-stereotypical roles (Heikkinen 1978; Kelly 1985). As a result, girls and young women students lack role models of successful women scientists and may be discouraged from pursuing scientific interests at the same time that boys and young men are given strong examples to follow.

The social and cultural factors influencing gender differences here derive from the gender aspects of the stereotypical nerd syndrome. Scientists, and thus nerds, are typically male. Therefore, the notion of developmental arrest in scientists, developed with the typical scientist in mind, may apply to male scientists more than to female scientists. Female scientists, then, are hypothesized to have a more highly developed notion of the good life. Women scientists may be more reluctant than men to subordinate all other aspects of life, especially those of marriage and motherhood, to scientific pursuits, and spend most of their waking hours in a laboratory. Such different priorities and a more balanced outlook on life and the notion of the good life might result in a higher good-life scores for women than for men scientists.

If a gender difference between women and men scientists is found, the question arises whether this is a difference in good-life stage between women and men in general, or a specific gender difference limited to the group of scientists. The subject groups of the two other studies (Armon, 1984; Commons, et al., 1989) could serve as normative, or at least comparative, samples for my study. In both other studies, women scored lower than men in good-life stage, on the average, although these differences did not reach significance level. Because there is little evidence that women in general would have a higher good-life stage than men, there is increased plausibility to attribute a gender difference of the kind predicted to specific factors at work in science. Of course, given the scarcity of available data, further research would be necessary to pinpoint the extent of this gender difference more accurately.

2.2 Theories of Adult Development

The classical models of human development, such as Freud's and Piaget's, concentrated on childhood and assumed that development comes to a conclusion in adolescence. The following table gives an overview of Piaget' stages of cognitive development. It illustrates that Piaget was preoccupied with early development. In great detail, he covered the developmental progress of very young children in Era I (age 0-2), for instance. As early as age 11, formal operational thought (Era IV) may be achieved--and for Piaget this is already the endpoint of cognitive development.

TABLE 2.1: Piaget's Eras and Stages of Physical-Cognitive Development

(Source: Kegan, 1982, p. 34)

In Piaget's theory, individuals move up the developmental hierarchy through processes of accommodation and assimilation. The cognitive concepts become less egocentric and more appropriate, in the sense of being successful in the real world. They also increase in complexity, as higher cognitive concepts coordinate lower concepts. What is structure at one stage becomes content at the next stage (which forms a new structure coordinating this content), and so on.

The most obvious distinction between the various theories of adult development is the domain of these theories, and I will structure my review accordingly. I will start with theories which deal with Piaget's core domain, cognitive functioning, and which postulate stages beyond Piaget's formal operations in this domain. Then, I will survey theories which postulate adult development in a number of other

domains. In this review of theories of adult development, I am primarily interested in what defines development in each of these theories. In other words, what are the criteria of stage progression? Most of the theories are neo-Piagetian to some extent, especially in the sense that they adopt Piaget's criterion of increasing complexity for stage progression.

2.2.1 Adult Cognitive Development

Two interconnected themes appear in many of the developmental theories in the cognitive realm: complexity and contextuality/relativity. On the one hand, theories of adult cognitive development typically postulate a qualitative increase in the complexity of patterns of thought beyond formal operations. Most theories of cognitive adult development are built around the notion of differentiation and the increase in complexity. This criterion of stage progression is very similar to Piaget's--only these theories postulate stages beyond formal operations.

For Fischer and his collaborators (Fischer, Hand, & Russell, 1984) Piaget's terminal stage of formal operations is "not an end but a beginning. It marks the start of the development of abstract thinking." (p. 43) The criterion of stage progression in Fischer's skill theory is "the progressive coordination of abstractions in more and more complex relations."(p. 43) Fischer recognized three more levels above his level 7, which corresponds to Piaget's formal operations (see Table 2.2) At the highest level (level 10), subjects are able to coordinate two or more systems to form an overarching framework or theory. In contrast with Piaget, Fischer's skill theory emphasized that specific skills are acquired in particular context and that only later they may become generalized.

TABLE 2.2: Fischer's Ten Cognitive Levels of Representations and Abstractions

(Source: Alexander & Langer, 1990, p. 169)

Sternberg (1984) asserted that "progress beyond formal-operational thinking can be understood, at least in part, in terms of the development of third-order relational thinking." (p. 76) As an example of such postformal thinking, Sternberg (1984) analyzed third-order analogies (i.e., analogies between (second-order) analogies). For instance, a second-order analogy would take the form: Bench : Judge :: Pulpit : Minister, and a third-order analogy would ask subjects to compare two such analogies and evaluate how analogous these analogies are, for instance: (Bench : Judge :: Pulpit : Minister) :: (Head : hair :: Lawn : Grass). Solving this kind of task, according to Sternberg (1984), requires post-formal reasoning.

An interesting and unique member of this group of theories of adult development Arlin's. Within a framework of a postformal stage of relativistic thought and logic, akin to Sinnott's (1984), Arlin (1984) hypothesizes that, at the postformal stage, the way in which formal operations are used changes. In the course of development, problem-finding operations are replacing problem-solving operations. "When the hypothetico-deductive model of formal-operational thought is examined closely, it requires that problems be presented to subjects for solution" (Arlin, 1984, p. 262). Postformal thinking, by contrast, "represents a new freedom in thought. Thought is no longer constrained by adopting a style of problem solving that is characteristic of a particular stage ... . Rather, one selects the strategy and style appropriate to the problem, the context(s), and to the problem's assigned priority" (Arlin, 1984, p. 261). In other words, the postformal thinker plays an active part in defining the problems.

2.2.2 Adult Epistemological Development

A number of theories of cognitive adult development also focus on an epistemological aspect of adult thinking. They commonly describe a shift from the belief in absolute and universalistic truths toward a more flexible, perspectivistic, relativistic, and context-driven approach to reality. The reason for this frequent association of cognitive and epistemological aspects in theories of adult development is that these two dimensions are not independent from each other. Rather, a higher complexity of cognitive operations is often considered the precondition of perspectivistic and contextual views because they are obviously more complex than the belief in absolute truths.

Linn and Siegel's (1984) approach exemplifies the often-made connection between complexity and contextuality. They postulated "that the context-free strategies of formal reasoning are related hierarchically to the contextual strategies of postformal reasoning,"(256)--i.e., the contextual strategies integrate Piaget's context-free strategies. And in addition, postformal reasoning is characterized by higher complexity, by the ability of considering third-order relationships, as in Sternberg's (1984) theory.

In his classic study of epistemological development among college students, Perry (1968) distinguished nine developmental positions. During the first positions, the subjects believe in a simple dualism of true/false. The dualism is dissolved by an emerging relativism. But relativism itself is eventually superseded by the subjects' realization that, within a relativist world, they have to make commitments. And again, the criterion for stage progression is an increase in complexity. "The sequence of structures I observe in my data qualifies as a 'developmental' pattern ... in that it consists of an orderly progress in which more complex forms are created by the differentiation and reintegration of earlier, simple forms." (Perry, 1968, p. 44).

Whereas, similarly, in Kitchener and King's theory

(1981), the highest stage of cognitive adult development (stage 7) brings a return to objectivity and a defeat of the relativism of the prior stage, a relativistic stage forms the pinnacle of Sinnott's (1984) hierarchy of adult cognitive development. "Postformal operations as described here permit the adult thinker to operate in a world of relative choices. They also permit the thinker to overcome the fragmentation and isolation inherent in knowing the world through abstract-formal logic" (Sinnott, 1984, p. 298). At Sinnott's relativistic stage, relativistic frameworks coordinate more particular frameworks; her "postformal stage ... organizes several formal systems" (p. 320)--again the typical theme of increasing complexity.

TABLE 2.3: Sinnott's Prerelativistic and Relativistic Concepts

(Source: Commons, Richards and Armon, 1984, p. 303)

In a similar vein, Benack (1984) described "contextual relativistic" (p. 340) epistemological thought that supersedes dualistic epistemologies. In addition, Benack (1984) argued that such postformal reasoning may be necessary for a clinical practitioner to be empathetic.

Koplowitz (1984) depicted two stages beyond formal operations: a general system stage and a later unitary stage. In contrast with formal operations, the general system stage develops a cyclical concept of causality; it emphasizes the interdependence of variables and open boundaries around systems (see Table 2.4). For Koplowitz, the rationale of stage progression is defined by increasing complexity. His argument is almost identical with Labouvie-Vief's (1984) point about the relationship of weak and strong logic mentioned earlier: "Formal-operational concepts are special cases or simplified versions of general system concepts." (p. 285) Koplowitz's unitary stage is somewhat influenced by Eastern philosophy. It conceives of causality as pervading space-time, assumes a unity of all variables and sees boundaries and objects as constructed. Again, "general system concepts are simplified forms of unitary concepts." (p. 292)

TABLE 2.4: Koplowitz's The Structure of Each Concept in Each Stage

(Source: Commons, Richards & Armon, 1984, p. 291)

Labouvie-Vief's (1984) theory depicts adult development in the field of logic: In the course of development people go from "strong" to "weak" systems of logic. Strong systems of logic are simple, but restrictive, weak systems are more flexible and have fewer assumptions. In the path of development, as described by Labouvie-Vief (1984), each particular set of strong logic will be discovered as a "special case" of a more general and less restricted system of logic. Again, the notion of increasing complexity is central in the developmental progression. "As in Piaget's model of development, this theory views development as a recursively constructed, nested hierarchy"(Labouvie-Vief, 1984, p. 169). Among the highest stages of adult development, Labouvie-Vief (1984) distinguished the intrasystemic, the intersystemic (corresponding to Piaget's formal operations), and the autonomous levels. Thus, Labouvie-Vief's developmental hierarchy exceeds Piaget's. Whereas relativism is pervasive at the intersystemic level, it is overcome at the autonomous level--without reverting to prior absolutist stances. however. At the autonomous level "personalized truth" (Labouvie-Vief, 1984, p. 177) emerges. "Truth no longer propagates itself but is created and propagated by individuals" (p. 177).

To summarize, in the epistemological theories, a common stand is the development of relativistic and multiple frameworks of thinking. There is an important distinction, however, between theories for which a relativistic stage forms the end point and theories which recognizes stages beyond relativism. One common thread in epistemological development is toward relativism. Whereas in Perry, Labouvie-Vief (1984) and Kitchener and King the relativism is ultimately overcome, relativism is the highest stage for Sinnott (1984) and Benack (1984). I should note, however, that at least to some extent these differences in the treatment of relativism appeared to be merely terminological.

2.2.3 Basic Theories

Before I go on to other domains of adult development, I should mention two theories that have emerged in the cognitive domain, but raised a claim to be something of a "root theory" that establishes the basis for adult development in all domains. Both theories are extreme, but in opposite directions. The General Stage Model created by Commons and collaborators (Commons & Richards, 1984a,b; Richards & Commons, 1984) is a radical expression of the Piagetian theme of increasing complexity, which is apparent in most of the theories of cognitive development. It is radical because it separates complexity from the individual and deals with pure complexity.

Basseches' (1984) analysis of schemata of dialectical thinking also constitutes, in his view, "the common underlying cognitive organizational basis for the various specific adult forms of reasoning" (Basseches, 2984, p. 246). Basseches' theory is a radical expression of the relativism/contextuality theme. He moved the focus of analysis from thought to thought schemata (i.e., the building blocks of thought). This smaller unit of analysis enabled him to trace developmental stages of thinking in any substantive domain of thought. The following is a table of Basseches' cognitive

schemata.

TABLE 2.5: Basseches' Dialectical Schemata Framework

(Source: Basseches, 1984. p. 74)

Commons and his collaborators (Commons & Richards, 1984a, b; Richards & Commons, 1984) created a formalized theory of the hierarchical complexity of tasks: the General Stage Model. They shifted the focus from reasoner's developmental competency to the complexity of tasks. In this theory, an action of a higher stage coordinates actions of the next lower stage. Because its definition of stage is so general, the General Stage Model offers itself as a unifying theory of adult development in all domains. I will describe the General Stage Model below in more detail, because it has become influential for the development of Armon's (1984) good-life theory.

2.2.4 Adult Ego Development

Whereas the cognitive and epistemological theories were developed in a predominantly Piagetian tradition, the theories of ego development have stronger roots in Freudian theory and its variations, such as, first of all, object-relation theory. Again they transcend the "classic" preoccupation with early development (for a history of the psychoanalytic theories of ego development, see Loevinger, 1982, p. 373-395).

Among the theories of psychosocial development, a number are concerned with a sequence of tasks which persons face as they go through life. The popular notion of the "midlife crisis" belongs to this type of theories. Levinson and his collaborators (1978; Levinson, 1990), for instance, traced the "seasons" of men's lives (from childhood through old age) and the specific challenges that appear in these seasons.

A pioneer of such theories of ego development was the late Erik Erikson (1950). He defined successive stages of ego development by way of typical challenges or conflicts that individuals experience during the course of their lives--and later ones of these conflicts were located in adulthood. According to Erikson, people successively encounter conflicts between trust and mistrust, between autonomy and shame and doubt, between initiative and guilt, between industry and inferiority, between identity and role diffusion, between intimacy and isolation, between generativity and stagnation, and finally between ego integrity and despair.

Jane Loevinger's (1982) influential theory of ego development also extended into the adult phase with its two highest stages of the autonomous and integrated ego. The following table summarizes Loevinger's developmental hierarchy of ego development.

Compared with these theories of ego development, Kegan's (1982) theory stands out with an uncharacteristically strong Piagetian bent. He distinguishes five stages in ego-development and calls the stages "evolutionary truces"--relatively stable configurations of making meaning about oneself. In the process of development, what is "subject" in one stage becomes "object" in the next stage, distinctly echoing Piaget's interplay of "structure" and "content." Stage change is a process of "differentiation from that which was the very subject of my personal organization and which becomes thereby the object of a new organization on behalf of a new subjectivity that coordinates it." (Kegan, 1982, p. 85).

Prior to the five main stages, Kegan also assumes an initial stage (Stage 0), the incorporative stage, in which the infant is just a bundle of reflexes (Table 2.7). The first transition moves the infant from being reflexes to having them. At stage 1, the impulsive stage, individuals gain control of their reflexes, but are now governed by their impulses. Around the age of six, the next change takes place.

At stage 2, the imperial stage, individuals gain command over their impulses. Now the subject consists of needs, interests, and wishes. The child now has a private world. Stage 3, the interpersonal stage, brings the individual's needs under control. Other people come into the picture; the self now is its interpersonal relationships; it does not exist independent of them. Whereas some sociopaths never transcend stage 2, stage 3 is the first regular adult stage. People operating at this stage of ego development have the strong need to be liked by others, because there is no self independent of others.

This is accomplished at stage 4, the institutional stage. Whereas at the previous stage, people were their relationships, now they have relationships. A strong sense of self-dependence and self-ownership emerges. People at this stage want to be in control and successful. At stage 5, the interindividual stage, the self is constituted as interpenetrating self systems. At this stage, persons are capable of true intimacy.

TABLE 2.7: Kegan's Stages of Ego Development

	UNDERLYING STRUCTURE	
STAGES	SUBJECT	OBJECT
Stage 0 Incorporative	Reflexes, (sensing, moving)	None
Stage 1 Impulsive	Impulses, perceptions	Reflexes (sensing, moving)
Stage 2 Imperial	Needs, interests, wishes	Impulses, perceptions
Stage 3	The interpersonal,	Needs, interests,

Interpersonal	mutuality	wishes
Stage 4 Institutional	Authorship, identity, mutuality	The interpersonal, psychic administration ideology
Stage 5 Interindividual of self systems	Interindividuality interpenetrability ideology	Authorship, identity, psychic administration

(Source: Kegan, 1982, p. 86)

In the following, I turn to domains that have as yet received less attention from theorists of adult development.

2.2.5 Adult Faith Development

A very small--but very intriguing--domain to which theories of adult development have been applied is that of faith. This is of course a domain where various religions vehemently proclaim their own truth, whereas the researcher is usually inclined to take a relativistic or neutral stance and to refuse to judge the various faiths. Fowler (1981) was interested in the structure of faith, which he thought amenable to developmental analysis. Fowler described six developmental stages, of which the highest two fall into adult development. His stage 6 believers, for instance, are no longer concerned with self-preservation and often become martyrs for their visions of universal and absolute love and justice. They are of course rare.

2.2.6 Adult Creativity Development

Riegel (1973) proposed that, beyond formal operations, dialectical operations constituted the final stage of human cognitive development. Riegel's cognitive theory contained a specific emphasis on creativity. In his view, the contradictions entertained in dialectical thinking were the source of creativity. In a concrete case study of Darwin's intellectual development, Gruber (1984) linked Darwin's scientific break-though to his ability to coordinate complex systems, i.e., to think post-formally.

2.2.7 Adult Moral Development

Whereas Piaget was mainly concerned with reasoning about inanimate objects, he was also marginally interested in reasoning in the social realm. But it was Lawrence Kohlberg (1981) who, building to some extent on developmental theories of social perspective taking (Selman, 1980), established the domain of moral reasoning as a major focus of research on adult development. Kohlberg's theory of moral development also formed a large part of the basis on which Armon (1984) built her developmental theory of the good life while she was Kohlberg's student. Therefore, I will discuss Kohlberg's theory of justice in detail in the next section. But before that, I should mention the work of a student whose work in adult development has become influential.

2.2.8 Adult Beneficence Development

Carol Gilligan (1982) made gender a central issue in the scientific debate about adult development. She argued that females place a higher emphasis on caring for others, rather than looking at moral dilemmas from the perspective of rights and duties. According to Gilligan, males tend to see people as separated individuals, whereas women perceive a higher degree of connectedness. Gilligan confronted the male "logic of rights" with the female "logic of caring." In a sense, Gilligan augmented Kohlberg's domain of justice-reasoning with a new domain, that of beneficence.

Against Kohlberg's hypothetical dilemmas, such as the famous Heinz dilemma, Gilligan also emphasized the relativism and contextuality of real moral decisions (Gilligan, Murphy, & Tappan, 1990)--thus linking with the various theories that propose relativism as an advanced stage of epistemological adult reasoning. "Intellectual and ethical development continues beyond adolescence and into adulthood through the shift from metaphysics of logical justification to the psychology of everyday life ... . Our analysis is compatible with the interpretation that this return to reality requires a cognitive transformation from a formal to a dialectical mode of reasoning that can encompass the contradictions out of which moral problems often arise" (Gilligan, Murphy, & Tappan, 1990, pp. 223-224).

In conclusion, when looking at the numerous theories of adult development, observers have often noted an intriguing degree of parallelism among them (Kegan, 1982; Commons, et al., 1984; Loevinger, 1982). Considering the diverse origins and domains of these theories, they are indeed surprisingly compatible with each other. This cumulative nature of research in adult development appears to strengthen the overall claim that there really is positive development in adulthood and that this development can be described in a few major stages, which are structurally analogous across a number of different domains. (It is, of course, no strict proof; skeptics might try to explain this parallelism as the collective perpetuation of a mistaken concept.)

2.3 The Developmental Psychology of the Good Life

I now turn to the intellectual genealogy of Armon's (1984) developmental theory of the good life. In other words, I will re-trace how the issue of the good life and developmental psychology became connected. Cheryl Armon, who created the developmental theory of the good life, was naturally heavily influenced by her doctoral supervisor Lawrence Kohlberg. A second major influence was Michael Commons with his General Stage Model.

2.3.1 Kohlberg's Justice Reasoning

Kohlberg always considered himself a Piagetian in the

sense of grounding development in cognitive processes, but he now examined moral reasoning, i.e., cognitive processes in the realm of justice. And in addition, he of course extended the developmental hierarchy into adulthood.

Kohlberg postulated six stages which are grouped into three levels. The six stages are described in Table 2.8.

Level 1 is the preconventional level that consists of stages 1 and 2. This is the level where most children under the age of nine, some adolescents, and many adolescent and adult criminal offenders are. Individuals at the preconventional level do not understand and do not uphold socially shared norms and expectations.

Level 2 is the conventional level that comprises stages 3 and 4. Most adolescents and adults in the American society are at this level. Individuals at the conventional level share societal moral rules, norms, and roles. Level 3 is the postconventional level which contains stages 5 and 6. Only a small number of adults reach the postconventional level and usually only after the age of 20-25 years. Those at the postconventional level understand and generally accept society's rules, but their acceptance of these rules is based on formulating and accepting the general moral principles that underlie the rules. In case the moral principles come into conflict with society's rules, the postconventional individual judges by principle rather than by convention (Colby & Kohlberg, 1987). Kohlberg also postulated intermediate stages between his six major stages (e.g., 1/2, 2/3, 3/4, 4/5, and 5/6). The correspondence between Kohlberg's stages of moral development and Piaget's stages of cognitive development is shown in Table 2.9.

Kohlberg demonstrated that his hierarchy of moral stages satisfied the formal properties Piaget attributed to stages (Kohlberg & Armon, 1984). The moral stages would thus qualify as "hard structural stages." Piaget's stage criteria are the "structured whole" and hierarchical integration. The structured whole means that developmental stages must be an underlying thought organization that expresses itself in responses to dissimilar tasks. In other words, a developmental stage goes deeper than performances on individual tasks; it is a more general competence. Hierarchical integration means that there is an inner logic to the stage sequence. Not only does a higher developmental stage empirically replace the earlier one, it also systematically transforms or integrates the operations at the earlier stage.

2.3.2 The General Stage Model

Because of certain problems in Piaget's and Kohlberg's theories with the assumption of an underlying stage "competence" that cannot be measured directly, the General Stage Model (Commons & Richards, 1984a, b) shifted the focus from the stage of persons to the stage of tasks. In this model, the hierarchical complexity of tasks became the basis for construing the notion of stage. In turn, the hierarchical complexity of tasks was grounded in mathematical models (Coombs, Dawes & Tversky, 1970) and information science (Lindsay & Norman, 1977). Commons and Richards (1984a, b) emphasized that developmental theory addresses two conceptually different issues: (1) the hierarchical complexity of tasks to be solved; and (2) the psychology, sociology and anthropology of how task performance develops. The description of stages in the General Stage Model belongs to issue 1 because it is strictly analytical, delineating a discrete hierarchy of task complexity. The General Stage Model consists of a set of axioms that define a stage sequence, and it describes the necessary analytical properties of stages.

At the heart of the model is the notion of hierarchical (vertical) complexity--as opposed to non-hierarchical (horizontal) complexity. Hierarchical complexity is the order of logic required to complete a task (Commons & Richards, 1984a). Non-hierarchical complexity is the number of bits of information needed to complete a task, as described in information theory. By definition, for every yes-no question embedded in a task, there is an answer containing one bit of information. The General Stage Model is concerned with hierarchical complexity only. The successful completion of a task requires an action of some order of hierarchical complexity. At each order of hierarchical complexity, actions, including reasoning, are defined in terms of the actions of the previous order. Actions at a higher order of hierarchical complexity organize and transform lower-order actions. In the terminology of the General Stage Model, higher-order actions coordinate the actions of the next lower order. This organization of lower-order actions is new and unique and cannot be accomplished by those lower-order actions alone.

The lower stages of the General Stage Model describe actions of low complexity (see Table 2.9). These actions form the upper complexity limit of what children of various ages can do. Abstract (General Stage Model stage 4a) and formal (stage 4b) operations are those with which adults are familiar. Systematic (stage 5a) and metasystematic (stage 5b) operations are tasks of enormous complexity, which only few humans can successfully perform. The even higher stages are of little concern for empirical research. In the moral domain, Sonnert and Commons (1994) have shown that it is theoretically impossible for an individual to solve a stage-6a task. The stages of the General Stage Model correspond to Piaget's and Kohlberg's stages (see Table 2.9).

TABLE 2.9: Stage Comparisons of the General Stage Model, Kohlberg, and Piaget

2.3.3 Armon's Good Life

Whereas Kohlberg devised a developmental theory of justice, he considered concepts of the good life too

individualistic and relative to be captured in a developmental theory. One of his graduate students, Cheryl Armon, however, applied his developmental theory of moral reasoning to reasoning about the good life and created a Kohlberg-style developmental theory of good-life notions. In this project, she was greatly helped by the development of the General Stage Model, because this purely structural Model now made it possible to create developmental theories in almost any substantive domain.

Armon's (1984) work is the basis for this dissertation. Characteristic for the higher stages in Armon's model is that the ideas about the good life are not self-absorbed and self-centered, but become increasingly altruistic and also aim at the integration of different aspects of a life, i.e., at living life as a "whole person." However, Armon's stages do not fully correlate with the philosophical dichotomy of hedonism vs. perfectionism, although there is obviously such a trend. At the higher stages of Armon's (1984) hierarchy, elements of <u>both</u> major philosophical strands can alternatively indicate the same stage.

The following table is an overview of Armon's (1984) Good Life Stage Model. Because this type of theories of adult development--including the developmental theory of the good life--is relatively new and unusual, the theoretical and methodological aspects of a developmental concept of the good life will be discussed in greater detail in a separate section below.

TABLE 2.10: <u>Armon's Stages of the Good-Life</u>

<u>Stage One</u>: Egoistic Hedonism

The Good Life consist

s of physicalistic and sensory experiences that grati

fy the self's desires and realize the self's fantasies. There is no conception of specific criteria for va

luing. Thus, the good life is synonymous with the desired life, without consideration of the self's or oth

ers' real capacities or of behavioral consequences.

Doing good is undifferentiated from having good experi

ences. The good life and the bad life, and any of its contents are completely dichotomized and simplistica

lly labeled in terms of surface attributes, e.g., "nice", "pretty", "clean", etc. No distinction is made a

mong happiness, contentment, satisfaction, and pleasure.

<u>Stage Two</u>: Instrumental Hedonism

The good consists of those activities, objects

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sistent conception of the good life that includes con

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objectives and intentions and the contemplation of consequences of behavior. There is no distinction made, however,

ever, between the "desired" and the "desirable" (that which is worthy of being desired). There is an instr

umental need for others, manifested in a conscious desire to be praised, like, cared for, and helped. Simu

l t a n e o u s l y , a d e s i r e f o r i n d e p e n d e n c e , e g o i s t i c f r e e d o m , a n d p o w e r i s a l s o p r e v a l e n t . S o c i a l l y a p p r o v e d " g

oods" are affirmed simplistically or evaluated in terms of their surface features. There is the beginning

of a distinction between happiness and pleasure.

Stage Three: Altruistic Mutuality

Good is an affective sense of happiness or fulfillment, a result of positive, mutual interpersonal experience that is distinguished from pleasure. The good life is predominantly determined by affective experience, that is, what feels good; good is often determined by the absence of bad feelings. The good life consists of activities in accordance with stereotypical, interpersonal, and personal virtues, particularly those that help; the self and/or others to feel good (be happier, more successful, etc.) and that promote mutuality between self and others in the immediate social environment.

Stage Four: Individuality

The good life consists of activities that express the individual's self-chosen, internalized interests and values (as opposed to the consensual values of Stage 3). There is the beginning of a hierarchy of values. Happiness, fulfillment, satisfaction, and pleasure are not only distinguished, but are also seen as ends that are freely chosen and prioritized. The good is found in activities that are considered personally meaningful. The society at large must be maintained and either benefitted or not harmed by the individual's pursuit of the good. In the perfectionistic orientation, the good life is generalized to other persons. It is the self- fulfilled life, accomplished through developing and exercising one's full capabilities and increasing one's understanding of the self and others, to the benefit of the self and the society. In the hedonistic orientation, the good life is viewed relativistically. It is the enjoyed life, but what is to be enjoyed is defined individualistically. At the very least, it is one in which the individual can be comfortable and maintain his or her "lifestyle" without harming others.

Stage Five: Autonomy

The good life

is conceptualized from a rational, consistent (equil ibrated), generalizable or universal framework of val

ues. The good life is expressed through values that a re constructed autonomously and considered worthy for

persons in general. Values are consistent with one another in a consciously-constructed ethical system. I

ntrinsic and extrinsic values are differentiated and

life goals focus on the former. Good work and intimat

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is that expresses the development of meaning and autonomy, while the individual maintains a deep connection

with the society, world, or universe. In the hedonistic orientation, the good life is the life of peace a

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(Source: Armon, 1984, pp. 154-162)

To recapitulate, in this literature review, I have drawn together the various strands of scholarship that are relevant for the issue at hand: the developmental stage of good-life notions among men and women scientists. The major purpose was to demonstrate how the developmental theory of the good life emerged from the field of adult cognitive development, by tracing the lineage of Armon's (1984) developmental theory of the good life to the Kohlberg's theory of moral development, Commons and Richards' General Stage Model, and, ultimately, to Piaget's genetic epistemology. In the following, I turn to the scant

empirical research results that directly pertain to developmental stages of good-life notions.

2.4 Prior Research

Disregarding Armon's (1984) work that established the concept of developmental good-life stages, there was only one other study that investigated this issue (Commons, et al., 1989). This study, of which Armon was a co-author, examined highly intelligent subjects (members of the "Mensa" organization) in various domains, among them the good life.

Armon (1984) tested a small group of people twice, in 1977 and in 1981. The first time, her sample contained 43 subjects, the second time, 39 of the original subjects. Armon's (1984) sample was very diverse in age (from five to 72 years of age in the 1977 sample) and social background in order to ensure that the whole developmental spectrum would be covered. Not surprisingly, age strongly correlated with good-life stage in both years the sample was measured ($r = .67$; $p = .000$, in 1977 and $r = .68$; $p = .000$, in 1981; Armon, 1984, p. 194). Moreover, in this sample, which spanned a wide range of educational levels, years of education were found to be positively related to good life scores among the adults ($r = .37$; $p = .02$, in 1977 and $r = .46$; $p = .009$, in 1981; Armon, 1984, p. 204). For obvious reasons, the correlations were much higher (in the .8 range), when the sample included the children.

In the whole sample, Armon (1984) found no significant gender differences in good-life stage, although the males scored higher, on the average. When only adults (20+ years) were examined, however, the men's average good-life score was significantly higher than the women's by about half a stage (Armon, 1984, p. 207). This gender difference remained significant after controlling for education (Armon, 1984, p. 209).

In the Mensa study (Commons, et al., 1989), subjects ranging in age from 18 to 83 were measured in a number of developmental dimensions, among them their good-life stage. Using Armon's (1984) instrument, good-life scores were obtained for 42 men and 37 women. The male average was

slightly higher than the female (3.81 vs. 3.65). The t-value associated with this difference was 1.90, which just missed the .05 significance level.

Good-life stage was predicted by cognitive stage and by moral-reasoning stage. Educational level was a non-significant predictor; its regression coefficient had a negative sign. Interestingly, mother's educational level was found to correlate significantly ($p < .05$) with a number of interest variables from the Strong-Campbell Interest Inventory (investigatory: $r = .20$; artistic: $r = .23$; social: $r = .21$; conventional: $r = .17$), whereas father's educational level correlated with none.

2.5 Summary

This literature review has touched on a variety of scholarly disciplines, ranging from religion and philosophy to sociology, in which the good life has been discussed. In this dissertation, I approach the issue from the perspective of adult cognitive developmental psychology. After a general survey of theories of adult development, this chapter described how the relatively novel developmental theory of good-life notions emerged and finally reported the results of the few empirical studies that exist on this topic.

CHAPTER 3
METHODS

Because this dissertation proposes an innovation in the methodological area, it seems appropriate to discuss some wider issues of the methodology of measuring developmental stage first, before describing the actual methods used in this study.

3.1 Methodologies of Assessing Good-Life Stage

In this section, I will discuss the methodology of assessing the developmental stage of good-life notions--which is connected to basic theoretical assumptions. The key issue is that of content- versus structural scoring. Do certain content-elements or themes in a respondent's reasoning indicate stage; or does the structure of reasoning, regardless of its elements, determine stage? Starting point of my discussion is Kohlberg's methodology in the area of moral development; I note that Kohlberg changed some of his positions over the course of time. Next I describe Armon's position, which was influenced both by Kohlberg and Commons. Finally, I present my own scoring method. It modifies Armon's approach according to the multi-domain scoring system and addresses some of the problems of her scoring system.

3.1.1 Changes in Kohlberg's Methodology

When viewing Kohlberg's work on moral development, one should not overlook that, along with his theory, his methodology underwent considerable changes over the years (Sonnert & Commons, 1994). Colby and Kohlberg (1987) distinguished a number of historical periods. The "old period," in my terminology, was characterized by global scoring of the content of subjects' responses (Kohlberg, 1969; Kohlberg & Kramer, 1969). In a transitional period (Kohlberg, 1973), moral stage 4/5 and other half-stages were added to the model to fix problems emerging with global scoring, but the difficulties in content-scoring proved intractable. The introduction of structural scoring (Kohlberg, 1976), which solved most of those problems, marks the end of the transitional and the beginning of the "middle period."

In this middle period, details of structural scoring were developed, and that solution finally appeared in Colby and Kohlberg's (1987) "Scoring Manual." During this time, Kohlberg was influenced by Commons and Richards who spearheaded the drive to develop an entirely structural model of development, the General Stage Model (Commons & Richards 1984a, 1984b). In this period, Armon worked as a graduate student with Kohlberg and created her good-life scoring manual in correspondence with Kohlberg's scoring methodology in the moral domain. She was also closely advised by Commons. Kohlberg's last period, or "new period," (Kohlberg 1986; Kohlberg, Boyd & Levine, 1990) is less relevant here, because Armon graduated in 1984, i.e., during the middle period. For the sake of completeness, however, I should mention that in this period, Kohlberg's thinking was greatly influenced by Habermas and brought a "new" moral stage 6, which put increased emphasis on discourse.

3.1.2 Armon's Good-Life Scoring Manual

The key elements of Armon's (1984) good-life scoring manual are noted below. For reading convenience, Table 3.1 repeats the good-life stage descriptions to which the respective sets of scoring elements belong. Armon's (1984) manual represents an interesting mixture of content-scoring and structure-scoring elements. The emphasis on structure is evident in the overall stage descriptions, whereas the "value criteria" through which Armon operationalized the scoring are reminiscent of content-scoring.

TABLE 3.1: Armon's Stages and Value Criteria of Good Life

Stage One: Egoistic Hedonism

> The Good Life consists of physicalistic and sensory experiences that gratify the self's desires and realize the self's fantasies. There is no conception of specific criteria for valuing. Thus, the good life is synonymous with the desired life, without consideration of the self's or others' real capacities or

of behavioral consequences. Doing good is undifferentiated from having good experiences. The good life and the bad life, and any of its contents are completely dichotomized and simplistically labeled in terms of surface attributes, e.g., "nice," "pretty", "clean," etc. No distinction is made among happiness, contentment, satisfaction, and pleasure. (Armon, 1984, p. 154)

Value Criteria for Good Life:

(1) Implicit or explicit reference to concrete wants as sole criterion.
(2) Reference to simplistic, surface features of physical, environmental, sensory, materialistic, or experiential benefits for the self.
(3) Reference to surface attributes as constituting good. (Armon, 1984, p. A-48)

Stage Two: Instrumental Hedonism

The good consists of those activities, objects, and persons that serve the individual's needs and interests, both emotional and material. There is a consistent conception of the good life that includes concrete considerations both of the self's and others' motives and intentions and the contemplation of consequences of behavior. There is no distinction made, however, between the "desired" and the "desirable" (that which is worthy of being desired). There is an instrumental need for others, manifested in a conscious desire to be praised, like, cared for, and helped. Simultaneously, a desire for independence, egoistic freedom, and power is also prevalent. Socially approved "goods" are affirmed simplistically or evaluated in terms of their surface features. There is the beginning of a distinction between happiness and pleasure. (Armon, 1984, p. 155)

Value Criteria for Good Life:

(1) Reference needs

and interests.

(2) Reference to simplistic conceptions or attributes of social roles, relations, objects, or

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egoistic freedom (complete lack of restraints/restrictions), independence, or power (e.g., freedom to do

what you want to do, etc.).

(4) Reference to activities that the self likes or prefers as sufficient justif

ication for goodness. (Armon, 1984, p. A-51)

as an affective sense of happiness or fulfillment, and

<u>Stage Three</u>: Altruistic Mutuality

Good i

esult of positive, mutual interpersonal experience that is distinguished from pleasure. The good life is p

redominantly determined by affective experience, that is, what feels good; good is often determined by the

absence of bad feelings. The good life consists of a
activities in accordance with stereotypical, interpers

onal, and personal virtues, particularly those that help; the self and/or others to feel good (be happier,

more successful, etc.) and that promote mutuality be tween self and others in the immediate social environ on

ment.

(Armon, 1984, p. 157)

Value Criteria for Good Life:

(1) Reference to altruistic virtues (honesty, c

arising, loving, self-sacrificice) or positive, reciprocal interaction with others in immediate environment.

(2) Direct reference to positive affect within the self ("feeling good about yourself," "being

contented," etc.); OR the absence of negative affect ("not worrying about money," "not being lonely," etc.).

(3) Reference to interpersonal relationships (love, marriage, family, etc.) as major source of happiness or contentment. (Armon, 1984, p. A-54)

Stage Four: Individuality

The good life consists of activities that express the individual's self-chosen, internalized interests and values (as opposed to the consensual values of Stage 3). There is the beginning of a hierarchy of values. Happiness, fulfillment, satisfaction, and pleasure are not only distinguished, but are also seen as ends that are freely chosen and prioritized. The good is found in activities that are considered personally meaningful. The society at large must be maintained and either benefitted or not harmed by the individual's pursuit of the good. In the perfectionistic orientation, the good life is generalized to other persons. It is the self-fulfilled life, accomplished through developing and exercising one's full capabilities and increasing one's understanding of the self and others, to the benefit of the self and the society. In the hedonistic orientation, the good life is viewed relativistically. It is the enjoyed life, but what is to be enjoyed is defined individualistically. At the very least, it is one in which the individual can be comfortable and maintain his or her "lifestyle" without harming others. (Armon, 1984, p. 159)

Value Criteria for Good Life:

(1) Direct reference to activities or states as personally meaningful, worthy, or as providing for a meaningful life; OR reference to activities that provide for increased awareness or understanding of the self, others, and/or the environment.

(2) Implicit or explicit reference to individual freedom to pursue personal satisfaction, interests, goals, etc.; OR explicit reference to exercising self-chosen values, goals, etc.

(3) Explicit reference to not damaging or harming society; OR explicit reference to one's activities as benefiting maintaining society.

(4) I

festyle (e.g., providing for the self, the family, ha

ndling crises, unemployment, etc.). (5) Reference to t

he self functioning fully, or fulfilling potential. (Armon, 1984, p. A-57)

<u>Stage Five</u>: Autonomy

The good life is conceptualiz

zed from a rational, consistent (equilibrated), generalizable or universal framework of values. The good l

life is expressed through values that are constructed autonomously and considered worthy for persons in gen

eral. Values are consistent with one another in a consciously-constructed ethical system. Intrinsic and ex

transic values are differentiated and life goals focu
s on the former. Good work and intimate relationships

are prevalent values, as is the recognition of all persons' interdependence. The good life for the self a

nd the good life for society are either considered synonymous or dealt with equitably through general mora

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principles. In the perfectionistic orientation, the good life is achieved through active virtues that express

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ty, world, or universe. In the hedonistic orientation, the good life is the life of peace and pleasure, each

ieved through thought and knowledge. (Armon, 1984, p. 162)

Value Criteria for the Good Life: (1) Implicit to

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reflecting upon and/or working through one's values system, etc.).

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society's Good Life. (3) Reference to involvement with one's highest level mental capabilities, particular

ly intellectual problems and ideas. (4) Reference to o new's capacities as a vehicle or empower others, or to

enable others, to fulfill their goals (intelligence as a good to others). (5) Direct reference to the dist

interaction between intrinsic and extrinsic value and a preference to the latter.

(6) The fully lived life or the fulfillment of potentialities as an imperative for all persons; OR the Good Life as the fulfillment of individuals' life plans.

(7) Identification of the self or persons with the human community, world or the cosmos. (Armon, 1984, pp. A-60-61)

Potential problems with Armon's scoring approach lie in two areas, the value criteria and the averaging method. First, the value criteria represent the last vestiges of content scoring, and the attempt to combine the value criteria with an essentially structural approach, causes difficulties in one of two forms: Either a particular content is associated with a value criterion of one particular stage--which makes it hard to score people who use that content at a different stage. Or a particular content is associated with value criteria of several stages--which undermines their very usefulness as discriminators between stages. The major example for the first difficulty is the mentioning of interpersonal relationships only at stage 3. I found numerous people reasoning about their interpersonal relationships at stage 4. The second difficulty becomes obvious when comparing the value criteria for stage 4 and stage 5. Is there really a substantial difference between value criterion 3 (stage 4) and value criterion 2 (stage 5), or between value criterion 5 (stage 4) and value criteria 3 and 6 (stage 5)?

Second, in determining the final stage score, Armon averages the scorable parts of an interview. This method is,

of course, facilitated by the value-criteria approach. If stages are represented by value criteria items, it seems only natural to count them and form averages. However, if I look for structure, I look for integrations and relationships between elements. It is the complexity of the integration of elements, rather than the elements themselves and their frequency that counts. For us, the highest complexity level in an response determines the stage score, even if the respondent reasons predominantly at a lower level.

In extreme cases, the averaging method might underestimate the stage of a response. For instance, people who mention certain low-stage issues, such as health, would receive a low score for this particular part. If the response is short, this might affect the overall score. I adopt the view of the General Stage Model that higher stages do not replace lower stages but integrate them. It would seem quite bizarre to assume that health concerns would be replaced by loftier good-life issues at higher stages. Rather, they would be integrated, i.e., put into a larger and more complex view of the good life. Because people normally concentrate on the issues associated with their highest stage, the averaging method yields good results. But in a few cases, special life-circumstances, such as experiencing a grave illness, may color a response to an extent that the stage score would be affected.

3.1.3 A Structural Method of Scoring the Good Life

This dissertation contains a methodological innovation: It applies the General Stage Scoring System, which Commons and his associates developed on the basis of the General Stage Model, to the good-life domain. Because, according to Commons and Richards, structural complexity defines developmental stage, the General Stage Model is domain-independent. The model claims that developmental stages can similarly be detected in a variety of domains, such as mathematical, moral, and also good-life reasoning. This has spawned the creation of a domain-independent scoring methodology, the General Stage Scoring System that focuses on the structure, rather than on the contents, of reasoning (Commons, et al., 1992). A practical advantage of this scoring method is that it does not require long, probing interviews. Paragraph-length statements are usually enough to arrive at a stage score. Applying the General Stage Scoring System makes the scoring explicitly structural. The results of the actual scores are not affected by the methodological change. To establish the degree of correspondence between Armon's scoring manual and an explicitly structural scoring method of the General Stage Scoring System, Commons re-scored Armon's data. The level of agreement was very high, and in the few cases in which Armon's and Commons' scores differed, Armon agreed after discussion that Commons' scores were more appropriate (Personal communication, Commons).

The reason for this is that Armon already applied structural scoring implicitly, without ever formalizing it. The proposed method only removes the last vestiges of content scoring and explicitly formalizes structural scoring by means of the General Stage Scoring System. A detailed explanation of this method is contained in the Appendix.

As we have seen, methodological approaches correspond to substantive issues. In short, the development of Kohlberg's theory has led him "back to the basics," i.e, back to Piaget. Again, whereas in the old period of content scoring, Kohlberg thought that higher stages would replace lower stages, Piaget had always argued that higher stages integrate the elements of lower stages in novel ways. In the Piagetian view, which Commons and Richards articulated the most vigorously among Kohlberg's associates, it is thus not the contents of respondents' notions of justice--or of the good life--that matters. Rather, the structure of the response--how it integrates various aspects of a subject area--becomes crucial.

3.2 Sample, Instruments, and Measures

3.2.1 Measurement of Adult Development: A Psychometric Perspective

Those who want to measure adult development empirically, must deal with two major issues: the validity and the reliability of their measurements.

Measurements are valid if they indeed measure what they intend to measure. To some extent, then, accepting measures of adult development as valid, presupposes a belief in the existence of adult development--which is not shared universally. But within the field of research in adult development, the validity of a particular instrument is strengthened by its correlations with other instruments. And it is very typical in this field that instruments of diverse methodological backgrounds strongly correlate with each other. In our concrete case, Armon's (1984) coding scheme of the good life and Commons' General Stage Scoring System (Commons, et al., 1992) had almost identical results, as mentioned.

Measurements are reliable to the degree that they are consistent or stable, especially across different persons performing the measurements and across repeated measurements of the same subject. Armon (1984) established three types of reliability for her good-life coding scheme. The interrater reliability, measured as the correlation between two raters, was very high (.98), and so was the short-term test-retest reliability, measured as the correlation between tests given to the same persons three to six weeks apart, (.99). Armon (1984) also reported a long-term (four years apart) test-retest correlation of .90. However, this may, to some extent, confound the issue of test reliability with that of the subjects' real development over the span of four years.

3.2.2 Participants

This research uses a part of the existing database of the Project Access study at Harvard University in which I participated. Project Access has compiled a large database of questionnaire data on 699 former postdoctoral fellows, who had received one of two prestigious fellowships (National Science Foundation, National Research Council). This was the most extensive sample of former NSF and NRC postdoctoral fellows that could reasonably be obtained. The NRC, which keeps an address database of its former associates, made available the addresses of all former associates who indicated their willingness to participate. The NSF gave us the names of all their former fellows, whom we ourselves then had to locate, chiefly by contacting the alumni offices of their colleges or graduate schools. Questionnaires were sent out to those former fellows who could be located. Repeated attempts were made if the first mailing did not result in a response. Of the former postdoctoral fellows who were contacted, the response rate was 60.6% for former NSF fellows (62.1% for men and 55.6% for women), and 82.1% for former NRC Associates (81.7% for men and 82.9% for women).

In addition, face-to-face open-ended interviews were conducted with 200 former postdoctoral fellows; and these interviews form the basis for this dissertation. The interviewees include 108 women and 92 men who had been National Science Foundation (NSF) Postdoctoral Fellows, National Research Council (NRC) Postdoctoral Associates, Bunting Postdoctoral Fellows in the sciences or engineering, or Bunting finalists in these fields. Different considerations entered the selection of interviewees. On the one hand, we attempted to contact as many former fellows as possible within a limited budget. On the other hand, we wanted to match men and women in the sample by type of current position, academic age, and academic fields. The resulting sample is a trade-off: a larger sample that is not perfectly, but at least to a substantial degree, matched.

Of the participants, 58.0% (men: 57.6%; women: 58.3%) currently work in academic science, 30.5% (men: 31.5%; women: 29.6%) work as scientists outside of academe, and 11.5% (men: 10.9%; women 12.0%) have left research science. The mean year of receiving the doctorate was 1974 for the men and 1971 for the women. In terms of fields, more than a third (37.5%) of the respondents are in the biological sciences (men: 38.0%; women 37.0%). Men are overrepresented in the physical sciences, mathematics, and engineering (men: 50.0%; women: 32.4%) and, conversely, underrepresented in the social sciences (men: 12.0%; women: 30.6%). As to geographical location, the great number of interviews (68) conducted in New England reflects both a geographical concentration of former postdoctoral fellows in northeastern states and easy accessibility from the Massachusetts-based Project Access. In New York, 13 interviews were conducted, and 47 took place in the Mid-Atlantic region. Another geographical focus was the West Coast region, with 41 interviewees. The remaining interviewees lived in the Midwest (18), the South (7) and the Mountain States (6).

3.2.3 Instrument

An interview schedule was developed and used to interview 200 former fellows. The instrument consisted of open-ended questions pertaining to their career path and personal life. The interview schedule was piloted with five Bunting Postdoctoral Fellows at the Bunting Institute at Harvard University. Based on the pilot data, the interview schedule was revised and refined. The final version of the interviewing schedule had two parts. The first part consisted of asking participants to narrate their whole career path in their own words without any probing or interruptions. The second part consisted of several sets of semi-structured, open-ended thematic questions: career aspirations, gender issues, reflections on science and own career in science, and science career and other aspects of life. Within the last set of thematic questions, two questions concerned the good life ("Can you describe your idea of a good life?" and "How about a bad life?").

3.2.4 Procedures, Transcription, and Coding

An experienced research assistant traveled all over the United States to conduct the 200 face-to-face interviews, typically lasting between two and three hours each. The interviews were recorded on audio tape. The 200 interviews took a period of approximately 15 months to complete. Because of monetary constraints and the potential problems of different interviewing styles if using several interviewers, only one research assistant was hired to conduct all 200 interviews. Maintaining consistency was important to the quality of the interviews.

The 200 interviews were then transcribed verbatim. Part of the transcriptions were done by several research assistants, who were trained by the Project Director and were provided written detailed instructions. The other part of the transcription were done by a company who specialized in transcriptions. They were also provided with written detailed instructions on what was required in the transcriptions.

As a graduate research assistant with Project Access, I thoroughly analyzed a random subset of 24 interview transcripts (twelve males and twelve females) to distill themes of typical responses and to develop a coding scheme. Thus, the categories in the coding scheme emerged from the interviews themselves, rather than being superimposed on them from some prior information or theory. The process consisted of repeated careful readings of the transcripts. During the readings, I noted potential content categories. In a

continuous process, these categories were changed and refined in the light of additional reading and insight.

This inductive procedure has the benefit that it provides a counterpoint to the theory-based structural scoring of developmental good-life stages. Whereas the developmental scoring (detailed in the Appendix) focusses on the structure, rather than on the content, of the particular responses, the inductive content-themes provide a summary--free of preconceived theoretical notions--of what the participants actually said.

For the question of "Can you describe your idea of a good life?", the following themes emerged: Family/Friends/Good Social Relationships, Altruism, Intrinsic Work Satisfaction, Health, Material Security, Social Recognition/Fame, Personal Growth, Balancing All Parts of Life, Hobbies and Activities, Education/Pursuit of Knowledge, No Oppression of any Kind, Other, and Don't Know. Characteristic examples for each are listed below.

For the code Family/Friends/Good Social Relationships, examples would be "To have a loving and fulfilling home life."; "Having the opportunities to have a family and participate in it fully"; "Trying to make every interaction with other people a positive one."; and "Having some very strong personal relationships. Supportive family is important. Real and permanent friends are important."

The code Altruism basically means making a contribution to the greater social good. Some of the examples are "Make some difference to mankind as a whole, so that after you die there's something left behind. It could be children, younger students that you have educated, it could be some scientific knowledge that you've helped uncovered."; "Offer something to the community."; "Being able to have an impact on others in the universe."; "To fit usefully into the society that you live in"; and "Doing no harm".

Intrinsic Work Satisfaction means having interesting work, intellectual stimulation, etc. Some of the examples from the coding manual are "To be intellectually challenged"; "Good achievements in my research field"; "Nice career"; "Having something to think about that matters to you enough to use your mental energy."; and "Sense of creativity because that's something that can be applied to both science, your discovering things, creating things, writing and those parts---sort of the creative aspects of science that--that I enjoy most, teaching is important to me."

The code Health basically means good health, for instance, "To be able to have good health."

The code Material Security pertains to money and basic survival needs. Some of the examples would be "That's the foundation to have a good life, you need some relative freedom from insecurity, financial insecurity, you need a good place for you to live, you can't feel intimated."; "To have the personal and financial resources to solve the problems that you will come up against"; and "Travel".

An example of the code Social Recognition/Fame is "respect". Personal Growth pertains to self-actualization, personal happiness, etc.

To be given the code Don't Know, a participant would have to say something to the effect of "I haven't figured that out yet."

The bad-life themes were basically the mirror images of the good-life themes. For instance, No family/Friends/Good Social Relationships would pertain to the absence of such relationships, and so on.

Then, all interview transcripts were coded according to the coding scheme.

3.2.5 Interrater Reliability

Five coders, who were trained by me, participated in the coding. After each coder had independently coded a random selection of ten transcripts, we all met and discussed the difficult cases, i.e., those in which the coders disagreed. On the basis of clarified and refined coding guidelines, a new trial coding of ten different transcripts, again randomly selected, was conducted. In this trial, the average proportion of agreement between the coders was 93.7%; Cohen's kappa was .698.

3.3 Design

3.3.1 Dependent Variables:

Good-life score

The relevant interview answers were scored according to the method described in the Appendix. The scoring method is a formalized version of Armon's (1984) good life scoring manual. I was trained in structural scoring by Michael Commons, the creator of this method, and then scored the interviews. Reliability of the scoring was established with Michael Commons (96.7% of agreement on 60 interviews).

Good-life themes

The responses have been coded according to a coding scheme that I had designed as described above.

3.3.2 Independent Variables:

Gender

Gender was coded as a dichotomous variable; males were assigned the value 1, and females the value 2.

Success

This measure is designed to capture the prevailing notions of professional success for academic scientists. It is based on three variables: publication productivity, academic rank (adjusted for academic age), and prestige of institutional affiliation. These three variables have been extensively used as success indicators in the sociology of science, and scientists themselves also commonly use them when evaluating their own or their peers' standing.

According to Merton (1973), the core mission of science

is to advance certified knowledge. Scientists, then, are successful to the extent that they contribute to the advancement of knowledge. Because new scientific knowledge is commonly communicated through articles and books, publication productivity is often considered a measure of scientific success. Of course, this is only an indirect measure because the quantity of publications might not always translate into the quality of a scientist's contributions. In addition, academic rank and the prestige of institutional affiliation more directly measure scientists' professional success than their scientific success. Whereas the widely-accepted meritocratic doctrine in science demands that the professional rewards go to scientifically successful persons, there may be cases where "successful" scientists--who contributed break-through discoveries--are denied the appropriate professional rewards. Conversely, some individuals at the top of the professional hierarchy may lack success as scientists. Although the composite measure does not measure "true" (scientific) success in the Mertonian sense, its components are commonly used as indicators of success because there is no feasible index that would directly measure scientific success.

Publication productivity is the average annual publication output. The academic rank measure is the residual of a regression of a rank variable (1 = non-faculty position through 4 = full professor) on years since doctorate. The prestige of institutional affiliation is indicated through a dichotomous variable that indicates whether the scientist is affiliated with an institution that was ranked among the top 15% in a large opinion poll among American academics or not. The composite success score is the first principal component of the three variables, i.e. a weighted average.

Socio-economic background

Educational level is commonly considered an important ingredient of socio-economic class and will here be used as an indicator of the subjects' socio-economic background. The educational level of the respondents' mothers and fathers was measured on a nine-point scale that ranged from "did not complete high school education" to "received doctorate." Although this scale is, strictly speaking, an ordinal scale, it is treated as an interval scale to enable averaging between fathers' and mothers' educational level. The measure of socio-economic background is the average of mother's and father's educational level.

Family support

Subjects were asked "Have there been others who help you deal with the obstacles you encountered--mentors, colleagues, family members." In a family support dichotomous variable, those who mentioned members of their family will be considered as acknowledging a high level of family support. Those did not mention any family members will be included in the group with low family support.

Marital status

This is a dichotomous variable distinguishing between those who are married and those who are not.

Parenthood

This is a dichotomous variable distinguishing between those who are parents and those who are not.

3.4 Data Analysis

To analyze the relationships between individual good-life themes and gender and career outcomes, Likelihood-Ratio-Chi-Square statistics were used for the appropriate two-by-two contingency tables (e.g., male/female x did/did not [mention particular theme]). An exception was the academic success measure; because this was a continuous variable, correlations were used.

Factor analysis was employed to interpret patterns of relationships among individual good-life variables (each indicating the presence or absence of the respective theme) (Afifi & Clark, 1984). First, the principal components of the original variables were calculated (principal components are linear combinations of the original variables; and they are uncorrelated with each other). Then, to transform the principal components into factors, each principal component was divided by its standard deviation. For each factor, the factor loadings indicate the correlations of the original (standardized) variables with the factor, or, put differently, the standardized regression coefficients for predicting the variables from the factor.

To improve the ease of interpretation, the resulting factors were orthogonally rotated according to the varimax method. Such a rotation does not alter any statistical properties because the rotated factors are still independent (orthogonal). However, the rotation optimizes the loadings of the original variables in the sense that the loadings are either close to 0, to 1, or to -1. This makes it easier to determine which original variables load heavily on a factor, and which variables have negligible loadings.

In terms of developmental stage analysis, I again used Likelihood-Ratio-Chi-Square statistics and correlations where appropriate. For the multivariate stage analysis, logistic regression was used, because the dependent variable (developmental stage) turned out to have only two values (stage 4 and stage 5).

CHAPTER 4
RESULTS

This chapter, which presents the results of this study, is organized in the following parts. First, I describe the thematic content analysis, with particular attention to gender differences and differences according to professional outcome variables. In other words, this section presents the "surface" of the participants' good-life notions.

Second, I turn to the "structure" of the good-life notions,

i.e., to the stage analysis of the good-life narratives, directly addressing the afore-mentioned hypotheses.

Finally, I explore the contrasts between the "high-stage" and "low-stage" groups of subjects. Given our almost complete ignorance about the correlates of good-life stage, such an exploratory analysis might be useful for further research.

4.1 Content Analysis

For the open-ended narratives in response to the interview questions "Can you describe your idea of a good life?" and "How about a bad life?" I developed a coding scheme, based on a subset of 24 randomly selected interview transcripts, that was then used to score all interviews. As mentioned above, the coding scheme tried to identify common issues and themes that emerged from the varied and idiosyncratic responses. The purpose of this heuristic approach was to get an idea of the content of the responses--of the topics or themes the respondents mentioned as ingredients of the good life and the bad life.

4.1.1 Content of Good-Life Responses and Gender

The following table (Table 4.1) presents the results of the content-scoring by gender. It shows the frequencies (in percent) among our male and female participants of each of the content categories described earlier (pp. 93-95).

Table 4.1: Content themes of good-life responses

-	Men	Women	
Family/Relationships	63.0	70.5	
Intrinsic work satisfaction	62.0	59.0	
Material security	44.6	35.2	
Hobbies and activities	15.2	21.9	
Balancing all parts of life	12.0	21.0	&
Altruism	9.8	20.0	*
Personal growth	15.2	13.3	
Health	15.2	7.6	&
Education/knowledge	5.4	9.5	
Recognition	3.3	1.9	
No oppression	2.2	5.7	
Other	27.2	27.6	
Don't know	1.1	1.0	
N	92	105	

Notes: Percentages of men and women who mentioned a particular theme. Last column indicates significant chi-square-tests: ***: p<.001; **: p<.01; *: p<.05; &: p<.10.

On the whole, the women and men scientists had quite similar ideas about the good life. The theme that both genders most frequently mentioned was that of family, friends, or good social relationships (men: 63.0%; women: 70.5%). A close second was the reference to intrinsic work satisfaction (men: 62.0%; women 59.0%). The third major theme was that of material security (men: 44.6%; women: 35.2%). The gender differences on all these topics were not significant.

Gender differences became more pronounced in the less frequent response categories. Women were twice as likely as men to mention the topic of altruism (men: 9.8%; women: 20.0%; Likelihood-Ratio-Chi-Square (LRCS) = 4.08; p = .043), and they also referred to the notion of balancing all parts of life more often (men: 12.0; women: 21.0%; LRCS = 2.90; p = .088). Men, by contrast, tended to mention good health more often than women did (men: 15.2%; women: 7.6%; LRCS = 2.87; p = .090).

Similar proportions of men and women gave responses in the areas of hobbies and activities (men: 15.2%; women: 21.9%), personal growth (men: 15.2%; women: 13.3%), the absence of oppression (men: 2.2%; women: 5.7%), and social recognition or fame (men: 3.3%; women: 1.9%).

The fairly high proportion of responses that fell in none of these categories (men: 27.2%; women: 27.6%) indicated that the responses contained highly idiosyncratic elements.

The strong emphasis on family and good social relationships seems not surprising. My respondents, female as well as male, probably share this key notion of the good life with a great number of their contemporaries. The emphasis on intrinsic work satisfaction, on the contrary, might be stronger among my group of scientists than among the general population. Many of my respondents stressed how central it is for them to do work that they consider meaningful and exciting, whereas people with routine jobs might be more prone to view their jobs as a necessary means to get their basic needs met, such as paying rent and bills. For these people, issues of material security may figure more prominently.

The gender difference in the reference to altruism may foreshadow a higher average developmental stage in good-life notions for women. It may at this point be taken as an encouraging sign that my initial hypothesis will be supported. The fact that women were more likely than men to talk about balancing all parts of life might illustrate the current societal pattern of the gender division of labor. Although women have now access to all sorts of careers, the burdens of childrearing and the household still predominantly rest with the women (Hochschild, 1989). A great number of women may thus experience the widened range of opportunities as a juggling act between career and family--hence the women respondents' emphasis on the issue of balancing all aspects of life. However, contrary to what one might expect, marital status was not significantly related to mentioning balancing all parts of one's life as an aspect of the good life (LRCS = .032; p = .857), both for women (LRCS = .231; p = .631) and for men (LRCS = 4.25; p = .039). The tension between career

and family thus appeared to be at most one particular expression of a broader balancing problem. Other potentially conflicting aspects of their lives that both single and married women may want to balance might include work and leisure, work and social relationships, and career and involvement in the community. Interestingly, the relationship between mentioning the balancing aspect and marital status was somewhat stronger, though still non-significant, for the men than for the women. For men, thus, the notion of balance might contain a stronger reference to the career-family-tension.

Men's greater concern for health was somewhat surprising. One would expect that health issues are age-related, i.e., become more prominent as age progresses. Age appeared to correlate weakly with mentioning good health as part of the good life, although the correlation was not significant ($r = .12$; $p = .1081$), similarly for men ($r = .17$; $p = .1021$) and for women ($r = .13$; $p = .1892$). Besides, age would not explain the gender difference in concern for health, because the men and women interviewees were of similar age, on the average. Perhaps, considering the greater longevity of women, one might speculate that men's health somehow deteriorates faster than women's health, but there are, of course, all sorts of possible explanations for men's increased health consciousness, and this topic is clearly outside the scope of this study.

The following table (Table 4.2) presents the results from the question about the bad life.

Table 4.2: Content Themes of Bad-life Responses

	Men	Women	
No intrinsic work satisfaction	53.3	46.6	
No family/Relationships	40.0	43.7	
No material security	35.6	31.1	
Poor health	15.6	16.5	
Oppression	11.1	17.5	
No personal growth	12.2	12.6	
No altruism	6.7	17.5	*
No balance of parts of life	3.3	9.7	*
No education/knowledge	1.1	10.7	**
No hobbies and activities	3.3	4.9	
No recognition	2.2	2.9	
Other	32.2	37.9	
Don't know	1.1	1.0	
N	90	103	

Notes: Percentages of men and women who mentioned a particular theme. Last column indicates significant chi-square-tests: ***: p<.001; **: p<.01; *: p<.05; &: p<.10.

In general, the responses mirrored those about the good life. However, one might note that a boring job was the modal idea of the bad life (men: 53.3%; women: 46.6%), surpassing the notion of an unsatisfactory family or social life (men: 40.0%; women: 43.7%)--a reversal compared with the good-life responses. Women's greater emphasis on altruism (men: 6.7%; women 17.5%; LRCS = 5.41; $p = .020$) and on balance between all parts of life (men: 3.3%; women: 9.7%; LRCS = 3.30; $p = .069$) re-occurred. An additional gender difference was found in the area of education and pursuit of knowledge, which hardly any man, but ten percent of the women mentioned (men: 1.1%; women 10.7%; LRCS = 8.930; $p = .003$). Apparently, the men took their education and scientific pursuits more for granted than the women did. This again may reflect societal patterns of the gender division of labor. There is much less of a tradition for women than for men to be educated and to pursue scientific interests, so that the lack thereof might have seemed more noteworthy to women.

4.1.2 Content Factors

Turning now from individual good-life categories to the interrelationships between the categories, I conducted a factor analysis that might be a useful heuristic tool to reveal such patterns. From all content categories, I deleted three categories that were mentioned very infrequently (social recognition, education, and no oppression) as well as the "other" category. The remaining eight variables (indicating the presence or absence of the respective responses) were entered into the factor analysis, which included an orthogonal varimax factor rotation. After inspecting the scree plot and solutions with various numbers of factors, a three-factor solution appeared informative. Table 4.3 displays the loadings of the rotated factors.

Table 4.3: Good-life Factors

	Orthogonally Rotated Factor Pattern		
	Factor 1	Factor 2	Factor 3
Intrinsic work satisfaction	0.77546	-0.05548	0.10700
Family/relationships	0.72031	0.19519	-0.01151
Material security	0.02327	0.71524	0.11905
Health	0.10902	0.69160	0.00369
Balancing all parts of life	0.09132	-0.34307	0.72139
Hobbies and activities	0.14241	0.19335	0.46610
Altruism	-0.29559	-0.05902	-0.31061
Personal growth	0.35725	-0.31030	-0.62435

The first factor is mainly an average of the two most

popular categories (family/social relationships and work satisfaction)--with a minor loading by the personal growth issue.

The second factor combines concerns of health and of material security; minor negative loadings are contributed by the issues of balancing all parts of life and on personal growth. This factor appears to signify a preoccupation with the lower stages in Maslow's hierarchy (health and material security) and, to a lesser extent, the absence of issues of the higher stages (balancing one's life and personal growth).

The third factor is bipolar; it distinguishes between balancing one's life and hobbies on the one hand, and altruism and personal growth on the other hand. Whereas balancing one's life and personal growth both loaded negatively on the second factor, they are on opposite sides on the third factor. Within the framework of Maslow's theory, the third factor appears to distinguish two stages among the higher stages--a lower one (balancing one's life and hobbies)--and a higher one (altruism and personal growth), whereas the second factor had distinguished both these higher stages from the more basic stages of health and material security.

The factors emerging from the bad-life themes were similar to those of the good-life themes (Table 4.4). The first factor again represented the absence of good relationships and work satisfaction, and, in addition, the lack of hobbies and other activities.

The second factor again combined the concerns for health and material security, whereas the absence of altruism loaded negatively on this factor. Thus, the second factor distinguished between low-level and high-level issues within a Maslowian framework.

The third factor polarized concerns for balance in one's life and for personal growth.

Table 4.4: Bad-life Factors

	Orthogonally Rotated Factor Pattern		
	Factor 1	Factor 2	Factor 3
No family/relationships	0.74322	0.18744	-0.13911
No intrinsic work satisfaction	0.64987	-0.25204	0.03307
No hobbies or activities	0.48544	-0.04715	0.38782
Poor health	-0.06456	0.74387	-0.03466
No material security	0.40327	0.64623	-0.03120
No altruism	0.08480	-0.31895	-0.06496
No balance of parts of life	0.05991	0.00789	0.77379
No personal growth	0.06302	-0.05578	-0.60729

4.1.3 Content Factors and Gender

Among the three good-life factors, only the second one showed a noticeable gender difference (Table 4.5). There, the men's average was higher than the women's average (men: 0.14; women: -0.12; p = .0647). This reflected men's stronger preoccupation with the basic ingredients of the good life--health and material security. Among the three bad-life factors, I found no gender differences.

Table 4.5: Content Factors and Gender

	Men	Women	
Good-life factor 1	0.03	-0.03	
Good-life factor 2	0.14	-0.12	&
Good-life factor 3	-0.09	0.08	
Bad-life factor 1	-0.00	0.00	
Bad-life factor 2	0.04	-0.04	
Bad-life factor 3	-0.08	0.07	

Notes: Means of factor scores. Last column indicates significant t-tests (two-tailed): ***: p<.001; **: p<.01; *: p<.05; &: p<.10.

4.1.4 Content and Career Success

My composite measure of academic success significantly correlated only with one content category. Successful academic scientists were more likely to mention hobbies and activities as part of the good life (r = .32; p = .0019). Those who had left science showed greater concern for the health aspect of the good life than the active scientists did (LRCS = 4.65; p = .031) (Table 4.6). More pronounced differences were found between the academic scientists and the respondents in non-academic jobs (Table 4.6). The academic scientists were less likely to mention health (LRCS = 4.42; p = .036) and material security (LRCS = 6.63; p = .010), and more likely to mention personal growth (LRCS = 6.44; p = .011). Perhaps, the difference on material security reflects the exceptionally high degree of job security in the tenured ranks of academe. Finally, fewer academic scientists referred to hobbies and activities (LRCS = 5.22; p = .022).

In addition, I compared the academic scientists with the nonacademic scientists, that is, I excluded the group of people who had left research science from these comparisons. Because the group of science drop-outs is small, however, the results of these comparisons generally mirrored those of the comparisons between academic scientists and all others. The few exceptions were: The health issue became non-significant. By contrast, the theme of education/knowledge became significant, and the theme of recognition surpassed the .05 significance level. More academic scientists than non-academic scientists considered the attainment of education and knowledge a part of the good life (9.7% vs. 0.6%; LRCS=4.99; p=.026), whereas fewer

mentioned social recognition (0.9% vs. 6.6%; LRCS=4.38; p=.036). Note that, owing to the small numbers of people mentioning these themes, the significance tests may not be valid.

Table 4.6: Good-life Content Themes and Career Outcomes

	Dropout		Academic Science		
	yes	no	yes	no	
Family/ Relationships	65.2	67.2	69.0	64.3	
Intrinsic work satisfaction	52.2	61.5	62.8	57.1	
Material security	39.1	39.7	31.9	50.0*	
Altruism	26.1	13.8	15.9	14.3	
Health	26.1	9.2*	7.1	16.7*	
Hobbies and activities	26.1	17.8	13.3	26.2*	
Balancing all parts of life	13.0	17.2	17.7	15.5	
Personal growth	4.4	15.5	19.5	7.1*	
Education/ knowledge	13.0	6.9	9.7	4.8	
No oppression	4.4	4.0	5.3	2.4	
Recognition	0.0	2.9	0.9	4.8	&
Other	26.1	27.6	24.8	31.0	
Don't know	4.4	0.6	0.9	1.2	
N	23	174	113	84	

Notes: Percentages of men and women who mentioned a particular theme. Last column indicates significant chi-square-tests: ***: p<.001; **: p<.01; *: p<.05; &: p<.10.

If we take the result that fewer academic scientists than people in non-academic jobs mentioned hobbies and activities together with the finding that successful academic scientists were more likely than less successful academic scientists to refer to this good-life theme, it appears that less successful academic scientists were the least likely to mention hobbies and activities as part of the good life, whereas both respondents outside of academe and successful academics had higher probabilities of doing so. This may point to a particularly singleminded focus on their work--or on "serious" pursuits, such as personal growth--among undistinguished academic scientists. Those who value other activities besides their scientific work may tend to either leave academic science for less time- and labor-intensive positions or to be so good or efficient at their academic work that they can afford a wider perspective.

Academic success did not correlate with any of the bad-life content themes, and neither did the other career outcomes (Table 4.7). The only exception was a preoccupation of people who had left science with bad health, which mirrored the findings for the good-life themes.

Table 4.7:
Bad-life Content Themes and Career Outcomes

	Dropout		Academic science		
	yes	no	yes	no	
No family /Relationships	56.5	40.0	38.2	47.0	
No intrinsic work satisfact.	39.1	51.2	52.7	45.8	
No material security	43.5	31.8	30.0	37.4	
No altruism	13.0	12.4	11.8	13.3	
No health	30.4	14.1	&	15.5	16.9
No hobbies and activities	0.0	4.7	4.6	3.6	
No balancing parts of life	4.4	7.1	7.3	6.0	
No personal growth	17.4	11.8	12.7	12.1	
No education/ knowledge	4.4	6.5	7.3	4.8	
Oppression	21.7	13.5	10.9	19.3	
No recognition	0.0	2.9	1.8	3.6	
Other	34.8	35.3	36.4	33.7	
Don't know	0.0	1.2	0.9	1.2	
N	23	170	110	83	

Notes: Percentages of men and women who mentioned a particular theme. Last column indicates significant chi-square-tests: ***: p<.001; **: p<.01; *: p<.05; &: p<.10.

4.1.5 Content Factors and Career Success

Successful academic scientists had higher scores on the third good-life factor than less successful ones did (r = .21; p = .0406). Compared with their less distinguished cohorts, they were more interested in balancing their lives and in hobbies and other activities and less interested in altruism and personal growth. This reflected the noted emphasis of successful scientists on their hobbies and other activities.

Those who had left science scored marginally higher than the active scientists on the second factor--reflecting health and security concerns--(r = .14; p = .0579), whereas those currently in academe scored lower than the interviewees outside of academe (r = -.25; p = .0005). Academics also had a marginally lower average than non-academics on the third factor (r = -.13; p = .0693), indicating a stronger interest in altruism and personal growth and a weaker interest in hobbies and in balancing their lives. This interest seemed to be particularly strong among the undistinguished academic

scientists, because, as noted above, the successful academic scientists showed less of such an inclination.

In terms of the bad life, the interviewees who had left science again scored higher on the second factor (r = .16; p = .0226), which signified health and security issues, and this was the only difference.

4.2 Developmental Stage Analysis

Among the 197 interviewees whose responses to the open-ended questions about their ideas of the good life and their ideas of the bad life were analyzed as to developmental stage, none scored lower than stage 4, and almost one fifth achieved stage 5, the highest possible stage in the developmental hierarchy (Table 4.8). Compared with the general population, in which all stages are present and the most common adult stages are 3, 3/4 and 4, the range of my respondents' good-life stages was notably restricted: My sample of scientists occupied the very top of the developmental hierarchy.

Table 4.8: Good-life Stage by Gender and Career Outcomes

Gender	Dropout		Academic science			
	men	women	yes	no	yes	no
Stage 4	83.7	80.0	86.4	81.1	81.6	81.9
Stage 5	16.3	20.0	13.6	18.9	18.4	18.1
N	92	105	22	175	114	83

Notes: Percentages of interviewees at good-life stage.

My first hypothesis expected women, as a group, to score higher than the men. Although women were slightly more likely than men to hold stage 5 views (20.0% vs. 16.3%), this small difference was far from significant (Likelihood-Ratio-Chi-Square = .451; p = .502). As indicated, the rest of the respondents scored at Stage 4.

My second hypothesis posited that success in the academic profession would be negatively correlated with good-life stage. Contrary to this hypothesis, my composite success measure did not correlate with good-life stage (r = .02; p = .8203). Moreover, I could not detect a curvilinear relationship (p = .9827 for quadratic term). Good-life stage was also not connected with dropping out of or staying in science. Of those who had left science, 13.6% scored at stage 5, whereas among the active scientists, 18.9% did so (LRCS = .380; p = .537), whereas I had expected a difference in the opposite direction. Of the academic scientists, 18.4% were stage 5 reasoners in the good-life domain--a proportion that was virtually identical to that among the interviewees not working in academe (18.1%; LRCS = .004; p = .950).

Finally, whereas my third hypothesis expected an interaction between gender and academic success, there was no such interaction (p = .9667) in logistic regressions of stage. Likewise, the interactions between gender and dropping out (p = .7881) and between gender and academic science (p = .5921) were non-significant.

The following table presents tests of the three main hypotheses in multivariate logistic regressions, which also include the above-mentioned background factors (Table 4.9).

Table 4.9:
Multivariate Logistic Regressions of Good-life Stage

	1	2	3	4	5
Social background	15	.05	.15	.01	.01
Birth order	.11	-.33	.11	-.25	-.26
	.39	.13	.35	-.04	-.08
Marital status	-.65	-.21	-.60	-.03	-.04
Parental status	-.16	.28	-.17	.20	.20
Academic success		.05		.12	-.05
Gender			.22	.99	.99
Acad. success* gender					.12
N	172	82	172	82	82
Pseudo-R^2	.0311	.0080	.0329	.0407	.0414

Note: No significant predictors.
Pseudo-R^2: The reduction in chi-square from the "baseline" model containing only the intercept to the full model, divided by the baseline model chi-square.

Controlling for the background factors and for academic success, gender becomes stronger as a predictor, almost reaching the .10 level (Table 4.9, column 4; p = .1213). The gender difference in developmental stage that was negligible in a simple comparison of the genders, thus, seemed to become more pronounced once a number of other factors were controlled. Nonetheless, gender was still non-significant. In conclusion, the very low pseudo-R^2s convey the key message of these multiple logistic regressions: Neither the background variables, nor the hypothesized predictors, were found to predict good-life stage in the top range.

4.3 Exploration: Stage and Interview Variables

In an exploratory mode, I correlated good-life stage with numerous content codes of my lengthy open-ended interviews. In the following, I report some correlations at the .05 significance level. Given that I looked for these correlations a posteriori, the few weak correlations I found cannot be considered statistically significant in a strict sense. It is well-known that among a large number of correlations within a sample, a few will turn out, by pure chance, to be significant--even without corresponding correlations in the population.

However, because at the current state of research, I know

next to nothing about the predictors or correlates of good-life stage, the correlations I report in the following may be useful as potential starting points for future research.

Interviewees who displayed good-life reasoning at stage 5 were more likely than those who reasoned at stage 4:

--- to have had career aspirations intrinsic to science when they had started out in science ($r = .15$; $p = .0399$)

--- to mention good work habits among the internal factors that made them well-suited to science careers ($r = .17$; $p = .0166$)

--- to mention the societal expectations for men to work and succeed among potential career obstacles that men, but not women, face ($r = .15$; $p = .0342$)

--- to mention biological or personality traits as sources of their being resilient ($r = .126$; $p = .0298$), but less likely to mention biological or personality traits as the sources of their being hard-working and energetic ($r = -.16.$; $p = .0256$)

--- to say that their gender influenced their professional conduct in science ($r = .16$; $p = .0424$)

--- to say that women scientists in general were less aggressive or competitive than men scientists ($r = .15$; $p = .0350$)

--- to say that in order to attract more people into science, one would have to intervene early in their lives ($r = .17$; $p = .0235$), and that in order to attract more women into science, one would have to change the image and values of science ($r = .16$; $p = .0278$).

--- to mention bad analysis ($r = .18$; $p = .0149$) and bad theory ($r = .17$; $p = .0172$) among the characteristics of bad science.

--- to experience tension between the various roles in their lives ($r = .19$; $p = .0102$).

They were less likely to mention thoroughness or comprehensiveness among the main characteristics of good scientific work ($r = -.18$; $p = .0119$), but more likely to mention its practical and social applications ($r = .15$; $p = .0385$).

Among those who ever contemplated abandoning science, the stage 5 reasoners were less likely to do so because of the lack of a job ($r = -.21$; $p = .0456$).

Among the small group of unmarried interviewees, those at good-life stage 5 were more likely to say that their being single had a negative impact on their career ($r = .50$; $p = .0009$), and also more likely to say that career demands had not played any part in their decision not to marry ($r = .22$; $p = .0490$).

CHAPTER 5
DISCUSSION

The most surprising finding from this study was probably the high developmental level of good-life reasoning among our scientists. None of the subjects scored below stage 4; and there were 36 stage-5 reasoners. This is an unusually large number of stage-5 subjects. Researchers typically have great problems finding stage-5 subjects, because they are so scarce. Armon (1984), for instance, had a total of three stage-5 subjects. Obviously, my subjects, whose prestigious fellowship awards probably indicate an elevated reasoning potential in the cognitive realm, applied high-level reasoning also in the realm of the good life. This finding challenges the stereotypical notion of the "nerd syndrome"--a domain-specific developmental imbalance of high cognitive abilities and only rudimentary abilities in other, more social domains. At least as far as good-life notions are concerned, these scientists appeared, if anything, more developed than the general population.

Because the developmental range of my sample was so restricted--I found only subjects at stages 4 and 5--those at stage 4 might subconsciously be labeled the group with "low" good-life notions. I should emphasize here again that these subjects held good-life notions of the second highest level. A stage 4 score might well have put them in the top group of more representative samples (where stage 5 reasoners would be extremely rare, if they were present at all).

Prima facie, all of my major hypotheses appear soundly rejected. However, on closer examination--especially when combining my results with those of prior research--, there is a significant result in the area of the gender hypothesis. By contrast, the other two hypotheses can indeed be considered strongly rejected. In the following, I will discuss these results in greater detail.

5.1 Good-Life Stage and Gender Among Scientists--Combining Prior and Present Research

Whereas I hypothesized that the women in my sample would receive higher good-life scores than the men, I found only a minuscule gender difference in the expected direction, which was far from even approaching significance ($p = .5056$). The correlation between good-life stage and gender was only .0477. However, I can compare this result with the result obtained in the Mensa study by Commons et al. (1989). Recall that, in the Mensa study, women had a lower average good-life score than the men did, but the gender difference did not quite reach the .05 significance level ($t = 1.90$). From the reported t-value and the reported sample size ($N = 79$), I could calculate the correlation between gender and good-life stage ($r = -.2116$) in the Mensa study. Each of the correlation coefficients was converted to a Fisher's z (for my study, $z = .050$; for the Mensa study, $z = -.224$). From these z's and the sample sizes, a z-value for the significance of the difference between the two correlations was obtained ($z = 2.03$). The associated p-value is .0424 two-tailed, and .0212 one-tailed. Thus, although none of the two correlations was significant by

itself, they differed significantly from each other. It seems probable that a similarly significant difference could have been found between my study and Armon's (1984) adult sample (in which the women scored significantly lower), and maybe even between my study and Armon's (1984) full sample (in which the women scored non-significantly lower). Unfortunately, however, Armon (1984) did not report the statistics necessary for performing a formal comparison.

In sum, whereas my results did not corroborate my original hypothesis, the comparison of my results with those of prior research suggests that the thinking that led to my hypothesis was not entirely misguided. Considering women's marginally lower average good-life scores in other populations, the fact that women ever so slightly outscored men among this group of elite scientists indicated that the situation might be different in science. The women did comparatively better among the scientists than in the other groups.

In a theoretical model of developmental hierarchies in general--and of the good life in particular--one might think of developmental stages as attracting points that exert a certain pull on people at lower developmental stages (a "progressive" pull, facilitating development) as well as a certain pull on people at that very stage (a "conservative" pull, keeping people at that stage). For men in our society, stage 4 may be the single most potent "attractor." A variety of mechanisms in our culture and social structure promotes the ideal image of the stage 4 man--successful, in control, self-confident, with a strong ego, etc.

For women in our society, by contrast, there may be several attractors. On the one hand, the image of the traditional stage 3 woman--existing for her family, with no ambitions of her own, etc.--still exerts a certain pull. And this may explain why women, in the general population, often score lower than the men, on the average. On the other hand, stage 4 may also be a weaker attractor for the women who have made it past stage 3--such as all our women scientists and probably most professional women, in general--and thus exert less of a conservative pull. Compared with their male cohorts, those women who have gone past stage 3 would thus be more likely to go also beyond stage 4 and settle into stage 5. This would be an admittedly speculative, but possible explanation of the finding referred to in this section.

5.2 Good-Life Stage and Success Among Scientists

The key result from my analyses in this area was that, among my select group of former postdoctoral fellows, the subsequent career path and career success was not related to the developmental stage of good-life notions. It seems probable that the severe range restriction of my sample may have made the subsequent differentiations meaningless in terms of the developmental stage of good-life notions. In a more representative sample, correlations between good-life scores and general measures of success might be higher.

Moreover, there were no significant interactions between gender and my success measures in predicting good-life stage.

5.3 Scientists and the Good Life--the "Nerd" Question

The scientists in this study were certainly no "nerds" as far as their notions of the good life go. In this respect, the popular "nerd" stereotype did not apply. If we assume that everybody in the sample is capable of stage 5 reasoning in their science--a reasonable assumption given our "elite" group of former postdoctoral fellows--their good-life scores indicate a slight developmental differential. But this is far from what the "nerd syndrome" hypothesis would have expected. Our participants average good-life score is still the highest ever found.

In explaining the absence of a severe developmental differential, one could speculate that stereotypical "nerds" may not have been likely to enter our sample in the first place. The award process of prestigious postdoctoral fellowships is strongly influenced by senior members of the academic and scientific communities, i.e., people very much like those in our sample--and possibly also similar to our participants in terms of highly developed ideas of the good life. Thus, stereotypical nerds may be "weeded out" before they could reach prominent positions in science.

Another possible explanation is to see the developmental differential of the nerd syndrome as a transitional and passing phenomenon that most scientists would overcome by their middle twenties. There is some anecdotal evidence for this. One of our male participants vividly described the process of his de-nerdification. Even if some of our participants had had good-life notions of a lower stage earlier on in their lives, they may have progressed since.

5.4 Structural Stage and Contents

Whereas gender was unrelated to the structural stage of good-life reasoning, gender differences existed in the good-life-themes. Similarly, career pattern and success were more strongly related to certain content themes and value criteria than to structural stage. This may carry an important message: Personal circumstances, career, socio-economic status, the gender division of labor in society, influence the types of things people mention when they are asked about their ideas of the good life. The influence of these kinds of factors is smaller, though, on the structure of people's thinking about the good life. The content of thinking is influenced more strongly than its structure.

This raises a more general point about the relationship between content and structure. The study approached scientists' good-life notions from two angles--a descriptive and a structural one, and there was little connection between content and structure. The only content category significantly correlated with stage was altruism (r=.31;

p=.0001). People who were scored at stage 5 were more likely than those at stage 4 to talk about altruism when asked about their idea of the good life. None of the other themes were related to stage. This indicates that developmental stage, as measured here, is relatively independent of specific content themes; it is a matter of how content themes are organized.

5.5 Clinical Implications

What are the clinical implications of this study? All of the participants were found to be highly developed in the area of good-life notions. Thus, in no case would a clinician have to worry about treating a "nerd syndrome." Nonetheless, a colleague who practices near MIT told me of numerous cases of clients, mostly MIT students, with a severe nerd syndrome. The elite scientists of this sample, by contrast, appear without exception well-adapted and might thus serve as role models of accomplished well-rounded scientists--not only in their scientific achievements, but also in their good-life notions. I expect that in therapy, stage-2 nerds would quickly progress to stage 4 of the good-life hierarchy, which appears to be the modal stage for scientists, once they learn to temper their zeal for scientific discovery with consideration for other people.

5.6 Problems and Limitations

In terms of methodology, this study applied the General Stage Scoring System to non-probed material, whereas the standard method in the field of adult development has been the probed interview--which was also employed by Armon (1984). This raises the question of whether using non-probed material is a valid approach. A critical argument could be that the absence of probes might consitute a bias toward lower scores. Shy or withdrawn people might not respond fully and thus not give their "best" (i.e., highest-scored) answer. On the other hand, however, structural scoring scores subjects' performance at the highest stage found and does not average stage performance in the way of the probing interview method. If anything, this would result in a positive bias. The key advantage of the non-probed material is that it entirely reflects the subject's construction of the good life. Thus, it is very likely that the non-probed responses are more representative of the respondents' notions of the good life than notions that would emerge in a drawn-out process.

Another issue is that the responses might have been influenced by a social desirability bias. The direction of this bias would have been toward altruistic notions and away from egotistical notions. However, the question about the good life came at the end of a long interview, and at this point, many participants may already have "lowered their guard," if /only out of fatigue. Moreover, any response bias is bound to be weaker in the open-ended approach than it would have been in a less open-ended approach. If, for instance, the participants had been asked to rate a number of given content categories as to their importance for the good life, few respondents might have declared a category, such as altruism, as irrelevant for their idea of the good life. By contrast, there might have been a negative bias against categories could be perceived as too egotistical. The open-ended response allowed the participants to discuss various aspects of the good life in a complex fashion. A number of participants, for instance, clearly distinguished and contrasted several different notions of the good life, which would not have emerged from rating schemes. In addition, structural scoring has the major advantage that it is not affected by a response bias in terms of mentioning topics of the good life that are considered socially desirable.

Because the situation of women in science has changed substantially in the past decades, it is likely that special cohort effects exist for women scientists. More specifically, the average developmental stage of women's good life notions may have risen dramatically, as it has become more "normal" for women to enter science careers. In the old days, the few women who ventured into science had to sacrifice all aspects of their life to science (they were usually unmarried). A generally hostile social environment may have forced many of these women to hold "nerd"-type notions of the good life.

Many limitations of the presented research arise from the fact that so little is yet known about developmental Good Life stages. Thus, any conclusions about the extent to which my results reflect wider societal patterns of developmental gender differences in good-life notions, or to which they are specific to scientists, must remain tentative.

At a more fundamental level, this research is based on a body of theories of adult development (notably, Kohlberg, 1981; Armon, 1984; Commons & Richards, 1984a,b) with certain basic premises. To those who reject these basic premises--that there is adult development, and that it occurs in well-defined stages--the whole approach in this study will of course make little sense. To those, however, who are sympathetic to the general notion of adult development, this dissertation hopes to represent a contribution to the understanding of adult development in the domain of the good life.

5.7 Implications for Future Research

I hope that this dissertation has made a small contribution to the nascent developmental psychology of good-life notions, in the methodological and in the substantive areas. But it is manifest that little is yet known about the antecedents and mechanisms of development in the domain of the good life, and there is a great amount of research still to be done.

Specifically, future research should probe the following questions: First, the absence of nerds in our sample poses the question whether they exist at all in the described form. To address this issue, research should focus on the group with the highest probability of containing nerds: criminal computer

hackers and virus creators.

Second, if the nerd syndrome can be found, the question is whether it is only transitional and fleeting. To address this issue, longitudinal studies of science students and scientists need to be conducted.

Third, the finding in this study that science seems particularly conducive to women's development in the good-life domain needs to be investigated more thoroughly in larger samples of scientists as well as of the general population. A question would be, for instance, whether an analogous result can be found among scientists in general (rather than among this sample of elite scientists) or among people in various other highly-skilled professions.

Fourth, a limitation in this study lies in the residual category of non-academic scientists. One problem is that the area of non-academic science is highly diverse. It is questionable to group together scientists working in different companies, let alone scientists in government-run research institutions and those in business and industry. Moreover, there is no sensible success measure for this diverse group. Whereas, for instance, publication productivity is a widely accepted standard for academic scientists, keeping research results secret is crucial for scientists working in the defense area. Further research should at least distinguish among several sub-categories of non-academic scientists.

In conclusion, as the sociologists who have studied values and value change point out, people's ideas about the good life are an important resource in our society--influencing its cohesion and stability. It therefore seems important and useful to know more about these ideas in a systematic manner.

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ABSTRACT

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